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PROCEEDINGS

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National Integrated Pest Management Forum
June 17, 1992

MR. JOHNSON: Good afternoon, everybody. We would like to get started. We are having some additional chairs brought in, so I would like to get started.

Good afternoon and welcome to the National Integrated Pest Management Forum. I am Steve Johnson, director of the Field Operations Division of EPA's Office of Pesticide Programs and co-chair of the Forum. My co-chair from the U.S. Department of Agriculture, responsible for helping me bring this Forum together, is Dr. Richard Parry, Deputy Assistant Administrator for Cooperative Interactions at the USDA's Agricultural Research Service.

Dick and I look forward to working with you these next 3 days. We invited you to the Forum to address the agenda for agriculture and the environment in the 21st century. We have no doubt that we will conclude here on Friday with a demanding set of challenges for all of us.

The past few years have brought about a widespread realization of the need for change in pest management. You are here to help engineer this change. This Forum includes leaders from all groups interested in IPM, from growers and farmers to representatives in the U.S. Congress. We will be hearing from the EPA Administrator, William Reilly, as well as the USDA Deputy Secretary, Ann Veneman.

We will also be hearing from the representatives of other stakeholders in integrated pest management. This include Kathleen Merrigan, a staff member on Senator Patrick Leahy's Senate Agriculture, Nutrition, and Forestry Committee; Bob Helgesen, Dean of the College of Food and Natural Resources at the University of Massachusetts; Fred Finney, owner of Melrose Orchard and Moreland Fruit Farm; Bill Kirk, vice president and general manager of DuPont Agrichemical Products; Herb Baum, president of Campbell's North and South America; and Maureen Hinkle, director of agricultural policy at the National Audubon Society.

Each of our speakers today will be preceded by one of their colleagues who will more fully elaborate on the extraordinary range of experience and accomplishments that the speakers bring to the Forum.

This Forum is the result of the efforts of many who have been working during the past 2 years to portray the current status of IPM and begin the analysis of constraints to the adoption of integrated pest management, and the options for resolving these constraints to open the way for broad-scale adoption of integrated pest management in the future.

Teams representing a cross section of the agricultural community have researched and prepared a report that addresses the current status of IPM and provides a blueprint for the future in four commodity areas of cotton, fruit, vegetables, and corn/soybeans. The report of these teams are compiled in the excellent publication just released entitled "Food, Crop Pests, and the Environment". The commodity team co-chairs will briefly describe their efforts and reports tomorrow morning.

A major contribution of the four commodity teams was the identification of many constraints for the widespread adoption of IPM. Four constraint resolution teams were formed to continue the identification of constraints to IPM adoption and to identify possible options for constraint resolution. Each of these teams prepared a discussion paper that will

be used as the basis for our discussions tomorrow at the constraint resolution team breakout sessions.

The intent of the Forum is to join together in charting the future of integrated pest management. Tomorrow each of you will be participating in the constraint resolution breakout sessions. We are charging you to bring your perspectives, experience, and goals to this group looking toward the common future of promoting integrated pest management. You are here to analyze and build upon each other's efforts and ideas so that we can leave this Forum with an agenda for action for IPM issues in the 1990s.

In addition to your efforts, the speakers today and on Friday will provide exciting information that will generate the enthusiasm and perhaps the catalyst that we need in our cooperative efforts toward the wide-scale adoption of IPM.

Now I would like to introduce EPA Administrator William K. Reilly, who returned yesterday from the Rio Conference. The nations in Rio made progress on the very issue that we're here to discuss and address at the Forum.

Introducing Mr. Reilly is certainly an honor for me, especially at this time following his difficult and starring role at the Rio Conference. I know I am speaking for all of you in welcoming home and thanking him for the distinction and perspective with which he represented the United States and the environment at the Rio proceedings. He is a source of inspiration to all of us.

Please join me in welcoming EPA Administrator, Mr. William Reilly.

[Applause.]

ADMINISTRATOR REILLY: Thank you, Steve.

It is nice to be back. I liked Rio, but you can overdo a good thing.

[Laughter.]

ADMINISTRATOR REILLY: It is nice to be here on this occasion discussing the issues which we're about to address here.

I would like to begin by thanking all of you who worked so hard to put this Forum together and make it a success. I very much appreciate the opportunity to be with you, and particularly to be with my esteemed colleague from the Agriculture Department, Ann Veneman.

I want to talk a little bit today about the future of agriculture in the United States and indeed the world. But before I begin, I want to announce an important new development in EPA's efforts to promote energy conservation and thereby reduce the generation of pollution that entails.

Today in San Jose, California EPA is signing partnership agreements with eight leading computer manufacturers to promote energy efficient personal computers. These eight companies now supply 35 percent of the personal computer and workstation market. By voluntarily joining in EPA programs, these companies are making a commitment to develop and market computer equipment that uses over 50 percent less energy than computers today. By the year 2000, we estimate that energy efficient computer equipment will lead to savings of 25 billion kilowatt hours of electricity, and those savings in turn will reduce annual emissions of carbon dioxide by 20 million tons, sulfur dioxides by 140,000 tones, and nitrogen oxides by 75,000 tons.

I am especially proud to announce this program today just a few days after the close of the Rio Conference. We proposed in Rio that the United States and other countries follow up on the Climate Change Treaty by acting as though it were already in effect when in fact it will take a couple of years to achieve full ratification. President Bush proposed a fast start to implementation of that treaty. We have a six-point plan of action to achieve those objectives.

This country is already taking strong effective action to reduce carbon dioxide emissions and these agreements are but the latest example.

I was interested to hear that before he left Rio de Janeiro, Jacques Delore, the president of the European community, was asked about the United States commitment to develop an action plan no later than January 1, 1993 and to come together at that moment to share with other countries their action plans. It is my understanding that the community president considered that date premature, a bit too quick. We want very much to work with our partners, but we want also to focus on the very significant things that we have done in this Administration to achieve reductions in greenhouse gases, reductions that are not just promises, not just commitments, but in virtually all cases have been not only proposed but enacted into law.

This conference is being held at a historically auspicious time. Environmental protection and economic growth were linked at the Rio Conference, a linkage -- I might add -- that the Bush Administration has endorsed and promoted vigorously over the past 3 years. This conference is but one example of the President's belief, my belief, and EPA's belief that a strong and growing economy is not at odds with environmental protection.

Just a little over an hour ago, I had the great experience of listening to Boris Yeltsin speak to a joint session of the United States Congress. He gave a stirring and historic speech committing his nation irrevocably to freedom, liberty, and also to free markets. I was struck as he spoke by the profoundly important lessons of Eastern Europe for the issues that we address here today and the issues that were under consideration in Rio.

If you look back, particularly in the post-war period, to what was attempted in Eastern Europe with respect to the environment, it was a virtual removal of pollution controls of all sorts. Why? In order to stimulate economic growth and development.

What was the result? Rivers were contaminated beyond all use, even for industrial cooling. Vast areas of Poland and the Soviet Union were rendered virtually infertile and unproductive, in some cases because of over-applications of pesticides and in other cases because of an accumulation of heavy metals. A despoiled and destroyed environment occurred, and not incidentally, a ravaged economy.

The basic natural systems necessary to support economic growth, the health of people, in places like Poland experiencing premature deaths, high rates of infant mortality -- 15 times higher than just across the Baltic in Sweden -- high rates of emphysema and absenteeism, a drag on gross national product, as an earlier environment minister told me, of some 15 percent due to a failure to attend to the basic lessons of environmental reality.

We ought not forget those lessons of Eastern Europe. They are profoundly important for our time. What they say is that the goals of environmental protection and protection of

natural systems and of human health are vital to the continued economic vigor and vitality of people and nations.

The Rio Conference took up some of the same questions Steve mentioned that are of concern to us here today. In Agenda 21, which is the long-term plan for global sustainable development, the nations at Rio agreed to a principle that you will find very familiar. They said, "Integrated pest management, which combines biological control, host plant resistance, and appropriate farming practices, and minimizes the use of pesticides, is the best option for the future as it guarantees yields, reduces costs, is environmentally friendly, and contributes to the sustainability of agriculture."

The substance of the United States position on the subject of biodiversity, which has received so much attention in the press, is that we consider ourselves leaders in it. We consider that we have at home, and by our generous support for biological diversity abroad, pushed back the envelope, defined the possibilities of biological diversity protection.

There was a moment in Rio when I was asked by one minister in a group to defend the Spotted Owl decision consistently with our position on the biological diversity convention. Irrespective of the merits of that decision, my answer was to say, "Is there another country here that has an Endangered Species Act that irrespective of economics accords definitive protection, absent a high-level cabinet-level exemption, to an endangered species?" No hands went up. We are proud of our Endangered Species Act, of our system of wildlife refuges and wilderness protection, and of our protection for old growth areas.

We believe also that biotechnology offers us one of our greatest hopes for preserving species because, for example, it can help reduce the world-wide use of biologically destructive chemicals. The private sector will not invest in biological pest controls unless they retain the right to profit from their investments.

The proposed regulatory regime that would have been established in the convention -- that is in the convention on biological diversity -- that singles out biotechnology as somehow inherently unsafe and needing special regulatory oversight, is in our view the wrong signal for a promising industry, an industry which has promise not just from the point of view of its economic potential -- and it is an area, not incidentally, where the United States now leads the world -- an industry that offers enormous potential environmental benefits, benefits to help us solve benignly for the environment longstanding environmental problems.

The Rio Conference marked the 20th anniversary of the 1972 Stockholm Conference, which was the first time the nations of the world met to address their common environmental problems. By coincidence, we are celebrating another environmental birthday this month.

Thirty years ago, the New Yorker magazine excerpted several pages from a forthcoming book and published them in its June 1962 issue. The article made the point that at the time was both startling and contrary to popular wisdom. Agricultural pesticides, one of the pillars of an agricultural revolution that was sharply improving yields and helping the world feed a growing population -- those pesticides, according to the article, were poisoning the earth, destroying the delicate balance of nature, causing wholesale destruction of wildlife and habitat, and undermining human health.

That article, and the book that followed in September of 1962, set off shock waves still reverberating around the globe. The book was "Silent Spring", the author Rachel Carson. The case she made became one of the primary forces driving the modern environmental movement in the United States. Her ideas, her insights, I think it is fair to say changed the course of American agriculture. Her spirit infuses what we're doing here today, finding ways to feed people while protecting the health of wildlife and natural systems essential to our own well-being.

If Rachel Carson were alive today, I think she would be proud of how much we have accomplished since 1962 and no doubt concerned about how much we still have to do.

In the 1960s, pesticide regulation was limited primarily to truth in advertising. Users of pesticides wanted to be sure that they would kill the pests they were supposed to kill. She would be pleased that in 1972 Congress amended the Federal Insecticide, Fungicide, and Rodenticide Act, FIFRA, to strengthen its health and environmental provisions. Those amendments included provisions for the registration and classification of pesticides and set standards for pesticides' acute and chronic effects.

She would be pleased also that in 1988 Congress again amended FIFRA to require registered pesticides to meet the latest scientific standards. Pesticides had to be reregistered to prove that they did not pose unreasonable risks to health or the environment.

Apropos to this requirement, let me announce today that beginning within the next 2 weeks EPA intends to issue notices of intent to suspend to firms that have failed to submit studies in support of pesticides going through the reregistration process. If you know of pesticides that are crucial to your crops or products, you may want to encourage pesticide manufacturers to submit the necessary studies or accept the consequences. EPA is not going to allow pesticides to remain on the market if they do not meet the requirements of the law.

I take this enforcement responsibility seriously. The rigorous enforcement of environmental laws has been and will continue to be one of the benchmarks of the Bush Administration. I am proud of our environmental enforcement record at EPA over the last 3 years. We have set records in virtually every enforcement category and collected more fines and penalties than in EPA's previous 18-year history.

Enforcement in the area of agricultural pesticides is especially important to the American people, who expect their food supply to be safe. I was exposed very early -- I think I was in office something like 3 weeks -- to the food safety concerns of the American public when the Alar controversy drove the country near hysteria. That controversy resulted in President Bush's proposals for food safety legislation, legislation that would streamline pesticide cancellation procedures.

The Alar controversy also made me realize that the word of EPA, USDA, and FDA carry a lot of weight with the public. I recall that when we developed a joint position and said essentially that the apples can safely be restored to the menus of school cafeterias and supermarkets across the country, they were -- actually, much to my surprise.

So to serve the public and the agricultural community, those of us in the public sector have to ensure that agricultural and food standards are supported by rigorous science and rigorous enforcement. In fact, if I were to choose just four words to sum up my sense of

what the Environmental Protection Agency ought to be about, those are the four I would select: rigorous science, vigorous enforcement. They apply in this area as well.

But while tough environmental enforcement is essential, it is not sufficient. EPA also has a responsibility to help America's farmers attain their goal: the production of healthy foods sufficient not only for the American people, but for export overseas. The best way for us to do that is to work with America's farmers, with the manufacturers of farm products, and with the United States Department of Agriculture to produce food in ways that are environmentally sustainable.

This more affirmative role is new to EPA and it is changing the way we do business throughout the agency. We're not just requiring automobile manufacturers to prove the catalysts that reduce air pollution, we are encouraging new fuels that are inherently cleaner. We are not just requiring that power plants install scrubbers, we are encouraging the development and use of lights and appliances that reduce the need for energy.

We are not just requiring the registration of pesticides, we are encouraging new, less environmentally harmful ways of controlling agricultural pests. That's what this conference is all about and that is why I am so pleased to take part in it.

I am especially pleased to share the stage today with Ann Veneman because EPA and USDA are working together toward the common goal of assuring that American agriculture will continue to thrive. We have already made a lot of progress toward common goals. We have developed new techniques for minimizing the extent to which growers and consumers are exposed to pesticides, techniques that include the use of natural predators and other biological controls, pest resistant crops, and alternative crop management practices like ridge tilling. We have developed the approach known as integrated pest management which combines these and other techniques in order to reduce simultaneously the use of chemical pesticides while improving crop yields.

Thirty years ago, Rachel Carson accused the farm community of not paying enough attention to environmental protection. More recently, the environmental community, including EPA, has been accused of not paying enough attention to economic growth. This meeting shows that we have come a long way toward linking these two goals and toward achieving them simultaneously.

Because we at EPA are trying to reduce America's agricultural reliance on chemicals does not mean that we envision a return to the past. It does not mean that we are willing to accept less yields or less food production. Rather, it means that we see a brighter, more abundant, more economically secure future if alternative environmentally benign pest controls are developed and then used.

If we can replace chemical intensive agricultural practices with information intensive and technology intensive practices, I believe both environmental quality and agricultural yields and profits -- especially long-term yields and profits -- will improve and will come up.

Integrated pest management is not a pie-in-the-sky dream that will disappear in the cold light of economic reality. It is an economic alternative and in some ways an ancient approach to pest control that has already proved effective.

The Organization for Economic Cooperation and Development released a report just last February pointing out the potential and the accomplishments of less chemically dependent agricultural systems. And believe me, Europe needs them far more than we. In this country, Campbell's Soups began to apply integrated pest management over 5 years ago. You will hear about the results of those efforts later this afternoon.

There surely is much more work to be done and if it is going to get done, then the private sector must play a critical and even a leadership role. Those of us in Government can study, encourage, and cajole, but the real progress in this -- as in so many other areas of environmental policy and advancement -- must come from the private sector.

It will be made by individual farmers like Iowa's Dick Thompson, who see opportunities for innovative pest controls on their particular crops. It will be made by food processors, like Campbell's, who see the long-term value of corporate investments in IPM. It will be made by the fast emerging biotechnology companies who develop pest-resistant plants and biological pest controls. The private sector will not invest in biological pest controls unless they retain the right to profit from their investments, a fairly straightforward principled lesson from modern experience on which we will continue to stand with respect to international covenants on biological diversity.

But we at EPA can cheer you on, those of you in the private sector. We can from time to time lighten the regulatory burden for safer pesticides. But more than anyone else, the private sector holds the future of agriculture in its own hands.

Speaking of lighter regulatory burdens, I want you to know that EPA already is beginning to do its part. We are undertaking a safer pesticide initiative to encourage the development of pesticides that present fewer risks to public health and the environment. As it stands, the registration can sometimes impeded progress. Potentially safer products -- and invariably newer products tend to be safer products -- may not reach markets because of the high costs and numerous tests entailed during registration. Meanwhile older and environmentally more risky products continue to be sold as they go through the reregistration process.

EPA recognizes the need to create a mechanism to streamline the registration process, especially for less risky pesticides. We are however caught in a catch 22. How can we identify those products that are less risky without the tests?

To solve this dilemma, we need input from you, the people affected by delays in the process. We need you to help design a workable approach that gets at what you and I both want: better, safer pesticides as quickly as we can get them registered.

I expect to announce EPA's new initiative within the next few days. I hope you will come up with your ideas and present them to us. This initiative is consistent with EPA's response to the President's regulatory review. I took that review for an opportunity for EPA to reexamine past and ongoing regulatory efforts to see if we can find ways to relieve the burdens on industry while still meeting or even exceeding our environmental goals.

We are tremendously proud that initiatives we have identified -- some of which have already begun -- at EPA are expected to reduce by some $4 billion to $8 billion the regulatory burdens on the private sector per year in this country; real and significant

improvements in processes; streamlining of permit reviews, in some cases alterations in the way we classify and deal with hazardous waste; and all of them completely consistent with continuing strong protection for health and the environment.

In my view, the safer pesticides initiative will be exactly that kind of program. I am very proud of it.

All of you attending this Forum have the opportunity to move beyond rhetoric to action. You will move us closer to our goal of a plentiful, healthy food supply for everyone on Earth, while at the same time protecting the interconnected web of life of which human beings are only a part. Your work here as international significance and it holds out hope to people everywhere.

Integrated pest management is something that has been distinctively developed, applied, and brought on a significant scale in the United States. Like so many initiatives and experiments in this country, we have taken it on the road. We took it on the road to Rio and it is among those relatively unsung contributions we made there, a priority of the United States quietly agreed to, negotiated over the preceding months, and now part of commitments made by the community of nations represented there, some 170 of them, commitments that I think will stand much like the human rights commitments made in years past, to be monitored, policed by interested non-governmental organizations or the press or citizens everywhere, a stick occasionally with which to beat government, but a new higher standard against which to measure governmental performance.

That I think is a worthwhile contribution. It is one we will continue to make both for the benefit of our people here in the United States and the rest of the world, which so desperately needs the kind of experience I think environmentally we have achieved. Your work here is important. We will learn from it, and we will apply it, and I hope be worthy of it.

In that spirit, I wish you the best of luck over the next few days. Thank you very much.

[Applause.]

DR. PARRY: It is my pleasure today to introduce to the National IPM Forum the acting Secretary of the United States Department of Agriculture. Ann Veneman serves as the Deputy Secretary, the number two post in the Department of Agriculture. She is the only woman in the 127-year history of the Department to hold this position.

Ann is one of the highest ranking women of the Bush Administration. In this capacity, she directs and oversees the policies and activities of the USDA and its 42 agencies, its $83 billion budget, and its 111,000 employees in the United States and abroad.

The Deputy Secretary has demonstrated strong leadership for IPM since assuming this post in June 1991. At her request, the Department has formed the IPM working group to coordinate the diverse programs of many agencies that directly relate to IPM.

Please join me in welcoming the Deputy Secretary of the Department of Agriculture, Ann Veneman.

SECRETARY VENEMAN: Thank you very much. It is a pleasure to be here.

So that no one is confused, I am only Acting Secretary for today. The Secretary happens to be out of town or would have liked to have been here himself today to join Administrator Reilly in welcoming all of you to this conference and kicking this conference off and in telling you all how much both EPA and USDA support IPM and how much we believe that this Forum will help to promote not only its use but better knowledge and coordination of knowledge of how we can move to support it in the future.

We are very, very pleased to be cosponsoring this Forum with EPA. We're here today as the result of the hard work of many individuals and organizations. I think we owe all of you a great thank you for your work in putting this conference together.

Every one of us shares a strong interest in seeing integrated pest management succeed. I can assure you that the Department's commitment to IPM is solid.

All of us here have a stake in pest control as producers, industry representatives, scientists, or administrators, not to mention as consumers. And we all have a role in pest control: to ensure that pest management helps agricultural producers do their job better. If there are viable alternatives to or supplements for pesticides that will produce the same or better results, we must make them available. That's what producers want and that's what we all want.

The challenge of this Forum is to focus on workable approaches to make IPM even more widely accepted. It is an opportunity for you to draw on one another's expertise and experience, to share ideas and insights. It is a time to explore the issues and propose realistic solutions to achieve real results and real progress. So when you leave here you will be closer to the goal of more widespread use of integrated pest management.

Throughout civilization, pests have plagued the production of vital food and shelter. In this century, we have witnessed remarkable strides in efficient production. These gains can be attributed in part to our improved ability to protect crops and animals from all types of pests. Still, despite progress in the war against pests, problems persist.

Today, agricultural and forestry losses from diseases, insects, and weeds are estimated to reach into the tens of billions of dollars. In the past, pesticides were used most frequently to control losses because they are effective and relatively inexpensive. But in some cases, over-reliance on pesticides has caused unintended consequences. Sometimes beneficial organisms have suffered or environmental concerns have occurred.

Today's producers are being challenged to assure that their loss control methods specifically target the pests and avoid harmful health and environmental effects. IPM meets these expectations. It encourages the development and use of alternative methods for pest control. Pesticides are not the only effective control method and IPM meets society's demands for effective pest management that is ecologically and environmentally sound. What's more, it ensures an economically viable agricultural system.

Together with EPA, we are undertaking programs to conserve our environment and ensure the wholesomeness of food. Examples of joint research and action programs include water quality, food safety, global change, and pollution prevention initiatives. These activities have components which address issues related to IPM.

Agriculture is a diverse and complex industry. It is critical to our Nation. The Department is a reflection of that diversity. For decades, we have been involved in pest control efforts that eventually led to the IPM approach in the 1970s. Thirteen of our agencies are now conducting IPM programs. These programs are coordinated through our IPM working group. I hope that our IPM working group will have the chance to interact with this Forum as you proceed through this conference.

I thought I would describe for a moment some of the initiatives we have underway at USDA. The Forest Service uses IPM methods to control major pests such as gypsy moth, the southern pine beetle, and the western spruce budworm.

The Soil Conservation Service is developing a course that addresses IPM integrating environmental, economic, and other management considerations when planning conservation and production systems. Four education programs on IPM for agronomic crops, ornamentals, shade trees, fruit and nut crops, and lawns and turf have been completed. Other courses are being developed.

Our Agricultural Research Service and our Animal and Plant Health Inspection Service are working with the State of Texas to control a major pest, the boll weevil. IPM practices in the Rio Grande region are helping cotton growers better control the weevils. By plowing down remaining cotton plants after harvest, they are able to destroy the pest's breeding spots and prevent over-wintering populations.

In the implementation of the 1990 Farm Bill, by continuing the freeze of payment yields and providing for planting flexibility improved incentives for producers to adopt IPM. These of course are just a few of the IPM initiatives in which the Department is involved and some of the ways we are using IPM to help producers.

To meet the expectations of American consumers and foreign customers, the private sector has a keen interest in effective and safe pest control technologies. The participation of farmers, food processors, and agribusiness owners here demonstrates that interest. It shows that there is a commercial demand for IPM alternatives. This is a strong showing of support and it is a strong start, a step toward success.

But ultimately both sectors must first recognize the advantages of changing current practices and products. Then there must be a willingness to change before the obstacles to IPM can be reduced and integrated pest management can reach its full potential.

I believe it is critical for producers and industry representatives not to let this Forum be the last word on IPM's future. The work is not finished when you leave here. That's why I encourage you to form partnerships with one another so that IPM can become a commercial reality. With commitment, determination, and hard work it can continue to be a commercial success.

Neither USDA nor EPA will impose regulations on producers to mandate that IPM be used. That decision is for the producers. But it is one that is in the best interests of all of us. But we can help to create a business environment to promote the use of IPM as a way to meet the demands of all Americans for a safer and improved food and fiber supply.

We are working at USDA to bring about that business climate and I would like to give you a few examples. We are patenting research results and giving exclusive licenses to

produce to the industry. We are signing cooperative research agreements with industry for the mutual benefit of U.S. Agriculture and business. And we are using the Extension Service to educate producers on IPM practices. We're giving producers hands-on training on which methods to use to control pests and prevent economic losses.

The tasks before this Forum are formidable, but obstacles, no matter how difficult, are no match for the power of determined minds united to achieve a worthwhile aim. Together Government, industry, producers, and others can advance integrated pest management. And you can create that agenda for action that was discussed before.

I wish you all the success in this conference. We hope that it will be everything that it has set out to be. I again appreciate the opportunity to be with you today. Thank you very much.

[Applause.]

MR. JOHNSON: I know that Administrator Reilly and Deputy Secretary Veneman have to move on to other meetings. I would like to give them another round of applause and thank them for kicking off our conference today.

[Applause.]

MR. JOHNSON: I would like to introduce Mr. Douglas Campt, director of the Office of Pesticide Programs at the Environmental Protection Agency.

MR. CAMPT: Thank you, Steve.

It is my pleasure to introduce Kathleen Merrigan, who will present the congressional perspective on integrated pest management.

For the past 5 years, Kathleen has been a staff member on Senator Leahy's Agriculture, Nutrition, and Forestry Committee. Kathleen has recently assumed some of the duties and responsibilities that Carolyn Bricky, who many of you know, had performed in the past. I am sure that she will continue the support and interest in this activity that Carolyn had expressed in the past.

Kathleen arrived in Washington through Texas where she received a master's degree from the Lyndon B. Johnson School of Public Affairs. She also was associated with the Texas Department of Agriculture.

I am pleased that Kathleen is a part of the Forum today because she has an important role to play in setting the IPM agenda.

Please welcome Kathleen Merrigan.

[Applause.]

MS. MERRIGAN: Good afternoon. It is a little intimidating to follow such a distinguished panel, but I will play my typical role at the conference, that of bomb thrower.

I look out at this audience and I see a lot of familiar faces, people with which I have had the opportunity to work over the past 10 years in the various jobs I have had in agriculture. I know that the experts are out there and not here in the podium. But when you

listen so some of the comments I make this afternoon, take it as the typical congressional staff person up on the Hill reading through -- I get about 12 inches worth of paper a day. Some days I get as many as 70 phone calls, and I am usually there at least one day over the weekend.

So in the scheme of things and what we do, I am one of the people who deal with sustainable agriculture IPM. The sort of things that come up and register as headlines on my screen may be interesting to you.

I thought today I would lay out four challenges that I think the people here in this audience face. The first challenge is that challenge of joining forces with other people seeking to advance integrated pest management sustainable agriculture environmental agendas within farm production systems.

The first question I am asked when we come to committee meetings and we're debating these issues is, What is integrated pest management? What is the difference between IPM, and sustainable agriculture, and alternative agriculture, and regenerative agriculture, and on down the list of terms? Everyone is touting their own.

I explain to them what I seem to understand the history to be. IPM is the grandfather of them all. It has been around a long time. Actually, the term has had some evolution in its usage. At one point in history it was a lot about scouting, spraying, and counting. Now when I look at definitions of IPM it is much broader. At one point we talked about biological control, chemical control, cultural control -- and now when we talk about these issues they are very integrated and very holistic.

I note in the 1988 national IPM coordinating committee report that the research goals for IPM should be "to assimilate the knowledge developed in basic monitoring and tactics development research into a total integrated pest management system. This system is based on sound ecological principles, numerous interactions between management tactics within and between crop production disciplines, and the numerous interactions within production management."

That all says to me that whatever is going on in IPM these days is not all that different than what people are telling me is going on in sustainable agriculture, or regenerative agriculture, or any of these other new distinct interest groups that are coming before the Congress and demanding that their needs be addressed.

We need a pest control philosophy that is based on enhanced natural controls. That is not a radical statement. That is a statement right out of the USDA IPM publication.

So my frustration in dealing with this area is that we do pay a lot of lip service to the importance of IPM, but when I scan the USDA budget, I see about $7 million in extension, another $3 million in CSRS, and EPA is now putting in some money. But overall, when you compare those numbers to the big ones -- we just heard in the introduction that USDA spends about $83 billion a year -- we know that it is not nearly enough. It is not nearly enough compared to the extraordinary challenges that our farmers out there are facing.

So I argue to this room that in your meetings over the next few days, talk about different groups that are emerging that are interacting in the political world -- the sustainable ag working group, the alternative agriculture groups -- and try to work on those definitions

and form some coalitions that will work to your advantage as we approach the 1995 Farm Bill and as we yearly go through the battle of appropriations.

The second challenge is really a basic knowledge gap problem. There are still a lot of areas, as you all well know, in which we lack information to move forward. The first I would like to highlight is economic research. I still find it very frustrating in the debates and the political process to find sources that are really useful in terms of weighing in environmental hazards of traditional production practices that do not include IPM sort of approaches and what all that means. Basically, we're still working on a cost-benefits analysis up on the Hill and people want to know what the bottom line is. I don't find that there is a lot of research or documents out there to help us.

I noticed recently in April an article about a couple of researchers -- and if they are here I would love to meet them -- Leon Higley and Wendy Wintersteen, out in Iowa and Nebraska. They had some research funded jointly by USDA, Iowa, and Nebraska. They are developing a tool to help farmers factor environmental risk as well as economics into pest management decisions. Another example would be a report that came out about a year ago by the World Resources Institute, "Paying the Farm Bill".

These are the kinds of analyses that will help us in the policy process to help farmers make better decisions.

The second in which I think we have major knowledge gaps is in weed science. I don't really know what weed science is. I think weed science is herbicide science. I go and talk to a lot of different universities and I try to talk to student groups along the way when I can, and I find that a lot of the younger researchers who are just entering into the system are all working on industry-supported grants, making sure this herbicide or that herbicide works. Very few of them are finding the resources, the professors to work with, or any sort of incentives to look at things like smother crops, rotations, or anything to sort of break the herbicide process.

I think if there is any aspect of agricultural science -- if I was an important policy-maker and I had all the magic wand power that I could -- I would do something in weed science. That is something about which I hope you can talk over the next couple of days.

The third knowledge gap area that has become a little bit of a political battle up on the Hill has to do with cosmetic standards for fruits and vegetables. The question is, Do grade standards influence pesticide use?

A report just came out to my desk about a month ago from USDA where the letter from the Ag Marketing Service said that there is too little evidence to warrant changes in USDA grade standards. However, a 1979 OTA report said that cosmetic standards "severely limit the use of biological control and other management techniques which depend upon the existence of some pests in the field."

The study that was underneath the cover letter sent to us by USDA saying that there was no evidence of a problem, a study by Arizona State makes a strong case for more research in this area. Just simply saying that consumers are not going to eat foods that don't meet a certain cosmetic standard I think is selling consumers short. I think it is certainly worth the effort of more research.

The fourth knowledge gap is the problem of resistance. I can't tell you how worried many of us are -- and I'm sure you share my worry as well -- about all that is coming out now on Biotechnology resistance. Biotech is great, and Administrator Reilly talked about some things that we really hope will come true with biotech. But as much as biotech can be a help, it is also seen as a threat by a lot of people. By using bacillus thuringiensis, the B.t. toxin, and a new and improved delivery system where it is very high-powered -- and we see the problems of resistance all across the country now won various crops -- may mean that one of our most important natural controls upon which all of us have relied for years will go by the wayside very soon.

The third challenge I would like to discuss is the challenge of restructuring the institutions. First, the concept of IPM asks people to break the molds, change the approaches of how to do things. You know this better than anyone else. It is interdisciplinary, problem-solving, systems research. It is much more difficult than a lot of ways of approaching a problem.

In fact, I was talking to a colleague on the way over here and I said what a pleasure it was to come talk to the IPM folks because in a lot of ways I think of them -- I hope this goes over well enough because I think of the different ways in which it can be interpreted -- but I think of them as the brain surgeons of the ag world. System approaches to problem-solving is not easy. It really requires a team effort and a lot of thought.

I think some of our funding mechanisms -- at least in agricultural research -- do not help out this sort of approach to funding. In the 1990 Farm Bill, we talked a lot about this as we approached expanding competitive research grants, the national research initiative with which some of you may be familiar. That was an effort to increase competitive research grants up from about $50 million at that time to $500 million over a course of 3 or 4 years. Right now, we are at $100 million, the President's budget has $150 million in it. Hopefully, we are progressing along that way.

Congress said that since ag research has been level funded for a period of about 20 years, it probably does make some sense to put some more money in the budget, but there are some things that we're hearing from the farmer out on the street that makes us worried. One is that we're seeing a lot of research dollars going into the kind of research that ends up as publications in obscure journals that doesn't really make a big difference to the farmer, who is facing some severe problems right now.

So one of the things that the Farm Bill required was that competitive grants take more of an interest and put more money into multi-disciplinary and interdisciplinary teams, younger researchers, and to have an emphasis, whenever possible, on sustainable agriculture, which I consider pretty much interchangeable with IPM, although I know that can be a hot debate.

We're seeing that program being implemented now. I think that the program managers of the competitive research grants have all the best intentions of trying to promote sustainable agriculture within that program, but it is tough. For example, I had a researcher come up to me and tell me that he wanted to put forward a grant on a whole farm approach

to his pest control problems on the farm. That included a livestock component because he was putting in grains in his rotations, as well as a crop component to his research.

Does that get funneled to the crop peer review panel, or the animal peer review panel? So much of our thinking in research is very narrow and not multi-disciplinary enough that I think the thinking this conference can provide to the administrators of that program would be most useful.

The second area of restructuring has to do with the Extension Service. I am very worried about the future of our Extension Service. I think a lot of people note me as one of its chief critics. I am a pretty tough critic of the Extension Service, but I am also one of the biggest believers in extension. I just think that unless things change over the next few years, its very existence is at peril. Change does not happen at the Federal level first, as a basic rule of thumb. I know that is not a big surprise. It happens at the State level.

One of the leading IPM universities in this country is U. Mass. Amherst. There is pretty much no extension left in Massachusetts. While you may pass off Massachusetts as not being a real ag State any more, but believe me that when there are cuts in Minnesota and Georgia and Iowa and a lot of States around the country I think that is a sign of the times and one that should worry us all greatly.

In the 1990 Farm Bill there was a new program written into the law to have Extension Service agents go through some new training in sustainable agriculture and in IPM that should occur before the 1995 Farm Bill. That program has yet to be funded, and a lot of it still rests on basic haggling in the political circles in Washington over definitions and ultimate goals of sustainable agriculture and IPM and whether or not it really rests on reducing or minimizing chemicals in farming.

If you're reading the newspapers these days and you're hearing the Congress and Secretary Madigan's talk about restructuring USDA's overall and the field agencies, ASCS, SCS, Farmer's Home -- too many offices, too few farmers, things have to change -- one of the things that we are considering along with this whole restructuring is a possible collapsing of the Cooperative State Research Service with the Extension Service.

Part of that is that we just don't see the need any longer for two agencies there. I think Deputy Secretary Ann Veneman said that there were 13 agencies working on IPM. I am glad everybody is working on IPM, but I would like to know what all those 13 agencies are.

In the committee, we feel that applied research and extension activities in the equation of research and extension are very undervalued in the reward system of research and extension. So if I am a university professor and I have a joint appointment and I decide that I am going to spend some time with the farmers in my State trying to help them address the problems on their fields, if I am going to spend time working on interpreting results coming from my university for the rural communities that I serve, I will not get a lot of points in the tenure system and in the overall climate of the agricultural community. We see that as a very big problem, and a problem that may be aided in part by merging the research and extension administrations so that they have to act as one.

The fourth area in restructuring institutions I would touch upon briefly has to do with something that was mentioned by the previous two speakers, and that has to do with patenting products that are developed at our universities through USDA or EPA dollars.

We have some concerns about this, as we look at it. Especially in the area of development of herbicide-resistant plants, we see a lot of chemicals that will exceed their normal lifetime of use patent-wise by new biotechnologies. We don't see that this is contributing to alternatives, to finding new ways to reduce chemicals in farming. You can make some cases for some good ones and I can make some cases for some bad ones.

But the bottom line is that the private sector is investing millions and millions of dollars a year in this technology. They have a lot of market incentives to do so. Why then do I find that our land grant universities are using their funds to augment private industry funds to do that research, to chase after private research dollars, pushing their guys to chase after private research dollars, bring in those dollars when public research agenda issues like IPM and sustainable agriculture are going by the wayside?

The fourth challenge I put out today is just a challenge to put it in high gear. You are on the right road, we just need you to move faster. I know in all of this I am preaching to the choir, but I really feel as if a lot of what we do in agriculture is in great jeopardy. I get regular phone calls from congressional offices saying, "What do you think about putting in a bill that would require a 50 percent cut nationally in pesticides?" They have done it in a couple of places in Europe, so why not here?

I say, "No, it is much more complicated than that." But I think it is a sign of the times. Looking back at the 1990 Farm Bill, there are some interesting lessons one may draw from that.

To a large extent, the commodity groups -- the traditional agricultural groups -- worked with the emerging environmental and consumer coalitions which have been very active in the last 2 years in agricultural. They worked together. They worked out a lot of provisions. But in two instances the coalition broke down. One was a challenge to the LISA program -- the Low Input Sustainable Agriculture Program -- the program that gets a lot of notoriety for all its $7 million of funding a year.

The definition of sustainable agriculture that was originally in the bill that was from the National Academy of Sciences included an emphasis on reducing pesticides whenever possible. This was challenged on the floor of the Senate by Senator Grassley, who preferred instead to substitute the USDA definition that made no mention of reducing chemicals as a research goal. That challenge was beat two to one and it was a pretty easy floor fight.

The second time the coalition broke apart was on national organic standards, standards for organically produced foods. The Senate Farm Bill had standards in the bill, the House bill did not. The House refused to put the standards in their bill. The Environmental and consumer coalition got together and brought their issue to the floor of the House and they walloped the traditional agriculture community.

So I think these are two important lessons. The lesson is that as we approach the 1995 Farm Bill, the environmental and consumer groups are very powerful. They are empowered for a lot of good reasons. They are saying a lot of good things to which we

should be listening. But now is the opportunity to work with these groups to guide farmers toward IPM, to guide farmers toward sustainability, before farmers are regulated into sustainability.

The last thing I will throw out in terms of why I believe we're in jeopardy is that we have heard a lot recently about a balanced budget amendment. When that vote was coming up in the House last week, documents were circulated to give Members an idea of what a balanced budget would really mean. They had three or four option papers.

Option paper number one had that if a balanced budget amendment passes, the way we will achieve the balanced budget would include a 50 percent cut for research and extension. That wasn't one of the controversial ones. They felt that was a good idea.

So I think the challenge to all of you in this room as leaders in the way agriculture needs to move for the next 10 to 20 years -- you need to push the system faster because there won't be a system there to push any longer if we don't move soon.

So with that, I will take a few questions from the audience. This is your opportunity to rail at me. One of my purposes in coming out to speak to people is that it is also an opportunity for me to find out what people are thinking out there. So your questions and comments are appreciate.

DR. COBLE: Kathleen, my name is Harold Coble, and I am the president elect of the Weed Science Society of America.

[Laughter.]

DR. COBLE: I met you in Raleigh and you talked to some of my students, too.

I applaud your statements about weed science. I would like to illustrate a point by asking all the practicing weed scientists from universities to stand up.

Thank you.

MS. MERRIGAN: Thank you.

You can either write into your Congressman and yell at him, or you can talk to me directly.

[Laughter.]

MS. MERRIGAN: With that, I will leave you to your next presenter.

Thank you.

[Applause.]

DR. FRISBIE: Kathleen has a way of striking us all silent. That's one of the reasons why we shipped her out of Texas up here because she could swing a bigger stick in the Washington area.

I would like to take a minute, if we could, to leave the Beltway and go all the way to the west coast of the United States and then also go back in time to 1952. There were two scientists who worked at the University of California. They were named Nickelbocker and

Bacon. They were trying to control the walnut aphid on apples. In the process of trying to do that, they were trying to work biological control into restructure a system that was not pesticide-dependent nor interfered with biological control.

In 1952, they coined the term integrated control, which really began the era of integrated pest management. The University of California was one of the flagships in developing the principles and philosophies. This philosophy in turn spread across the United States to the major land grant university systems both in our research, our teaching, and our extension programs.

Today we have Dr. Robert Helgesen, who is the dean of the College of Food and Natural Resources at the University of Massachusetts. He has experience in research, teaching, and extension. Before he got the job he has today as dean of the college, he was a department head at Kansas State University in the Department of Entomology where he led one of the strongest entomology departments in the country.

Prior to his administrative job where he really worked for a living, he was working primarily in greenhouse pests, forage crops, and particularly developing IPM systems for alfalfa in the northeastern United States.

Join me in welcoming Dean Helgesen.

[Applause.]

DEAN HELGESEN: You will notice I have to adjust the microphone. We have the long and short of IPM up here.

[Laughter.]

DEAN HELGESEN: It is certainly a pleasure for me to participate in the National IPM Forum. I am sufficiently charged up. What happened to Kathleen? Did she leave?

[Laughter.]

DEAN HELGESEN: I will have more to say about that as I proceed in the talk.

I am especially delighted to offer some perspectives from the university standpoint on integrated pest management because pest management basically has evolved in our land grant universities. In fact, Ray did a nice job of setting that perspective for us, and from our partners in USDA.

I am also delighted to be here because given the fiscal problems in Massachusetts, the environment here is much more kind.

[Laughter.]

DEAN HELGESEN: I do want to congratulate all of you. I have read the draft papers in preparation for this Forum and I truly was excited about what you are doing. I have a feeling that if the proper follow-up -- and I think you have heard that from the three previous speakers -- if the proper follow-up is made, the Forum can serve as a major new initiative for integrated pest management.

We heard from Administrator Reilly, who referred to the Road to Rio. That sounds like a Bob Hope and Bing Crosby movie.

[Laughter.]

DEAN HELGESEN: But in the road to Rio there is a platform for integrated pest management. We need to take advantage of that. Somebody set an agenda and set a priority and it is up to us to take advantage of that. Taking advantage of that means money and positions from the university standpoint.

I accepted this responsibility for two reasons. First, you stated in your program description that the National IPM Forum begins with the premise that integrated pest management is the best solution to many of today's pest management problems, and that it represents a key factor in developing an economically viable and environmentally sound agricultural system for the 21st century. I might add -- Administrator Reilly made some reference to the first time that we have addressed economic development and environmental protection -- we have been doing that in integrated pest management as long as I can remember.

I concur with this premise and it is this premise that is the basis from which I will make my remarks this afternoon.

Secondly, as a faculty member and as an administrator with significant responsibilities in integrated pest management, I do have a few messages to deliver this afternoon on behalf of the universities that are involved in pest management programs regarding our role in the future of integrated pest management. I find the task of giving the university perspective and what we have already accomplished in integrated pest management a real joy. At the same time, I find the task of giving university perspective on the further evolution of integrated pest management very challenging.

First let me talk a little bit about accomplishments. We have a lot of which to be proud. We have been surrounded with critics ever since I have been involved in integrated pest management. In that atmosphere, we have accomplished many of the objectives that we set out to do in the late 1960s and early 1970s.

First, and very importantly, we have for the most part changed the American farmers' basic approach and philosophy on the management of pests. In the 1950s and 1960s the cost of agricultural chemicals was relatively cheap, the environmental cost of agricultural use was not well understood, resistance to pesticides was not an important issue, and the farmers' approach to pest control was the routine preventive application of pesticides.

Now let me share with you a little anecdote. When my wife and I would introduce ourselves to new friends in upstate New York, invariably people would say, "Do you have any children?" Then we moved to Kansas. We introduced ourselves to our friends and they invariably would say, "How many children do you have?"

[Laughter.]

DEAN HELGESEN: We moved to Massachusetts -- my colleagues are going to crown me here -- and people say, "How many times have you been married?"

[Laughter.]

DEAN HELGESEN: There is a vast sociological difference in perspective.
[Laughter.]

DEAN HELGESEN: I want you to step back in the 1950s and 1960s and ask the question, What was the perspective of the farmer? In essence, that farmer would ask us as entomologists or plant pathologists, With what should I spray my crop?

If you think about most of the innovative farmers in America now, they ask the following types of questions. What pests can I expect in my crop this season? When can I expect them? Will these pests exceed economic levels? What crop variety is best for the pest complex in my area? If I experience a pest outbreak, what management efforts can I anticipate? And in some cases, he will ask, Why can't you answer my questions?
[Laughter.]

DEAN HELGESEN: We have changed the basic philosophy of our growers through a very effective research, education, and implementation program. I will be the first one to admit that we have a long way to go, but we have made that fundamental philosophical change, I believe. At the same time, we have changed the basic attitudes and approaches of our own staff, our own faculty, who are charged with the responsibility of developing and educating our farmers about pest management.

That change in philosophy is a very significant accomplishment. That is something that we need now to build upon.

Along with that change in philosophy, we have also provided our farmers with a number of very successful integrated pest management programs that have gained the confidence of those growers. That is a very important issue. For those critics who told us that we needed to abandon pesticides, immediately get off, we were not in a position to gain the confidence of our growers. We have moved them through an evolution to a certain point in time.

In many cases, these programs have reduced pesticide use by 30 percent to 50 percent. I looked through many of the draft papers with the surveys that have been done and the figures have ranged between 30 percent and 50 percent. There is not time here this afternoon to go program by program to give recognition, and we shouldn't because a lot of work and investment has gone into each and every one of those programs.

But I believe at this point that every major land grant university can point to some program or another where they have shown and established those kinds of reductions with significant savings in cost, significant improvement in environment, and little or no loss in yield.

That is second major achievement to which I made reference. We have shown that we can make those kinds of reductions.

We have also fostered a new industry, the crop consultant or the pest consultant. And in many cases that industry has become very critical to implementation of integrated pest

management programs around the United States. I will have more to say about that issue a little later on.

How have we accomplished all these accomplishments? We have done that through cooperation. We have done it through cooperation between the research sector and the extension sector. I share Kathleen's concern about institutional organization, but the fact is that we have done a reasonably good job of linking the research and extension activities.

We have accomplished this through a partnership with USDA, to some degree with EPA, early on with NSF, and in many of our States a very important partnership with the Department of Food and Agriculture, and in our State and some other States the Department of Agriculture. The fact of the matter is that in many States that partnership really needs to be strengthened. We found in our State when the Governor recommended eliminating State support for cooperative extension that when we turned to our colleagues in the Department of Food and Agriculture, they in shock said, "But how are you going to educate our farmers about the regulations that we're implementing?"

We would leave our growers without the opportunity to learn about the very regulations the Governor is putting in place. So it has been done through a partnership. It has also been accomplished through the education of new farmers going through our classrooms, through that birth of a new industry I mentioned, and through the generation of new knowledge about pest management.

The change in grower philosophy and the dramatic decrease in pesticide use achieved by our successful IPM programs certainly are accomplishments of which we can all be proud, but this is not a time to be complacent about those achievements. This is not a time to allow our commitment -- and I am going to speak from the university side, but I am hoping that Kathleen, the Administrator of EPA, and USDA echo my same concern -- this is not a time to allow our commitment to integrated pest management to plateau or to erode.

If there are budget gyrations going on and there is no concern about a loss in funding for agriculture, then we have to rally that support. We means all of us. The university, I have discovered over the last 2.5 years, can't rally support by itself.

There are two very good reasons why we can't let our commitment to integrated pest management erode. Many of our pest management programs, to which I alluded earlier, have been built around the most efficacious use of pesticides in the management of major pests. I maintain, as I said earlier, that that was the most effective way of transitioning our growers from a strict unilateral approach to an integrated approach to pest management.

However, we have so finely honed, in some cases, the use of those pesticides that making future gains in pesticide reduction will be very limited. Yet, there is an expectation by all of us that we will continue to make those major gains.

Secondly, many in this field have to lobby for these changes if use of pesticides is to continue to decline. I think you heard one of those messages from Administrator Reilly.

The agrichemical business itself has produced a declining number of new materials. We may hear that that is going to turn around, but at the moment, that is the case.

We have an increasing frequency and severity of resistance to pesticides. The Colorado potato beetle is one good example of that. We have at the same time significant increases in the concern for safe food and environmental protection.

These two factors tell us that we need to increase our commitment to integrated pest management. It also tells us that we must move at the fastest pace possible to a biologically-based, or biologically-intensive, pest management approach. In essence, we will finally treat the crop system as an ecological system in which certain populations of pests must be managed, analogous to the way in which a wildlife management manager manages a deer population.

I have great concerns about our ability to make that shift to a biologically-intensive -- and as we heard from Administrator Reilly -- information-intensive pest management system or approach. We know that making that shift from a biological standpoint is a quantum leap. By that I mean that it is going to require a quantum leap in the need for new knowledge, in the need for applied research, and the need for research into the implementation processes that are used to develop pest management systems.

Each of us here -- USDA, EPA, universities, legislators, industry, and commodity organizations -- must participate in that accelerated investment as partners. Since the Administrator is not here, this may be unfair, but I was a little concerned when I heard that EPA can cheer us on. We need a much stronger commitment than cheering us on. I am sure that what he meant was that he is behind us.

I am not going to speak about how the university can participate in that process of moving to a biologically-intensive process and what might limit our capacity and our ability to participate in that investment. First of all, I think it is important that we all understand very well what our respective roles are in the development and implementation of integrated pest management programs.

Traditionally, the university has assumed three major roles: the generation of new knowledge through research; the dissemination of that new knowledge through our classrooms; and the transfer of technology from the laboratory bench to the farm through cooperative extension programs. For the land grant university, in doing that, we have always had a Federal partner, the USDA through CSRS, and ES.

I would like to discuss each of these roles a little bit before I move on to some suggestions for the Forum. You heard Kathleen express a concern -- and I guess an interpretation -- about an apparent shift in our research at the land grant university. I don't accept her interpretation. I have been at three major land grant universities and in none of those have I seen the scientists who are involved in applied research penalized in tenure cases. I refuse to accept that interpretation.

Where they have been penalized is where they haven't performed. I am getting off on a little tangent here, but I would like to throw back to Kathleen that I have been there. I was a faculty member who scratched for money to support my program. I did not get enough money from Dave Cole.

The issue here is, Where is the money? Kathleen was critical of our scientists going after private sector funds. I encourage our scientists to do that, too, because that is a source

of funds and we have an expectation of every one of our faculty members to contribute to the generation of new knowledge, to contribute to public service through extension, and to perform in the classroom.

The failure is not in the faculty member. The failure is in the system that has not recognized that there is a need to significantly fund applied research and to significantly fund research in the implementation of pest management programs. At the end, I will leave that as a challenge for this group to address.

Secondly, on the research side, I will say -- and I sincerely believe this -- that we have a very strong research network that can serve integrated pest management well as we ratchet up to a biologically-intensive pest management approach. The platform is there, but we don't have the horses.

I appreciated the response to Kathleen by asking the weed scientists to stand up. I will ask you at the end to make an assessment of the FTEs, of the people that are involved in research and pest management. It is astonishingly low and it is declining, at least in the northeast. I haven't had time to talk to my colleagues in other parts of the United States. But at best all we're doing is holding our own. Again, at the same time, we're getting pressures that require increased emphasis in pest management.

USDA shares a role in research in integrated pest management. I want to make sure that I give proper recognition here. We see that as an appropriate role and continue a commitment in research in IPM and certainly USDA does.

Let me move to extension. And extension is certainly a form of education and has long been recognized as the legitimate domain of the land grant university. Like the research side, I believe we have a good platform in place. Historically, extension has served industry's needs and constituents needs very well.

But we may need to reexamine the role that extension plays in pest management. They will continue to play a role in education, but it turns out, if you look carefully at many major land grant universities, extension faculty have assumed some of that applied research that has fallen by the wayside. Unfortunately, I don't feel that the system has gone along and clearly articulated that this is a legitimate shift. We also need to establish extension's role in the actual implementation, that is, the providing of services as opposed the providing of education.

The fourth area that I see as a very important role is the area of applied research and implementation research. I believe that this is the linkage between the laboratory bench and our constituents in the field. Research evolves. It becomes specialized. If you look at what has happened over time in any science, we become more and more specialized as the more difficult researchable questions come on the table. So we have had a natural divergence between the constituent and the researcher. You bridge that gap through the applied research.

I have to echo the question, but I am going to ask it now from the university side rather than from the USDA side. Kathleen asked the question about extension and research in the USDA organization. I am going to ask the question, On the land grant campuses, is

the continued separation of the administration of cooperative extension and research -- has that really kept pace with our needs?

Perhaps we need to reexamine our organizational structure. Perhaps, in fact, that is why we have been criticized for a somewhat sluggish technology transfer.

I would like to mention on last issue very briefly because I am exceeding my time here, which is public opinion. We have had over the 25 years in which I have been involved with pest management a number of constituencies and a number of critics who have expected or perceived the university to take an active role in changing public opinion. You heard a little bit about Kathleen talking about sustainable agriculture, regenerative agriculture, and so on.

I don't accept that as the university's role. If that is agreed upon here, I think we need to articulate that to our constituencies. Our role -- and I appreciated Administrator Reilly's statement -- rigorous science, rigorous education, and rigorous regulation.

Now I am going to suggest four or five items very quickly which I think will help the process of the Forum this week. I am going to encourage you that we must lay before ourselves and before our constituents what it will take to get the job done and to make that quantum leap. First, internally as universities we must agree that applied research and implementation research is a legitimate domain of the university, of the experiment station, and of cooperative extension.

Secondly, internally we must make the kind of organizational changes that allow a closer working relationship between the disciplines necessary to achieve a truly integrated system. In a certain sense, like the Division of Research and Extension, we still maintain somewhat strict discipline lines, meaning entomology, plant pathology, and so on.

Third, we must forge new partnerships and strengthen existing partnerships. We have heard that in previous speakers. I am not going to prolong that discussion, but I would like to point out that there are new opportunities. We in Massachusetts 2 years ago became involved with the ASCS in the integrated crop management program. It was a tremendous incentive for our growers and a tremendous opportunity for us to help further our programs.

Fourth, I truly believe that we need to make an assessment of how many people it will take to get the job done. If we have 10 people and we have 30 years, we will get this much work done. If we have 100 people and we have 10 years, we get this much work done. The amount of work that needs to be done and the pace at which it needs to be done needs to be measured against the number of FTEs that we all have in our universities.

I want to tell you a quick story. I went to Kansas State. We had one person -- one person -- in the entomology department working on wheat insects in a State that produces 400 million bushels of wheat a year, in a State that every 3 or 4 years that is ravished by green bugs, so on and so forth. They have one FTE.

I am not going to share with you the astonishing figures for the University of Massachusetts. I am embarrassed to share those with you.

We need to get that assessment done and we need to share with everyone the resources that we currently have. Then we need to compare it to what it is going to take to get that job done.

That has a second benefit. Many of us -- I look at Eldon, who is the director of the experiment station -- many of us are in the process of planning changes in response to budgets. We are making some pretty tough decisions right now, decisions that can be very critical to integrated pest management programs.

In New England, there is one Department of Plant Pathology left, and that is at the University of Massachusetts. It has six faculty members. That is an astonishing figure to me. I think we may have two people working in the area of weed science.

Fifth, What is the funding basis necessary to get the job done? We at least need to put the number out there. If we know what it is that we want to accomplish, put the figure out there so that people can argue with it, they can say it's outrageous, but we need to put it out there. Then if there is an expectation that is up here, we need to say that the expectation is too high.

I am going to echo the comments of a couple of previous speakers. I was excited by reading the documents that you provided, but your activity cannot stop here. You need to take what you have learned and what you have concluded, and we need to turn that into a platform to convince legislators, grower organizations, industry, and State legislatures that the investment is needed at this point in time.

We heard about a 1995 Farm Bill and we heard about Rio. Somehow we have to come together to impact the funding for integrated pest management.

It may be a cheap shot, but it is curious to me that we spend many times more on cancer research than we do on integrated pest management, and there is a perception -- and I underline perception -- that some pesticides cause cancer. Wouldn't it be wiser to make the investment where the perception appears to be a source?

I think it is very important that you extend beyond this Forum and develop that coalition that can build the new platform for integrated pest management.

Thank you.

[Applause.]

DR. SORENSEN: Thank you, Bob.

I am Ann Sorensen and I work for the American Farm Bureau Federation.

It is my distinct honor to introduce our next speaker, Mr. Fred Finney. Fred is both a Farm Bureau member and he is the farmer/president of the Ohio Farm Bureau.

More importantly, as an IPM producer, he is on the IPM front line. As researchers, regulators, and policy makers we must not forget that producers are the ultimate jury on the success or failure of IPM.

Fred is a graduate of Ohio State University with a B.S. in agricultural economics. He began farming as an orchard foreman in 1971 for the Davis Melrose Company, and in 1985 purchased the Moreland Fruit Farm, which was owned by that company. He is actively involved in both the Ohio Fruit Growers, where he was president in 1985, and the Ohio Farm Bureau where we served as President as President from 1989 until 1992.

Fred, his wife Marilyn, and their three sons grow apples, raspberries, strawberries, grapes, plums, cherries, peaches, pears, and various vegetables on their farm in Wooster. They sell their produce both through pick-your-own and through their own farm market.

Would you please help me welcome Mr. Fred Finney?

[Applause.]

MR. FINNEY: Thank you, Ann. Thank you for inviting me to come to Washington today. It is a distinct honor for me to be here. I feel somewhat at a loss with all the education in the room, but as Ann said, I am the one that gets my shoes dirty every day and I am the one who is going to have to make this work, so be nice.

[Laughter.]

MR. FINNEY: IPM is an integral part of our farming operation and I would hope that it would become more a part of more farming operations. Farmers and growers need to be involved in developing IPM strategies and policies because they are the ones who will ultimately have to make them work.

Today I would like to share with you from a grower's point of view from Wooster, Ohio a few of my own experiences, the policies of the American Farm Bureau, and possibly raise a few questions in the hope that these experiences and thoughts will help in achieving the goals of this Forum.

First off, let me say that there are about as many definitions of IPM out there as there are people identifying IPM. In preparing for this conference, I took an independent unscientific survey of what IPM means to growers, farmers, and agriculture-related people in my area.

To some, IPM is a new magical all-inclusive term identifying a new method of pest control. To some, it is just a new term to identify the production methods and practices that some farmers and agriculture producers have been using all along, putting the control where it is needed. To some, it is using genetically engineered biological predator insects to control harmful insect pests on growing crops. And to some farmers, it is the deathly fear of suddenly being forced into growing crops without pesticides. There is no uniform definition of integrated pest management. Maybe there can't be a specific definition, but we need a more uniform understanding of what it is about which we're talking.

I agree with Dr. Glass in his chapter on constraints in the food crop pests and environment that we can get bogged down in specifics when we talk about definitions of IPM and that IPM is more a strategy than an exact science or an exact methodology. And therein lies one of our major obstacles. Many people are using and discussing IPM, but we're all on different wave lengths. Everyone has a different perception of what IPM really is.

I believe that any discussion of IPM should include the concept of coordinated use of cultural practices biological, genetic, and chemical methods to produce a commercially acceptable product, whether that be a bright red apple or a nice green lawn, with minimal risk to people, property, and the environment. Someone I am sure can write an eloquent definition, if indeed we do need a definition, that would satisfy our needs, but it needs to be

short, to the point, and communicable. Farmers are not going to read a full paragraph definition and comprehend that and talk to their neighbors. It is going to have to be short and to the point.

I started in the fruit business as a student of the standard protectant, follow the extension bulletin and calendar, complete chemical control philosophy. My teacher, the orchard manager where I started, operated with the idea that if a little bit was good, then a little bit more was a whole bunch better. I questioned in my own mind at the time whether all that pesticide application on a rigorous scheduled was really necessary, but the results were acceptable.

It seemed to me at the time that there ought to be more of a reason to spray than just because the extension bulletin and the calendar said to do so, but that was the way it was 20 years ago. It was very difficult to switch from that proven program that provided the results for which my superiors were looking, even though I questioned whether all that pesticide application was necessary.

IPM is management-intensive. In fact, IPM could very well be defined as intensive production management with management being the key word. It is a total systems approach to pest control and crop production. Very often, the standard protectant spray-by-the-calendar program is easier to schedule and somewhat more cost-effective than intense management and targeting that goes with IPM. The more intense time management involved in IPM many times is not balanced by the savings in pesticide purchases or application time.

This might very well be one of the major constraints to widespread acceptance. Sometimes it is just easier to go out there and spray when the weather is fit than it is to wait until the insect counts meet threshold levels.

One of the most difficult parts for me about switching to an IPM program was the first year when you just know that you should be out there in the orchard spraying but the insect counts and the weather conditions don't call for a pesticide application. I call that switch the leap of faith, when all of a sudden you now put the outcome of your entire crop in the hands of an IPM scout and someone's table to insect threshold levels, or the information of a mini-computer in the orchard or the crop field.

Our scout was in the orchard yesterday and handed me the sheets. He said that I have on the average one mite per leaf, and according to the charts, we don't even have to look at them for 2 more weeks. I know that isn't true. I know we're going to have to be checking for mites in the orchards in the next 3 or 4 days, but I am putting my faith in somebody's chart there.

Today on our farm, the same farm where I started 20 years ago which my wife and I now own, we have evolved towards an IPM approach in our fruit and vegetable production. IPM really is an evolution rather than a complete switch of farming practices. There is a graduation from one level of learning to the next as you gain experience and confidence in each new concept or program.

I should probably add here that we grow 15 different fruit crops, 30 different varieties of apples, 10 different vegetable crops mostly for our farm market and pick-your-own, but

some for processing. We have actually been using IPM practices really all the way back those 20 years, but we really didn't identify them as such.

For a 10-year stretch there, when we were doing that spray-by-the-calendar extension bulletin program, we didn't use a miticide. So the predator mites were out there working. We were doing something right, but we didn't know what it was. We moved toward more IPM programs and strategies because of questions in my mind as to whether all these sprays were really necessary and whether there was a better and more cost-effective way to grow our produce.

Since the Alar fiasco, our customers have asked more questions about our production practices such as whether we spray our produce, with what we spray, or if they need to wash the produce with any special cleaner to remove all the pesticides. All these are legitimate questions, but we were never asked before. Now we have been put on the defensive answering questions about our production practices where in the past we as growers were perceived as doing a good job of producing a safe wholesome food supply. There was no question that everything we sold was safe.

Probably the single biggest reason we changed from a traditional preventive type program towards IPM was trying to save on input costs. I would not purchase any pesticides if I could produce a commercially acceptable product without them, but the crops that I grow and the climate of the eastern United States just do not allow me to do that. However, we have discovered that in most years with IPM programs we can reduce the amount of pesticides that we apply.

I don't want to lead anyone to think that I am an expert in IPM or that we employ all the IPM strategies available on our farm or even all the programs available on any one crop, but we are gradually working toward that end. We presently are using a crop scouting service for our vegetables. We are using extended protectant spray programs along with a scab predictor disease program in our apples. That disease predictor really is -- and probably most of you are familiar with those -- a microprocessor collecting environmental data located in the orchard.

We are using IPM guidelines for petritis control on strawberries where we use an intensive fungicide spray program during bloom. And then once we start harvesting fruit, we spray no more. There was a tremendous leap of faith in that operation when I knew darn well when it was raining during harvest that I ought to be out there spraying. But we have been on that for 3 years now and we don't have a petritis program. But you have to get it at the right time. There is a window of opportunity there that is about 6 hours long on lots of different days and you have to be right there.

We are using crop rotations. We are testing a relatively new pheromone mating disruption product, Isamate GBM, for the control of the grape berry moth in the vineyard.

Scouting is a necessity for IPM. Scouting takes time. In most operations today, scouting is done by the grower or one of the farm family members or by a scouting service. As more scouting services and consultants become available, both private and through grower cooperatives and processors, IPM use should increase. Our scout visits the farm once a week and checks the crops for insect damage, insect counts and traps, and disease

infestations on the crops and leaves us a report of his findings and recommendations for control. We then spot-check during the week.

Scouting and IPM will not always eliminate pesticide applications but should closer target them to where they will be more effective. An often misquoted conception about IPM is that it will save time by eliminating unneeded pesticide applications. That is partially true, maybe. Actually we find that we need to be ready to apply needed materials on a quicker basis than if we were on a standard program, as the need arises or as the weather conditions change rather than on a calendar time schedule.

My farm is only a few miles from the Ohio Agriculture Research and Development Center and I have the privilege and the luxury of access to their apple scab predictor. This microprocessor monitors the environmental conditions constantly and records them in its memory. It measures rainfall, relative humidity, temperature, and leaf wetness. It is programmed to calculate the data gathered from the sensors and predict the optimum conditions for disease infection.

Insect damage is something that you can see readily by observing either insects in the orchard, stings on the fruit, or holes in the leaves, but disease infections occur sometimes 10 to 14 days before any visible damage can be observed. In those instances, we need to monitor the environment to determine when conditions are conducive for infection or spreading of a disease.

This predictor has saved me as many as three fungicide applications in one season because according to the data it gathered the conditions that had occurred were not conducive to infection. Those same conditions, though -- and I know twice I can remember that those were all-night rains -- when left to my decision would have led to curative applications that very next day. This is that giant leap of faith when you suddenly change from a strictly preventative protective program that you know controls the disease to one where you monitor the environmental conditions and use that data in a decision-making process to determine if and when to apply protective materials.

Let me add on that, too, that in that particular process I can't use that predictor without two products -- and there is a third one on which DuPont is working now -- the sterile inhibited fungicides. If I didn't have them, which have a 4-day reach-back on apple scab infection, I couldn't use that. I would have to go out there with a standard protectant program and have that stuff on there before the rains instead of after. But those products, along with that scab predictor, give me now 4 days after the beginning of an infection period to get in there and apply curative materials.

One of our concerns for several years in our grape production has been visible pesticide residues on grapes sold for table use. Dark-skinned grapes will show a residue as long as 75 days from application.

We have been using an IPM strategy for intense fungicide application through bloom for black rot and mildew and then no more fungicide applications. To control the grape berry moth, we have been experimenting with a pheromone mating disruption product so that we might totally eliminate insecticide applications on the grapes.

It doesn't work yet, but we are working on it. In fact, if I had to purchase that, I would be on a spray program because the cost -- and that is one of the points I would like to make. IPM programs have to be cost-effective for the farmers to use them. At this point, that pheromone disruption device is not yet to the point where it keeps the grape berry moth out of the vineyard. We have, though, cut four insecticide applications down to two. So the combination there of reduced pesticide applications plus the biological control is working.

As these kinds of things develop and as growers gain more confidence in their use, and if they remain cost-effective, I can see a widespread acceptance. However, we need to remember that IPM strategies need to be economically viable alternatives for growers to accept them.

Now let me shift to the American Farm Bureau for a minute. The American Farm Bureau Federation is a general farm organization representing nearly 80 percent of the growers in the United States. In fact, in Ohio, the Ohio Farm Bureau members farm 92 percent of the farm land in Ohio. Our policies are developed by our farmer members starting at the county level, going through the State policy development process, onto the national level, our American Farm Bureau annual meeting, which is held in January of each year.

These policies are discussed and voted upon by delegates selected from each State and then incorporated into our policy book. I think it is important to note that our members make our policies and they review those policies each year.

Agricultural chemicals first appeared in the policy book in 1970, along with a statement on biological control. It read, "We support expanded biological pest control research to determine where biological pest control measures can be used as practical and feasible substitutes for chemical controls." The following year, the policy was amended to urge users of pesticides to be aware of the dangers involved and to conform to recommended usage. The recognition of problems related to the use of agricultural chemicals and the support of biological control have appeared in every policy book since 1970.

The Farm Bureau's policies on IPM can be traced back to 1986. At that time we added two more statements to the agricultural chemicals policy. The first expressed support for IPM programs. "We support the environmentally and economically sound concept of integrated pest management." The second recognized a need for environmentally benign chemicals. "We encourage continued research and development of pesticides which are more rapidly biodegradable and less environmentally persistent."

Later that year, Farm Bureau president, Dean Cluckner appointed a study committee to look at ways to improve net farm income. The report published in June of 1987 strongly endorsed adoption of IPM as a way to improve net farm income. This also led to the expansion of support for IPM in the 1987 policy book and to the development of a separate policy in the 1988 book. Since then, the policy has been refined and revised each year by the delegates and has been designated as a priority issue by the American Farm Bureau board of directors.

The current 1992 Farm Bureau policy on IPM reads: "We support the widespread promotion and use of integrated pest management as a method of reducing costs, risks,

liability, and total dependence upon farm chemicals. IPM can reduce risk or output loss, the per unit cost of production, and liability from chemical damages. IPM is a defensible use of pesticides because it focuses use where problems have been identified.

"We encourage continued research and development of pesticides which degrade more rapidly, are less environmentally persistent, and are compatible with accepted IPM practices. The loss of environmentally benign pesticides for specialty crops through the reregistration process will weaken IPM efforts. We urge the Environmental Protection Agency and USDA to consider these impacts and seek ways to minimize their effects. We support the removal of pheromones from the pesticide classification in order to permit, expedite, and encourage their usage."

I was going to bring one of those pheromone disruption ties with me today, but I forgot to grab it out of the vineyard. When they brought that out to our vineyard for the first time, I said, "Is this cleared yet for use?" They told me that we had to have 2 years of residue data. We are talking about a piece of material that is like the thing that you tie the bread with on a plastic bread bag wrapped around the wire on a trellis. You folks are probably a lot more intelligent than I on some of this residue stuff, but you tell me how you're going to get residue on grapes from something like that.

That is why we have in there to take the pheromones of the pesticide classification, so that we can increase some of this and speed it up a little bit.

"We support increased biological pest control research to determine where biological pest control measures can provide practical and feasible substitutes and supplements to chemical controls. We support a beneficial insects category in USDA competitive grants program. Expanded educational programs are needed to encourage widespread adoption of IPM. We recommend the addition of IPM instruction to pesticide applicator training programs.

"IPM should continue to be a budget priority for USDA and land grant institutions. They should expand their research and development of IPM techniques on a regional basis."

This is our policy as developed in January of this year. I would venture to say that it will probably be further enhanced at our 1993 annual meeting in January.

The number of growers using IPM varies by regions of the country and crops grown. IPM varies by region, by farm, and sometimes by soil type on each farm. In Ohio, most of the fruit and vegetable growers use some form of IPM in their productions program. Most have greatly reduced their pesticide application rates. In fact, I don't know of a fruit or vegetable grower in Ohio right now that uses the full label rate on any pesticide on any crop.

Let me say again that if I could grow my crops without buying any pesticides, I would do it. My fertilizer and pesticide expense together is my third largest cash outlay each year and it would be a relief not to have to write that check. Pesticides, though, will remain an important part of any IPM program. I know of no predator programs so far that will remedy an insect explosion.

Minor-use pesticides will need to remain available if for no other reason than as an emergency backup to other IPM controls in case of an outbreak. It might be the security

blanket in the hip pocket of a lot of farmers if they know that that pesticide is still available when they switch over and use more IPM practices.

Minor-use is very important and let me tell you that I grow a lot of minor-use crops. There are only two fungicides available right now for raspberries and one of them has a 10-day PHI, pre-harvest interval. So if I have a disease outbreak during harvest, that one is not available because you have to pick raspberries when they are ripe. You can't let them hang on there for 14 days.

Registrations need to be kept up-to-date so that products can be made available when needed. IPM objectives should provide a commercially acceptable product and maintain a commercially acceptable level of insect and disease control on a consistent year-to-year basis with minimal pesticide use. This will require the integration of pesticides, cultural practices, resistance, and biological control. Each of these four integrate with the others in varying degrees depending upon the crop, the region, and in some instances different areas of the farm.

For instance, certain apple cultivars right now are totally resistant to apple scab, the number one apple disease in Ohio. Therefore, no fungicides need be applied to them. However, these cultivars are not widely accepted as culinary delights.

[Laughter.]

MR. FINNEY: In this instance, do we have a commercially acceptable product, or will we have to change the eating habits of the consuming public?

Cultural practices, such as summer pruning on apples and strict weed control in strawberries, will greatly reduce the potential of certain diseases by allowing better air circulation, thus eliminating some fungicide applications on them. We don't really have any commercially acceptable biological controls yet for many fruits and vegetables.

As I was writing that, I had to think -- I live close to the Ohio Agriculture Research and Development Center and a lot of those researchers use my farm as an extension of the research farm. So I just happened to think on the way in here today that there is a biological experiment going on in one of my strawberry fields right now. They have been growing wasps in the laboratory and they bring them out and release them to see if they will keep down the strawberry sap beetle population. That project as been ongoing for 2 or 3 years now. So maybe we will have biological control in strawberries shortly.

Research of biological control and the interactions of different insects needs to continue to expand IPM acceptance. Let me raise a question here, too. Are biological controls always going to be better than chemical controls? Have we looked at human tolerance and threshold levels for moles, crop diseases, and insects? I think we're assuming that these will always be benign, but do we really know that? I assume that biological control will not result in mutations to resistance, but do we really know that?

Several other questions I would like to raise. Are we moving toward an IPM certification? If so, are we going to certify the product, are we going to certify the grower, or are we going to certify the farm? Will there be pesticides available for minor crops if an

extreme outbreak occurs, for whatever reason -- the weather or introduction from other areas?

Right now, I have a terrific disease problem in raspberries that is called orange rust. There are no chemical controls for orange rust. There is no pesticide. In fact, I plowed down one raspberry field this year because it had too much orange rust in it to make it commercially acceptable. We rouge out the plants that have orange rust, but it took over this whole field so we had to plow down the whole field.

Can we develop, maintain, and analyze a database on IPM using grower data? I am sure there are a lot of growers out there that have data we could put into a database and utilize. This might be a key in developing and promoting IPM.

Will there be available -- and I wish Mr. Reilly was here -- will there be available a spokesman who can speak with authority when someone raises questions about certain pesticides or production practices or IPM, especially if all of a sudden someone decides that one of our approved pesticides or IPM strategies is more dangerous than Alar and decides that 60 Minutes ought to know?

[Laughter.]

MR. FINNEY: This is very frustrating for me as a grower. I am certified to apply pesticides. I follow the label approved by EPA. Then all of a sudden someone decides that there might be a potential problem with this material or practice and the media picks up the story of potential harm to the food industry. Now back in Wooster, Ohio, I have a crop that is worthless. What am I going to do?

We, as growers, scientists, processors, and consumers, need an agency or authority, whether it be EPA, FDA, USDA, or someone else, who can and will step forward as questions arise about food safety, specific pesticides, or IPM that will say that this food is safe, or this product or practice is safe. Yes, they did come forward in the Alar incident, but after a $200 million devastation to the apple industry that year.

We don't need another Alar incident. I was on the front line of that issue. I know and can tell you from experience that we don't need to go through that again.

With further research and with the current Federal budget situation, I would look to the Government for only the most basic research in IPM and hope that we could create an atmosphere conducive to private companies and private institutions doing the research and development of IPM practices and techniques. With more education through the Extension Service, I feel we can reduce our use of pesticides.

Ten years ago, I could not have made that statement, but I have been a part of the evolution of IPM. I have seen what it can do and can imagine what could be possible in the future. If we could eliminate all pesticide use, it would be a tremendous savings for all of us, but so far that is virtually impossible. The alternative, though, is to integrate pesticides, biological controls, resistant cultivars, and cultural practices to provide a commercially acceptable level of pest management and a commercially acceptable product. And we can do that.

IPM is really a production philosophy, a total systems approach to crop production. It is really an intense production management strategy. It is not an exact science like pesticide use. It is a learning process rather than reading the label and applying 2 pounds to the acre type of approach.

Growers need to be involved in the development process to help gain acceptance in the growing community. IPM promotion should be a team effort throughout the food industry. It feels right now like there is more of a team atmosphere in the food industry now than ever before. Growers still grumble about prices, processors are never pleased, laborers are never happy, but we don't have any major nationwide strikes or boycotts as in the past. Maybe IPM promotion can be a team effort. It certainly would make it easier.

Keep in mind, though, that IPM will need to be economical and cost-effective for widespread acceptance by growers, especially in non-program crops. There is no leverage on the non-program crop grower as there is in the feed grain and program crop grower in the Farm Program.

There are enough variables in the crop production arena now -- temperature, too much rain, drought, ice, snow, hail -- many growers in the past have chosen the route of least resistance in pest control, and that is to spray by the extension bulletin and to spray by the calendar. IPM needs to be user friendly, cost-effective, and practical. Remember, farmers are stubborn, farmers are slow to change, and whatever we do, we need to remember that ultimately the farmer and the grower are those that have to make this IPM thing work.

Thank you.

[Applause.]

MR. JOHNSON: Thank you very much, Fred.

We have had a very interesting and stimulating first half this afternoon. We would like to take a 15-minute break and will reconvene at 3:45. Please take advantage of the poster session that is set up outside in the hallway area.

[Recess.]

MR. KIRK: It's a pleasure to be here. I am not sure whether I ought to talk as a farmer or as a chemical representative, but I will try to work back and forth across those since I work in both areas quite a bit.

It is an honor and a pleasure to be here on the forefront of pest management and the techniques that are being developed as we go forward. It is a privilege to share my perspective on how the agricultural chemical industry can set the agenda and help participate in that process for agriculture in the 21st century. My views have been molded by a lifetime in agriculture going from things like hauling manure and pulling cockleburrs, some of the jobs that were not so good, out as a farm boy in Illinois.

I have been with DuPont now for 28 years and that experience goes across agriculture as well as into other areas like polymers, corporate planning, and employee relations in

terms of experiences. These have been productive years for me, both as a developer and seller of products that have helped make this country one of the most cost-effective and safest food producers in the world and I look forward to continuing to contribute to that as we go forward.

More importantly, my feelings about agriculture are on a deep well in terms of emotions. I love the land, I love agriculture, and I expect that my children will have a safe rural environment in which to work and live and their children after that.

It is because of these feelings and my experience that I believe that the ag chem industry is an essential and significant contributor to helping develop economically viable and environmentally sound agricultural systems for the 21st century. It is my hope that within the efforts, cooperative setting here, and the talk about partnerships that I can clearly demonstrate that we can contribute to this effort.

In many cases it is perceived that ag chemicals are the problem, but I would suggest that the industry, with a lot of help, can also be a major part of the solution. This industry spends at least $500 million on research in the United States and over $2 billion in the world. I know that ourselves -- we are learning. In the last 5 years, we have changed significantly. We have gone now to where about 15 percent of our R&D budget is in things like biotech, new diagnostic tools, and plant breeding with biotech as well as viral materials.

So we are trying to learn to integrate these into systems that will be effective. We are nowhere near there. We have a huge distance to go, but we have started on the track as we have moved along.

One of the things that we did about 3 or 4 years ago as a leadership team in our business is that we set a vision for our business that in simple terms we would be a partnership with nature. So we measure everything we do in our business against that kind of a vision for the future.

While I come here today as one representative of the ag chem industry, I can assure you that the leadership teams throughout the industry are trying to change. They are changing their measurements, their metrics, and the things they are trying to accomplish. This is difficult at times. Of course, in an industry that is going through a lot of change in terms of rationalization and resources and changing from probably what is generally accepted from about 30 some odd companies in the world to less than 10 over the next 10 years. So there is a lot of change occurring there as we work at that.

No one in this room is unaware of the tremendous challenges facing agriculture. Let me review a few of them just to make sure that we keep the broader holistic kind of view of the world as we look at things.

The scope of the problem demands that you have a solution that fits the same kind of scope as you go forward. When you look at population, you have a tremendous challenge which we all face in the world going forward. It is not an American problem, but it is a global problem that we face as population continues to grow at the rate of 95 million people per year. And as we move from 5.4 billion people up to a point where we will have about 8 billion people by 2020.

When you say 8 billion people, you in effect have probably raised twice as much food at that point in time because while the population doesn't double, the developing countries want a better quality of life. They would like a better diet than they have today. There are an awful lot of people who go to bed hungry and we as a society have to find a way to contribute to that on a longer term basis.

The world food reserves are only 45 days. In a resource that is critical, that is not a lot of food reserve. We have to make sure that we develop systems that will allow us to supply food and make sure that we don't end up with shortages in various areas of the world.

There is a limited natural resource base. For example, in 1960 about 1 acre of crop land was available to support the food and fiber needs of each person. Today there is three-fourths of an acre, and within 30 years there will be less than one-half of an acre of land available out there for producing the food for each person.

In addition, as someone indicated earlier, weeds, insects, and diseases continue to hold their own. While we work hard to manage those pests so that we can grow the best crop possible, it is still a major battle as we work through pesticide control programs.

I think another thing that is worrisome at this point in time in society is that we had a contract between society and agriculture as a condition of doing business over the years, and that is breaking down. Even though the United States provides a significant percentage of the world's food supply, and even though it is the most abundant and cheapest and the safest in the world, agriculture is looked on with suspicion at this point in time.

All of us -- Government, growers, ag chem companies, food processors, environmentalists, and scientists -- are experiencing serious questions about our motives and actions. Do we have the public's best interest in mind? Are we hiding information? Are we driving solely for profit? Are we throwing untested technology at agriculture without concern for the environment and health?

The suspicions on the part of the public are coupled with an almost startling lack of agricultural knowledge. There was a study about 7 years ago by the National Research Council's Committee on Agricultural Education that said that most Americans know very little about agriculture and its links to health and environmental quality. During the last 7 years it has not improved at all.

In essence, the complex and challenging question facing agriculture in the 21st century is, Can we produce safe, abundant, and inexpensive food on limited land for more people while preserving the environment? Our answer is a resounding yes. As you look at the overall sustainable agriculture approach and IPM, we think that we can do that as a society. We all have to learn -- and that includes DuPont and my business -- to be a contributor to that effort.

What does DuPont, as a member of the ag chem industry, mean by sustainable ag? As indicated earlier, there are a lot of definitions for sustainable ag and IPM. We support the Agronomy Society's definition of sustainable agriculture as a practice that protects the environment, sustains a resource base, provides flexibility, creates economic viability for farmers, a reasonably priced product for consumers, and enhanced quality of life for all.

This means that we must take a holistic view of sustainable agriculture in which agriculture is productive, socially acceptable, economically viable, and environmentally sound.

These four components must work together to thrive and achieve a balance, an integration, a sustainable system that will be on the farm at both national and international levels, to be able to provide safe and abundant food. The framework that binds these components together is good public policy together with science and technology.

What does a sustainable agriculture require? I think first it requires creating value and responsibility of the farmer to be the steward of the land. Creating that ethic that has been there for many generations and continuing to build upon that is the first stone for the foundation.

Secondly, broadly sharing knowledge within the ag community about better farming practice is necessary. Here we discussed earlier the critical nature and the need to network and partner together to be able to share that knowledge throughout.

Third, we need to examine trade subsidies and barriers that destroy historic free agricultural trade. I have been in Brazil, Hungary, France, and the Ukraine in the last 6 weeks. I can tell you that that is a major issue, as many of you know, in agricultural production and how these countries that are in the developing category can develop.

Fourth, we need to encourage increased food production on existing farm land while preserving the natural ecosystems.

Fifth, we should support tailored research to develop and communicate pest management practices.

Sixth, we need to develop new tools in making better use of established ones to meet social, environmental, and economic challenges. The word tool is an important one. We at DuPont see ourselves as essentially in the business of providing tools to farmers so that they can protect their crops and raise a crop that you as a consumer would be happy with.

Our primary tool in the past has been crop protection chemicals. As we go forward, you can see from this representation that we envision a farmer's toolbox of the future to hold many opportunities and many alternatives to be able to provide effective pest control. Some of them are cultural practices, crop varieties, natural enemies, diagnostics, biotechnology, agrichemicals, biologicals, and expert systems. We are working on many of these tools in DuPont now.

I think probably the only area in which I would deviate much from a few of the speakers earlier this afternoon is that I'm not sure we have seen the safest chemicals in the world yet either. I think that if you go back to the 1960s, we have made terrific progress in where we are at today. I will just show you an example. This is a placebo, but I show you the kinds of things that are happening today versus in the 1960s when we putting 4 pounds per acre on.

Today we are putting things out like a tablet like this that treats 4 acres with some of the newer generations that are coming out. A few weeks ago, when I was in France, I looked at two new chemicals that were used at 5 to 12 grams per hectare, or 2 to 5 grams per acre, to control weeds in cereals and corn.

Chemicals are going to continue to improve, but likewise other new technologies are coming into play like biotech and diagnostics and other tools. I don't really care too much which one of those technologies win as long as I can play in those technologies. I think what will happen is that we will end up in integrated systems that will involve a little bit of all those tools to provide the safest most effective control of pests in markets out there.

Nor do we see the toolbox as being inclusive, excepting that the sustainable agriculture model means accepting flexibility to new ideas and technologies. What we do know is that integrated pest management is a vital strategy in putting these tools to work in sustainable agriculture.

Before I talk about future tools, I would like to take a few moments to discuss the development of new products and new tools and the kind of things we go through to try to develop safer and better compounds all the time. I will use an example later here in a moment when I do that.

The search begins for the pursuit of an ideal molecule. We believe the ideal molecule from a chemical standpoint has some of the following features: that it is cost-effective; flexible; reliable; and environmentally acceptable. It should have a low use rate so that the environmental load -- when you go from materials used at 4 pounds per acre down to where you are using 2 to 5 grams per acre you are talking about a dramatic change on materials that at the same rates would have the same or safer environmental and safety aspects even at the same rates. So you are talking about a dramatic change in the environment.

It should leave no harmful residues in the treated crops or the environment. It should be target specific and easily integrated with best management practices.

Moving a new molecule into development is a very costly and some of the most critical decisions in our business. We're talking about 5 to 8 years in order to get a new product developed from synthesis to the marketplace and we're also talking about $60 million before you decide to build a plant. You have a lot of risk involved because a lot of your toxicology studies don't get completed until you're toward the end of that time frame. So there is a fair amount of risk involved in that operation.

There is actually currently more than 120 health, safety, and environmental tests involved in testing as we bring a new molecule out. We have changed a lot from the 1960s when the Secretary talked about the need to basically get a biological recommendation as a requirement. It is a much more stringent process at this point and much more rigorous, as he indicated. These include both long-term and short-term toxicity tests, breakdown on the environment, residues on food, and various metabolism and environmental studies.

In addition, many biological tests must be conducted such as field performance trials under a wide variety of soil and environmental conditions and with mixtures with other products. We have to pass all those tests before we move into receiving a registration.

I would like to take a moment and talk to you about one of these new step change generation materials that we have developed here just in the last couple of years. We feel it is an especially good fit. Earlier a product was mentioned that we have in the fungicide area that was going to be a good tool for IPM, a fungicide called NuStar or Punch that is being developed. But the one I am talking about now is a herbicide in corn.

In the last 10 years, we have introduced about a dozen new products that are being used at extremely low rates like the sample I showed you. These are now being sold in corn, rice, soybeans, wheat, and several markets. The product is used at an average of 1 percent of the rate of the previous standards that were used. There have been tens of millions of pounds of products displaced by these new materials in terms of weed control.

This product that I would like to mention is Accent. It is one of those dozen new products and is being used in corn as a post-emergence weed control product that you put on if you do have enough weeds. You don't put it on in a preventative method, but you put it on after the corn crop is up and if you have enough weed pressure. It is used at low rates and foliar applied. It is very a very effective tool to use in an IPM sense.

As I indicated earlier, we don't believe that chemistry is the only route to IPM. We believe that all the tools that are there -- and we are only learning. I would say that we are 3 to 5 years into it to where we have been incorporating a lot more of the IPM tools in our research effort to develop new tools for agriculture.

Here are some of the efforts by DuPont at which we are looking. We are looking at crop and insect resistant characteristics that will help protect against pests. We are looking at insecticidal viral products -- natural enemies, you could say -- that we're using. We are developing one currently that will be used in controlling insects. We are looking at new processes for manufacturing B.t. that will improve the activity and effectiveness in controlling insects in fruit, vegetable, and cotton crops as well as in soybeans and alfalfa.

We also have specially developed varieties of crops to meet processor or consumer needs. These could include such things as corn that converts into more ethanol, higher oil corn which will add energy to the ration for feeding livestock, and also things like healthier foods for humans with less cholesterol, changes in the fatty acid ratios, things that can make the quality of life better as we go forward.

In addition, our efforts are aimed at determining better product formulation, packaging, and delivery systems so that the safety to workers and applicators is improved. We are looking at eliminating dust, splashing, and drip problems; to reduce total packaging waste; to develop packaging that is biodegradable, recyclable, reusable, and disposable in an environmentally acceptable way; and to ensure on-target application.

To date, we have had success in all of these areas and I have already shown you an example of the product for the tablet kind of thing. We also have water soluble packages where the whole package can be put in the tank and no one ever be exposed to the chemical in terms of application and new techniques in that area.

We have introduced container recycling projects in agriculture and we are taking those containers back into some of our soybean herbicide containers and recycling about 25 percent of the plastic into the new containers that are made the next year.

In addition, we are trying to place more capabilities in the hands of growers through the development of diagnostic tools that will allow them to identify disease levels in the field. They will be able to determine whether -- because a lot of fungicide applications, unless they are in IPM, tend to go in on spray schedules as preventative -- diagnostic tools have been developed. We developed one for eye spot in Europe or what we call foot rot in the

northwest in wheat where you can check the infection levels to determine whether you need to treat it all or not.

We have developed that. We have introduced it in Europe and France and it is finding great value in the marketplace there. We are cooperating very closely with the research institute there that is called ICCF in France. That has been very effective in terms of being able to reduce the number of applications.

These tools are all foraged through science and technology. Equally important are the support and education programs that contribute to make sustainable agriculture a reality. DuPont, like many of our fellow ag chem producers, is actively engaged in education and training efforts that provide environmental stewardship and worker safety.

I will list a few examples. We are one of the early leaders in the Alliance for a Clean Rural Environment, known as ACRE, that promotes water quality through education and the careful monitoring of the groundwater resources. We are also active in the Ag Council America's food watch program, which educates consumers about food safety. We work with key farmer trade groups, such as the American Soybean Association, the National Corn Growers Association, the National Cotton Council, and others, to send hundreds of young farm men and women to leadership training seminars.

I can tell you that I personally participate in these. I can also tell you that the things we talking around, IPM, they are very much out front in that area. One of the young farmers we had from the Soybean Association last year on the leadership program, John Wilson out of western Tennessee, as a matter of fact this week is having a groundwater program there and a tour of some work they have put in there of about $5 million to be able to understand the groundwater situation and mange that properly.

Another one of which we are extremely proud is that we have developed an environmental respect award. This is an award that we developed about 2 years ago that we are giving to dealers or retailers around the country. We have built a checklist and an audit and a judging kind of situation that sets new and much higher standards around storage and handling of crop protection chemicals out in the marketplace. That has been very successful. We will be here in Washington in late July to present both the regional and national winners here of that award.

With the USDA, EPA, and several research and environmental institutions we are launching an on-farm research demonstration and education project on sustainable agriculture here on the east coast. More specifics on this project will be released in the upcoming months. In addition, we will continue to host national conferences on sustainable agriculture in which stakeholders from agriculture, industry, environmental groups, academia, and Government will gather to work toward a common agenda.

All of these efforts have one common value: a respect for partnership, a respect for working together in developing a vision of where agriculture should be 20 or 30 years from now. In DuPont, we spend about $200 million per year on research for agriculture. I want to make sure that I understand what society, farmers, and our customers are going to need in the future 20 or 30 years from now so that I deploy that research money in a way that is effective for society as well as our shareholders.

So I am very much supporting the work around IPM and the dialogue that goes on here. I very much encourage the very diverse group of people here to help set that vision and to work together in a partnership way to try to develop where the future is going to be so that we work then on the details of the agenda.

As we work on the vision of the future and the past to get there, we must focus on the components of a sustainable agricultural system and avoid undue preoccupation with fine-tuning of the individual parts. It is, after all, the integration of the parts that holds the promise for the future. We can no longer afford the luxury of time. In other words, we have to get on with it, as was said earlier. The future is now. If our children are going to have the same quality of life that we have had, we need to move on.

Thank you very much. It is good to be with you.

[Applause.]

MS. HOPPIN: I am Polly Hoppin with the World Wildlife Fund. I understand that we're going to put off our perspective from the food processing industry until the last presentation and move the environmental perspective up. So I am here to introduce to you Maureen K. Hinkle, who is the director of agricultural policy at the National Audubon Society.

Maureen represents or embodies a shift in the environmental movement, although she did it about a decade before many of the rest of us did. The environmental movement is evolving to include entomologists as well as toxicologists, people trained in disciplines that are relevant to the issues we're discussing today.

The environmental movement has traditionally challenged assumptions and pushed people forward in thinking through the critical questions and the possibilities. We now integrate some experience and some cutting edge research with that tradition of challenging assumptions.

As organizations, our research spans from in-depth interviews with farmers in Central America exporting to the United States, results which inform food safety as well as economic development strategies, or our scrutiny of 50 percent reduction programs for pesticides in Denmark, Sweden, and the Netherlands --research my organization has carried out -- to examination of the economics under different scenarios and different accounting systems of agricultural production systems which have been carried out.

It is fair to say that environmental organizations, in addition to pushing the agenda and asking challenging questions, are increasingly providing information and knowledge. Maureen embodies both of these things.

Maureen knows agriculture. She has published extensively on chemical impacts, broader agricultural impacts -- such as vegetative manipulation, conservation tillage -- she has published on agricultural policy issues, and on biological controls. She is on a number of boards, including the CARE Center for sustainable agriculture, she is on evaluation teams, she has served on Federal advisory boards, on industry panels, and has testified numerous times before Congress. She has made presentations internationally in Hungary, the former Soviet Union, Denmark, Africa, France, and Belgium.

Environmentalists today have been praised and applauded, as in Administrator Reilly's reference to Rachel Carson. We have been criticized implicitly for our poor toxicology and for our tactics in the Alar scare. We have been identified as constrains in the executive summary to the paper you all received, both lack of public pressure for IPM and pursuit of an extreme position advocating totally organic agriculture.

I hope Maureen will put some flesh on the bones of some of these comments about environmentalists and their role, and that she will provide us a charge as we move into tomorrow.

Maureen Hinkle.

[Applause.]

MS. HINKLE: Thank you, Polly. And thank you all for asking me to share the thoughts, concerns, and hopes for IPM with you all.

Thirty years ago, as Administrator Reilly said, "Silent Spring" launched the environmental movement. It put USDA in topsy turvy position and their phones rang off the hook for 2 solid years. At the end of that time, however, the appropriations for agricultural research was increased 32 times. Most of that appropriation went into pesticide residue laboratories. The lesson there is that sometimes controversy can help you. You should not reject or be too defensive about controversy. It might help you to get more money. As there is more competition for money, then that may be used to your advantage.

The environmental movement was launched in the decade of the 1960s. By the end of that decade the new Environmental Protection Agency was formed and a whole spate of environmental laws were enacted. One of those was the Federal pesticide law which was enacted 20 years ago. As everyone knows, in 1970 the pesticide authority was transferred from USDA to EPA. Then the new pesticide law was supposed to give EPA new comprehensive authorities to get a handle on pesticides.

I would like to think of the 1970s as the golden age for EPA. It was during that decade that EPA was very aggressive and did implement the mandates that were given to it by Congress. They took action against most of the chlorinated hydrocarbons. Despite the removal of these chemicals from farmers' use, production burst at the seams, farmer income went up progressively throughout the decade, and we had an era of prosperity.

This was also the golden age for IPM because in 1972 this was the year that EPA and the National Science Foundation got together and formed the block funded, multi-year, multi-university, multimillion dollar IPM project that ran throughout that decade. At the end of that decade, however, OMB, in its infinite wisdom, decided to give IPM to USDA. It is my view that IPM became bureaucratized in the 1980s. Also in my view in the 1980s EPA got bogged down in the reregistration process and has yet to recover from that.

It is not EPA's fault, I should say. Congress gave it additional mandates every year and less resources and less funding to do so. Similarly, with IPM, IPM was given less funding and never again reached the major focus and the emphasis that was placed on it in the 1970s.

In the 1980s, I started working on the Farm Bill. I decided that that is where the action is. So we as environmentalists decided to target environmental problems and to insist on environmental performance. Our thesis was that the dollars will flow. I think that we proved that. In 1985, we were able to put into law the conservation reserve program. Within the first 3 years of that program, we had reduced soil erosion by one-third. I would call that environmental performance. Of course, the ticket was high. It cost $1.7 billion per year to keep 34 million acres in grass and trees for the 10-year contract.

By 1990, based on that record, we asked for an agricultural wetland reserve and we were successful in getting $46 million appropriated for that in this fiscal year. The President did request $160 million for full funding for the agricultural wetland reserve. We are now in the process of urging Congress to appropriate this full funding.

Just out of curiosity, I would like to know how many people in this room have ever marched up to Congress and asked for money for IPM.

[Show of hands.]

MS. HINKLE: That is more than I might have expected. We have to insist upon environmental performance.

As Polly mentioned, I am also on the advisory committee of NRI. My presence on that is also to insist upon environmental performance. I have to say that every time I can I try to urge integrated pest management in the appropriations process. That is very difficult because they tend to say, "What?" They tell us that they don't do earmarking but that it will be there someplace.

I thought I was going to be the last person and that you were going to be in a hurry to get to the reception. I am now the next to the last person and we're kind of in a holding operation, like when you're not landing.

[Laughter.]

MS. HINKLE: I did shorten my remarks because I thought you would all be impatient and a little bit tired of sitting in your seats listening to 30-minute renditions of IPM.

So at this point I would like to go into some cautions as you go into your next few days of working out your targets and narrowing down your priorities.

In looking over this book of yours, which I just got -- I haven't looked at it in-depth -- but it seems extremely ambitious and it covers an awful lot of ground. It covers just about every jurisdictional committee in Congress. One problem when you have this much is that your ambitions are so great that you cannot possibly succeed, at least in all of it.

Because I find that I really can't work more than 20 hours a day, I narrow down what we work for and hope that we can get that. Then we don't doom ourselves to failure at the outset.

Secondly, some of you may wonder why sustainable agriculture frequently doesn't have IPM in its little package. One of the reasons is that IPM has become all things to a lot of people. It has tended to be fuzzy. It is the subject of turf battles and the solution for

everything and anything. Whenever you do that, then people who want something think that IPM cannot possibly be that because it is too blurred and too status quo. It just is what is. It just can't be all things to all people or broken down into 100 different slivers.

In my view, also, IPM can't continue to just focus on the pest. The future is really in management. We have to look at farms as a resource and we have to look at managing the resource and managing the farm. We have to consider all the elements of this resource. We have to look at soil, water, plants, seeds, the crop mix, tillage, machinery, fertilizer, nutrients, and pest control. But that is where I think we are going and it is inevitable.

The bottom line, no matter what, is going to be environmental performance with increasingly scarce dollars. I think the public wants a benefit. The public wants to feel that it is getting its money's worth. So if you can prove that there is an environmental improvement, environmental performance, and environmental benefit, then it is easier -- not easy, but easier -- for people like me to go into the appropriations process and make a case.

Finally, In my view, change is the order of the day. We have many environmental problems, and these are real problems. Maybe some people think they are only perceived, but they are real problems. We have food residue problems. We do have surface and groundwater contamination. We do have pest resistance. We do have exotic pests which are invading our country, or being brought in inadvertently, and many of those become established pests. These pest problems pose very serious challenges to anyone who is trying to get a hold on pest control.

We need teams of researchers, including economists and social scientists and farmers, to work together in a multi-disciplinary, multi-State, and multi-year way to solve these problems. I think if that happens we can make the case for environmental improvement and a benefit for society.

One reason that I won't be able to be with you throughout all these sessions is that Audubon has a convention in Washington for the first time this year. We brought our grassroots people to Washington and they have been in town all week. Yesterday, they spent all day lobbying. In the evening, they had a rally on the Capitol steps. It was just a terribly exciting thing to fill up the steps with activists who had come to lobby on ancient forests, endangered species, and wetlands. They went in to markup today. It was a very good position to be going into markup in the Interior Committee. I can't wait to find out what happened.

If you get together and you make your case and you are unified, then you will get not just what you want, but you will really make a significant contribution. As the previous speaker said, we have to do that. There is a serious challenge there. I have to say that I am glad that DuPont is tackling in a creative way. I think that all of us -- no matter where we are coming from -- have to tackle it in a creative and significant way.

Thank you.

[Applause.]

MR. HEGELE: Well, if we think that integrated pest management is a challenge, you may want to ask our next speaker about the transportation system in the District of Columbia.

[Laughter.]

MR. HEGELE: Herbert M. Baum is the president of Campbell's North and South America in Camden, New Jersey. Mr. Baum first joined the Campbell's Soup Company in February of 1978 as an associate director of new products in the canned foods division. Two years later, he was elected as a corporate vice president for marketing. It was about that time that I first met Herb Baum and he had just successfully introduced a very, very well-known spaghetti sauce known as Prego.

He and I happened to be on a panel discussing consumer interests and desires in food products. Of course, he was thinking about Prego spaghetti sauce and a variety of things from the standpoint of the Campbell's Soup Company, and many of our listeners in the audience wanted to talk about pesticide residues. That was more than 10 years ago.

Nevertheless, Herb has progressed through a number of positions at the Campbell's Soup Company. He was appointed in 1985 as the president of Campbell's USA, which is their largest operating unit. He then added Canada a few years later. And in January of this year, he added their operations in Mexico and Argentina.

Herb had about a decade of experience in the advertising agency business before joining Campbell's. He is a graduate of Drake University, 1958, holding a bachelor of science degree in business administration.

Herb is the chairman of the National Food Processors Association. He is also a director of the Chemical Bank of New Jersey and a director of Kindercare learning centers. He serves as a trustee for Rider College and the Cooper Hospital Medical Center.

Mr. Baum represents a company that has made a huge commitment to integrated pest management through their internal operations, through their relationships with growers, and through commodity coalitions, about which he will tell us more. Herb also speaks for the National Food Processors Association, which includes the vast majority of America's food processing firms, both large and small, many of whom have established long-term relationships with growers, agriculture input firms, cooperative extension agents, academic experts, and other principles in integrated pest management.

Herb joins us today as a representative of an industry answering the wake-up calls of EDB and Alar during the 1980s, and industry responding to enlightened consumers of the 1990s who deeply care about the safety of their foods, and an industry that is committed to the long-term success of American agriculture.

Please join me in welcoming Mr. Herb Baum to the podium.

[Applause.]

MR. BAUM: I would like to thank everybody for indulging me. It has been a long ride from the train station here, but it is nice to be here with all of you. I thank Fred for

those kind words. I would also like to thank Bill Reilly of the EPA and Ed Madigan of the USDA for their leadership in raising the visibility of integrated pest management.

As you know, substantial progress has been achieved in recent years in integrated pest management. I think now the time is ripe to achieve broader acceptance of IPM throughout agriculture and the food processing industry. We need to chart a game plan that demands the best from all the players involved -- the growers, the chemical companies, the crop consultants, food processors, universities, the environmental community, and Government agencies. During this Forum you will hear speakers reiterate the need for us to work as a team. I can't tell you how important that is.

This Forum is a timely opportunity to begin building a consensus on this issue. I am grateful for the chance for me, as a member of Campbell's Soup Company, as chairman of the National Food Processors, to contribute to this effort by offering perspectives from the food industry in general and Campbell's Soup Company in particular.

When we talk about the need to reduce the use of pesticides, we should begin by acknowledging one important fact. The level of pesticides in the food that Americans eat is extremely low. The preponderance of scientific evidence has confirmed that the health risks from pesticide residues is negligible. The United States food industry has a long history of responsibility in addressing the issues of pesticide residues and the ingredients we use and the products we sell.

As a result, the American food supply is the safest ever achieved any time anywhere. You should remember that.

Nonetheless, the public has some concerns over pesticides. Some consumers think that pesticide residues in foods may represent a risk to human health. And whether we like it or not, perception is reality. We have to face up to that. Since we in the food industry depend so heavily upon the public trust, we have to take the concerns of consumers to heart. We have to make sure that we continue to earn that trust or our future isn't worth a hill of beans.

That is one of the reasons Campbell's made a commitment several years ago to establish a leadership position in integrated pest management. But there were other important reasons as well. We also committed to integrated pest management because of environmental and economic factors. We recognized that reducing pesticide usage would be environmentally friendly, specifically by safeguarding groundwater supplies, preserving wildlife, and protecting beneficial insects. In addition, it became very apparent that IPM would offer economic advantages by reducing the amount of pesticides applied without reducing crop yields.

In the year since Campbell's has made this major commitment to integrated pest management, these principles in integrated pest management have won greater acceptance in the food industry. In addition to unilateral initiatives, groups of food processors have joined together with farmers -- again, that whole subject of teamwork -- to address environmental and food safety issues.

A good example is the process of the Tomato Foundation. It was established in 1989 by the California League of Food Processors and the California Tomato Growers

Association. Together, they represent a little over 90 percent of the United States processed tomato market.

While members of these organizations, as you can imagine, often find themselves at odds at the bargaining table, in this case, they saw eye-to-eye on the need to initiate joint action. Their goal was to protect the interests of the tomato industry while responding to the concerns of the public and Government regulators.

So the Tomato Foundation has three principal objectives. The first is to anticipate major pest management issues. The second is to address them in a constructive and substantive manner. The third is to show the public that the tomato processing industry is acting responsibly on these issues and not just talking about them.

The grower and processor organizations, with strong support from the Cooperative Extension Service, have gone on the offensive. They have spread the word about integrated pest management through seminars, through field demonstrations, and other means. In recent years, pesticide use in the tomato fields has been trending downward as more and more California growers have adopted the methods advocated by the Tomato Foundation, and that is great.

At Campbell's, we are encouraged by the results of this cooperative initiative. It shows how much can be accomplished when the food processing industry works together with growers to encourage wider adoption of integrated pest management and related procedures. Again, we come back to that teamwork issue.

Another good example of food industry initiative on the subject is the efforts of the National Food Processors Association. The association's stated goal is, "to support and promote integrated pest management as a biologically and environmentally sound approach to pest control."

To this end, the NFPA has sponsored well-attended workshops on integrated pest management and has done extensive IPM-related research at its three laboratories. NFPA's scientific and regulatory staff have an ongoing dialogue with EPA and USDA on the subject of integrated pest management.

While supporting further action throughout the food industry, we have moved ahead with a comprehensive program of our own at Campbell's. Our approach is based on a total systems method of pesticide control. We are focused on understanding, monitoring, and controlling pesticide use at every step of the process from growing the crops, to packaging the finished product. We are committed to encouraging and assisting our growers in alternative agricultural practices including integrated pest management.

While IPM doesn't eliminate the need for agricultural chemicals, it makes it possible, through scientific monitoring techniques, to use chemicals only when specific thresholds are identified. This is good because this process discourages the spray-by-the-calendar approach to pest control. It eliminates the just-in-case mentality.

Campbell's total systems approach is based on four primary strategies, the first of which is integrated pest management. We're promoting the use of a variety of integrated pest management techniques, all designed to reduce the need for conventional pesticides. These techniques include disease-free seeds; pest resistant varieties; extensive field

monitoring; natural insect predators and parasites; pheromones; crop rotation; bioinsecticides; and others.

These methods work. They absolutely work. Over the past 5 years, for example, Campbell's tomato growers in the midwest have cut their use of pesticides by an average of 50 percent, saving over $200,000 per year in control costs while maintaining tomato quality and yield. This was achieved through filed monitoring for insect pests and the use of weather-based disease forecasting models for determining fungicide use.

A few specific integrated pest management case studies deserve mention, so let me talk about them. In 1989, Campbell's researchers in California and Mexico began working together to find a new way to control the tomato pinworm in the fields of Mexico. I can tell you that this was a real problem for us.

After conducting tests over a number of tests, in 1991 we began the full-scale application of pheromones, chemicals that interfere with the insects' reproductive cycles. The pheromones have been effective in managing pinworm. Only 5 percent of the tomatoes have been damaged by the worms compared to 70 percent without pheromones. This creative integrated pest management program has cut pesticide usage by 50 percent, saving $471,000 per year. That's a big savings.

Campbell's researchers have also used integrated pest management to control tomato fruit worms in Mexico. In this case, they have introduced trichograma, which is a tiny wasp that preys on the fruit worm. The program has shown that tomato damage due to the fruit worm can be reduced to under 3 percent. It's amazing. This control measure has eliminated two sprays with conventional insecticides and with the parasite release costing only one-fourth of what the chemical sprays cost. Savings of at least $100,000 are estimated per year for Campbell's growers.

These wasps, trichograma, have been so effective that we have developed an insectory in Mexico. In this facility we are breeding beneficial insects to do battle against various species that harm out crops.

The second strategy in our total systems approach is HACP, or hazards analysis control points. I know you all know what that is. HACP has been used sporadically in the food industry for 20 years. Now that the EPA and the USDA have embraced the procedure, it should gain wider acceptance in the years ahead. HACP encourages farmers to keep accurate records on their use of specific pesticides. This orients them toward a policy of just-in-time instead of just-in-case.

In Campbell's HACP program, we inform farmers about which pesticides we consider acceptable, how to keep accurate records of their use, and the benefits of sharing their records with Campbell's Soup Company. HACP encourages growers to think carefully about their use of pesticides on crops, to monitor the application of these chemicals, and to make their records available to our specialists.

Our third strategy focuses on our food processing procedures. Now when fruits and vegetables arrive at our plants, they have only minimum levels of pesticide residue due to the IPM program. By using the industry's most advanced methods to wash, to trim, to blanch, to peel, to core, and cook these commodities, we further reduce any residues.

Our last strategy involves rigorous analysis of our raw ingredient in finished products. By measuring pesticide residues, we are able to issue what we call report cards on how well we measure up to our own standards. This is essentially a verification of how well the previous three programs I mentioned are working.

During the past year, we conducted more than 35,000 tests on ourselves. The results have given us the hard scientific data to confirm our success in controlling and lowering pesticide residues.

Coordinating the execution of these four strategies is a demanding responsibility. To handle it, we formed the Campbell's Pesticide Advisory Committee, PAC. That is not a political PAC. It is the Pesticide Advisory Committee. It consists of experts from quality assurance, toxicology, agriculture, procurement, and manufacturing. In addition to coordinating existing strategies, this committee encourages the search for new ways to achieve our goals. This group developed our HACP approach to pesticide management and encourages integrated pest management applications.

Although we are proud of our record, we believe we still have a long way to go. One area that is receiving lots of attention these days involves many of the commodities which we have purchased. While we are able to influence the quality of some commodities, such as tomatoes -- since we are so closely involved in the growing process -- other things we buy our often beyond our control. When we purchase certain raw or processed ingredients, such as potatoes or flour, when we purchase them on the open market we often lack the ability to trace their quality programs.

That is a problem. It's an important challenge not only for us but for everybody in the food processing industry. In addition to encouraging wider use of integrated pest management practices among our growers, we all need to become more aggressive in working with our suppliers.

Toward this end, again at Campbell's we have developed a select supplier program of which we are quite proud. In this program, we enter into cooperative partnerships with selected vendors that meet certain standards that are intended to promote continuous quality improvement while maintaining competitive pricing. By working with suppliers, rather than dictating standards, we believe that we can achieve more effective pesticide management.

Our industry has to make clear to all our ingredient suppliers the importance of adopting integrated pest management techniques and relating strategies in their own operations. In our case, we have found them responsive when we do a good job of communicating and cooperating with those suppliers.

Similarly, we found that the farmers are generally receptive to initiatives to cut down on pesticides. The challenge facing us in the industry is to make sure that the farmers know the issue is just as important to them as it is to us. Once a commitment is made and goals are set, we have to communicate our stance clearly and forcefully to our friends in the farming community.

As I indicated earlier, this is an effort that requires cooperation and teamwork from all the sectors represented here today. We have the opportunity to move the action to a higher level of accomplishment.

A strong commitment from the food processing industry is essential. For many farmers, food processors are their number one customer. It is our responsibility -- the food processor -- to encourage our growers to utilize integrated pest management techniques and to provide the necessary resources to ensure that this happens. Farmers need the knowledge, the tools, and the incentives to keep the momentum going.

The agrichemical industry faces a difficult challenge. Chemical companies are making a transition to a whole new era of pesticides that can be used more selectively, more intelligently, and more effectively. A number of companies also are branching out to produce diagnostic tools for detecting plant diseases and measuring pesticide residues right on the farm. For growers to achieve the full potential of integrated pest management, they need these kinds of new resources.

The Government and universities can also make a vital contribution by supporting and carrying out the basic research that provides the foundation for all our efforts. The remarkable achievements I mentioned earlier are in large part due to the research carried out in our Nation's laboratories, and that shows just how much we can benefit from investments in research. The National Food Processors Association's three research laboratories have been actively involved in integrated pest management-related research for some time.

Substantial losses from pests like the whitefly in California, for example, illustrate the importance of this basic research. When a creature like the whitefly is resistant to all pesticides currently in use, it shows the value of scientific knowledge in enabling us to develop creative new approaches to solve a problem.

Whenever new pest control techniques are developed, they are only as good as the farmer's ability to use them. The Cooperative Extension Service is a great resource in raising awareness of integrated pest management on the farm and teaching farmers how to implement this approach. A study by the Cooperative Extension Service of 3,500 growers in 15 States revealed that integrated pest management users, in total, earned $55 million more per year than growers using conventional chemical controls.

That's a big number. This is the kind of ammunition that is needed to show farmers throughout the country the benefits of jumping on the band wagon.

Many of us from various sectors of the food industry have different interests. We face different pressures from diverse constituencies. Our common goal, however, is to earn the public's trust in the years' ahead. That is a single-minded goal. This will require a strong commitment from all of us. We will have to find new ways to reach a higher level of cooperation based on mutual trust. We in the food industry continue to place top priority on giving the consumer safe food products of the highest quality at a reasonable cost. I know everyone here today shares that goal.

Integrated pest management may never become a household word, but it offers the promise of assuring greater peace of mind to households everywhere. I am thankful for that.

Thank you.

[Applause.]

MR. JOHNSON: Thank you, Herb, very much.

We thank all of our speakers this afternoon for sharing their experiences, success stories, and insights into integrated pest management.

I think they have certainly set the stage for tomorrow. I would like to briefly review the agenda for tomorrow and what we would like to accomplish. We will also talk about tonight as well.

Our agenda for tomorrow begins with Dick Parry having a general session at 8:30 tomorrow morning in this room, followed by each of the co-chairs of our commodity teams describing their efforts and the reports they have put together.

Then we will divide up and break into our constraint resolution breakout sessions. If you will notice on your name badge, you all should have a little dot. If you don't have a dot, we will give you a dot. It is a colored dot. There are four colors and those colors represent one of the constraint teams. We will go over this again tomorrow morning, but I know that some of you will not rest well tonight not knowing what your dot means, so let me try to ease your minds.

The green dot means that you are on the institutional constraint team breakout session. A blue dot represents research; a red dot policy; and a gold dot regulatory. I don't know that there is any correlation between the color and the subject, but I will leave that to you. Again, we will go over those tomorrow morning. Green, institutional; blue, research; red, policy; gold, regulatory.

If you would prefer to attend a different session from the one you have been assigned, I believe that there aren't any space limitations with the exception of the breakout session on the research constraints. We have an abundance of people interested in that particular topic.

The plan is that the breakout sessions will continue all tomorrow afternoon and close at 5:00. During that time we want you to review the papers that have been prepared and that you should have received at the registration desk. We want you to look at the constraints, looking at the possible resolutions or options for resolving those constraints. We want you to make sure that we have captured the constraints and captured various options for resolving those. If we, as a team of people, have not accurately captured all the constraints and options, we want to try to pull those together.

What you are then going to do on Friday morning is that we will put you through a multi-vote process which we will describe in more detail tomorrow. In essence, that is a technique that will enable us to identify what we as a group feel are the major constraints, in priority order, that need to be addressed, and what you believe are the major options for addressing those constraints, in priority order as well.

So we will go through the multi-vote process on Friday. By the end of the session, we will have the results of that. So we will collectively have set the course, charted the future, for what we believe the direction in which we should be going resolving the various constraints that have been identified in a priority order. That is the plan for tomorrow and Friday.

So your job now is to enjoy. We have an extensive poster session, which I trust you have already seen. We are going to have a reception at 5:45. I believe the reception will be held in the room right behind this. Then at 7:30, we're going to have a banquet in this room

here. AT the banquet, Dr. Richard Herret is going to give us a presentation and we will be looking at our roots. He will be talking about Charles Valentine Riley. So we it should be enjoyable and entertaining.

Again, I would like to encourage you to take advantage of the poster session. But before you run out, one other color item that may be important to you -- you will see some people wearing red ribbons. Those people wearing red ribbons are ones from EPA who are prepared to answer any and all questions regarding a pesticide registration process. So take advantage.

Then there is another color -- we are into colors -- some people are wearing yellow ribbons. Yellow ribbons are members of my staff who are here to help you in any way we can. So if you have need of directions or need of any other assistance, we will try to help you in any way we can. So keep in mind that not only do the red dots mean something, but the color of ribbons means something as well.

Thank you for a good first session. We will see you later on.

[Whereupon, at 5:05 p.m., the Forum recessed, to reconvene on Thursday, June 18, 1992.]

National Integrated Pest Management Forum
June 18, 1992

DR. PARRY: Good morning, everyone.

Already we are a few minutes late and I think we had better get started with our full agenda.

It appears this morning that the television cameras have disappeared. I guess many of the news media are off chasing sound bytes and other newsmakers around this city in some form or other. I guess it is about time for us to roll up our sleeves and get to the job at hand because this is the heart of why we are meeting.

The evolution of this activity has occurred, as has been mentioned earlier, over the past 2 years. It was a very difficult struggle as to how we would structure this activity to capture the diverse viewpoints and approaches that encompass the concept of integrated pest management.

So we took it on roughly two tracks. First, we tried to look at the current state-of-the-art of integrated pest management and to compile that information. From that, we challenged those commodity teams to look at the constraints and propose resolutions to those constraints.

Bear with me a moment while I try to summarize the remarks made yesterday by our diverse and eloquent speakers who spoke to us.

First, they all recognized that IPM works.

Second, nearly all appreciated the constraints that are hindering the widespread adoption of integrated pest management and technologies.

Third, they all suggested that a unified efforts by all viewpoints is required to bring resolution to the constraints. No one viewpoint, I don't believe, can prevail alone. Rather, it is a team effort, just as much as putting together an IPM program on farming systems in the field involve many people working in the system. And so it will happen that we can speed its rapid adoption here by looking at the issues -- and there are many -- and looking at potential ways in which they can be resolved.

To that end, the Forum planning team has spent many hours developing this green-covered document called the Constraint Team Reports, which you will be debating later today. These are discussion papers. They are working papers for use at this conference to give us a start. They do not represent the policy positions of the USDA or the Environmental Protection Agency, the Administration, or any other single group, but a compilation of all these viewpoints so that we can attempt to address them and propose solutions.

I would suggest that as you work on this during the day that you focus on consensus positions because many of the programs addressed in this book are the product of decades of interaction of all sectors represented at this Forum and they must be recognized for their legitimate participation in this process.

Let us proceed now to the first stage of the planning of this Forum. The first stage was the Commodity Team Reports.

When we first started talking about this idea, we wanted to have 17 commodity teams that would be addressing different crops and different regions because IPM doesn't

necessarily translate from the southeast to the northeast, or from the plains States to California. Recognizing the limitation of resources, to which no one could devote in large measure, and knowing that a lot of these things have been well-documented in the literature, we attempted to define it into four commodity teams to look at the entire United States.

This was a large effort. This red book is the result. The co-chairs of these four commodity teams are sitting at the table this morning. They will briefly summarize the work within this report.

I said that there were four teams, and two chairs on each team. There is a missing person. Before we even proceed with introducing those talks, I would like to recognize that missing person, Dr. Jim Tette.

Jim is the IPM coordinator for the State of New York, and probably no other State has received so much support behind IPM than New York, and I think it can be directly attributed to his fine efforts. He has been especially successful in promoting crop rotation and diversity which has led to improved methods for pest control. He certainly has been a key person in guiding the organization of this Forum.

Unfortunately, Jim is unable to be with us today. He is recovering from a serious injury successfully in a full body cast. Soon he will metamorphose, come out of that, and be totally healthy.

I have a certificate that I would like to have passed on to Jim Tette. I would like to ask the person who hired Jim at Cornell to come forward to accept this, Dr. Edward Glass, now retired from Cornell University.

The certificate reads: "The National Integrated Pest Forum, in recognition of James P. Tette for his contribution and dedication to advancing integrated pest management, June 17, 1992."

Please, give this to Jim.

[Applause.]

DR. GLASS: It is with great pleasure that I act as a conduit for this document to Jim. I can assure you that Jim would be here. I talked to him recently on the phone and he had hoped to come, but that corset that he wears about that thick wouldn't allow him to sit in any of these seats.

I would like to correct on little item. Actually, Wendell Rolass was the first one to hire him at Geneva. I was the first to put him on our first IPM program in New York.

Thank you very much.

[Applause.]

DR. PARRY: Let me proceed with the first commodity team report. The corn/soybean commodity team is co-chaired by Dr. Rich Edwards and Dr. Richard Ford. The presentation this morning will be made by Rich Edwards, who is professor of entomology at Purdue University. He is also coordinator of extension entomology and the State pest management programs.

Dr. Edwards developed and presently directs Indiana's extension efforts in field crop pest management. This is multi-disciplinary effort involving specialists from five departments and is directed toward pests of corn, soybeans, alfalfa, and small grains. The program trains IPM professionals and growers, develops pest management publications, and pest advisories.

In addition to Dr. Edwards' extension activities, he also conducts research on host plant resistance, evaluation and observation of use of pesticides, development of economic thresholds for pest species, and the development and evaluation of insect survey techniques.

Would you please join me in welcoming Rich Edwards?

[Applause.]

DR. EDWARDS: My dad is a farmer in Texas. He often said that when there is a job to be done, you roll up your sleeves until you get it done. That's what we're going to do today. We're going to start getting this job done. If it is going to be done, it will be done by us and not anybody else. I think your comment at the beginning, Dick, is very apropos to what is that we're getting ready to do over the next day and a half or so.

First of all, before we get started with the corn/soybean commodity team report, I would like to recognize Dr. Dick Ford.

Dick, please stand up.

Dick is our co-chair. Dick did a heck of a lot of work. He did the work and I take the credit.

In addition to Dick, I would also like to introduce the various members of our commodity team. As you can see, it is a very diverse group. I believe today that we have five of these individuals present.

John Cardina is here from Ohio State University. He is a weed scientist, and not a token weed scientist. He is really great.

We have Lou Hargett from Sandoz. Lou Hargett really added a lot to our commodity team and was a very important person to us.

Dennis Keeney from the Leopold Center was also involved in our activity at Iowa State University.

Les Lewis, USDA ARS, located in Iowa.

And then I believe Elizabeth Owens is back there. Elizabeth is with ISK Biotech Corporation.

I believe that includes all those listed that are here today. But I do want to recognize those individuals. Dick and I are not smart enough to do this on our own. It took a lot of people to get involved in this to do what we have done. I certainly want to recognize them for their efforts.

If we take a look at the corn/soybean agroecosystem, it is one of the world's largest farming systems. In fact, about 43 percent of the cropland acreage in the United States is devoted to the corn/soybean system. About 50 percent of the farmers in the United States are associated with this particular system. Therefore, you are talking about a very extensive kind of activity in which these producers are involved over a wide area.

We are going to be talking primarily about the corn belt when it comes to corn and soybean. We obviously have corn and soybean production in the south and the southeast, but because of our time limitations, we were not able to devote the kind of time we would have liked to have had to cover the whole United States when it comes to corn and soybean production.

However, you will find that many of the constraints we discuss are constraints that really go across all regions. So therefore, it really is not all that important to say that they have been left out because they haven't. These constraints also affect those particular regions also.

If we take a look at the corn belt, we find that 83 percent of the corn is grown in the corn belt on 80 percent of the acreage devoted to this crop, 77 percent of soybeans on 73 percent of the acreage. So you can see how important the corn belt is from the standpoint of corn/soybean production.

If you look at the value of the United States corn/soybean crop -- and I haven't compared these figures with some of the other commodities, but it would probably be pretty hard to beat the fact that $30 billion worth of corn and soybean are produced in the United States. I am not sure exactly how this does stack up with some of the other commodities, but I think you would probably have to go a long way to find another system that produces that much money.

The corn/soybean agroecosystem is primarily a rotation of two crops, which is different than it is in some other regions in the United States with other commodities. But as I said, this is a very extensive system and one that primarily is devoted to the two crops.

However, depending upon where you are located, there are other important crops that may be grown within the rotation, such as grain sorghum, wheat -- especially out in the western part of the midwest -- sugarcane down in the south, cotton possibly, rice, and forages. So there are some other commodities that are also grown in rotation. But it is primarily a corn/soybean rotation system.

Within this system, the pest management tactics are designed basically to disrupt favorably combinations of biotic and environmental factors necessary for pest development. So really that is the premise of pest management or pest control within this particular region at this particular point in time.

Pest management strategies emphasize prevention since many pests can be controlled effectively if they don't become established during the cropping season. So really this is the way we go about managing and emphasizing the prevention of the population.

To give you an example, if weeds aren't controlled early, then we have a problem later in the season. Now we may use several different systems to go about controlling those weeds. But we attempt to prevent the pests from becoming a problem. Certainly when it comes to pathogens, from the standpoint of host plant resistance and the development of resistant lines and variety, we are attempting to prevent the problem from happening.

It is not necessarily just using chemicals as a preventative measure. As you listen to what we have to say about this as we move along, you will see that we are talking more and more about preventative pest management as opposed to prevention just by chemicals.

Chemicals are an extremely important part of this particular system, as you will see, if you don't already know that.

There are a combination of pest management tactics that are available for use within the corn/soybean system. They are based principally on chemical and cultural control techniques for weeds and insects at this present time. And then cultural and genetic resistance primarily for plant pathogens. There are certainly not very many fungicides used in this particular system except maybe for seed treatments and so forth.

However, there is some use of genetic resistances and biological control when it comes to insects, also chemical control is occasionally used for plant diseases. So you can see that we are primarily in a chemical cultural kind of a system with host plant resistance supporting some of what we do with a little bit of biological control.

Really, as far as introducing biological agents into the system, we haven't been very successful. As we move into the future, this will be one area that will be extremely important to us, and we are definitely interested in it. I know there may be some people who are in the biological control area that are providing biological organisms that may feel like the people in the midwest are not interested in biological control. But we are a little bit like the State of Missouri. We are the "show me" region. We have to see that it will work before we implement it. That is what our farmers expect. I think that is what farmers expect all over the United States, no matter what the system.

What about the chemical usage within the corn/soybean system? It is fairly extensive, certainly from the standpoint of herbicides. Well over 90 percent of the cropping acreage -- and remember what I was talking about the number of cres involved -- are treated with herbicides. Yesterday, we heard Bill Kirk indicate that they are reducing the rate of herbicides, and that is true. If you look at the total amount of herbicides going out in pounds active ingredient, there is no doubt about it that that is being reduced.

A lot of people still have the question as to whether that is good enough because we still have a very high percentage on which we are using chemicals. But the farmer is not going to accept anything else until they have alternatives that they know will work. That's the big stickler and the one on which we need to continue to work.

From the standpoint of insecticides, about 31 percent of the corn acreage -- you can see there is virtually none in the soybean area being treated with insecticides -- but about 31 percent of the corn acreage is being treated with insecticides. If you look at this, this varies a lot from region to region. In areas where there is more intensive continuance corn, there will be more insecticide use primarily from the standpoint that you have corn rootworms within the system. The producers are going to attempt to manage that particular pest usually using planting time applications. There are certainly some alternatives there.

Just to give you an example of how this has changed over the past 10 to 12 years, in the State of Indiana, we have reduced the amount of soil insecticide usage in the State of Indiana in the last 12 years by an average of 700,000 pounds a.i., actual ingredient, soil insecticides, since about 1980.

That represents a savings to the producers of Indiana alone -- and this has happened throughout the midwest -- of about $10.5 million as a result of producers rotating crops.

And soybeans are obviously a very important part of our system now. However, there are some barriers, as many of you have already seen, to even changing this further and maybe getting this figure at a lower level.

With these factors and other factors in mind, let's take a look at what the team addressed from the standpoint of major constraints. Hopefully, you have had an opportunity to take a look at the book. Within that book, we will be talking about different constraints and research from the standpoint of development, delivery, and use.

One of the major constraints -- there are a lot more constraints than what I have given you, but these are the major constraints that we saw. Really, these kind of showed up in every report. In fact, we were talking the other day that is very interesting that you could almost take our report, take out some of the introductory sessions that deal with the various commodities and get down to constraints, all you need to do is put a blank line in there and you can fill in the commodity because it pretty much goes across the board.

Lack of funding, staffing, research, training, education, technology transfer -- we have already talked a lot about this over the last day. We know that this is certainly a barrier or constraint to the further development of IPM.

Low cash value of the corn/soybean crop. If you are familiar with those systems at all, you know that you're talking about corn somewhere around $2.50 or so per bushel, soybeans up close to $6. Depending upon what happens with the weather and so forth, this can obviously jump up and down, but you can see that these are low cash value crops.

So therefore, the producer, with the inputs to produce those crops, have to make sure that what they're utilizing is cost-effective. We talked a lot yesterday about economics and the importance of economics and the importance of management. Management is extremely important within this system, as it is in any other system. As we move to more pest management, we are even going to get more into the management side of it.

Federal farm programs. Obviously we have these, at least from the standpoint of corn. Nearly ever farm in the midwest has a corn base for that particular farm. Through that base, a producer can receive deficiency payments, depending upon how the prices go for those particular commodities. That may in fact discourage some producers from rotating to soybean, although there is some flexibility in the program.

For those of you who know something about the corn base program for corn producers, you know that there is 15 percent of their base on which a farmer will not receive payments, and then there is 10 percent on which they have flexibility that they can plant to another crop and protect their base so that their base will continue. I will present to you at the end of this talk a scenario of one thing that we might be able to do to change things a little bit, at least as far as insecticide use for corn rootworm.

There is minimal staffing for training, education, and technology transfer. That is probably pretty apparent. I probably don't need to say too much more about that. We can't do it folks. There is not enough of us out there to get it done. We can't train enough private consultants right now with the people that we have. We don't have enough private consultants.

I was a little bit concerned with Rose's bill on safer pesticide use. Within that bill, they talked about the consultants being the people who would provide the information to the producers. I think that is great, but I don't think the consultants at this point can do it alone. There is not enough of them.

We only have what I would consider to be about 26 to 30 private consultants in the State of Indiana for 5.5 million acres of corn and 4.5 million acres of soybeans. Folks, that is not enough people and I can't train enough by myself. There is not enough of me. I guess if they could clone me, we could do it a little easier. But we have to have support to get that job done.

There is lack of a knowledge base. We have no long-term inter-disciplinary research on pests really going on within this system, on pest interaction, and the cropping system together. Every time that we get into some kind of a new cycle that talks about research and what we are going to fund, we start talking about long-term research, but when it comes down to it there are funds for only 2 to 3 years. You are lucky to get the funds for 2 to 3 years.

We keep talking about expanding and providing more money so that we can get into long-term research and where we can commingle these dollars and get these programs together to do the job. We can't do it. That is frustrating for those of us attempting to do research.

Then, of course, there is regulation and registration requirements -- which certainly are constraints -- and the private sector's reluctance to get into some of this because of those regulations, which has already been discussed. Those things are going to have to be dealt with before we can move forward.

Within our section of the book, we talk about constraints by strategy or practice. We broke it out into some of the strategies like crop rotation tillage systems, biological control, genetic resistance, genetic engineering, pest resistance management, agricultural chemicals, regulation, decision-making and implementation, technology transfer and extension. This is very similar throughout the book for all the commodity teams because these are the strategies and practices that are being used. Then we look at the constraints associated with those and what we might do about those constraints with which we are dealing.

My dad always told me that when I gave talks I should stand up any longer than I have to or somebody is going to jerk you off. So I won't stay up here too long, but I did want to just very quickly tell you just a little bit about the way I think this may go.

For each strategy or practice, we addressed what is available now, basically the state-of-the-art, what the current research or practices are in that particular system -- the corn/soybean system -- and the constraints to further development.

Jut to give you an example of one -- and we could argue about this, but at this particular point in time, from the standpoint of biological control, we have B.t. Several different companies have their B.t., some of them different formulations for control of the European corn borer. We know that B.t. does a fair job at controlling first generation European corn borer. However, when you put it out there for second generation, it just will not do the job. It has been tested and looked at. We have worked very closely with one of

the major seed companies and they attempted to get control by treating for second generation and it just did not get good control. We all know there are problems associated with B.t.

Current research on talking the B.t. toxin into endophytes and putting them into the plant for control of the corn borer is really pretty monumental and we think there are some very good possibilities there. However, there are some constraints associated with that. Some of these have already been pointed out, such as the high potential for resistance potentially developing, the need for new strains within the system, and the return on investment.

People are going to have to have some kind of return because we are a capitalist society. People are in business to make money. The farmer is in business to make money. So we have to make sure that what we do in the systems that we use will work and that there is a return.

Those of you in the back of the room, you are just like everybody in my church. Of course, usually we don't show slides or overheads in church. You're probably not going to be able to see this, but I will tell you about it anyway.

Let's take as an example this traditional pest control system within the corn/soybean system. Here we are directing toward corn.

A corn to corn rotation, indicated by the C/C, would reduce tillage. In this particular system, the farmer is going C/C because of his base. He is protecting his base. There is not enough flexibility within the system for him not to do that because he has to protect his base.

We do have farmers going C/C because they need the corn for production of livestock. We certainly see that, but here it is because of the commodity program.

In October, the producer makes the hybrid selection. In December, pesticide selections are made for herbicides and soil insecticides. Many times producers do this because they want to buy it before the first of the year. There is an incentive there. They may do this in December, or it might happen in January.

In April, herbicides are applied, pre-plant incorporated, broadcast in most situations at a cost of about $12 per acre. Certainly the product that you're using will depend upon the cost associated with that.

Plant in May and use a soil insecticide. Because we are in a corn system, corn rootworms are a concern. In this particular instance, the producer is not scouting the field the previous year looking for corn rootworm beetles, so they don't know whether they will have a problem or not.

Back in the early part of the 1980s myself and Marlin Bergman did a study in Indiana and we found that about 68 percent of the farmers didn't have any idea whether they had a rootworm problem or anything else out there. We didn't like what we saw there. That kind of bothered us. But a soil insecticide would be applied at about $15 per acre.

Herbicides on a contingency basis might be applied as a post-band. After that, to take care of weeds that were not controlled by the pre-plant incorporated herbicide.

In July, leaf blight may show up to which the plant has no resistance, but there is not much a producer can do about that to begin with in this particular system.

In August, the European corn borer moves in. The farmer is not scouting the field, the farmer hears about it from somebody else, it takes awhile before the farmer gets to the field, and he applies the insecticide too late -- which happens more times than not -- a lot of the times the third generation, which is the one that bores into the stalk has already started moving into the stalk. In that particular situation, it is applied too late, so therefore you still have some corn borer activity.

If you have corn borer activity, usually you see an increase in stalk rots because the stalk rots can move very easily into the plants now because of the damage created by the European corn borer.

As a result of this, we get into a situation in the early part of the fall where the farmer has this damage both from the European corn borer and from stalk rots and has to harvest the crop early. At that particular instance, we figure about a $13 loss on an average in that kind of system. And by the way, there is a $13 insecticide charge back where they control the corn borers too late. Since the farmer has to harvest that field early, then you have a situation where we have to dry the corn down. So in this particular system, we are talking about approximately $71.

Now let me show you what I think we will see in the future. In this particular system, we changed the commodity program to such where there is 100 percent flexibility within the system. If a farmer is involved in pest management, there is a potential for a deficiency payment as a result of participating in pest management.

The farmer has to have some incentive to do it, and we may not like the commodity programs and so forth, but this is one way to get the producer to do it. So we give them a little bit of a deficiency payment not to grow corn after corn. So in this particular system, if a farmer decided to that, and maybe something like the 092 program, only we're not saying that you don't grow any corn at all and you get 92 percent of the deficiency amount, but we come up with a system very similar to that.

So the farmer is growing soybeans the previous year, going into corn, and he is in a no-till situation. He uses a cover crop -- and we are doing quite a bit of research on this. This cover crop is probably $6 to $8 per acre. Then the producer makes the hybrid selection.

Before in hybrid selection, we didn't think too much about host plant resistance, but now we have traditional kinds of resistance that are in the plant, genetic engineering to put resistance in the plant, and in this particular system we have tolerance to herbicides, resistance to stalk rots, leaf blight, European corn borer, and army worm. Army worm resistance becomes important because our cover crop in this particular system is wheat or rye, to which army worms can be very attracted in the early part of the spring.

The producer still makes a pesticide selection sometime in December, but this is burn-down herbicide to take out the cover crop. So we can't eliminate that. The farmer can't plant into live growing tissue. He has to burn that down with something. So if we're going to go to something like a cover crop, you have to take care of that cover crop. So he may have to use a herbicide, hopefully a benign herbicide that doesn't cost the producer too much money.

We added $6 for the cost of seed -- I don't think it will go that high. So if it cost $25 per acre to plant corn, we would be talking about $31 per acre under this system paid for the resistance. I don't think it will be that high, but I just put that dollar figure in.

So we make our selection in December. Then in March we begin our scouting. This is the part about which we are really excited. We are looking for all pests within this system. We know we're coming out of soybeans and we know good and well that coming out of soybeans in the eastern side of the midwest you could have Japanese beetles in the soybeans the year before, the Japanese beetles could lay eggs and you would have white grubs in the corn the next spring. We have to watch out for that. That is one of the thing into which we are keying on our scouting.

We established our insect traps for those insects that might be in that particular system. We are designing some new insect traps. We have a very innovative wireworm trap on which we are working right now that I cannot say any more about right now, but it really looks pretty good.

The scouting begins and then continues through the season. We put an $8 charge on that. That is more than is being charged right now. Most consultants are charging anywhere between $5 to $6 or even less. You add the fertility aspect to it and that price can go up to some degree.

A herbicide is put down as a burn-down. Now we are going to spot treat. The technology is there. The cost may be too high at this point in time where machinery can move through the field and pick out those plants we want to control. The technology is there to do that. We can do it. I have put that into our system. We are going to spot treat to control the plants that we need to control within the system where we can use it.

We're going to plant in May, as we did before. We have the potential for white grubs, based upon what we saw in our scouting, and we are going to spot treat with an insecticide because we found the white grub. Now we're going to go out there and figure out where the white grubs are and put the material down where it is needed.

We still have ag chemicals in the system. I can guarantee you right now -- I don't care who you are -- we can't get rid of them right now. They have to be there because when we get into a bad situation and it is the only alternative we have, producers have to have something. There is going to be a cost associated with that.

Then as far as herbicides, we have contingency spot treatment available to us at this particular point in time to take care of those weeds that may have come through. Now you notice through July and August and September that we really didn't have to do anything as compared to what we did over here because we took care of it from the standpoint of host plant resistance.

I have factored in an environmental cost. Wendy Wintersteen and Leon Higley did a study where they factored in an environmental cost to the economic threshold. I factored that originally into the cost of controlling those white grubs back up here, but I threw it out just to make a point. There are producers, based on their study, that are willing to change the economic threshold and pay a cost for insult to the environment if they didn't do it.

So in this particular instance, for the product we were using, there would be about a $9 charge for this particular part of the system. Yet you see as we add those numbers together, we only spent $59 instead of $71.

Folks, it can be done, but it is going to take all of us to do it and we will have to work with producers and get them to accept this and utilize it. In fact, we are seeing producers more and more interested in this particular kind of system.

I don't want to take any more time because obviously there are three other people who have to get up here, but I do want to mention one thing. Hopefully all of you got the supplement that was out there on the table to our book. We had a three-page table that for some reason didn't get into the book. This particular table goes into several different pests, talks about the different control strategies, where we may be going in the future, how soon we may see these control strategies, and the constraints of those.

If you didn't get a copy of that, I hope you picked it up. Dick reduced that in size so that you could cut it down and insert it right into the book in our section.

So if you didn't get that, I hope you will get a copy and put that in as a part of our offering because it is a very important part.

I will stop there and turn it back over.

DR. PARRY: Thank you, Rich.

The next commodity team report will be on vegetable crops.

This team has been led by Dr. Frank Zalom and Dr. Bill Fry. Frank will make the presentation. He is currently the director of the University of California's State-wide IPM project. This program is probably very well-known throughout the United States and it sponsors research projects, extension implementation projects, student internships, and certainly it is well-known for their series of IPM manuals that are used throughout the United States.

Without further ado, I introduce Frank Zalom.

DR. ZALOM: Thank you. I would like to introduce first my co-conspirator in this particular report, Bill Fry from Cornell University. I am not going to introduce everybody else that is in the audience that is affiliated with this particular report, but there are a lot of people in attendance here who were members of our particular group.

I would like to start by saying that it was a difficult job for us to work in the area of vegetable crops because as opposed to corn, soybeans, or cotton, we have 60 different crops with which we are dealing. Each one of them is their own independent production system.

I would like to talk a little bit about vegetable production in the United States and then talk a little bit about some of our view of what the future might look like in vegetable IPM.

We will begin with the slide presentation at this point.

Vegetable production in the United States exceeds about $7.5 million annually, so it might be somewhat less than the corn/soybean system, but I think by the time you look at all the processed products and the value added to vegetable production, it probably roughly

equivalent in value to a lot of the other major systems in the United States. Virtually all Americans eat vegetables daily either as fresh or processed products and our consumers have come to expect an assortment of vegetable products for extended seasons, and they expect the availability for fresh vegetables with high quality that are unblemished and that are relatively inexpensive.

Our growers have responded by producing vegetables for these extended seasons and they are growing vegetables in a number of different production areas, both for export around the country and for local markets. So we have vegetable crops grown in virtually every State.

Consumers demand a dependable supply of high quality vegetable products. They are also expecting vegetable crops to be at relatively low cost. This has made the control of pests which attack vegetable crops an essential part of production.

Vegetable growers, in particular, have profited from he availability of pesticides over the last 30 or 40 years because it has allowed them to produce some of the crops in otherwise unsuitable locations to take advantage of various market niches. This has made the availability of our fresh vegetables, in particular, to be available for longer than normal seasons.

I remember when I was growing up, my mother used to buy vegetables only during certain times of the year because that was the only time of the year they were in season. Now because of imported products and also because of the extended seasons we have, we can get fresh vegetables virtually all year round. In addition, growers can now grow their crops in uniform plantings on larger than the traditional acreage.

These seasons were really extended to satisfy market demands to supply the processing industry and the packing industry for these extended seasons. In addition, pesticides have been used extensively post-harvest to maintain the quality and extend the shelf life of agricultural products. As a result, some of our most important traditional pest control methods, such as crop-free periods, rotations, cultivation, and various types of sanitation practices, are used with a lot less frequency.

As I mentioned, over 60 different vegetable crops are grown commercially. Pesticides used on these crops must be registered for the individual crop. In California, where we have 55 different commercial vegetable crops grown, they have to have separate State registrations for pesticides. As a result, we have a limited number of products that are registered for use on most vegetable crops. This makes the loss of a particular product especially vulnerable when specific pesticides are not available for use.

Therefore, there is a real need to come up with alternatives to the use of pesticides for vegetable crops. But unfortunately we really lack a database on most vegetable crop production. I would say that the state-of-the-art in IPM for vegetable crops is a lot less advanced than it is in some of the major program crops. A lot of this has been because of the lack of funding for research and implementation activities in particular on vegetable products.

It is difficult to give a general overview of pest management in vegetable crops that can be representative of all the different situations in which we grow vegetable crops, yet we

attempted to develop information on the current availability and use of IPM programs nationally through a survey of research and extension personnel, producers, and processors.

In this study, we attempted to identify constraints which impact the development and use of IPM, the critical areas for future IPM research, issues in pesticide resistance management, the role of cooperative extension in vegetable crops IPM, recommendations to enhance the development and use of biologically intensive IPM for vegetables, various implementation needs, and finally the strategies for achieving the goals of implementing a biologically intensive IPM system in vegetable crops.

All these areas are discussed in the report that we have. I am going to try to address some of these areas in this particular report.

I would also like to add in addition, in the constraints area, there are certain constraints that are specific for vegetable crops. I mentioned the fact that there is a real lack of database information on many of our vegetable crops and a lot of this is due to the historic lack of funding for research in the vegetable crop area.

As opposed to the other systems, we also have a very high value crop with which we are dealing. As a result, there is sort of a natural tendency not to implement things that growers perceive as being more risky. IPM, unfortunately, by many growers is perceived as being risky. It is up to us to develop programs and implement those programs to try to show growers that in fact IPM can be used successfully in a high value situation like vegetable crops.

There are also specific regulations that impact our ability to use IPM in vegetable crops. There are some very good specific examples. For example, we can't use many biological control agents, particularly insect biological control agents. In some situations, we are dealing with packaged post-harvest products because of actual restrictions on use of insects in those types of situations.

We also have situations where we have plant-back restrictions. So because of the lack of registrations of materials across a lot of vegetable crops, we have situations where you can't use certain types of rotations because the plant-back restrictions for particular pesticides that might be used on a previous crop. Therefore, we get into the situation where we are growing the same vegetable crops year after year and not being able to take advantage of rotational type of schemes. Those types of constraints really need to be addressed individually for vegetable crops in particular.

We developed several recommendations to address the constraints identified in our report. These included: developing alternative tactics; speeding the development and implementation of comprehensive IPM programs; enhancing the efficiency of currently available conventional and biorational pesticides; enhancing incentives for grower adoption of IPM programs and strategies; developing location-specific highly specialized IPM programs for vegetable production; developing basic understanding of the ecosysetm supporting vegetable production; and facilitating the development of a professional group of plant protection specialists who would prescribe the use of certain pesticides.

We focused on two particular vegetable crops, which we think are representative of vegetable crops in general. These particular crops were potatoes and tomatoes. We assembled specific subsets of our work group to deal with those particular cropping systems.

Potatoes are very good in that they are grown in a number of diverse agroecosystems and they have a lot of different types of problems to which potato production is exposed. We also have a diversity of markets for potatoes. Potatoes are produced both for fresh market and as a processed product. So we have different types of production practices depending upon the direction in which potatoes are going to be going. As is true for most vegetables, pesticides are widely used in the production of potatoes.

But what we have tried to do is to identify many alternative tactics that could be used to reduce the amount of pesticides used in potatoes. A lot of alternative tactics are already used in potato production.

For example, certified seed is widely used in the suppression of many pests that are associated with seed tubers. Cultural and sanitation practices are also widely used in potato production for managing various types of pest situations.

But potato production in particular is constrained by a number of factors, including extremely rigid demands of processors and buyers, competitiveness between production areas, and Federal grading standards. Some effective pest management techniques are not currently applicable because of either the market grading or processing requirements.

One of the things for which we have found a tremendous demand is the russet burbank cultivar, which happens to be one of the most test-susceptible cultivars there is. As long as that is the particular market cultivar that people are producing, we are really limited in a lot of types of pest management practices.

So we then looked at the implications of the elimination of all pesticides in the potato system. We addressed this with 30 individual pests or groups of pests. In the majority of cases, we found that elimination of pesticides would cause production problems in particular areas of the country.

For 11 of the most important pests alternative tactics were identified and the technical and operational feasibility of such tactics were assessed. Additionally, data gaps existed and more research was needed. The time required to develop implementable results was estimated. I would like to go through some of those particular pest situations.

One of the most widespread and destructive pests of potatoes is late blight. If you will notice in our report, we have a series of tables that illustrate what sorts of alternatives might be available for the control of late blight. You can also notice here the regional importance of the particular pest. In the case of late blight, the northeast and central production areas are much more at risk from the loss of pesticides for late blight than the western and southern growing areas.

Some of the implementable techniques that are available include sanitation, resistance, monitoring and forecasting systems, irrigation management systems. Biocontrol is something that was recommended as an approach to control, but under current plans, we really don't have the database for making it technically available or operationally implementable.

I think when you look at some of these alternatives, you start seeing some of the constraints in their use. Some of those need to be addressed.

In the case of sanitation, sanitation is fairly widespread already. One of the problems is that it isn't totally effective so it really needs to be used in combination with some other technique.

As I mentioned, resistance is a problem that is universal in potato production. There is a certain amount of resistance in some potato cultivars, but in the case of the most widely marketable cultivar, we really don't have resistance available.

Monitoring and forecasting systems are implementable currently. The problem is that they require some fungicide input. Even biological control might require a forecasting system, but we would still have to have some sort of control available to utilize the monitoring and forecasting system.

Finally, in the case of irrigation management, it is really only applicable in an irrigated sort of system and where the irrigation can induce the outbreaks of late blight.

The Colorado potato beetle is another important pest on potatoes. Again, we looked at the regional importance. The Colorado potato beetle is important in most of the production areas of the country. We don't find Colorado potato beetles in California and they are not a particular problem in the southern part of the United States either. You can see that there are a number of different alternatives that are proposed for their control.

But again, if you go through all these different alternatives, there are certain types of constraints to their use. This does not mean that it is not possible for us to be using those types of things, but they are constraints which we need to be addressing through either basic research type studies or adaptive types of research. And again, you can see things like host resistance and other types of techniques like that are sort of universal in our view of what is possible as alternatives, but we have to address some of the market problems.

We have the same thing with nematodes. Again, nematodes are something that we addressed on potatoes in a number of different types of control approaches.

It is interesting that not all pesticides are used for the control of specific pests. In the case of potato production, pesticides are also applied for cultural techniques to avoid sprouting in post-harvest situations, and also to desiccate vines to make their harvesting more efficient. In cases like this, we need to look at other types of techniques besides pesticides for those particular cultural practices.

We also look at tomatoes. I am putting in a little plug here for our IPM program in California. This is our integrated pest management manual for tomatoes. In our work group we looked at a number of the different tomato problems ranging from diseased pests through nematode pests to insect pests, again looking at what the technical and operational feasibility was of implementing the alternatives, the research time frame, and some of the constraints then to use.

One of the things we did very well in our report -- fortunately, we had some weed scientists working very closely with us in the development of this report -- was how you manage weeds in vegetable cropping systems. I think a lot of these are probably applicable across. You can see some of the different types of alternatives that were proposed.

In the case of vegetable crop production, things like even weeder geese are possible on limited acreage, but there are a number of different types of problems there in their availability, a number of different types of biological controls, cultural controls, mulches, mechanical types of controls, down to things like flaming the weeds were all proposed as potential alternatives. Again, the economic feasibility of some of these things need to be addressed, but they are all possible available controls.

I would like to conclude by talking about some of the critical areas that were identified for research in vegetable crops IPM. One of these was to increase the knowledge of the basic biology and the field ecology of both the pests and beneficial organisms including microbial agents and antagonists, their interactions, and their effect on crop production.

I think this is something that we really need to emphasize in the area of IPM is an area from which we are straying, and this is the idea of looking at the entire cropping system and not just looking at tactics for controlling pests. Advances in technology are really important and they are important parts of IPM programs, but we need to figure out how we're going to use these new technologies in cropping systems.

Increased emphasis on the epidemiology studies of pests and forecasting systems. Again, this is the idea of really looking at the cropping system and how the different pests interact in the cropping system.

Development of practical sampling techniques for pests.

Improved methodology for increasing beneficial organisms in culture and augmenting natural populations.

Increased emphasis on identification of genetic resistance or tolerance for all major vegetable crop systems.

Development of mechanisms to prevent pest resistance

Increased efforts in exploration for new species or strains of beneficial organisms.

Isolation of new beneficial microbial agents or antagonists and enhancement of those already identified to improve activity.

Identification of selected pesticides which are soft on beneficial organisms.

Renewed support for directed on-farm adaptive research.

Support for biologically intensive IPM research specifically addressing pest problems of the food industry.

Research on the effects of various crop rotations on pest populations.

Development of formulations and delivery systems permitting reliable performance by effective microbial agents

Surveys for pesticide resistant natural enemy strains.

Laboratory selection for resistant natural enemies.

Increased emphasis on non-chemical methods of weed control which are economically viable, including living and dead mulches, electronically directed cultivation, and bioherbicides.

Increased support of research on the ecology of plant-associated microorganisms.

Newer modified control action thresholds which incorporate population levels of beneficials.

Then we looked at some of the strategies for achieving these goals. One of the most important things is establishing some sort of a grants program to look at some of these alternative tactics. I am really happy that vegetable crops were included in this particular analysis because again I think that vegetable crops and some of the more minor crops nationally were overlooked in the past in a lot of our IPM efforts, but yet they are very important consumer-oriented types of crops.

We felt that it might be useful to develop regional centers for pest management. There are a number of constraints that might be looked at in how we might alter the regulatory procedures to foster the adoption of IPM.

Finally, we felt that trying to foster the development of a group of IPM professional consultants was important to the implementation of IPM.

Again, we had a number of people that were associated with this work group that either participated in the survey part, reviewed the documents, or actually participated in our work group meetings. They went from A to Z and included people from industry and universities as well as producers and private consultants. We really appreciated their efforts in the development of this report.

I would like to stop with that and pass it along to our next chairs.

Thank you.

[Applause.]

DR. PARRY: Thank you, Frank. Your task was certainly one of the most complex because of the diversity of all the possibilities within a vegetable production system.

Our next team report will be from the cotton commodity team. This team was co-chaired by Dr. Raymond Frisbie and Dr. Dick Hardee. Ray Frisbie will be the presenter today and he is the professor of entomology and extension IPM coordinator at Texas A&M University. In addition to these responsibilities, Dr. Frisbie is coordinator of the cotton research activities of the Texas Agricultural Experiment Station and the Cotton Expert Systems in Texas.

Please join me in welcoming Ray Frisbie.

[Applause.]

DR. FRISBIE: Thank you very much, Dick. It is a pleasure for me to be here. I think because we are running a little late we will go ahead and jump right into the slides.

Basically, as the speakers that preceded me, I have been designated to present our report from the cotton action team. We are going to talk today about several factors, but before I do that I would like to acknowledge the members of our action team. We had 20 members, whose names are listed. There are several people in the room today who were involved. As you can see here, it represents university, government, private foundations, farmers, and private agricultural consultants.

I would particularly like to acknowledge my good friend and colleague, Dr. Dick Hardee, who is co-chairman, and also Dr. Ted Wilson, who was very instrumental in not only reviewing our action team report, but also providing several sections within the team report.

I am going to reorient based on the previous speaker's -- I am going to speed up through parts of this presentation and then I am going to slow down to try not to duplicate but to accentuate some of the points that may not have been covered yet.

But basically we went through the same procedure. I want to talk a little bit about cotton production and IPM. I want to talk about the survey that we all conducted and we all got together and constructed a common survey instrument, identified some of the constraints. Then I want us to go forward to the year 2012 and show you where we see cotton production and cotton IPM going in the future.

Cotton production is of course a very complex physical, chemical, biological, economic, and political entity. Cotton has played a pivotal role in integrated pest management development. We have made several mistakes in the management of pests over the years. As a matter of fact, we think practice makes perfect and in cotton pest control we have made these mistakes time and time again.

We have been plagued with resistance, pollution, and industries completing going out of business. We have seen cases, for example, in the Kinyeta Valley of Peru, Nicaragua, and other places where IPM programs have been constructed, collapsed, reconstructed, and so on and so forth. So through these iterations, we think we have honed the system down to where we know where we have made some of our mistakes.

Cotton production basically is a southern crop. It is produced from California to the Carolinas. Gate value of farm sales of cotton is about $4.5 billion. If you put an economic multiplier on that, it runs up to about $20 billion in crop value. So it is a very important crop in the United States. Annually, we estimate losses from all pests -- and usually year in and year out we're talking about a $1 billion loss from weeds, plant pathogens, insects, and nematodes.

As I discussed earlier, we developed a survey instrument basically. We sent it to 60 authorities, colleagues, a mixed audience across the cotton belt. We again identified the available IPM technology. This is all well-documented and is in our report, of course. We determined our research and extension needs. Then we identified the major constraints that were impeding progress.

Again, very quickly, we do have is a whole cadre of IPM tactics and strategies to be employed, ranging from cultural control -- which is the basis of all IPM programs -- we do have rotation systems, planting systems, high quality planting seed as tools, time of planting, sanitation practices, and so forth. We do have good host plant resistant, particularly for plant pathogens and also for some insects. Unfortunately, not all these characters are used in commercial cultivars that are available to us.

Genetic engineering has probably prototyped itself in cotton. We see herbicide-resistant cottons and our weed scientist, Dr. Harold Coble, pointed out very nicely that

herbicide-resistant cottons would actually serve to reduce herbicide use in the cotton production system.

Also, insect resistance, transgenic plants with a gene inserted for production of bacillus thuringiensis is being tested widely. We will see commercialization very shortly.

In biological control, we have several aspects, both in plant pathogens and in insects, lesser so in weeds. Probably our greatest focus has been on the quantification of pests on the crop and in production, sampling techniques and thresholds are available basically for all insect pests. That is not saying that we have them refined to the point where we want them to be, but there has also been sampling techniques and analysis developed for weeds and also for certain plant pathogens.

The last point on there was on systems management in modeling. We are very fortunate that we do have several crop models and several pest models that have been very helpful not only in tactical decision-making at the field level but also more importantly in strategic planning and identifying priorities of research. We have a large range of pesticides. We are a non-food crop. We have pesticides chemically based and we also have a significant number of biological insecticides.

Semiochemicals have played a role in cotton production. Pink bollworm mating disruption is a classic kind of flagship case of using pheromones to disrupt mating. They are also extremely valuable tools in monitoring insects like the boll weevil and the pink bollworm and bollworm budworm complex. Sterile insect releases, of course, are very well known for pink bollworm having prevented the introduction and establishment of the pink bollworm in the San Joaquin Valley of California.

Area-wide management, which I will stress a little bit later, has been adopted in many areas. Community-wide bollworm management in Arkansas, short season cotton production now universally used across the cotton belt to escape late season pest incidents, and of course boll weevil eradication, which is gaining tremendous momentum across the southeast and moving ever westward.

Educational programs have been tailor-made for farmers beginning in 1972 with our Cooperative Extension Service IPM program. We think these educational programs have created a business environment that has fostered the development of many private consultants. There are several private agricultural consultants involved in cotton IPM.

Some of these constraints -- we're going to repeat these. They keep coming back to us continually.

One thing identified in our survey was basically grower attitude and a perceived risk toward adopting IPM. Despite the fact that we have had several good economic analyses that IPM is actually less risky than conventional techniques given the long-term of production, there is still a perceived risk.

Tradition. The availability of inexpensive insecticides. Probably we ought to capitalize this last one: lack of long-term stable funding base for research and particularly for implementation of programs. We have many things on the shelf right now that could be implemented broadly if we had the resources with which to deliver this both to the private consultant and to farmers and farmer groups.

Although there has been a great deal of work done on economic evaluation in cotton IPM showing that it definitely is profitable, we are still weak in some of the environmental evaluations. How do you really evaluate an environmental impact? That's the question. Is it simply a reduction in the use of pesticides? How does that really go through a particular ecosystem and for what do you look in doing that?

Biopesticides is a favorite biological tool. The constraint identified in the survey is that we have had inconsistencies in the performance of some of these biological control agents.

There is a lack of incentives to adopt IPM under existing farm policy. The policy constraints group will deal with this.

There is also a very high capital demand for land which fosters maximum yields rather than the highest net return on investment.

State and local regulatory requirements and registration procedures were also viewed to impeded implementation of IPM.

Lack of regional centers of excellence. Because cotton, like many other commodities, is regionally focused, we have common things -- perhaps a more efficient way of looking at how we organize our research and extension programs is very important.

Finally, at the university level several points were brought to bear that perhaps there is a lack of balance between basic and applied aspects within our research program; the inability to reward faculty for inter-disciplinary -- which is after all what IPM is all about -- within the university system; and not being able to provide proper incentives to recruit the next generation of IPM users and advisors through faculty recruitment within the universities.

We had a 2-day session at the Washington center of excellence. Dr. Barry Jacobsen fortunately arranged for us to meet all the commodity teams and several of the constraint members to try to develop some blueprints. Where are we going into the future? How are we going to handle this? One of the things for which I was responsible was trying to set the tempo or provide a framework with which we could move forward into the future.

You have heard the term biologically intensive said several times. Basically, as we look to the future, I asked my learned colleagues to tie both hands behind their backs and to carefully go through and evaluate available technologies now and in the future. We took their pesticides away from them.

As I presented this, they were warming up the tar in the back of the room and the feathers were being brought in, but I asked them to be very patient and to try to push their creative imagination to the limit to see how far we could go in developing basically a non-pesticidal approach. Then at the end of the session, we gave them their pesticides back.

Interestingly enough -- again, Harold Coble, weed scientist on our team, was most excited about this opportunity to be able to really look hard at our alternatives. Here are some of the things at which we arrived.

One of the things at which we arrived immediately was the importance of scale, that is, size. Most IPM programs are directed at the farm field level. That has been the history of IPM, focusing on farmer involvement. That's extremely important.

But we also saw that there were IPM programs at a different scale, and that is a regional scale, whether you're talking about uniform planning dates, stalk destruction, pink bollworm sterile release programs -- that's a whole different strategy for a regional IPM program -- and finally a multi-regional and in some cases national programs. Here we give boll weevil eradication as an example, and we also cite short season cotton production as an example. So you have scales of IPM that have to be considered.

Then we asked one of our survey respondents, a gentleman by the name of E.F. Knipling, who is probably the most famous entomologist in modern history responsible for the eradication of the screw worm program -- when he responded to our survey, it was a 10-page answer. I am going to read this to you because I think it is extremely important.

He says, "It will be no simple matter to make the transition from control measures applied by growers at their discretion to coordinated programs executed by pest control agencies. This would have to be recognized by agricultural administrators, the appropriations committees, the cotton industry, and others.

"However, if the industry is indeed threatened by the lack of satisfactory pesticides, and the public becomes increasingly apprehensive over environmental hazards created by pesticides, scientists must give serious consideration to drastic changes in strategies as well as techniques for control.

"For the major cotton insect pests, the total population management system, in my view, offers the only hope that cotton can be produced with little or no reliance on pesticides."

Given the differences in scale, how would we approach the problem? Basically we look at these major factors: ecological monitoring; plant/pest community ecology; and the whole cadre of what it considered typical tactics for an IPM program. I would point out that we added in a necessity to evaluate environmental impacts, also to consider economic, policy, and social implications, and then with a focus on some of our technology transfer programs.

The elements of the blueprint basically went forward like this. We feel that plant/pest community ecology is extremely important at no matter what scale, not only within the field, but what goes on around the field, and with the pest complexes that are being evolved. This would call for new techniques in ecological monitoring, both within the field, outside the field, the crop, the pest, and the environment in which we are putting this system.

Cultural practices will continue to be the foundation for IPM programs as we look to the future. We also need to consider in our design the impact of the soil conservation practices which are frequently at odds with some of our IPM approaches.

We need to expand investigations of alternatives in weed management -- cover crops, allelopathic effects, plant geometry, and planting patterns -- to discourage weed growth and competition. We need to expand our work on planting of other crops as refuges for parasites and predators or biological control agents.

Host plant resistance and biotechnology will be accelerated. That is another cornerstone of IPM, particularly, biologically intensive IPM. The role of biotechnology will be used along with conventional breeding to accelerate multi-pest and multi-stress resistance.

We need to evaluate traits of resistance, particularly to try to determine the true environmental risk of genetically engineered plants.

Biological control. I believe there will be an expanded emphasis, particularly on weeds and plant pathogens.

Another thing in terms of augmentative releases is that we have to be able to establish what the extant mortality factors are of natural enemies that we are trying to conserve in the field before we can recommend the augmentation or addition of predators or parasites into the cotton system.

Pesticides. I think public agencies and private companies are going to work better on the grounds of producing more ecologically and environmentally compatible pesticides. Work in application technology has been said over and over and over again and we still don't have enough of a funding base to really make some major impacts of putting the pesticide on the target and nowhere else.

Environmental evaluation of emerging technologies. This is a whole area, as I indicated earlier, along with economic, policy, and social implications, of our emerging IPM systems. This is where the rubber meets the road, and that is in education and technology transfer. This is a researchable area. How do you get the word down to the farmer in the least time possible and make it an acceptable practice for them? I think the Cooperative Extension Service, which has been a leader, has to accelerate its field development programs, particularly with resistance problems and with the disappearance of major pesticide groups that we are seeing today, even in cotton.

We also need to continue and accelerate creating a favorable business environment for private consultants.

Let us jump ahead quickly to the year 2012. Believe it or not -- which I am sure you do -- there will be even more concern about the environment and there will be tighter regulations on pesticides. We will have fewer tools and fewer pesticides with which to do the job.

By the year 2012, it is estimated that pesticide use in cotton will be reduced by 75 percent, primarily through resistant varieties, biological controls, and cultural techniques. Through breeding and biotechnology, cotton plants will be more physiologically efficient. It is even expected that some cultivars will have allelopathic compounds that will resist weed competition.

Cotton IPM systems will be designed to favor biological control agents rather than to disfavor biological control agents. All private consultants by the 21st century will be certified and licensed to issue pesticides on a prescription basis. That will be here probably sooner than that.

Basically, the boll weevil and the pink bollworm will have been eradicated from the cotton belt. Those are the key pests by the this time.

Finally, a stronger public/private partnership will have been developed to achieve these goals.

Thank you very much.

[Applause.]

DR. PARRY: Thank you, Ray.

I feel assured that cotton will be with us in 2012.

Our last presenter is another rather important commodity group, the orchard crops. Certainly, the tree fruit commodity team had also a very challenging job. We have already heard and made a presentation of an award for one of the co-chairs, Jim Tette. But our presenter this morning will be Dr. Barry Jacobsen, who is perhaps best known as professor and head of the Department of Plant Pathology at Auburn University.

In addition to these activities, Barry is serving as a member of the board of directors for the Biocontrol Institute and chairman of the IPM and Environmental Programs Coordinating Committee at Auburn. He has very recently joined and is planning to move very shortly -- this conference may actually be delaying that transition -- to become dean of the College of Agriculture and director of the Montana Agricultural Experiment Station for the Montana State University.

Please welcome this morning Barry Jacobsen.

[Applause.]

DR. JACOBSEN: Thank you, Dick.

As Dick said, the tree fruit team had a really complex job. For those of you that think you might be hearing about citrus, we excluded that.

I think the tree fruit crops are grown in a vast diversity of environments throughout the United States. We go all the way from the humid subtropics of the southeastern United States to the dry subtropics irrigated agriculture in California, to temperate rain-based orchard systems, and temperate irrigated orchard systems in the west. This definitely ensures both a diversity of pest pressures and pest types.

Orchard crops are characterized by very high costs. For those of you not involved in orchard situations, it is not unusual to spend $10,000 to $15,000 or more per acre to establish an orchard.

Orchards are a long-term commitment. Rotation as a strategy really was not available to the orchard crops team.

There are a very, very limited number of cultivars that are available because of consumer or processor preference. Quality and cosmetic factors are absolutely preeminent. These factors really place a great deal of emphasis both on insect damage, disease damage, insect parts, and very important, pesticide residues.

If I could, I would like to go into the slides very quickly.

Within the fruit crop group, we only considered one area. We had a very wide-ranging team with weed scientists, representatives from biocontrol, consultants, industry, university, and commodity groups, the actual growers themselves. We chose to use a model crop. Our model crop was apples because it is grown throughout the United States. It has a great regional variance of pest incidence and pest importance.

The commodity team considered both major and minor pests. We looked at direct effects or direct damage from these pests as well as vigor effects. I ask you to keep in mind

that next year's fruit buds are being formed this year, so very often the effect of pests is not seen until a year or more later.

Across all regions, we had a few pests that were really important. Please excuse me, entomologists for misspelling coddling moth, but the coddling moth leafroller complex was important in virtually all areas. Fire blight, as a disease, affected one or more areas. We're really talking about five or six different diseases in this group that we determine to be summer diseases and are important to a greater or lesser extent across all regions.

Powdery mildew, apple scab -- with the orchard crops, I guess we are going to be the first ones to bring in a new pest area, the vertebrates such as moles, mice, deer, the woodchucks, and of course weeds.

As we look at integrated pest management, I want to be very, very clear that it is a very site-specific situation. Within these regional areas of production, every orchard is somewhat different. If we are going to go to a biointensive IPM -- and this is what we looked at for a very stable long-term system -- we have to understand that this is going to be even more site-specific, highly information intensive. It is going to be based on scouting.

The phenology of both the apple, the pest, the potential parasites and predators, as well as pathogens are going to be driving informational factors. We are not at the present time monitoring all those factors as well as the physical environment.

At the Wingspread Conference that was co-sponsored by the EPA and the Johnson Foundation, we looked at two scenarios. Ray Frisbie put to us a very, very difficult task. First of all, we looked at a scenario of producing apples without synthetic pesticides. We looked at what controls are available now and from the extensive survey work that we did that is reported in the orange book, we looked at what might be available within the next 10 or 15 years.

Our second step was looking at the integration of all available strategies, including synthetic pesticides, what controls are available now, and where we will be going in 10 or 15 years.

Both of these scenarios were discussed relative to feasibility. Are they technically feasible? Are they economically feasible? We are dealing in a situation where that orchardist, the scout, or the consultant has to make money. What are the market standards?

In looking at things without synthetic pesticides, we saw something that was very, very interesting. There was a general consensus that some of our pests will decrease in importance such as mites, leafhoppers, aphids, and scales. There is a very serious proviso here. What is the transition period in the decreasing importance of these pests without pesticides? How long is this going to take?

Another serious question was asked. Are there older secondary pests of which we are not highly aware that have been controlled or suppressed by our pesticide use? And lastly, what new pests that have been introduced and controlled will emerge to cause us problems?

We certainly have a wide range of tools for controlling pests in apples right now -- sanitation, resistant cultivars. Let's look at resistant cultivars for just a minute.

Do you realize that fewer than six cultivars comprise more than 90 percent of the total production in the United States? Three of those six cultivars go back to the 1700s in

terms of when they were selected. We have done a lot of research in fruit breeding. We have probably done more work in terms of size control than we have done in terms of introducing pest resistance. We do have scab resistant varieties. These scab resistant varieties are not even produced on .1 percent of the total production.

Disease-free planting stock. I think this is a very critical area, virus freedom, freedom from nematodes, et cetera.

Managing fertility. I think this is grossly underestimated.

Orchard architecture. Water management. Managing our harvest time is going to be critical. How we handle the orchard floor is certainly an important factor.

We do have some pheromone disruption, and we have some interesting strategies that are available now and some that are immediately on the horizon.

Selecting the site for our orchard can be very important.

Now in terms of some non-synthetic things, we do have the old sulfurs, coppers, and even really improved formulations of those. We have some insecticidal soaps. We have some traps. Attracting apple maggots with large red traps impregnated with pheromones to attract them, sticky traps, is certainly available right now.

Bacillus thuringiensis is a biological. The use of ordinary household bleach in post-harvest dips to get rid of things such as sooty blotch and flyspeck. We do have some release predators and parasites. And immediately on the horizon I think granulosis virus is going to be available for some of our insects.

Without synthetic pesticides, looking 10 to 15 years down the road, I think resistant cultivars are going to be much more important. In a long-term crop, such as the fruit crops or apples, the use of biotechnology to identify elements for insects or disease resistance using molecular biology to incorporate these into tissue cultures, produce plantlets through that tissue culture, and then graft them onto existing root stocks is certainly going to be there.

The whole area of semiochemicals. I think we're going to find mating disruptance, attractance, repellents, et cetera available.

We're going to see more in the way of biological pest control agents both for insects and for diseases.

Biorational pesticides. As we understand more about the biological control agents, we're going to identify specific compounds produced by these agents that might be utilized in a biorational basis. As we learn moire about the ecology of the situation, we are going to understand more about the role of predators and parasites, whether they be augmentative releases or ways of working the ecological system to really build them up.

Pheromones, which are really part of the semiochemicals -- I think we have some real opportunities there.

Then insect growth regulators I think will be one of the new tools we will see in the next 10 to 15 years.

Now as we integrate all strategies, I think we have some lower rate pesticides. We saw the tablet yesterday that was going to treat weeds on 4 acres. We have fungicides now instead of using 2 or 3 pounds per acre that are used at less than one-fourth pound per acre.

However, these newer pesticides are very specific in their mode of action, resistance management. Are we going to have other pesticides and fungicides there to control the resistance problem?

I think we can use some of the tools that we used without pesticides available at less than label rates. I think if you start to integrate the strategies, we can use lower rates of pesticides.

I think scouting is going to become far, far more important and something with which we can do a lot right now.

Fred Finney said yesterday, "You had to make that leap of faith." But scouts are allowing us to do that right now. We're going to be knowing a lot more about the environmental effects, how to predict diseases, insect outbreaks, how to time our sprays much better.

A change in market standards. What things are truly just cosmetic and don't influence storability, wholesomeness, et cetera? We have to work with some consumers on that.

Now 10 to 15 years from now, we will see a lot more in the way of biological pest controls. We have very few products available to us right now -- and I am going to throw a little bit of a bombshell out there right now -- I am going to put a challenge to the pesticide industry.

Bill Kirk used a number yesterday that really surprised me. He said that it cost $60 million for the development of a new pesticide. Let's even go back to a more standard $40 million. Do you realize the amount of money spent on the development of one pesticide exceeds all the money being spent right now on the development of biocontrol products? I think there is a tremendous market opportunity there. Somebody is going to take it.

Biorational pesticides. As we learn more about the mode of actions, we're going to understand simply how to get to simple molecules that will do some of the things that Bill Kirk talked about.

Semiochemicals and pheromones are going to play a much greater role in monitoring and actual disruption of life cycles for these insects.

Growth regulation of both the host and the pest. I think there are a lot of opportunities there.

Combinations of both biological and synthetic pesticides.

I will tell you -- and you can't read this from the back of the room -- after the group got done with this study, we concluded that right now it would not be feasible to produce commercially acceptable fruit without synthetic pesticides. There may be an orchard here and there that would be able to do it 1 year out of 5 or 2 years out of 5, but it is not commercially feasible to do it right now without synthetic pesticides.

It is going to take a tremendous research investment and long-term studies to get us away from the use of pesticides on apples and most of our tree fruits. I will skip these tables that are in your book on page 102.

What is the orchard of the future going to look like? I suspect we'll have some sort of monitoring device out there, whether it is going to look like that or be based on a Y-trellis

sort of thing. I think if Jim Tette had been pruning these apple trees, he would be with us today. Instead, he was pruning an apple tree that was of standard height. But let's look at what the apple orchard of the future might look like.

The site would likely be selected for a number of different characteristics -- air movement, freedom from frost, et cetera. The site would be pre-planted to a crop that either directly or indirectly controls nematodes whether we might look at something like marigolds or there are a number of other crops that we might actually use as a pre-plant nematicide on a biological basis.

The grower is going to very carefully decide what kind of tree and what kind of characteristics he wants. Likely, it is going to have to be size controlling because we're going to emphasize heavy pruning. We're going to have disease-free planting stock. Remember, you are planting something that is likely to be there for 20, 30, or 50 years. We can afford to spend some money up front to assure freedom of disease or pests. We're going to be planting pest-free or disease-resistant cultivars. I think biotechnology is going to play a very important role there.

The orchard floor is going to be ecologically managed. We might plant slow-growing or even genetically dwarfed grasses. Likely, we can use propane burners for weed control. Y-trellising will really allow us to the sanitation job that we want to do. Heavy summer pruning and fruit thinning will play a key role.

More microbial biocontrol agents will be used. We will be using some synthetic pesticides. There is no question in our minds after doing this study.

I think as we go to these size-controlling Y-trellis type orchards the concept of electrostatic spraying -- putting our pesticide on the site that we want -- is very, very possible. We're going to use a full range of parasites, predators, and semiochemicals.

Post-harvest pathogens -- and I think there is some really good working going on right now -- we are going to be able to control them through some of our microbial biocontrols, controlled atmosphere storage, and really looking at some optimal marketing system.

I said that this is based on research. Resistant cultivars are going to be the key. Are we going to be able to identify the genetic elements that we have to move into commercially acceptable varieties? Six apple cultivars right now are what the industry will accept for 90 percent of the use.

Fundamental understanding of the biology and ecology. Looking to the future, I think that if we have to look to the next 10 years, the term "ecological study" across all commodities -- and that's basic science -- is going to be key in fruit crops, both leaf surface and fruit surface ecology, the ecology and biology of both the pests and beneficials, phenology of our host plant as well as the other components.

Economics. We talked about a key constraint at the universities as to how you reward teamwork as opposed to individual accomplishment. We are really going to need to focus on multiple pest models. It is going to be absolutely critical. I think if we're going to get a validated expert system so that the growers can have access to a Jim Tette or any of the other people who are really, really experts in tree fruits and their management, we're going

to need to have computer programs so that they can access these people 7 days a week, 24 hours a day.

We have some key social considerations. We have to think about the farm laborer. Are we going to have enough labor to have these labor intensive systems? Are we going to have enough consultants? Is there going to be a way for these people to make a living?

Public education of what an IPM system really is about. How do we transfer the technology from the research? Extension is going to be a key component as well as the private sector through our consultants. Those consultants are going to need continuous updates and education. Extension is going to play a key role there.

As we look at technology transfer, allowing the Fred Finneys and others in this world to make that leap of faith, long-term demonstrations are going to be absolutely critical. Anything we do on fruit is going to be a long-term situation. Expert systems are going to play a key role.

What are the incentives for that grower to take risks? I think he is going to need some insurance program to indemnify him when these biological systems don't work.

Going back to our pesticide manufacturers, I will throw another bomb out there. As we develop new microbial control products, they set the standard for their own pesticide. It has to be better than something on the market already. I would say that for a biological, if it is as good as our synthetic, maybe that is good enough. Likely, the development costs are going to be far lower than they are for synthetic chemical pesticides. So I think we need to look at the risk/benefit situation and how we can manage this.

I want to thank you for your time and indulgence. I know you are all looking for a cup of coffee or perhaps the rest room.

Thank you very much.

[Applause.]

DR. PARRY: Thank you, Barry.

We have run over a little bit this morning before our break. I apologize. However, I think our speakers have set the stage for a rather interesting process upon which we are about to embark, looking at the constraints and proposing resolutions.

The logistics of this process are a little bit complex and our MC of that activity is Mr. Steve Johnson.

MR. JOHNSON: Thank you, Dick.

Remember the dots and the colors? We will go over it one more time.

The breakout sessions we're planning to begin at 10:30, so why don't we make that 10:50. That should be about a 25-minute break.

The research and extension breakout session will be in the last two portions of this room. So those of you who have a blue dot and are the research extension constraint team, you are in the last two portions.

Those of you with red dots, those are the policy constraints, and that will be in the middle section.

Then those of you with gold dots, regulatory, you will be in the front section here.

Those of you that have green dots and are part of the institutional, you will be upstairs in the Dewey I room.

There will be signs. All you have to do is watch your color code. It's kind of like Winnie the Pooh and clothing coordination. Just follow your dot and you will be all right.

These sessions were originally planned to go until 5:00 and then we were going to have a plenary session at 5:00. We have decided to eliminate the plenary session and you all can go to at least 6:00, at which time you need to clear out because the hotel needs these rooms for other activities. But you can go until 6:00 this evening.

I would like to make some other comments. There is a wide range of constraints and options for resolution. The teams that put these constraint reports together created this wide range to avoid any pre-selection and to encourage you to explore numerous possibilities, both in terms of constraints and resolutions.

Obviously, there are a number of people that have varying opinions on each of these constraints and resolutions. So the purpose of the multi-voting is to give a needed focus by identifying the most pressing constraints and the needed resolutions for dealing with that.

I would like to give you just a brief explanation of the process which we will use tomorrow.

The constraints and options paper which you already have -- I encourage you to read those during the break, if you haven't read them already.

[Laughter.]

MR. JOHNSON: I know some of you probably read them on the plane. Some of you I saw reading something in the bar.

But we want you to use that as a focus and as a basis for discussions. We want you to add to, delete, modify, both in terms of the constraints that have been identified as well as options for resolution. We are going to take the results of each of your efforts and put them on a ballot. So there will be a ballot that identifies for each one of the constraint areas both the constraints as well as the resolutions.

Then tomorrow morning, and as part of your badge -- if you were to take your name plate out, there is a multi-vote card because we know that some of you have brought your own dots to try to influence the vote, we have a special set of dots that require your use of a card.

[Laughter.]

MR. JOHNSON: So tomorrow morning when you come in at 8:00, you will rip off this, give us your card, and we will give you two sets of dots, 10 dots. They are actually big dots. You will also be handed a ballot. You will be asked to vote on which of the constraints you believe are the most important that we collectively need to address, and which are the options for resolution that you believe are the most important that we should pursue.

You only have 10 dots for identifying the big constraint and 10 dots for identifying which are the resolutions. There is a sheet in your package that describes the multi-voting process. I won't go through that.

During the morning session, you're going to go through that voting process. Then some time -- whether it be middle or the end of the day -- we are going to give you the results, kind of like real-time election results. We are going to identify for you what you consider to be the top constraints across all the four constraint areas. We are also going to inform you as to which are the top three constraints that you all have identified in each one of the four constraint areas.

In addition, we are going to give you a listing of what you believe are the top options for resolving constraints. Then the last item with which we will provide you will be what you have told us are the top three resolutions for each one of the constraint areas. So there will be four bits of information as a result of this tabulation.

So that is the process that we have put together. Again, voting will begin tomorrow at 8:00, so remember to bring your card and be prepared. If there are any questions, please feel free to see me or one of my staff.

As a reminder, those people with red labels are there to answer your questions on registration issues; yellow, general help; and if you see a white, that is an organizing committee, and we don't know anything so don't see us.

[Laughter.]

MR. JOHNSON: Thank you for your indulgence. We need to clear out of here quickly so that we can get the walls set up and the room rearranged.

Thank you.

[Whereupon, at 10:30 a.m., the Forum went into breakout sessions, to reconvene in plenary at 8:00 a.m. Friday, June 19, 1992.]

National Integrated Pest Management Forum
June 19, 1992

DR. CATH: Good morning, ladies and gentlemen.

My mission this morning is to try to get this program back on schedule and get you to the point where you're not all going to leave with your handbags and miss part of the program so that you will all be able to make the scheduled flights you have.

It is going to take a little hustling to do this because the video has run us over time. I think we have all our constraint presenters at the table now.

Unfortunately, we only have a short period of time for their presentations. I am going to ask the four of them if they would try to make it as brief as possible so that we can accord our speakers the opportunity for the time that has been allotted to them.

When the constraint members get through, I would ask that our guest speakers come forward and take their place up at the head table up here.

My name is Stan Cath and I am with the Agricultural Research Institute. I apologize for being absent the last 2 days, but I was at a meeting in New Orleans. Why I have been assigned this task, I do not know except that I am always pushing and shoving. Maybe they felt they could keep this thing on time this way.

To start out the reports from the constraint teams, the first reporter I would like to ask to come forward would be Therese Murtagh speaking on the institutional constraints from EPA.

MS. MURTAGH: Good morning.

The institutional constraints team set a very ambitious agenda for all of you. This group set out to identify and resolve the constraints embedded in educational and research institutions, within the Government, and in the agricultural community. They also looked at consumer attitudes and the agenda of environmental groups. The results is a very energetic agenda for everyone involved.

Our breakout session had a strong western contingent yesterday, so they really came out shooting. I would like to go through the options they are recommending because I think that summarizes their direction.

The team proposed increased funding for IPM research and implementation. They stressed that the funding needs to come from both traditional sources and from more creative sources such as public/private partnerships. They stressed that creativity is needed in this area.

They also ask that increased recognition and reward be given for long-term research. They ask USDA and EPA to look at themselves and restructure so that the agencies are in position to set clear and comprehensive goals and agenda for environmental and ag issues in IPM. USDA and EPA are also asked to form a formal interagency task force on IPM.

We had sociologists on our team, and they won fervent converts to the need for including social science and marketing strategies at every stage of IPM development. You will see options included on your voting sheets which have this direction.

The team proposed interdisciplinary teams for IPM research. They also focused on IPM consultants in the field. The discussions in this area led to a number of proposed options. They proposed improved educational opportunities from practical training to advanced degrees. They say perhaps there could be a Government subsidy for the efforts of IPM consultants. They say perhaps there should be a pesticide prescription program. They also ask for development of interdisciplinary certification programs for IPM.

The team also stressed often the need for community involvement in IPM development and implementation. When they turned to communication and education, they saw the crying need for the eduction of the public both at the general level and also at schools to catch the people who can still learn. They recommend a strong extensive outreach campaign for IPM.

They would like to see environmental groups pushing IPM implementation. The team asks for their increased involvement. They also present the option of developing measurable standards for IPM food.

I am sure that many of the options presented by the institutional team will be echoed by other teams here today because of how the teams did overlap. I am sure our team has been lobbying in the halls.

Stan, I would like to turn the program back to you.

DR. CATH: Thank you, Therese.

I would like to ask Chuck Lander to come forward now, from the Soil Conservation Service of the United States Department of Agriculture, on the policy constraints team efforts.

DR. LANDER: Thank you and good morning.

I will be brief because as we found during our group session yesterday, a lot of the materials we had put together prior to this meeting were considered good, but maybe not totally up to the job of recommending options.

I want to say that I find it quite interesting standing up here. My involvement in this process came about a year ago. I went to one of the meetings substituting for the fact that no one from our agency was going. I went with the intention that I would take some notes and carry them back to the appropriate people and that that would be the sum total of my direct involvement in this process. I went away from the meeting somehow having become a co-chair of one of the constraint resolution teams. But it has been quite exciting and challenging. I will say that.

The policy constraints team met over several months. As you may have noticed as you looked in the green book, we gathered quite a significant amount of data and made some attempts at analyzing it, and even putting together what we thought would be some logical options to help remove constraints within existing policies of USDA and other Federal agencies.

During our group session yesterday, while we were accorded some thanks for the amount of effort we made, we were advised that there were some Federal agencies not mentioned in the document, which we recognized. But more importantly, we were advised that some of the options we proposed, while they might work in some situations, they might have the opposite effect in other applications.

This is due often to the site specificity that is related to the use of IPM. A policy for one type of application may not work across the board. When you're working with national policy, it is difficult to design that to accommodate that kind of specificity.

I think one of the most important things our group came to a consensus about was the fact that Federal policies by themselves, as they exist now or as they might be modified in the future, will not in and of themselves drive the further implementation and development of IPM strategies. This was brought home over and over again by very many people in our group yesterday.

One member put it in the terms that it would be difficult or probably very wrong to start recommending policy changes that would promote IPM in national programs until the research, education, and demonstration segments that affect IPM are in place and that the policies can be designed to reflect them. I just happened to think sitting here this morning that the Federal Government is often criticized for writing policies, directives, and directions to the exclusion of folks outside the beltway, and maybe even before there is a recognition of what the goals are and what we hope to accomplish.

That resulted in a strong consensus that it is probably wrong to think about major policy changes in existing Federal programs at this point to promote IPM until some more fundamental activities have been accomplished. I will talk some more about them in a minute.

We only touched briefly on constraints within existing policies of USDA and other Federal agencies and we talked more in generic terms than anything else. I think the consensus of the group was that while many of the existing policies in Government programs do in fact act as constraints, they certainly were not intended to be constraints because most of them were written long before IPM reached the crescendo of focus at the national, State, and local levels that it has now. Most Federal programs are targeted toward a specific goal. Quite often it is very difficult for a Federal program designed to do one thing to accommodate a lot of different goals.

One with which I am quite familiar and which I think is apropos to mention are the erosion control requirements in the 1985 and 1990 Farm Bills. The policies written to achieve those goals were designed to do one thing: achieve a significant reduction in erosion control on America's farmland that is classified as highly erodible.

That is at odds with certain strategies associated with IPM if we're talking about mechanical weed control as an alternative to chemicals. One of the detriments of mechanical weed control is that it promotes soil erosion. It is difficult in some situations -- that situation specifically --

to always accommodate all the applications of IPM if we're still going to achieve the erosion control goal.

The group recognized that that will be a significant challenge to Federal policy-makers as well as State and local policy-makers now and in the future. It is very difficult to often accommodate multiple goals in a specific type of program.

The group talked about a wide variety of issues. You have them in front of you, so I won't go into them in detail. But some of the things that we talked about being needed prior to initiating significant Federal policy changes are a number of basic fundamental things. One is a national commitment to the development and implementation of IPM on American farms. This commitment must be developed and recognized not only by the Federal bureaucracy, but it needs to be recognized by States, local governments, agribusiness, producers, and the public.

The public is going to be a key in this. There was a great amount of discussion over a very contentious issue dealing with what some people call cosmetic standards. Some propose that if we would reduce the quality requirements within some of the Federal programs that affect the sale of fresh produce, that would automatically impact favorably IPM.

A number of producers told us that that would not be true, that if we didn't have any Federal standards on the appearance of fresh market produce that the housewives that buy the majority of products in this country and take them home -- at this point in time they consider ultimate appearance to be important, regardless of whether that affects quality. So there was some feeling that this national commitment of everybody that would be affected, from the producer to the Government down to the consumer, has to be achieved before we can really start writing Federal policies to help implement that.

This national commitment must be based on a common vision of what IPM is and what it should achieve in America's agriculture. It should include the development of a universal definition of IPM into which everybody can buy.

It was evident in our discussion yesterday that not all of us in that room had exactly the same idea of what IPM is or what it should do. As long as that type of situation exists, it is going to be difficult to bring together a group as small as the four people sitting at the table up here, let alone a group this size or everybody that is affected within the agriculture community to buy into an overall idea of IPM.

The group felt very strongly that after the commitment and a vision are established that there needs to be a strategic plan established to help promote IPM and the implementation of IPM, that this plan should be developed with input from everybody within the agricultural community that is going to be impacted by it, but specifically the producers -- America's farmers -- who will be ultimately affected most. But it also needs to be developed with input from America's consumers because they are the ones that will ultimately determine the success or failure of programs that may change how some things look.

It is only when the above actions are completed that our group felt it would be safe to initiate major policy changes in Federal programs. That is what our design team decided to look at solely because of the number of resources which we have to do our job.

It was mentioned that any Federal policy changes should be done with care, recognizing one major issue: the fact that America's farmers, the producers of our food and feedstuffs, operate in a very high risk environment. They deal with many factors over which they have no control. They have no control of weather; they have no control over most input costs; and often they have no control over market price.

You have the resolutions that our group considered, so I said I would not go into detail. However, I do want to highlight a couple of issues that came up over and over again in many of the proposed resolutions.

Number one, our Federal policies should be developed to encourage research and education. Funding for IPM research should be given a much greater emphasis among both public and private research organizations than it does today. And Federal agencies should encourage the allocation of funds that would have favorable impact on the development of IPM technologies.

A strong nationally coordinate education campaign is needed. Normally, when we think of education we think of such things as the practitioners of the technology, the farmers, the Federal, State, and local officials who help deliver the technology to the producers. Our group

recognized that there are some other segments of the society that the policies should be designed to help educate.

One would be the legislators, the people up the street in Capitol Hill, who ultimately determine funding for all federally supported programs. It should also include the practitioners within agribusiness who could help deliver this technology to the producers. It should extend down to the university level, as was already mentioned in the previous report, to help graduate programs better train our future scientists in IPM technologies.

It was mentioned that much better communication and collaboration is needed between different levels of Federal Government and extending down to the State, local, and agribusiness to help everybody become a team member working to implement IPM and develop new IPM strategies.

There was a considerable amount of discussion concerning the role of crop consultants and agribusiness people in the delivery of IPM technologies to the farmers. There is one group that feels that agribusiness should be as intimately involved as USDA, SCS, and Extension people have been in past years in developing detailed plans that are often needed to support Federal and State environmental programs.

Finally, and most importantly -- and I mentioned this before -- any policies that are written to promote the use of IPM, and any other Federal programs actually, should be written with intimate involvement of the people they are going to influence, in this case the producers and the consumers who will ultimately determine the success or failure of IPM programs or any other programs.

I will summarize by saying that you have a copy of all the resolutions that were prepared by our group. This morning's session is designed to help you prioritize these and the other constraint team recommendations. That will help all of us move on to the next step of taking everything we learn here and starting on the road to getting IPM a much more widely used technology in agriculture production.

Thank you.

DR. CATH: Thank you, Chuck.

I know call forward Pat Bagley from the regulatory constraints team. Pat is with the Environmental Protection Agency in the registration division.

MS. BAGLEY: Good morning.

First of all, I wanted to thank you all for coming and showing your support for IPM. Also, the members of our panel and our participants for taking time out from a busy schedule. This is a particularly busy time of year for people who are out in the field. I appreciate them coming in.

I am going to go over a few of the points that really struck me in our session yesterday. We don't have a lot of additions to the constraints and options that we discussed. We do have some and they are out on the ballots this morning.

One of the things that really struck me was that we still need -- and will continue to need -- to improve communication among everybody. Along with regulatory burdens, we have a very

strong need to continue our dialogue with our customers, be it registrants, growers, academia, the people on the Hill -- whatever. We need to continue to talk to each other. We need to find out the real concerns and issues and get them out on the table and talk about them.

One thing that I have noticed with registrants from time to time, since they are rather -- I would not say intimidated, but they have not always had the best experience with EPA -- is that we don't always know what it is that you need. It would help for you to come in and tell us what you need.

For instance, one thing that strikes me very strongly is with some of the new products that are coming out that are really dependent upon their formulation technology to work, for instance, semiochemicals, some of the bait and trap or bait and kill type materials. We really need to be flexible within the agency to allow you to work to develop formulations that work out in the field. We realize that we need to allow you to test these things before they go out so that growers will know how to use them before you register them.

I think one of the fastest ways to kill a new product is to release it on the market without any real good knowledge of how to make it work, particularly with more unforgiving products as opposed to conventional products.

I think it is also very important to note that people who make conventional chemicals have a very strong point in that they want their products to be considered in the registration process in any kind of risk assessments that we do when we consider IPM programs. I think this came through loud and strong and I think we do need to do this.

Funding I believe has to be brought up in every session. It was brought up in our session, specifically with maintaining the high level of attention that our biological work group has been able to give to registrants, new chemicals, and those types of programs. We are beginning to get very backlogged and we would like to maintain our high level of being able to communicate and get the work done.

With funding, the one thing that struck me when I heard Kathleen Merrigan speak the first day is that we want you to do IPM, we want you to do it fast, we want you to get it done. I am hearing is that we, as a group, probably need to quantify what we have done with this now up to this point to show how it has worked. We need to really make a good case for it and indicate where it is going to help in the future with a conglomeration of programs, including conservation, environmental, ag production -- this really does aid a lot of programs and a lot of people. We need to use that in our plea for more funding.

I think we need to have some numbers. That is something we need to take out of this conference and on which we need to work.

One of the other points that was brought up was a concern that EPA does regulate product-by-product and it is registrant driven. We really don't look at IPM programs when we're registering. We need to look more at these programs when we make our regulatory decisions. That is going to be very difficult and very subjective, but it is something that we need to do. We need to get a start on it and we will certainly need a lot of dialogue when we begin to do that.

Lou Falcon, who I greatly appreciated being on our panel, brought up some really good points. We have all this wonderful publicly funded research that has been going on, and there

is very little incentive to carry this out farther and it marketed because it is very difficult to get exclusive use permits with publicly funded data. One of the requests that we had was to try to provide data compensation exclusive use to publicly funded research so that we can provide incentives for getting the tech transfer out and into the field.

The other thing, as Chuck mentioned, was to maintain our flexibility. When we regulate, we tend to do it over a very broad category. We had people in our audience from the hops group that are saying, "We're not up to speed with other commodity speeds like corn, soybeans, fruit, or whatever. We need for you to consider what some of our needs are and don't regulate us out of the picture. For instance, if you go with prescription control and needing consultants, we have none. We have nobody doing research."

This led me back to the thought that we do need to keep flexibility. But one of the things that really strikes me about our group is our vast resource. We have tremendous resources within this group. A lot of us have our own agendas. There is nothing wrong with that, but I would strongly urge all of us to draw on each other for new ideas. It is very imperative in EPA that we start thinking about things differently. We need to change our mind set. This is not an easy thing to do, but look at the resources we have in you.

I would extend that to everybody. I think we need to stay narrow to get our jobs done, but I also think we need to stay broad in gathering in other information and keeping our antenna out to gather in information to get something done.

Last night it was late, we had finished trying to type up the new constraint resolutions, and I had gotten in the car. It was about 11:00 and all I really wanted to do was see my bed. I live about an hour from here. They closed the road that I normally took. So I drove up to the people putting the markers out. I told them, "It's late. I'm tired. I don't know any other way home." The guy gave me some directions. I told him that I didn't have a road map with me.

What struck me as I was driving in this morning is that this is what is happening. Everybody is afraid that we will have all these changes and we won't have a road map and we won't have any help.

The one thing that strikes me about this group is that we have our resources here. We have our research people that can provide that road map for farmers. We have EPA that can provide that road map for registrants. We need to do this. It is extremely stressful to think about jumping from a system that you have known for years into something that is totally unknown. My suggestion is that we try to make it easier for everybody by providing these road maps.

Another thing that struck me was where we go from here. I was hearing from research that we needed to have products to test in our systems. But if we don't have the registrants interested particularly in minor uses to proceed with this, we need to figure out a way to do this. Again, more road maps and more thinking about doing things differently. I think we can do it. I would like to see us help each other instead of making it real stressful on each other.

Those are the thoughts I would like to leave with you. I think we have some work to do after this Forum. I will be calling upon some of you to perform some panels. I think EPA can help by providing some training sessions, particularly for researchers, and we will do this.

Thank you.

DR. CATH: Thank you, Pat.

Our final presenter would be Janet Anderson, who is going to speak on the research constraint group. Janet is with the Biological and Economic Analysis Division of the Environmental Protection Agency.

Janet?

DR. ANDERSON: Thank you all for being here. On behalf of Mike Fitzner, who is my co-chair in this, we also want to thank all the members of the research constraints committee, the seven member of our reactant panel, our moderators who really helped us yesterday in the breakout session, and the recorder we had as well as all those who participated in the session. I really think we accomplished things far beyond what Mike and I ever envisioned when we started on this project.

Our working draft of our paper had 12 constraints and 44 potential resolutions. When we finished yesterday, we had 25 constraints and nearly 60 potential resolutions, and a lot more recommendations for improvement in the content of that working paper, which we will take back and on which we will do a lot more work.

I don't intend to go over all 25 constraints and 60 potential solutions. You have them in your package and I think you would probably like it if I am rather succinct and give you time to spend some time looking over those to make your votes.

But let me just give you a flavor of some of the issues that we covered yesterday.

We were challenged to change our thinking to go from not thinking about producers, but to start thinking about systems managers; to not think about interdisciplinary, but trans-disciplinary projects with an emphasis on ecosystem approach rather than even a whole farm approach. Many of us in the past have probably thought of a single crop or a single pest/crop combination.

We need to increase IPM training with an emphasis on farmer-to-farmer training as well as farmer-to-research training. We need to look at the way we train people within our academic institutions and consider whether or not IPM ought to actually be taught at the freshman level rather than as an advanced part in someone's graduate degree.

It was stressed that IPM programs should include all types of operators. We should have people who are organic farmers, small farmers, as well as large farmers in our IPM programs.

We thought about whether we should go back and really analyze if all our IPM coordinators are doing what they're supposed to be doing. Are we really providing what we need to our customers? Maybe we have too many researches who are tied to pesticide research. Maybe pesticide companies should reconsider their actions that have the salaries of their salespeople tied directly to the volume of pesticides they sell. Maybe this is actually not helping us implement IPM.

We had a grain farmer from Maryland, Mr. Meeks, come and talk to us. He was a very important part of the panel. He gave us a perspective of what the farmers were really like and just how far farmers are really likely to go. But the constraints of the farmer are something that

I think we haven't put into many of our other aspects as we have looked at it. Maybe the commodity people had it a bit more in their reports, but I'm not sure about our four constraint teams. I don't think we really looked at the time constraints that are there for farmers.

He reminded us that we have to keep looking at the farmer's bottom line to figure out what we really can do in IPM. He suggested that many farmers are innovative and certainly receptive to changes that improve that bottom line so that they would become their own IPM scouts if we would really train them.

We have to have a system that will reward people for their successes in IPM. There are successes in research, implementation, education, and regulatory efforts and we need to make sure that we have a reward system for recognizing those successes.

We also were called upon to improve the image of IPM and to look at it and maybe make the statement that IPM is the only sensible pest management system which will allow us to continue to improve the world's best agricultural system.

We, too, had many of the same themes you have heard from the other panelists. We talked about the need to include economists and rural sociologists more into our projects. We have a lack of weed scientists and agronomists in many of our projects. We have to go beyond just having entomologists and plant pathologists.

We recognize that the best IPM programs include producers, IPM practitioners, local extension staff in the planning and in the design stages of the research projects as well as having researchers at the on-site implementation stage. We recognize there is a need for further information on pest and host biology. We don't know all we need to know about them. We need to know much more on the pest of minor crops. We also need to know more about ways to monitor pest resistance and host plant resistance.

We recognized as a constraint to the further implementation of IPM that there was a lack of good coordination among Federal and State agencies and the private sector. We needed better ways to disseminate IPM success stories and reward those efforts.

Finally, our group recognized that we need better ways to educate the public on IPM principles and strategies.

We had numerous solutions, as I mentioned before, and these fell generally into eight categories. The team talked about the need for an IPM strategic plan that would guide all our other activities. This you have heard from the other panelists.

We also spent a good deal of time with funding. Many people have talked about funding, funding, and more funding. While we recognize that there are limited resources, we need to be able to channel those resources into the appropriate mechanisms so that we get the most bang for our buck. We have to really seriously look at the programs we have now and figure out whether we need to move money from one area to another.

We also need to look more at private groups, which we have not done in the past. The pesticide manufactures, food processors, distributors, and commodity groups are just a few which might be there to help us with funding problems.

In order to utilize our funding more effectively, we need a true priority list for our research and extension education programs for IPM. This would come out of a good IPM strategy.

We got several additional categories yesterday in our breakout session that we needed to add to our list of research areas and priorities. I would say a fourth category we covered was the need to have an independent private IPM consulting industry. Then we spent quite a bit of time talking about training, certification, having training at a variety of levels, a 2-year program, a 4-year program, a graduate program. How do you go beyond a graduate program with internships, apprenticeships? What can you do for farmer's hands-on, and even going down to the elementary level to teach students about IPM at an age so that it is not foreign to them when they come into higher education?

For any of you who doubt the benefit of elementary education, you only need to look at how important recycling has become since they have gone to the school children. That is the place to begin.

Improvement in communication is an issue that seems to come up whenever you talk about problems. When we have problems with implementing here, too, we came up with a need to improve communication with the public and between ourselves. Of course, this Forum helps a great deal. But we also need to improve communication between those who are our managers, our upper management, and those who handle the purse strings.

We noted that there needs to be a hiring policy that includes not only people with basic research but also people who have experience and training in IPM.

We want to improve interdisciplinary cooperation at the university, State, and local extension levels and collaboration with agriculture economists and rural sociologists to emphasize a systems approach for both research and extension education projects.

Finally, it was noted that in the area of rewards and recognition we need to more fully utilize all kinds of mechanisms. It doesn't just have to be money. People at all levels like to know that they are appreciated and that they have contributed. Such activities actually encourage these individuals and groups to do more and to do a better job.

With that, I would like to encourage all of you to reward each other for coming and participating in this conference and to enjoy the rest of the day. I give you now the rest of the time to do your voting.

Thank you.

DR. CATH: Thank you, Janet.

You have been good guys and gals. You have given me a few minutes here. In view of that, somebody has already stole that from me.

We are going to do something a little different that is not in the program, but before I make that announcement, I would like to ask the following people to come forward to the front table, and then we will be all set to go when we come back into the room in a second: Jim Ed Miller, Sinthya Penn, Robert Bedoukian, Fred Hegele, and Lou Hargett.

I have been asked if all of you would stand up and take a break for a minute, walk out and hand your ballots out, and walk back into the room. I guarantee you that at 9:15 we will go as scheduled.

[Recess.]

DR. CATH: We're ready to commence with the program, if I could get you all to take your seats, we're ready to get started.

This looks to me to be a very important part of the program. I want to be sure that we accord our speakers every opportunity to have the time to say what they want to say. I have discussed with our speakers that if they should conclude their remarks with a moment or two left they would all be willing to accept a question or two from the floor. So it will depend upon how well they can get their message into the time slots they have. We would like to encourage that where we can.

Our first speaker in this session is a grower representatives, Jim Ed Miller. Jim Ed Miller farms cotton and chile peppers in the El Paso Valley of Texas. He and his brothers also farm about 2,000 acres of pima cotton.

Mr. Miller has been involved in IPM programs for 15 years, and he is president and chairman of the board of the Texas PMA, Texas Pest Management Association. He serves on the board of directors of the Pima Association of America and the National Association for the Promotion of Pima Cotton. Mr. Miller is chairman of the Texas Boll Weevil Eradication Committee and he is the Hudspeth County Commissioner.

Please join me in welcoming Jim Ed Miller to the podium.

[Applause.]

MR. MILLER: Thank you, sir.

Half of my speech has already been made after telling who I am and from where I am. I do want to tell you that I am not from El Paso. I am from Fort Hancock, Texas. Fort Hancock, Texas is a town that is so small that both city limit signs are on the same post.

[Laughter.]

MR. MILLER: Coming from that type of background, you can imaging how fascinated I am to be here in Washington will all the movers and shakers right here. Now I find myself up here talking and hopefully you all are listening a little bit.

I thought about introducing myself as a farmer, and then realized that a friend of mine said that every time I introduce myself and tell what I do for a living I say something different. I want to introduce myself as a businessman.

I am a businessman. Farming is my business. Part of having a business entails profit. If you don't have profit, you don't have a business very long. So I want to tell you right now that I am profit oriented.

I heard someone in one of the sessions yesterday -- I got a real kick out of it -- he was talking about farmers feeding the world and this and that. It sounded like we are out there just doing our best to keep everybody fat and happy. He said, "The heck with that. I'm trying to make a living."

[Laughter.]

MR. MILLER: We all have to make a living at this.

When we talk about the acronyms, I think this is the city of acronyms. So I want everyone to know that I am the PP, or PMP, whichever you want to use. I am here for the producer's perspective of IPM.

I would like to relate some of the things I thought I knew before I got here, some of the things I have seen, and some of the things on which I have changed my mind since I have been here.

We could go through all that I have heard for the last 2 days. We can talk about extension, research, safe food, the profitability, and how we get it to the farmer. I thought at one time it was my charge to get up and explain to everyone here how to get IPM to every farmer in the United States. I don't know. I don't know.

I don't think that IPM is a silver bullet that we can load up in our cannon and leave here and go shoot something with it. IPM is not something that you can take a quart, mix with 10 gallons of water, spray it on an acre, and everything be fine. One of the most important components of integrated pest management I feel is flexibility.

We were talking last night, even within the State of Texas, the farming practices are so diversified that there is no one thing that we can say is IPM and say that you have to do it this way. If there is anything I would like to get across to the people here today, it is that you can't bottle this up and shove it down the farmers' throats. It won't work. You have to have more people in research and extension. You have to make more examples and they have to be profitable examples.

But my word to you today is caution. My concern is that we come together and have this Forum -- we have heard it over and over again for the last 2 days all the things we need -- now we will go out and implement it. I am afraid that if we go too fast we are going to get in a lot more trouble than that in which we think we are right now. I would suggest that we let markets drive IPM.

They will. We can be egotistical and think that we can affect this. We can be egotistical and think that we can affect the markets, but we can't. Markets seem to have a mind of their own and in general they always work things out.

Something I said in one of our breakout sessions yesterday is another word of caution. Let IPM start at the farm and work up to Washington. Don't decide here in Washington what we're going to do and shove it down to the farms.

With that, I would like to make a special invitation to anyone involved in any part of IPM to come to Texas and come to my farm. I know they would be glad to have you in California, Florida -- you name it. I suggest that those who are going to be involved in making policy go down to the farm and see what will work.

That is really what I have to say. I am cutting it short and I will be glad to try to answer any questions that anybody may have.

[No response.]

MR. MILLER: Hearing none, I thank you.

[Applause.]

DR. CATH: I thought he was a true politician. A true politician would have waited 10 minutes for that question to come up.

[Laughter.]

DR. CATH: Honestly, does anyone have a question? We do have a few minutes here. If you have a question, now is the opportunity.

[No response.]

DR. CATH: Having heard none, our next presenter is a representative of the biological control industry, Sinthya Penn. She has been president of the Association of Natural Biocontrol Producers since 1990. ANBP is a non-profit corporation consisting of natural enemy producers, distributors, and industry supporters with a goal to strengthen the natural enemy production industry and to promote research and education on the use of natural enemies.

In addition, Ms. Penn has served as president since 1986 of Beneficial Insectory, an established commercial predator parasitoid production and distribution company based in Oakland, California.

Ms. Penn is a certified pest control advisor and certified pest control applicator with a degree in entomology from Texas A&M. Her field experience includes releasing predators and parasitoids for pest management monitoring and advising growers as an independent consultant. She is currently involved in coordinating all aspects of IPM and providing technical assistance to distributors, consultants, and educators.

Would you please join me in welcoming Sinthya to the podium?

[Applause.]

MS. PENN: Good morning. I am glad to see that there are still some here.

I do feel that I have an important message to bring to you and any comments on how to get that message across better will certainly be appreciated.

As was mentioned, the Association of Natural Biocontrol Producers is a non-profit organization. However, the individual companies making up this organization are definitely profit-oriented. We are relatively small companies. In the overall scheme -- when we look at pest control, pest management, and the products that are available today -- we really constitute a small dollar amount by figures of less than 1 percent.

However, I think it is important to realize that the smallness isn't relevant to the significance of this. The industry itself is very important, and certainly natural enemies. A lot of what I present today may be very familiar to you, so it's not necessarily from a standpoint of me trying to explain to you or give you information, but to give you a perspective from our side of this.

There seems to be a lot of division going on when we talk about IPM. It is almost like the chemical industry is concerned about the natural biocontrol industry or biotechnology industry, and there is this warfare going on. Actually, I think the goals are very similar and it is just a matter of trying to communicate this better.

I would like to refer back to the remarks that were made by William Reilly during the opening session in terms of the Earth Summit at Rio de Janeiro. There was a resolution passed which included the formation of an agency on sustainable development. The work of that agency has to do with monitoring how the economic development is pursued in terms of the environment. Clearly, the use of beneficial insects and predatory mites, the natural enemies, will work towards this goal.

At the same time, it is really a very important tool in IPM. Natural enemies are really the cornerstone of integrated pest management.

I have a few slides which I would like to show you at this time.

We have gone through IPM so much, but I want to spend just a brief minute here on integrate: to make into a whole by bringing all parts together; to unify; to join with something else or unite.

Here I have the IPM toolbox. I just have a very few tools displayed here in the way of natural enemies. I skip down here in terms of conservation and augmentation. There are certainly examples of conservation in the way of up to 97 percent natural parasitism taking place under proper conditions and augmentation of natural enemies.

I would also like to clarify here that I am speaking specifically of arthropods. Our producers are producing natural enemies, but specifically arthropods. The idea of the computers is because the use of natural enemies and all these other products will come on line and be much more cost- competitive because of the new technology that is being made available. Technical support obviously is very important and it is something that has come up continuously during this session that we need this information to be available. We need IPM specialists. We need more education in that direction.

Cultural techniques. The pheromones are obviously very important in this. Monitoring is absolutely essential. Selective chemical use and information.

Again, not only are there many more categories necessary -- right here the slide just wouldn't hold it. Somebody told me that you wouldn't use a hammer to build a house. Consequently, we need to use all these tools.

We seem to be moving in this direction: biologically intensive integrated pest management. I don't think the definition of IPM has changed any. Perhaps now we will simply be focusing on spending more time on searching for these types of alternatives. Obviously, if the intent is to reduce pesticides, we have to have alternatives.

This is what we see as a potential threat. In the past, we were looking at the silver bullet and we were looking at broad spectrum chemicals. But suddenly, we are entertaining the thought of broad spectrum biological control. Again, any single approach is a threat to integrated pest management. It just goes against the very definition of the whole strategy.

One tool that shouldn't be overlooked or underestimated is the commercial production and release of predatory insects. Here we have the chrysoperla feeding on aphids. We have a lot of slides on this because it is a general predator and it is something that is commercially available in sufficient numbers today.

This happens to be an oreous minute pirate bug, which is also commercially available.

Predatory mites, of which there are several species available, and parasitoid. This happens to be a fly parasite here which isn't in terms of the normal crop production when we think about it, but there is much to be said for this.

The challenges faced by biological control agents, such as these enemies, differ from those faced by chemicals and some of the microbial pesticides, such as B.t.s. The natural enemies are living, heterogeneous, and genetically plastic organisms and they have unique relationships with the components of the agroecosystem where they will be applied.

Commercially produced natural enemies cannot be canned or bottled and viewed as a biological silver bullet type of thing. They don't perform equally in all habitats. The natural enemies must be used considering their interrelationships with the environment where they are applied.

I have a few examples that really speak to the dedication of a relatively few people. Obviously there have been a lot of people involved in this. It is interesting to thing that we're looking at IPM today as almost a new approach when in fact it has been in practice since before I was born.

Here we have the tomato pinworm. There was some reference made to a project that had taken place in Mexico. This consisted of approximately over 5,000 acres of processed tomatoes. Prior to implementing IPM, they had a tremendous amount of damage. They were having chemical applications of between 15 and 18 per season.

Going into an integrated pest management program, which included quite a bit in terms of cultural practices, and the use of monitoring, pheromones, and trichogramma is used on different hosts.

They were able to significantly reduce -- this is the difference just from the standpoint of effects of cultural control. It gives the difference on moth traps per night in the catch. They had about a 40-fold decrease of the population.

In 1990, they only had eight applications. It is a little misleading to me here when it says before IPM because actually they were doing like 15 to 18 applications. But then they came into this realm of 18. Then in 1991 they were down to three applications. In this particular one there are some figures in terms of the difference monetarily. So IPM is definitely economical. There was a savings here during this latter part.

This is a California scale on citrus. It is a severe pest in various areas of the citrus. The parasitoid here is aphytis melinus. In this case, this parasitoid was imported in 1956 from Pakistan. Through work from the USDA and the University of California in 1959, it was brought in to use as a control measure.

The results proved promising, but it was recognized that annual releases would be necessary. In 1961, the Fillmore Insectory started a culture and mass releases were begun. Today, seven insectories in California produce an estimated 1.5 to 2 billion of this insect, which are released and used in integrated pest management. In excess of 100,000 acres of citrus in California, Arizona, and Mexico use aphytis melinus as an integral part of their IPM program.

Here we have strawberries. In California, approximately 75 percent of the area is involved in this type of an IPM. This is the tooth spotted mite, which is a problem to the strawberry growers there. This is a portion of the solution. This is phytoseiulis persimilis. It

is a predatorymite which preys on the pest mite. They come in bottles like this from various companies. In this case, they are actually released manually through the rows. It is a high cash crop and that labor is affordable in this case.

The conclusion of a study that was done by John Trumble and Joseph Morse was published in a Strawberry Advisory Board newsletter. Here it was indicated that the releases of phytoseiulis persimilis once again appeared to delay the development of tooth spotted mite infestations and that releasing 40,000 persimilis per acre was economically beneficial when used in conjunction with either Agrimek or Vendex.

This is an illustration here where the predatory mites were used in conjunction with chemicals. In this particular situation, it was demonstrated that there was a savings from between $1,350 and $1,600 per acre when it was used in an integrated program. So this is predatory mites and the chemicals.

This is just a reminder of almond fields. I had a call just before leaving to try to get some figures in terms of using predatory mites in almonds. In one particular county, Kern County, the Extension agent reported that 75 percent of all acreage there was using predatory mites. That is about 83,000 acres. Actually, that constitutes a small amount of the acreage in California. It certainly is not quite representative of the total amount where they are using these. They are used quite extensively.

In the case of this mite being used, it has been in fact a tremendously good IPM program in California whereby they have looked at various insecticides and which should and should not be used in conjunction with these. It has been working quite well.

This is another specie of mite and it happens to be feeding on thrips here. Again, this is being used, although I have no real accurate data from the field yet on this. A lot of it is experimental and that is probably part of the problem, but there have been very good results there and also in greenhouse operations.

This is encarsia formosa. This is a whitefly parasitory, which is used in greenhouses. It is more specific to the greenhouse whitefly and is not used for large-scale field releases. It wouldn't be affordable. But in the greenhouses it has been tremendously successful.

Here again is a slide of the green lace-winged larvae. In this case, it is feeding on ash whitefly, but actually they are used in greenhouses on sweet potato whitefly and there is at least good evidence of them working on that.

Here, 100 percent biological pest management using augmentative releases of predators and parasites is routine in European glasshouse vegetable production. I think this is an important statement from the standpoint of how that entire community came together in working in this direction. Certainly it shows great promise for us. This is not something that took place overnight, by any means, but it is certainly being done.

This is a pecan orchard that happens to be in Georgia. There is a lot of work going on in terms of cover crops and such. The reason for this particular one was to bring again in the use of the predator. Again, this is a green lace-winged feeding on a yellow pecan aphid. This aphid has become quite resistant as far as chemicals. As of right now, it is not to say that this has been proven to be economical in terms of using this. There is widespread use of this insect

in both the larval stage and being released in the adult stage when the female is ovipositing into the trees.

From the standpoint of the research that has been done and shown to be successful, they were using tremendously large numbers, like 250 per tree, which would not be economical. The particular researcher involved in this is Lewis Tedders in Byron, Georgia. He has indicated that they are doing work now going down to using the numbers of these predators at an economic level and see if they will be successful in getting the same type of results.

This is simply another demonstration of feeding on cotton bollworm. This shows it being a general predator. I think it shows a tremendous amount of promise for use.

Natural enemies will become more cost competitive as they are integrated with new technologies such as computers, pheromones, and the selected chemical uses. Again, it has been brought up in terms of how to measure the worth of using the natural enemies. I don't know how the computation was made in that discussion on the corn/soybean complex, but obviously once you start computing the cost of chemicals on the natural enemies that already exist -- which are a tremendous resources as far as IPM -- then you will find that they are cheaper than what you think.

Application methodology is one area that needs attention in order to maximize the use of natural enemies. This methodology -- in this case, this happens to be an aerial application of trichogramma being made to cotton. This was a tremendous amount of work again through the USDA with this equipment that was used in keeping the parasitoids cool and they were released in somewhat of a program manner trying to release the parasites at the proper time of development.

This happens to be a device that is from the ag engineering department at UC Davis. They are interested in integrating ag engineering and biology from the standpoint of bringing these concepts together. Obviously, this is the type of thing that is needed.

The methodology should be adapted to the socioeconomic characteristics of the site. For example, this happens to be again in Mexico. It might be desirable to have the mechanized delivery systems in areas where labor is scarce or too expensive, but in developing countries, hand-releases of natural enemies may be advisable. It is actually a source of employment for them and if they were mechanized oftentimes they would have equipment failure and it is almost impossible to make repairs.

So it doesn't have to be mechanized. But from our standpoint and our labor costs, we need mechanization in this industry in order to make this a viable product.

I was pretty optimistic in coming here and went ahead and checked off all these items so that we're not looking at them as problems because we would solve all that by the time this meeting is over. But in terms of the complete IPM programs -- obviously this has been addressed -- but the IPM programs need to be developed with the natural enemies in mind.

Quarantine facilities. We really need to have quarantine facilities to bring in natural enemies. Right now, there are natural enemies available for importation, yet the facilities aren't available to us to do this. And quality, reliable, commercially produced natural enemies -- the ANBP has now developed a criteria and quality assurance program. We are looking at putting together a certification program. It will take a few years to bring this on-line. We would be

able to certify producers and in the end users will know what type of product they are getting. They will have some guarantee.

I noticed even on the ballots today one of the things mentioned was that the biological controls don't always perform reliably. I think it is a realistic consideration, but we have to be very careful about how we're moving and not to restrain this industry or those that are involved in it. It is almost impossible to try to do this very rapidly.

I would like to remind you that there are a number of people who have been involved in this for so many years -- for 20 and 50 years -- and we can be here talking about IPM, but these practitioners have been out there actually doing this and using these. We would probably save a tremendous amount of money if we don't try to over-legislate a lot of this. I think education would be the way to go.

As far as the appropriate regulations, we certainly have no problems right now with EPA, but the problem came up for us from interstate type movement. So for example, in California you apply for a permit and it is fairly routine that this will be approved if it is something that has been moving already.

In Tennessee, if someone wants to use this the customer has to make the application for the permit for every single shipment. So if a person wants to receive weekly delivery, they can't do it. It just really becomes an impossibility.

Then of course, there is funding. That has been the large cry lately anyway. During an informal gathering, we were joking about from where all the money is coming? Why don't we just declare war on pests and get it from the Defense Department? I don't think they need it anymore.

[Laughter.]

MS. PENN: And finally, the cooperation. Obviously, we have seen a lot of that taking place here. But again, we do talk about it a lot. I think it was brought up by Kathleen during the earlier session in terms of all these different organizations that are forming, yet it seems like we have much the same agenda. We just seem to really need to get in here and define what it is toward which we are working and there has to be a little give and take there. So it is not just a matter of saying at the Federal and State university level that they need to get together, but actually even from our end we need to get together and form some cooperation among people who are really striving for the same goals.

I think we have really made a lot of progress -- not just here, but I know for those of us out there practicing IPM, we even wonder why we're still debating this because it has been going on for a long time.

Thank you very much.

[Applause.]

DR. CATH: Thank you, Sinthya. That was an interesting presentation. That was an interesting comment about the Defense Department. I don't think many people have thought about that.

Just a thought, concerning your problem between States and transporting insects, you might want to look into an interstate compact between States. These sometimes work for the common good.

Now from the semiochemical industry, we have Robert Bedoukian. Bob Bedoukian is currently president of Bedoukian Research, Incorporated, a company involved in research on organic aroma compounds. In addition to this responsibility, Dr. Bedoukian is the president of the American Semiochemical Association, a member of the board of directors for the Research Institute for Fragrance Materials, and a member of the Scientific Affairs Committee, an instrumental analysis and specifications committee of the Fragrance Materials Association.

Bob received a B.S. in chemical engineering from Tufts University and his Ph.D. in organic chemistry from Purdue University.

Bob, would you come forward?

MR. BEDOUKIAN: Good morning.

As was mentioned, my company's primary business is the manufacture of perfume and flavor chemicals, specialty materials. We manufacture about 450 different items that are used worldwide in perfumes and flavors.

We got involved in semiochemical manufacture because the chemical classes are identical, the raw materials are identical, methods of manufacture are identical, and methods of purification and analysis are all the same. So it seemed a very logical product to manufacture.

Semiochemicals are substantives emitted by organisms to transfer information to alter the behavior of other organisms. In all cases, they are naturally occurring. In many cases, they are the same chemicals that we already find in food and that are used in flavors and perfumes.

The technology involved in employing semiochemicals has been advancing rapidly over the last few decades with many products now available. Semiochemicals play a significant role in integrated pest management. Pheromones is a class of semiochemicals restricted to chemicals emitted by insect species to induce a response from the same species.

Semiochemicals can be used in a number of ways. The most obvious use in integrated pest management would be in monitoring to determine when other pest control strategies are required and how well they are working. They are used in mass trapping, which can be used as a control technique.

The larger scale uses of semiochemicals or pheromones are through pheromones of mating disruption in which the insects are confused and not able to follow the mating signal emitted usually by the female insect. Typical amounts used in mating disruption are 4 to 100 grams per acre per season, not very much. There are numerous formulations available, some of which are applied with conventional devices which can last several weeks and some of the hand-applied devices which can last an entire season.

Lastly, pheromones can be used in combination with insecticides to increase contact or insect activity and thereby increase the contact with the conventional pesticide, or probably some of the other IPM technologies.

There are a number of types of devices, just to give you an idea, that pheromones are applied indirectly with controlled release applications, which is very important to get a constant low-level release. These are just some of the types of materials available.

We have regulatory impediments, as everyone does. When discussing the regulatory situation with regard to semiochemicals, I think it is important to keep in mind that they are naturally occurring compounds intended for communication. They are either identical or closely related to the natural ingredients in the foods we eat and the flowers we enjoy. And almost without exception, those in use as pesticides are non-toxic or very low toxicity and are applied indirectly through controlled release mechanisms.

Although there are a vast number of potential pheromone products, the market for each, as we know, is limited. Each species requires its own pheromone or combination of pheromone and -- back to constraint number one on everyone's list -- compliance with the registration requirements as too costly, restrictive, and time consuming for people to really make money and for the products to become as cost-effective as I think they could be.

To their credit, EPA has recognized the characteristic safety of pheromones and has provided a reduced set of data requirements for full registration. But many specific impediments still remain, including the 10-acre limit after which an EUP is required, and the time frame required to obtain a registration.

The American Semiochemicals Association was formed in part to promote progressive changes in the regulations affecting semiochemicals and is anxious to join in an effort to develop IPM. We had a lot of discussion about alleviation of the 10-acre limit for the evaluation of semiochemical products, and the ASA strongly supports this position. This will be a very important step to facilitate the testing of various formulations to arrive at the optimum effectiveness. It also should serve to free some EPA time to focus on other priorities, including regulatory changes and registration processing.

I would like to reemphasize a few of the suggestions made and add a few of my personal pet peeves, but they are important. The expansion prior to requiring an EUP was exemption from tolerance. It is perhaps the most important suggestion that has come up.

Along with that and many other things, my company - - which, by the way, is one of the few suppliers of technical or active ingredient pheromones in the United States -- sells to just about every pheromone formulator or manufacturer in the country. We are constantly encountering problems with whether shipping these materials is legal or not. It is not very clear and because the formulators and producers are separate companies with completely different technologies, this is a major problem.

Substances already permitted for use by FDA in foods somehow should be more easily used in semiochemical mixtures. I would include inerts, such as food and food preservatives, often vitamins used as stabilizer in the pheromone, as well as flavoring agents such as geraniol, which may serve as an attractant because it is present in many flowers, fruits, and vegetables.

Just for a frame of reference, geraniol is used about a million pounds a year, 1,000 pounds of which is used as derivatives, and at least 50,000 pounds of which is dietary intake through foods already. We can't expect the manufacturer, who may want to ship 2 or 3 pounds

of geraniol to a formulator to want to go through the registration process. That does not mean that use of this material should not be beneficial.

The next one brought down the house yesterday, so I will mention it again. I think the requirement that the product chemistry package -- not the toxicology package -- done under GLP is very costly and non-productive for pheromone products. I think it was Larry Ellsworth at the constraints session who commented that rigorous and burdensome need not be synonymous. I think that is very applicable here.

Next I think it might be productive to somehow involve the Office of Compliance Monitoring in the process to promote pheromones and IPM technologies. These are very complex issues. The regulations are very complex. I think in many cases they are open to interpretation. I think a lot of help can be provided there.

Finally, this again is a personal issue, but I think it will affect all of us. If some form of the Circle of Poison bill passes, I hope semiochemicals and probably a lot of other biologicals do not end up being included. Many are not registered in the United States and many may never be if we don't have the insect pests here. I think that would certainly be counter productive to the intent of the bill.

Many of the regulatory problems our industry is having stem from the fact that we have in a sense been pulled in FIFRA regulations because we mitigate pests. Really, the regulations were written with other products in mind. Unfortunately, that is not an uncommon regulatory situation in any industry.

While we continue to work to amend the existing structure, it may be more efficient in the long-run to develop a more appropriate method for reviewing semiochemical products which is able to recognize the inherent difference between this class of insect control agents and other various classes. The number of semiochemicals identified with potential use is going to continue to grow and we need a more efficient way of handling them.

My personal viewpoint would be to consider employing an expert panel, using a decision tree approach, in which is included potential exposure, chemical class information, and backed by a vast pool of existing toxicological and safety data to provide the regulatory agencies with assistance to determine the appropriate pests on each particular product that should be used. It should be a very clear-cut process.

A paper was presented in the Brighton Crop Protection Symposium on Pheromones that the USDA helped to organize. It is available as part of the conference proceedings, along with other relevant papers dealing with non-target effects and environmental fate data of various classes of pheromones.

I think that research done by USDA and academic institutions has helped bring the industry to its present stage and must continue. Each individual product is inherently limited to a particular insect and there is certainly the necessity to do certain parts of the basic research at academic or public sector institutions.

I think we have to keep in mind -- and this is a recurring point -- that IPM component technologies are not simple to develop even without regulatory constraints. Yet each must be carefully developed before IPM can succeed. Further, each component strategy must rely on

coordination and backup from the other components of IPM. We need to approach IPM as a whole before we can implement it.

I think this Forum may lead to the exchange of ideas and cooperation between all the industries involved, with our customers, farmers, food processors, as well as the regulatory agencies. I think it is very significant that there are so many people here from so many groups. I think that is a very good sign.

I also would like to point out that EPA encouraged the ASA formation in order to provide assistance, ideas, and scientific rationale for some of the changes we have been requesting. They have asked for input on a number of issues, and I think this is extremely positive. I hope that all component industries in IPM are consulted and get involved in these regulatory changes so that we can avoid some non-target regulatory effects.

Thank you.

[Applause.]

DR. CATH: It's very interesting to see that almost every aspect of IPM has its particular problems, regulatory or otherwise.

We are right on time and now we would like to hear a presentation from the food processing industry sector by Fred Hegele.

Fred is the director of the quality assurance and regulatory affairs for General Mills, Incorporated. Fred has been with General Mills since 1965 and has served as director of quality assurance and regulatory affairs since 1983. Mr. Hegele has served as chairman of numbers committees and working groups in the areas of food safety, chemical residues, and crop protection and pesticide regulatory affairs.

Mr. Hegele received a B.S. degree in food technology and completed the program for management development at Harvard University. His experience has included management of quality control activities for processing, packaging, and distribution of packaged consumer foods, international food quality control coordination, and development of public policy in the areas of food safety, integrated pest management, and food quality control.

Please join me in welcoming Fred to the podium.

[Applause.]

DR. HEGELE: Thank you very much, Stan.

First of all, I would like to offer a word of thanks to the organizers of this Forum. Many people deserve credit for enabling this event to become a reality. Although the roots of this Forum are many and widespread, I would like to acknowledge the receptive minds, the receptive ears, and the open minds within the Office of Pesticide programs at the Environmental Protection Agency with whom I meet twice a year as a member of the Pesticide Users Advisory Committee, or PUAC.

Doug Campt and Steve Johnson, as a part of that group, have been most interested in some of our concerns and interests in advancing integrated pest management. This Forum at least in part comes out of some of that open-mindedness. The PUAC group has for the past several years been relentless in advocating the merits of integrated pest management as an

alternative to banishing agricultural chemicals from the face of the American farms and food industry.

I also want to acknowledge the United States Department of Agriculture, and particularly Dr. Richard Parry, who has been meeting regularly as a part of the Pesticide Users Advisory Committee. Certainly his role in bridging the gap between departments and among agencies is most appreciated. Thank you.

I particularly want to acknowledge some of the unsung and maybe somewhat invisible change agents that I think have played a role here. One is Jim Touhey. Jim is one of those people who just shows a willingness to stand up and be counted. He stands up in the crowd as well as works behind the scenes to build bridges on behalf of the environment as well as agriculture. I particularly appreciate that. Diana Horn's vision for integrated pest management has helped all of us to see new possibilities.

I applaud those minds who view the environment and agriculture holistically and not in a mutually exclusive fashion. We will hear later from both Linda Fisher and Harry Mussman, who will have a later word, but I would like to take this opportunity to say thank you for their willingness to take a risk, to be involved, and to make a commitment to break down barriers and to erect some bridges.

My role here is to comment on this event from the perspective of the food industry, from the industry of food processors and grocery manufacturers who face a number of interesting dichotomies as we think about the American food supply, public health, and the market.

One of those dichotomies is that scientific data very often does not match public perception. Certainly we have that situation in the case of pesticide residues. We obviously feel and are committed to the idea that we have the safest food supply in the world. It has never been safer and there is none better in the world. But we are also committed to making it better. We believe integrated pest management is a part of that.

A second dichotomy is that there are many major public health improvement opportunities on our plate. One of those is nutritional. You have certainly seen much in the media here recently about new nutrition labeling guidelines and the pyramid from the United States Department of Agriculture, and dietary guidelines coming out of the National Academy of Science, and so on.

Another major opportunity is in the microbiological area, reducing the transfer of microbiological disease through food as a vector. Certainly chemical pesticides and chemical residues in the food supply fits into that sense of priorities, but it is not the only one that we face. It is one of many. I think that most in the scientific community would say that it is not on the top of the list. But again, we are committed to making improvements in that area. I think integrated pest management is a very, very important part of that.

A third dichotomy, from my point of view, is that public policy tends to reward and recognize inspection rather than prevention. If you stop and think about that, most of our policies are set up to look for problems, identify risks, and to take action on those kinds of things rather than to set up and reward preventative efforts. For example, how do you measure the problems that never occur? That's a real dilemma for public policy-making.

Let me share with you the lesson of EDB, ethylene dibromide, in grain products in 1983 and 1984. That taught me and a few others a very important lesson: that analytical chemistry, or chasing pesticide residues in the food supply, is not a way to play this game. It is not a win-win situation in any way, shape, or form.

Prevention of these kinds of things and public confidence -- the importance to maintain and grow that public confidence -- lead us very much in a different direction which I would refer to as integrated pest management.

Another dichotomy we face is that although we are not the primary user of agricultural pesticides, we assume a major liability because the residues tend to wind up in our branded merchandise. Those brands are a big part of our net worth. If the public loses confidence in our reputation, our image, our brands, we don't have a business. We may have facilities, manufacturing operations, and distribution systems, but there is only one way we stay in business, and that is if consumers vote for us when they go by the cash register on a regular basis.

So we share in that liability with all the rest who are involved in this whole chain. That kind of a dichotomy leads us to want to form working partnerships.

I believe this whole idea of integrated pest management is a team sport. I think that what is going on here this week is a manifestation of the kind of thing that we need to continue.

Last but not least, the need for effective pest management tools is growing while our arsenal is disappearing. That of course is no surprise to this audience, but I can't help but think about that when I reflect on some of the figures that come out of our own United States Department of Agriculture and thinking that roughly 25 percent of all the wheat grown in the world is lost to pests before it is ever harvested. If you look at some of the data on worldwide losses to grain in storage, it approaches 50 percent.

Those kinds of ideas put this whole subject in some perspective for me. Again, I am sure that is no secret to most of you.

I just want to try to reflect on a few of the aspects of the food industry that might help us to understand how we ca solve the dilemma about which we are all talking this week. The point is to say that an economical and abundant food supply has a long history of taking preventative actions. I would like to share a few examples with you.

One of those is back during the early part of this century. Micronutrient deficiencies -- vitamin and mineral deficiencies -- were a very important part of the public health concern. That then led to policies of enriching and fortifying food products. We don't see people running around today with scurvy and beri-beri and so on and so forth. So there was an example of where a preventative policy served to improve public health and do some good.

Microbiological disease in foods is another example of a public health concern that has been solved with some preventative action. Mr. Baum from Campbell's Soup talked about hazard analysis and critical control points, or HACCP. Certainly that set of principles applied to microbiological issues in the food supply has dramatically reduced the incidents of food borne disease.

Other examples, such as spoilage and waste in distribution have led to improved methods of preservation. And there are other examples.

Last but not least, the concern about pesticide residues in the foods leads us to integrated pest management. That is why I am here this week. I suspect that is why some of you are here this week. The best defense is a good offense. I think IPM represents that offense.

I think we need to challenge the status quo. I know that is hard. I know it is painful. I know it is not comfortable. But we need to challenge the status quo. It is not going to get us to where we need to be.

When I look at change, I think there are two ways to approach change: forward and from the rear. Frankly, I would rather lead it than follow it.

In my view, our collective goal, from the standpoint of the food supply, should sound something like this: eliminate detectable residues in foods as they are consumed. That should be done in conjunction with the proper balance of public health interests and consumer confidence. Somewhere intertwined in this whole idea is this idea of a market system. You eliminate detectable residues in foods as consumed. Our collective goal, in my opinion, should not be to eliminate the use of pesticides.

I would like to offer three success factors as we think about moving on beyond noon on Friday and this Forum on integrated pest management.

The first success factor is that I think we must work together. This is a team sport. You have seen and heard a few examples about how processors and growers are working together. I think that is the only way it is going to work.

I found yesterday in the policy session a young lady by the name of Laura Smith. She opened the session by saying, "You are our customers in the agricultural community. We want to hear from you."

I think that's the kind of an attitude and the kind of a spirit that we need to use when we approach each other on this subject. That's how you form teams. That is how we're going to get where we want to go. Customers and suppliers need to get together and understand the requirements and integrate the requirements.

USDA and EPA need to forge a collective vision for the future. The time is here to put turf issues aside. There is more than enough to do. We're not going to run out of work and we will be much more successful if we do it together as a team.

The Extension Service and private consultants are not in competition with one another. They should be synergistic. They're going to be better off if they work together.

We need leadership. All of us can help provide some of that leadership. We need leadership a lot more than we need another congressional debate about pesticide residues and the environment and so on.

The second recommendation for success factor is that I think we need to reorganize ourselves to achieve some interdisciplinary cross-functional cooperation and commitment. Any time you say that word "reorganize" what happens? We kind of tense up. That makes us worry. I would suggest that if we don't do it to ourselves, somebody else will do it to us. I think that we're in a better position to do it right the first time with entomologists and mycologists working together and plant pathologists and biochemists working together.

Interestingly enough, in my laboratory in Minneapolis I have a microbiologist running the analytical group that does all our nutrition analysis. Ten years ago, that would have been

nonsense, but it works pretty well. Some good ideas have come out of that. I think there are a number of ways that we can do it.

I had no thought about this idea until the other day of looking at the Cooperative State Research Service and the Extension Service as being a common organization, but I can certainly see some advantages to having both of those functions focused on delivering integrated pest management systems to growers. I think that has some interesting advantages. I am sure there are some down sides that I don't understand, but I think those are the kinds of issues at which we ought to take a look.

We need to look for the synergy where 1 plus 1 equals 3, or 5, or 50, or 100. I think reorganizing is the way to get at some of that.

And, by the way, producers need to be at that table, maybe at the head of the table. I think they can help all of us.

The third recommendation for a success factor is that if it is important, then measure it. If we can't measure it, then we're not going to know where we are. I think there are a lot of ways that we can figure out how to measure progress -- or lack of progress -- in this whole business of public confidence in the food supply and success in American agriculture.

One of the measurement systems I would suggest that we abandon is to say that funding is a measure of success. I can tell you that at General Mills we are introducing more new products at a faster rate with less expenditure in research and development today, and we're doing it by reorganizing people and setting goals. I think we can do that in American agriculture starting right in this city. That is our challenge. That is from where the resources will come, from being more efficient.

I think speed to market is one of the measures we might want to use. I think we need a sense of urgency. I think by setting some aggressive time tables we can help ourselves.

Let me close by saying that I would suggest that this conference today not end and that we all just go back and resume life as we knew it before. I hope that as a result of this conference we have some follow-up documentation with names and dates. I offer the help and support of my friends on the National Coalition for Integrated Pest Management, a cross-functional group that is trying to advance integrated pest management.

I would like to see coming out of this conference this week a one-page executive summary that lists the top two or three or four achievements or goals or next step and get that out into the public arena next week, get it on White House stationery if we can. Let's make a commitment to move forward together.

Thank you very much for this opportunity.

[Applause.]

DR. CATH: I, too, share your comments, Fred, in regards to paying recognition to the people who are responsible for motivating this whole group and getting it to the point where it is today.

Our next speaker on this morning's program is Dr. Lou Hargett of Sandoz Agro, Incorporated. Dr. Hargett is director of product development at Sandoz and oversees field

testing of commercial and experimental compounds. He served on the corn/soybean commodity teams for the National IPM Forum.

Sandoz Agro's place in the agrichemical industry is unique. In addition to its traditional chemical products, Sandoz produces biological and biochemical products that are closely linked to IPM movement. One of its predecessor companies, Zoicon Corporation, achieved considerable renown in the 1960s and 1970s for developing synthetic insect hormones. In addition, Sandoz has produced biological insecticides based on the bacterium bacillus thuringiensis for almost 20 years.

With that, I will turn it over to Dr. Hargett for an agrichemical industry perspective on the National IPM Forum.

DR. HARGETT: Thank you, Stan, for that kind introduction and good morning, fellow environmentalists.

I would like to thank EPA and the USDA staff for bringing the National IPM Forum to its successful fruition. Thank you.

Having worked on the corn/soybean commodity team, co-chaired by Dick Ford and Rich Edwards, I can testify to the hard work and expertise that led up to this meeting. The National IPM Forum is a wonderful opportunity for dialogue and debate, and I am honored to be speaking with you this morning.

Before I proceed, however, I would like to outline briefly an event that happened 30 years ago that has affected my life and my thinking about pest management and what it really means.

It was 30 years ago this month when I was on two field tours -- one in France and one in Greenville, Mississippi -- in France I saw these beautiful fields of vegetables. What did I see out in the field of vegetables? Ladies and children on their hands and knees picking out weeds among the vegetables and you couldn't tell the weed from the vegetable.

Following that, I had a trip to Greenville, Mississippi, 100 degrees temperature, 100 percent humidity, out in the field chopping away women, children, and old men chopping Johnson grass and other cotton weeds. I think there is a better way. I don't think we want to go back to the old ways. We have to get the new tools and bring them forward.

In my time here today, I will discuss my observations on the work we've done at the National IPM Forum. I also want to give you my thoughts on what the Forum's conclusions mean for the agricultural chemicals industry.

Again, 30 years ago this week, the New Yorker magazine introduced the American public to Rachel Carson's "Silent Spring". The book launched the modern environmental movement and had a profound impact on pest management around the world.

The last chapter of "Silent Spring" is called "The Other Road", which is a reference to the Robert Frost poem "The Road Not Taken". In that chapter, Carson outlined her ideas for improving pest control. Better pest control techniques, she said, "all have this in common: they are biological solutions, based on understanding of the living organisms they seek to control, and of the whole fabric of life to which these organisms belong."

Though there is still disagreement about Rachel Carson's legacy, I think we at the IPM Forum have all agreed that she was right on this point: the foundation of sound pest management must be a strong understanding of the entire crop production system. Over the 30 years, most of the thoughtful commentary on pest management has included this idea. Before we attempt to manage pests, we need a basic understanding of weeds, insects, and diseases. We also need to understand the relationships to these pests and their environment.

Rachel Carson made this point in 1962, a National Academy of Sciences report on pest management said it in 1975, a congressional study of pest control practices said it in 1979, and we are saying it again at the National IPM Forum. I sense one difference in our conclusions, however. The earlier works focused more on the research necessary for IPM. We at the Forum have called for a greater concentration on taking what is known to the grower level.

There is a considerable amount of technical information available. We know of specific crop rotation and tillage practices that reduce weed and disease problems. We know that naturally occurring insect predators can be maintained by selective cultural practices. We have identified crop varieties that have greater pest resistance. And we know much more. Now we need to make sure that growers have this information, too.

Unfortunately, the most important link in sharing this knowledge -- the university extension system -- has suffered recent cutbacks in funding. Further cuts are proposed. In addition, the extension system's focus is being shifted away from pest management.

As we have noted at the Forum, these are major constraints to the increased adoption of IPM practices. Field scientists in my industry have begun to fill some of the information gaps. However, I share the opinion expressed here that more funding is needed for IPM training and information programs if we are going to assure their success and adoption.

Another clear conclusion from the Forum is that we need new, more, and better pest management tools. You have heard other speakers say that we have to have and we do have a toolbox with many pest control approaches. Government agencies, such as EPA, have a considerable role in this mandate. For example, EPA needs to hasten the arrival of all new products to the market. The agency has been very supportive of registration efforts dealing with naturally biologicals. It is also making progress on guidelines for registering genetically engineered biopesticides. And as EPA completes its safer pesticide policy -- a concept that Sandoz strongly supports -- we should see improvements in the registration of safer traditional chemicals as well.

What do the Forum's conclusions mean for the agricultural chemicals industry? The simple answer is that my industry must keep on developing new and better products. While most of the existing products have great benefits, it is clear that many of them could be improved or augmented. It doesn't matter if the new products are biological, biochemical, or chemical. The key is that all must originate from an understanding of the pest they seek to control.

They must also continue to be kinder to the user, kinder to the environment, and address other grower needs. User safety, environmental soundness, and solving problems -- these are the driving forces for the future and also for the newest products available on the market today.

Biological pesticides offer a high degree of user safety, which is one of the reasons they are attracting more interest. Over the past few years, we have witnessed many companies join us in the development and sale of biologicals. Some are working to supply better and different biologicals through the use of genetic engineering. For example, ag chemical companies such as Monsanto and seed companies such as Northrop King will soon offer crop varieties with built-in insect resistance. These crops feature a gene from the naturally occurring bacterium bacillus thuringiensis, or B.t. Other companies, mine included, are looking to genetic engineering techniques to improve B.t.'s potency and the spectrum of control.

On the chemical side, it's no secret that toxicological standards have become tougher. My industry realizes that society has raised the pesticide safety bar, and we are responding to that. DuPont's sulfonylurea and Cyanamid's imadazolinone herbicides have excellent toxicological profiles that enhance user safety.

The industry is also making progress on products that are kinder to the environment. The sulfonylureas and imadazolinones are also excellent examples of environmentally friendly chemical pesticides. The products, which are applied in grams rather than pounds per acre, have set new standards for use rates. Sandoz' new herbicide candidate, Frontier, also has considerably lower use rates than products in its class. Though the rates are not in the same range as these other two chemistries, we think corn and soybean growers will see the lower rates as a major environmental benefit after Frontier's expected registration next year.

Also on the environmental side, the industry is working to address the packaging issue. As you have heard, we are adopting and implementing a policy of reducing, reusing, and recycling. Lower dose chemicals and concentrated product formulations mean fewer packages in the field. Where it is appropriate, the industry is using bulk distribution that allows for reuse of larger packaging systems. And where the traditional plastic jugs are still utilized, the industry is leading efforts to develop container recycling programs.

While these safety and environmental issues are vitally important, new products must also solve other problems the grower is facing. One of the most important problems is pest resistance, a subject that has received a great deal of attention at the IPM Forum. Before, it was primarily an issue insects, but growers now face increasing problems with plant disease and weed resistance as well. Today there are more than 100 weed biotypes that have demonstrated resistance to herbicides; the triazine class of chemicals, which includes atrazine, has suffered most from this problem.

Increasingly, the grower is being advised to use products with different modes of action to combat resistance. But just as this call is being made, growers are losing many of their tools. The industry is responding, but all of us must recognize the need for as many safe and effective tools in the pest management toolbox as possible. In the case of weed resistance, the alternatives tool will likely be different chemicals, biochemicals, or a specific weed pathogen. In addition, a cultural practice, such as cultivation or crop rotation, may be used.

With insects, an increasing number of growers are using biological options to supplement their chemical tools. But existing biologicals are not a panacea. As many of you know, resistance to B.t. has been identified in some intensive cropping situations.

I was surprised -- I shouldn't have been. I have seen corn rootworm heliosis subjected to 30 generations of B.t. without developing resistance and in a very short time a resistance develop in Florida or Hawaii to the pest because of the culture and the way they were produced.

Resistance problems in general are driving companies to search for new compounds or reexamining older ones with alternative modes of action. One area that is getting a lot of attention is bacilla viruses. These insect viruses attack agriculture pests but not plants or animals. They may become a good resistance tool since they work in a different method from the traditional chemicals and also from the other biologicals. Today, we are looking at genetic engineering to help us produce biologicals that can become viable commercial products.

All of the examples of resistance demonstrate the remarkable ability of pests to adapt to mankind's controls. This ability requires us to develop as many new pest management tools available as possible. We cannot rely totally on new products, however. My industry also needs to help growers avoid or manage resistance problems with existing pest management tools. In some cases, this may mean telling a grower not to use our product, or to use it with another product, or to use an additional cultural practice. It all leads back to the same place: a pest management decision based on an understanding of the whole agroecosystem.

We are clearly moving in that direction, but we must also ensure that we have the tolls to do the job once we get there. I am encouraged that the Forum has acknowledged the need for these tools. However, I am not so confident that the world outside this meeting will agree.

A recent Atlantic Monthly cover story discussed whether the human inhabitants of this planet are coming together or growing apart politically and economically. The author described trends toward two polar types of society: one he called McWorld and the other he called Jihad. McWorld is globalism and is characterized by McDonald's restaurants in Moscow, the European community, and CNN. McWorld acknowledges the value of linkages in a commercially homogeneous global network. Jihad is tribalism and is characterized by separatism and a fragmentation of cultures and peoples. Jihad is Yugoslavia, the Middle Est, and south central Los Angeles.

In some ways the debate about pest management over the past few decades would have fit nicely into a Jihad society. Zealous environmental groups; vicious attacks; a reactionary ag chem industry; stubborn, uncompromising defenses -- with Government officials and academicians adding their voices to the bitter, divisive debate. In some ways, this patter continues today.

We at the National IPM Forum have taken a different path and have used this meeting to move closer to a reasonable consensus. We have acknowledged that integrated pest management is informed pest management with the best biological, cultural, and chemical tools available. We have also stressed the need to get pest management information to growers. I challenge each of you -- and myself -- to see that this happens.

We have also called for new and better products, and all of us must take responsibility for making that possible. We in the ag chemical industry must continue to develop new pest management tools; Government must find ways to get the best ones to growers more quickly;

growers must be willing to continually update their pest management knowledge; and environmentalists must give the process a fair chance to work.

We at the National IPM Forum must also take our emerging consensus far beyond this meeting. We must extend our agreement to other members of the groups we represent and to other segments of our society. Biology-based pest management with the best tools available must be our common path -- a busy thoroughfare shared by growers, Government, environmentalists, and industry alike.

With a strong commitment to our various roles, we can move a truly integrated pest management system closer to reality.

I leave you with this thought. Public opinion can establish policy. It cannot beat us.

Thank you.

[Applause.]

DR. CATH: Thank you, Lou.

Is there any room in your Jihad for a terrorist?

[Laughter.]

DR. CATH: We are about ready to go for the break, but I promised Sinthya Penn one ad lib which she would like to give you. Then we will adjourn.

MS. PENN: We did have a poster up, but we have quite a few of the brochures left on the ANBP. I am going to leave them out on the table. Perhaps if you are interested, you can pick one up to learn a little more about it.

Thank you.

DR. CATH: This is the scheme. We keep adding little things as we go along here.

We are going to project the balloting here for your folks. However you want to handle it is fine. We are due for a coffee break now. I would suggest that we do that and come back in and view the balloting as you see fit, but we have to get on with the show pretty soon. We are running a little late.

Please, join me in thanking all our speakers this morning.

[Applause.]

[Recess.]

DR. CATH: Please, take your seats. We want to get this thing going. I know you all have airplane flights out of here. The only way to get this done is to get moving on.

Our next session will now begin. Our next speaker will represent the environmental community and that gentleman is Roger Blobaum, president of Blobaum Associations.

Roger is president of a Washington D.C.-based consulting firm that specializes in providing policy development and related services to alternative agricultural organizations. His clients include the World Sustainable Agriculture Association, the Michael Fields Agriculture Institute, and Organic Framers Association Council.

Mr. Blobaum's professional background includes experience as an agricultural staff member in both houses of Congress, as director of public relations for two national farm organizations, and as director of the national sustainable agriculture project sponsored by the Center for Science in the public interest. His background also includes working as director of communications and policy development for the Institute for Alternative Agriculture, and managing editor of the American Journal of Alternative Agriculture, a refereed scientific journal.

Please join me in welcoming Roger Blobaum.
[Applause.]

MR. BLOBAUM: Thank you very much.

I appreciate very much the opportunity to participate in this Forum. I have certainly been impressed by the amount and quality of preparatory work that was done for the Forum.

I have been part of a national food safety dialogue the past 2 years and am especially pleased to see several of the participants here at this Forum. We encountered each other initially in a rather adversarial setting, but I have learned a lot from them -- you may not agree when I am finished -- but I have learned a lot from them about pest management and value them now as professional colleagues and friends.

I have been surprised at how many speakers have felt compelled to declare that our food supply is safe. Most Americans don't believe that, whether it is perception or not. They have lost confidence in the Federal Government's ability and its willingness to do what is necessary to protect the environment and to provide a food safety guarantee.

Public frustration and anxiety documented in polls and surveys help to account for continuing concern about pest management policies and for the appeal and political militancy of consumer and environmental groups. It also helps account for the unusual political situation that is shaping up in this election year.

The questioning of Government is not a fad; it's not an aberration; as some in high places contend. The public concern about which we read is reinforced by almost daily reports of environmental insults and official inaction.

I come from Iowa where most people shy away from controversy and where the public is slow to show anger. But people are upset by news stories like the one a year ago in the Des Moines Register that began with a one-sentence lead that said, "It is Raining Atrazine in Iowa." They are dismayed by the nitrogen alert days that are announced when farm chemical levels get too high in the Des Moines River, which is a drinking water source for Des Moines and other cities.

Things like this, which are happening all over the country, are focusing public attention on farming practices in particular and agriculture in general. Some who advocate ecological farming methods -- and I am one of them -- favor incentives and other voluntary approaches that will help farmers make the transition to more environmentally benign practices. Others -- and I think the number is growing -- fell that tougher regulations are the only solutions.

This situation creates an unusual opening for the IPM community to rededicate itself and begin leading agriculture in a different direction. It is time for USDA and EPA to make a real

commitment to IPM, to work harder to remove the barriers to adoption, and to fight for the funding and other support needed to make this happen. I believe it is time for EPA to become proactive and to being advocating ecologically sound farming.

I do not agree with Bill Reilly that Rachel Carson would be pleased at what she would see in American agriculture today. I think it is time for USDA to get off the chemical band wagon and advocate policies that will make IPM and the whole range of sustainable agriculture practices a genuine option for farmers.

USDA's mission statement does not support its bias against ecological agriculture. It appears to me that EPA's mission statement requires a commitment to environmentally benign farming.

I want to take this opportunity to challenge all of you to consider some steps -- things beyond the resolutions we voted upon this morning -- that I feel would help you gain the public recognition and support that you need to realize IPM's full potential. I challenge you to reject the assumption that pesticides are an essential food production input. As a section of the discussion papers points out, pest management is tacitly defined first and foremost as a chemical-based process. Rejection of this assumption, among other things, would remove the bias against non-chemical approaches that is written into many USDA policies and practices.

The Farm and Home Plan portion of the Farmers Home Administration agreement with farm borrowers, for example, specifies pesticide application as a key management practice. This plan may be written during negotiations between the borrower and the county committee, or it may be prepared entirely by Farmers Home personnel.

The growing number of highly productive farmers who have successfully phased out pesticides in their operations should be rewarded, not discriminated against by public agencies. Farmers who don't use pesticides have complained about Farmers Home and public lender discrimination for years. There is nothing new in this. It is time to put a stop to this and all similar pro-chemical practices and policies.

I challenge you to acknowledge and to learn from the whole farm systems approaches used by thousands of organic farmers across this country. The highly sophisticated and management intensive systems that they have developed and demonstrated provide the model for the farms of the 21st century. This technology, transferred so far primarily farmer-to-farmer, is almost universally ignored by researches and policy-makers who presumably are searching for more ecologically sound methods.

It was pointed out yesterday that IPM gets less funding than the cost of bringing one new pesticide to market. Organic research gets less funding than EPA and USDA are spending on this Forum. Congress wrote the Organic Food Act into the 1990 Farm Bill giving organic farmers some long overdue official standing. But it stripped the legislation of the title that would have authorized an organic research program.

Many believe our public agencies and agricultural institutions have become too ideological. They feel the spirit of inquiry in the public research area, in too many instances, has been replaced by a spirit of justification of the status quo. Environmentalists and others in the public interest community are often accused by farm policy-makers of trying to impose their ideology on agriculture. We see the situation as exactly the reverse.

At least one organic farmer should have been included on every constraint resolution team and every commodity team for this Forum. And one of the many outstanding organic farmers in this country should have been included among the speakers. EPA, in particular, should be encouraging and tapping this farmer-generated technology. I'm sure that Rachel Carson would like that.

I challenge you to adopt a goal of a 50 percent cut in synthetic pesticide use in 5 years and a 90 percent phase- out in 10 years. The material developed by the commodity teams and studies like NRDC's "Harvest of Hope" strongly suggest that these goals are achievable. Campaigns in Sweden, Indonesia, and the Netherlands clearly show that cutbacks of this kind can be made.

If the IPM community cannot bring itself to set pesticide cutback goals, it does not deserve the political support of environmentalists or the general public. Many of your critics have long contended that IPM really stands for integrated pesticide management. I know some of you personally and I know many of you by reputation.

I know about your work and dedication and I don't happen to share that view. But many in the environmental community feel that you are in bed with the chemical companies, and I understand that many in the chemical feel you're in bed with us. Most of you, I am sure, would deny that either of those claims is true.

I would suggest that it is time for you to respond more aggressively to public concerns and the situation in agriculture, and to give those of us who advocate an ecologically sound agriculture more and better reasons to embrace your approach and support your work. I challenge you to reach out to consumer, environmental, citizens, and similar groups and engage them in real dialogue and solicit their input. I have the impression that the IPM community is in a cocoon as far as exchanges with potential supporters or where the general public is concerned.

I have been involved in several dialogue situation because I feel the relationship between farmers, consumers, and environmentalists has been far too adversarial. I have found increasing interest among public interest people with which I work, especially since the alar episode, in finding ways to talk things out with people who have a different perspective. Unfortunately, I don't find much interest in this in many sectors in agriculture.

A retired dean of agriculture at a land grant school came by recently to talk about dialogue. He was preparing a report on the extent to which consumers, environmentalists, farm, and commodity people get together and have an honest exchange of views. Recently I had a letter from him reporting on what he had found out.

He said that he had found people who were urging the farm community to engage and continue in dialogue with non- farm representatives, but thus far, he wrote, "I would have to conclude that any meaningful dialogue is not occurring."

We need this because the political scene is changing. I want to share with you a brief description of this change from a recent report issued by the National Council of State Legislatures. The report said that agriculture is no longer the dominant interest group influencing farm policy. Its representatives must now vie with more powerful constituencies of

consumers, environmentalists, urban interests, and others for primacy over what traditionally has been agricultural policy-making.

In short, agricultural policy is being transformed to incorporate additional goals of resource conservation, environmental and health protection, and sustenance of family farm and rural communities as explicit social objectives. Ecological agriculture is increasingly viewed by consumer, environmental, and similar groups as an approach that meets these objectives. The coalition that convinced Congress to authorize several new sustainable agriculture initiatives in 1990 will be even larger and more organized and committed in 1995 unless we see real movement away from pesticide dependence in agriculture.

Preliminary coalition work on the 1995 Farm Bill is already underway. I would urge you to consider this important political realignment and respond to it as you look to 1995 and beyond.

I challenge you to become more politically active in fighting against barriers to adoption of environmentally benign farming practices and in seeking funds for IPM research and extension. You can't rely on osmosis to convince beleaguered appropriations committee members that they should support you. Public support for research is critical to IPM, which is information rather than product driven, for the most part. It seems to me that you need to do more to line up allies and public support. IPM has been on the scene now for about 30 years, and it still lacks the public visibility and the political support that it needs to do the job.

I think it is ridiculous to be spending $8.2 billion in this decade for boondoggles like the Superconducting Super Collider, and many billions more for a space station, while IPM and initiatives like the LISA program struggle to stay alive. I would urge you to begin identifying with and fighting for a transition to ecological agriculture. The sustainable agriculture train is beginning to move and the IPM community needs to decide whether to get on board or whether to let it leave without you.

Finally, I challenge you to support the new resource accounting approach that accounts for the first time for health and environmental costs of farming and the deterioration of agriculture's resource base. The public is beginning to insist on placing a monetary value on these externalities and on finding ways to give a credit to farmers who use ecologically sound methods.

It was noted in several instances in the discussion papers that the impact of removing a constraint to IPM would result in higher food costs to consumers. The fact is that what consumers pay at the supermarket does not reflect the real cost of food. The externalities are paid for by consumers now, or will be later by our children and grandchildren, but these costs do not show up at the supermarket or in the reports that purport to show the cost of production. Preliminary studies strongly suggest that full recognition of all costs and benefits and getting agricultural economists to stop cooking the books will help strengthen this case for IPM and for ecological farming methods in general.

I have been actively involved the last few months at the UN in New York, and in Brazil, and the Earth Summit process where strong commitments to both IPM and sustainable agriculture were made. I worked with environmentalists from 50 countries or more, and I can assure you that growing support for ecological farming methods is worldwide. The UN

development fund, in fact, released a report in Rio that makes a strong case for increased support for organic agriculture.

We have entered a new era that involves a transition from chemicals to biological agriculture. The real question for the IPM community to consider today and for USDA and EPA as well is whether you are going to lead or whether you are going to follow. Those of us who advocate this inevitable change in direction hope that you make the right choice.

Thank you very much.

[Applause.]

DR. CATH: The next person is not very difficult for me to introduce. I always take pleasure in introducing State officials. Having opened the Washington office for NASDA in 1968 here, any time I get an official from a State Department of Agriculture it is always a pleasure.

We have with us this morning Barry McBee, Deputy Commissioner of the Texas Department of Agriculture. He is currently the Deputy Commissioner, having served recently in Washington as an associate director of cabinet affairs at the White House after being selected as the 1989/1990 White House fellow by President George Bush following a national competition.

Barry also served the State of Texas under the administration of Governor William Clements, Jr., from 1987 to 1989 as deputy general counsel and chief deputy director of governmental appointments following 6 years of private legal practice in Dallas. Please welcome Mr. Barry McBee.

[Applause.]

MR. MCBEE: Thank you, Stan.

I arrived in town late last night at the establishment down the road to a fraternity convention and a false fire alarm, not a real auspicious start to a trip to Washington, but it did give me a different perspective to the term "pest management".

[Laughter.]

MR. MCBEE: We are here today and you have been here the last few days to talk about real pest management, integrated pest management. We want to thank you from Texas for the opportunity to come and present at least one State's perspective on IPM and more importantly on Texas agriculture commissioner Rick Perry's perspective on the vital need for a national integrated pest management focus.

What you all have been talking about the last three days here, and more important what happens at the close of this conference, we believe is critical to agriculture's future viability and its productivity.

All of us in this room are well aware of consumer, environmental, and health concerns about agricultural production and how those are increasingly causing us to take a serious look at the way American food and fiber has traditionally been grown, marketed, and sold. In the coming decade IPM-produced food and fiber will increasingly be viewed as our best approach

to balance the consumer's desire for safe food and fiber, and the grower's ability to profitability produce the same.

Texas agriculture has long been a leader in integrated pest management programs. Introduced in 1972, IPM is now employed by more than 1,000 Texas farmers who are producing premium quality crops, everything from citrus to cotton to cabbage, on nearly 1 million acres of land. These stewards of our land and we at the Texas Department of Agriculture firmly believe that our farmers and ranchers are the best and the most conscientious stewards of our lands and all our natural resources. We have come to realize that IPM systems can allow for increased profits with minimal environmental impact.

With IPM, for instance, a boll weevil cultural control program that encourages fall cotton residue destruction has increased net farm income in our State's Rio Grande Valley by $270 per acre, a regional impact of $31 million. At the same time, environmental quality has been improved with an annual reduction of insecticide use totally 650,000 pounds. Vegetable growers from this same region have reached similar benefits from IPM programs with examples such as reducing insecticide use on carrots by 66 percent.

Yet while we in Texas are proud of our successes, we are far from satisfied. Much more remains to be done. For example, not all crops have IPM programs due in part to the stagnant Federal funding for IPM research, which I know has been discussed over the last few days. That stagnancy in funding results, we think, from the focus of this entire meeting: the lack of a nationally coordinated focus and emphasis on the benefits of IPM.

This lack of a national focus has not prevented Texas from taking a leadership role in IPM, however. Texas farmers are strongly encouraged to consider less chemically- dependent agricultural systems. We in Texas are committed to the use of production methods that make economic "cents" and environmental "sense".

Through the wisdom of progressive farmers and farm organizations and the Texas Legislature, we have fortunately been able to put our money where our mouth is with a TPA-sponsored competitive grant program for biologically intensive IPM demonstration and grower education projects. While the amount of money distributed has been small, the benefits for Texas agriculture are substantial.

Projects funded in fiscal year 1992 include a demonstration project using B.t. for pecan nut case bearer management, an education outreach program on the use of cultural controls in sweet potato whitefly management, and funding for a State-wide integrated pest management database, and a State-wide producer organization dedicated to the development and implementation of IPM programs.

Commissioner Perry strongly believes that State departments of agriculture should and must lead the way in creating innovative public/private partnerships to enhance IPM adoption. Encouragement of IPM needs to be an integral part of each State's regulatory and educational mandates.

How do we do that? We do it in one way by following your lead here today and holding forums similar to this one to help identify State-level incentives for IPM as well as to examine the State-level barriers to IPM adoption that do exist.

The relationship of the Texas Department of Agriculture with the Texas Pest Management Association, Texas A&M University, and the Texas Agricultural Extension Service we think is a wonderful example of the kind of innovative partnership that this Nation needs in its quest for rapid adoption of IPM technology.

TPMA serves as a major force in acquainting farmers with IPM philosophy and tactics. It also serves as the State- wide steering committee for the Texas Agricultural Extension Service's State-wide pest management program. In turn, the Extension Service maintains cooperative relationships with colleges and universities to involve the widest technical base possible in promoting IPM techniques. And TDA works with TPMA, A&M, and the Extension Service to build a coordinated cohesive approach to maximize what might otherwise be our divergent and ineffective efforts.

This type of cooperation among government agencies, producer groups, researchers, and private industry is vital to meet the challenges that lie ahead of us. But while we cooperate, we must also educate. We must remain diligent in informing consumers on how IPM differs from conventional production practices and how they as consumes can benefit from these technological advances. Consumers must be made to feel that their environmental concerns can be answered while producers are allowed to profitably meet the demands of a growing world population.

As development of biologically intensive integrated pest management strategies expand, the marketplace we feel will naturally speed the adoption of IPM practices. That is how it should be. We at the Texas Department of Agriculture believe that allowing the marketplace to work its magic is the best way to promote widespread adoption of IPM practices.

With this in mind, we are closely examining all marketing opportunities for IPM-produced food and fiber and asking what we think are the relevant questions in this area. Will processors, distributors, and retailers pay a premium for food that is produced under IPM systems? If they won't do that today, will they do that tomorrow? Under what conditions?

What do consumers really currently know about IPM practices? Can they be educated to help build demand for IPM- produced food and fiber? At the same time as we ask those questions, we are also thinking about the proper role of Government in fostering a market-driven IPM culture. Government must not create regulatory straitjackets, but road maps, road maps that recognize regional and local differences in cropping patterns and pest populations and take note of what nature will always give us, unexpected pest outbreaks.

Later this month, the Texas Department of Agriculture will sponsor the first of a series of meetings with university researchers, producers, consumers, and retailers to examine the possibilities of a State IPM grower certification program for Texas. We believe that such voluntary certification programs are the right direction for IPM and not another mandated command and control scheme that will only raise the hair on the backs of farmers' necks.

We believe that this will work not just in Texas but throughout the Nation. That is why TDA is calling upon the National Association of State Departments of Agriculture to form an IPM committee which will take the recommendations of this conference and work to develop a similar voluntary certification program on a national scale.

As with any change or innovation, some of the issues surrounding IPM will be difficult to resolve. But Government and business, producers and consumers working together can and

must achieve our overriding societal goal: producing an abundant and diverse supply of food and fiber for this Nation and the world while protecting and preserving our shared environment. We in Texas feel that IPM holds the key to achieving that goal.

I look forward to working with each of you in this room in the months and years ahead as we do in fact achieve that goal.

Thank you.

[Applause.]

DR. CATH: It is interesting to see that one of the States is taking a lead in supporting and endorsing IPM activities.

We have the privilege to have with us this morning the Assistant Administrator for the Office of Prevention, Pesticides, and Toxic Substances, Linda Fisher. We are going to revise our program a little bit to accommodate Ms. Fisher. Because of her hot track that she is on, we were lucky to get her here and we are going to take advantage of the time that we have her.

Just very briefly I would like to introduce Linda Fisher, for those of you who may not know who she is, although I am sure that most of you do.

Linda was confirmed by the Senate on August 4, 1989 as EPA's Assistant Administrator for Pesticides and Toxic Substances. In this position, she oversees the agency's pesticide and toxic programs. She most recently served as Assistant Administrator for Policy, Planning and Evaluation where she had primary responsibility for developing the agency's position on global climate change and establishing the Office of Pollution Prevention.

Linda Fisher first joined the agency in July of 1983 as special assistant to the Assistant Administrator for Solid Waste and Emergency Response. From January 1985 to January of 1988 she served as chief of staff for Administrator Lee M. Thomas. She was a principal policy liaison with Congress and the White House during the rewriting of the Superfund Law in 1986.

Linda is a native of Columbus, Ohio and a 1974 graduate of Miami University of Ohio. She received her master's degree in business administration from George Washington University in 1978 and earned her jurist's doctor degree from Ohio State University College of Law in 1982.

Please help me welcome Ms. Linda Fisher to the platform.

[Applause.]

MS.FISHER: Thank you very much.

It is a pleasure to be here with all of you today. I think I should distinguish myself. I was one of the few assistant administrators who told Bill Reilly that I did not want to go to Rio with him.

[Laughter.]

MS.FISHER: When I told him that, he turned to me and he said that his wife didn't want to go either. I told him that women know what is right.

[Laughter.]

MS. FISHER: As the conference draws to a close today, I want to thank each of you for taking the time and spending the whole week with us to making a commitment to helping make IPM a success. I think all your participation will enable us to instill an integrated pest management philosophy into the pest control practices of the country and hopefully much of the world.

We have heard a great number of presentations over the past couple of days emphasizing IPM practices, identifying constraints for us, and making it clear the urgent need to resolve some of the many issues before us. We have come a long way in proving that IPM strategies can work. Every day, more and more farmers, scientists, and CEOs are recognizing that IPM is the preferred approach to pest management because it minimizes so many potential risks to the environment, and yet can assure a successful agricultural economy.

We do have much of which to be proud for the work that we have done, but I think this conference emphasizes how much more remains to be done. We are at a precipitous moment in our environmental history and this Forum has helped set the stage for much of our future.

The common goal of institutionalizing sustainable agricultural practices has brought together many people who have traditionally found very little common ground: environmentalists and industry, farmers and regulators, and perhaps most amazing of all USDA and EPA.

[Laughter.]

MS. FISHER: As you look around the room, you see people who have made IPM a reality. We can all take heart from many of the success stories we heard and those which we know. But I hope more people will realize the potential of IPM because it will take people like all of you in the room to spread the word and get the message out. We need to do more than just spread the word. We need to show people action.

This Forum has provided us a starting point to develop a national IPM strategy. Now it is time for us at the Federal level -- both USDA and EPA -- working with all of you in the States and in the private sector to complete the strategy and put it into motion. Each of us has a very important role to play. We all have challenges to meet. Let's start with what we at EPA can do.

One of the messages that came across loud and clear from the participants in the Forum is that our regulatory program is far from perfect. In fact, it inhibits the current and future practices of IPM. Clearly, this is an important message to EPA and one about which we need to do something. It is essential that we straighten out our registration program. We have already begun to identify a number of actions to do that.

A total quality action team has been established to evaluate and improve our new chemical registration program. The team is focusing on process and on communication improvement in data requirements as well as scientific review for new chemical registrations. I am personally involved in the process and I am committed to making the registration process faster and less complex. Good management is necessary for any effective program, but it is essential to us at EPA if we are going to be successful in getting newer and safer chemicals to the market.

We are currently reviewing our data requirements. This is not just a review to stack up all the existing requirements and put them in just one big new bound book. Instead, this is a true reevaluation, particularly for biological pesticides.

We are focusing on several very important questions. First of all, do our current data requirements make sense, given the nature and the use of pesticides? Are these data really necessary for us at EPA to make risk management decisions? Are the data requirements scientifically sound? Are the tests doable? Hopefully, we will have some answers to these questions and some changes to our data requirements.

As you heard Bill Reilly mention on Wednesday, EPA is developing its own safer pesticide initiative. Our goal is to provide incentives to the pesticide industry to develop products which pose little risk to human health and the environment. We want to identify these chemicals early and accelerate them through the registration process.

IPM is also a key component in a direction we are setting in our section 18 program. In a growing number of cases, the agency is requiring that IPM programs be put in place in order for a section 18 to be granted, or in order for future section 18 requests to be granted for that crop to be considered. In this way, we are hopeful that the section 18 program can provide a laboratory for new methods and practices, and provide the right incentives to get more growers adopting IPM techniques.

It is also clear from the comments we heard in the course of this week that we need to better communicate our pesticide regulatory decisions to the grower community and the rationale underlying those decisions. We also need to provide a lot more opportunity for others in the agriculture community to have access to agency pesticide decision-makers.

We also need to consider the impacts of reregistration decisions on existing IPM strategies, particularly those supporting minor crop production. I am committed to working with all of you to address some of these and other issues with the reregistration program identified at this Forum.

As I said, each of us needs to take action if IPM is to succeed. My challenge to each of you in the public and private sectors that you represent is threefold. First, you much identify what IPM means to you. Secondly, you need to set targets or goals which you want to achieve. And third, you need to get action underway to meet those goals.

For the grower community, I believe it is critical that each of you set voluntary but meaningful targets. If you are serious about implementing IPM, we need to have some specific goals, goals that are relevant to your part of agriculture. These can be certain percentage reductions in terms of the use of pesticides; it could be the number of acres grown under IPM; or the number of crops grown under IPM programs. The goals must be progressive over time.

These targets can be set by crop, by geographic region, or they can be set by production process but they need to be aggressive. They need to put pressure on the system, and yet they need to be realistic. They must reflect the uniqueness of each of the parts of agriculture.

All parts of agriculture are not created equal, so not all goals will fit. It is not a one-size-fits-all approach. Remember, our goal is to be successful in terms of loadings into the environment. From my perspective, setting realistic but aggressive targets is important. Success will not be achieved over night.

For the chemical industry, they need to accelerate the development of safer less risky pesticides, including biologicals or pheromones, and even conventional pesticides. Farmers, users, and crop consultants need to take the leap of faith that was described by Fred Finney on Wednesday and begin to use IPM strategies.

When existing pesticides, subject to reregistration, are critical to IPM strategies, it is important for you in industry to communicate the information to EPA so that we can factor that into our decision-making. By and large, when we make decisions on pesticides, we are trying to make things better and not worse. It is important that you get information to the agency.

Researchers and educators need to focus on the applied programs that incorporate interdisciplinary IPM approaches from the laboratory bench to the farm. Environmental and public interest groups need to support and promote IPM. The food processing industry needs to follow the lead of Campbell's Soup and expand the use of IPM in their production systems.

Lastly, EPA and USDA need to take action. It is clear from your comments that USDA needs to integrate their research and extension and education efforts into a coordinated national IPM program. This program must be sufficiently funded to operate and it must target the needs of growers. EPA stands ready to assist USDA in all of these efforts.

In closing, I want to emphasize that it is important that the progress we have made at this conference in determining future initiatives does not stop here, but only begins here. It is imperative that we act upon the commitments each of us has made. The only way this will be possible is if we all open ourselves up to each other's ideas and understand each other's goals and needs. In my mind, IPM is certainly a hallmark of the future, but it may not be so to other people unless each of us here does our part to get the message out.

Thank you again for your participation in our conference.

[Applause.]

DR. CATH: Thank you, Linda. You have really left us with some thoughts.

I am sorry, Keith, that we kind of changed things around a little bit, but you know how things work in Washington anyway and it is important that you are here.

Keith Pitts is the director of the House Agriculture Subcommittee on Department Operations, Research, and Foreign Agriculture, DORFA. He came over with Charlie Rose, who took over the chairmanship of that committee and currently chairs the DORFA Subcommittee.

The subcommittee primarily serves as an investigative and oversight organization of the United States Department of Agriculture. Agriculture, research, and education are also under the subcommittee's jurisdiction. The subcommittee has held extensive hearings on food safety and recently completed the consideration of the Pesticide Safety Improvement Act -- which is going to become a household word I am sure -- which was sponsored by Congressman Rose. The proposal is now pending before the House Committee on Agriculture and the House Committee on Energy and Commerce.

Keith is a graduate of the chemistry program at the University of North Carolina at Chapel Hill. Prior to working for the DORFA Subcommittee, Keith was the legislative director for Congressman Rose.

Welcome, Keith.

MR. PITTS: I will say a little bit. I appreciate being here today. I had called initially because I was concerned I wouldn't be invited to the Forum so that I could sit down and learn. A little bit to my surprise, I found out last week, I was a speaker. So please bear with me.

[Laughter.]

MR. PITTS: First of all, I would like to thank everyone for attending this Forum. It is especially rewarding and heartening to me to interact with folks outside of D.C. because I think at times we tend to be a little too focused and keep our blinders on as far as trying to deal with an issue as comprehensive and as difficult as food safety. For me in particular, I have had a very particularly rewarding experience working with some of you in developing a safer pesticide provision of the Food Safety Bill. I appreciate some of the interactions we have had here over the past couple of days with folks who even haven't agreed with me much at times. But I do appreciate it.

The other night I very much enjoyed the discussion about Charles V. Reilly and his involvement with integrated pest management. I thought I would point out to you that there is another important date that you should mark down as far as IPM is concerned.

On February 19, 1992, during a hearing that we held on safer pesticides, the chairman of the full committee, Mr. de la Garza, went into a very detailed explanation of how he used garlic juice and jalapeno pepper juice on his crops at home to help regulate sweet potato whitefly. Of course, that immediately started off a discussion about whether or not EPA had seen any sort of registration for that product yet.

[Laughter.]

MR. PITTS: Mr. de la Garza went on to explain that as a child he had been told by some of the old-time farmers in his area that he should plant garlic in between the rows of his crops to better manage pests. My boss, Congressman Rose, realizing the partisan ranker of the food safety debate at that time, suggested that perhaps we put the garlic in between the members of the committee.

[Laughter.]

MR. PITTS: So once we established that and used some measured doses of caffeine and aspirin over the next few months, we were able to report a food safety bill out of the subcommittee. I see that as a big step for IPM in that it would be integrated politician management.

[Laughter.]

MR. PITTS: Let's hope we can incorporate it into the full committee markup. I am sure that some of you may thinking that PAC money has been doing a little bit of that for awhile anyway.

Perhaps also the next step is a little bit of IBM, integrated bureaucrat management, so that we can get EPA and USDA to work a little better together.

I think we have heard a lot of things about IPM and I won't focus on those too much. I think what may be most useful for me to do is to just give you a little run-down on the food safety debate.

We have reported the bill out of subcommittee. It is certainly less than perfect, but we are pleased that probably for the first time in 6 years we have gotten some sort of food safety measure out of subcommittee. For the first time in a long time, we do see a little bit of a cooperative relationship developing between the House Agriculture Committee and the Energy and Commerce Committee.

I think that environment is something that we all should recognize and do our best to work with because as things develop with a decision on the Delaney clause I seriously doubt that that cooperative spirit may be there next year. I think that things could become much more difficult as far as agriculture and some industries may be concerned about the food safety debate.

I certainly hope that those of you participating in McWorld today should get back with the different trade associations here in D.C. and maybe have them stop the Jihad that has been going on the last few months. Maybe we will see some progress.

In the bill, we have attempted to speed up the removal of what we call bad actors from the market. We have made efforts to better certify and train folks that will be applying restricted use pesticides. We do have some language on which we are currently working trying to address the minor use problem. The debate seems to be going fairly well on that. I think within the next few weeks we will see some results on that particular issue.

We also have a safer pesticide section in the bill. Initially it looked like it would be a very problematic section. We are making progress. Problems do remain, but I feel fairly confident now that we're not going to see the section struck altogether, which encourages me. That particular section deals a lot with encouraging the development of newer pesticides -- for lack of a better word - - that are safer.

We also deal with issues like pesticide resistance and also prescription use. Hopefully we will see a product within the next couple of weeks there, too.

As far as just some feelings that I have with the associated agencies, I definitely feel that EPA should work more aggressively with putting forward its safer pesticide policy. We have been promised it for some time now, but I will take Mr. Reilly for his word and expect it out within the next week.

[Laughter.]

MR. PITTS: One issue that concerns me about EPA as we do get into safer pesticides and products that are much more specific is problems with resistance management that do exist even today. Currently, as I understand it, we do require resistance information be submitted under 6(a)(2). To date, that data is used primarily for cancellation decisions. I would certainly hope that we could find some way to use that data in a more proactive sense and use it for preserve uses of products rather than as part of the cancellation decision. I think that is certainly imperative to farmers and the agricultural industry as a whole.

With USDA, yes they do have 13 agencies working on IPM. That may be a little bit of the problem. It is unacceptable that we have 13 agencies working on IPM but our farmers are in the situation in which they are today, particularly with minor uses. I hope that we see a little more emphasis on working to develop IPM programs and do something about the lack of alternatives that many farmers have.

I think I will leave it at that. I hope to hear from more of you as we start going through this process with the Food Safety Bill. I hope you will feel free to call on us at any time if you have comments.

Thank you.

[Applause.]

DR. CATH: Thank you, Keith. I think it bodes well for all of us to follow the activities of Charlie Rose's committee over there because a lot of important things are going on that relate to the whole concept about which we are speaking.

The next speaker gives me great pleasure because I have known Harry Mussman for quite some time. I can honestly say that in my 26 years in Washington I have never found a more accommodating individual in my life. It might be one of the last people to be saying that to in the Washington area, but I am saying that.

It is always a pleasure. I have introduced Harry before on a few occasions at some functions we have had. I was delighted that Harry would be able to make an appearance and talk to you folks just briefly.

I haven't recited all this. You have the biographies in front of you. But let me read along with you once again.

Dr. Mussman is presently serving as Deputy Assistant Secretary for Science and Education, United States Department of Agriculture. Secretary Yeutter appointed Harry, a native of Wisconsin, as Deputy Assistant Secretary for Science and Education at USDA on August 31, 1989. Dr. Mussman brings to the position a broad knowledge of the Department of extensive experience in teaching research and management.

Dr. Mussman earned his B.S. degree in agriculture bacteriology at the University of Wisconsin. In the years that followed, he managed his family beef cattle ranching operation in Kansas while working toward his advanced degrees at Kansas State University. He received his M.S. and Ph.D. degrees in microbiology and his DVM. Dr. Mussman was an assistant professor at Kansas State University and then an associate professor of veterinarian science at the University of Nebraska.

Dr. Mussman has held positions in USDA's consumer marketing services; Animal, Plant, and Health Inspection Service, APHIS; and the Food and Agricultural Organization, FAO. In addition, he was executive vice president for scientific affairs for the National Food Processors Association and director of the animal, health, and plant protection program for the American Institute for Cooperation in Agriculture.

It is my pleasure to ask Dr. Mussman to come up and give us the benefit of his remarks.

DR. MUSSMAN: Thank you very much, Stan. With that kind of introduction, about half my time has been used up. We're going to have to do something about those introductions.

I, too, want to compliment all of you who have seen fit to be a part of this rather historic event, the IPM Forum. I know there was a time when there were delays in setting dates and it kept being moved and moved. There was some misgiving on the part of those doing the organizing, but I think those delays simply whetted the appetites of many to finally be here at the time the event took place.

I am told there are some 50 percent more people registered for this IPM Forum than what even the wildest expectations of the organizers had been in the earliest stages of planning. I think that makes it an unqualified success.

We have here in the audience and as participants in the program people from every possible sector that one could imagine, some that would not normally come up in conversation about IPM. When you get people from OMB, from DORFA, from the Federal agencies -- EPA and USDA and there may be others present -- small companies, large companies, the environmental groups -- the list goes on -- it is an incredibly strong endorsement for the need for attention being given for IPM. I don't think there is anybody in this room who is not persuaded at this point, if indeed at any point in time there were not persuaded before, that IPM is certainly an important component of any kind of agriculture of the future.

Just as an aside, I found it rather interesting. Yesterday I received a letter from the Defense Research and Engineering arm of the Department of Defense in which he shared with us the priorities they had for the kind of pest management research in which they are interested that the Department of Agriculture is doing. They regularly advise us on what they believe are important areas that would be beneficial to the Defense Department's interests.

Let me quote one line. After having stated three paragraphs, the statement is made, "Where appropriate, an integrated pest management approach is the strategy the Department of Defense is emphasizing for our programs worldwide." So even though DOD may not be on the program, I think we have a clear endorsement from the Department of Defense for using integrated pest management wherever possible on any pest management activity in which they are interested.

There are three things I wanted to share with you this morning, all of which are somewhat connected. In some cases, some of you may be familiar with them, but I would like to go through them. I believe they are worth highlighting.

The subject of this meeting has been primarily the constraints to the more rapid adoption of IPM-related activities in agriculture. Many of you may know that the National Academy of Science proposed a study very similar to and along these lines to follow up on the publication of alternative agriculture. There was recognition that biocontrol, particularly, was not being moved as quickly as many would like to see it. The NRC proposed -- and I suspect EPA became involved in funding that as well as our offices, and there are probably other agencies that contributed.

Coincidentally, the panel that was put together for carrying out that study convened for the first time early this week. I suspect there may even be some people in the audience who are

a part of that panel who stayed over to be a part of this since the purposes of that panel run somewhat in parallel with the purpose of this Forum.

I suspect also that the results of that panel's deliberations particularly on biocontrol and how it can be moved ahead more rapidly -- both the research, the development, and the eventual adoption of technologies -- will be very complementary to the outcome of this Forum.

The second thing I would like to share with you has to do with what I think all of us would agree are some shortcomings that we have relative to IPM and practically any other environmentally sensitive practice, and that is the difficulty we experience in trying to capture the benefits and put numbers on the benefits using the traditional accounting methods. There is simply no mechanism available for a typical cost/benefit type of relationship to be able to put a number on the value of not losing soil into run-off; the value of not contaminating groundwater or surface water; or the value of whatever other action or reaction that may be prevented through the adoption of environmentally sensitive approaches to agriculture.

As a consequence of this -- and we have a number of programs within USDA with which I think everyone in the room is probably familiar, a major program on water quality, major programs in sustainable agriculture -- we had to ask ourselves at various points, How do we quantify the benefits that are achieved through the implementation of some of the practices we are using to prevent water contamination, some of the practices we are using or urging to be adopted to promote the idea of sustainable agriculture, IPM among them?

We did not have an answer. We did not know how to capture these. The accounting methods simply don't permit that to happen. We have, as of almost a year and a half ago now, commissioned a study with an organization that is capable of doing the study and will do an excellent job of hearing it out, in which they are going to attempt to provide us a mechanism by which we can capture the non-market benefits of some of these sustainable or general category of environmentally sensitive practices.

We are talking about health benefits, public recreation, resource conservation -- the whole package of environmental benefits that result as a consequence of implementation of environmentally sensitive practices in agriculture. I think that these returns on investment in these practices may make a significant difference in the way they may be seen by those being asked to use them. If a practice can be shown to be less likely to cause farm worker injuries, how do you capture the value of that benefit that you're not exposing that worker to something to which the worker might otherwise be exposed?

If we can get those kinds of numbers put to those benefits, it may make the whole job of persuading those who are expected to be the users of these technologies to quickly adopt them and understand why the economics of adoption makes a great deal of sense to them as individuals and to the agriculture sector collectively. I think that we will all be awaiting the outcome of this study. Just as quickly as we have some sort of result that we can share with the world, we will be delighted to do so.

I think all of you should look forward to having this kind of information which will continue to bolster and provide support for the adoption of not only integrated pest management but a variety of other environmentally sensitive practices.

The third thing I wanted to share with you is again something with which some of you in the room may be familiar, and that is that EPA well over a year ago invited us to sit down and talk to express an interest in being involved more in the agricultural research area. We talked about where we might work together. These conversations that ensued took place between our office, Science and Education, and the Office of Research and Development with Eric Brethauer at EPA.

Out of those multiple conversations with small groups from EPA and USDA sitting together emerged the concept of using IPM as a common focal point, something that both USDA could do and EPA could provide a dimension that was not particularly strongly emphasized in the nature of USDA programs, which is the monitoring and evaluation of what is being accomplished.

I think traditionally -- I am not saying this to be critical. I think it is just the way statutes are written and how programs have been carried out. But traditionally USDA has had programs going for years and years and years in which activities are undertaken in the field while sharing with farmers soil conservation practices, putting tree-lined windbreaks -- all kinds of things over the years -- and water quality activities now, with little thought being given to quantifying the impact those activities have had down the road, the evaluation of how successful they have been, being able to point to results that are measurable as a consequence of having implemented those practices.

So we have leaped, literally, at the chance to work in conjunction with our friends at EPA to develop a plan that would permit USDA to have a series of mutually agreed upon practices that we would be evaluating. EPA would then provide that monitoring and evaluation looking at a number of parameters, water quality among them.

That went along very well until we realized that there was more to it than just IPM, that what we were talking about would entail monitoring or talking a look at the contributions that a number of other agricultural practices might make to a balanced management of agricultural practices.

So we coined the phrase integrated farm management systems rather than IPM. IPM is a key component, but under the integrated farm management systems, we are including considerations such as food safety, water quality, animal waste disposal, fertilizer or nutrient management -- a number of things that would not normally be part of IPM in a strict definition, but truly part of a total farm management system.

So we have now agreed upon the integrated farm management system jointly being operated by EPA and USDA. We selected a site for some initial work, even in 1992 before we had any budget support to do this. We have underway at a site in Iowa in the Walnut Creek area a major project that was ongoing to which we have added the additional dimensions of this integrated farm management system with EPA providing a much needed evaluation, the monitoring that is so important, USGS similarly involved in the monitoring and evaluation.

I think out of that we are going to get a great deal more coherent information regarding agricultural practices and changes in technology and what impacts they have. In turn, our Extension Service and other arms of the Federal Government will be able to take and

disseminate much more widely to farms, farming communities that may be far away from the Walnut Creek site in Iowa.

Our hope is as we move toward 1993 -- and by the way, both EPA and USDA put in their fiscal year 1993 budget proposal a modest amount of funding that would underwrite the cost of such a joint effort. We will be looking at other sites in the future for 1993 and beyond at which we hope to do a similar sort of thing to broaden the exposure of the farm community to the multiple possibilities of the environmentally sensitive practices and have many more sites from which to draw information that will be made available to the farming community in general, wherever it may be applicable.

So we're terribly excited about the joint work with the Environmental Protection Agency. Linda was kind enough to offer the full cooperation of EPA. You may come to regret that. If you have a lot of people in the field who are willing to carry some water and information, we're going to have some information being cranked out in sufficient quantity and quality that any and all help in getting that kind of information to the broad agricultural community I think will redound to not only our mutual benefit but to agriculture's benefit in general. I think everyone would be delighted to see that happen.

I think with that, Mr. Chairman, I will close my remarks simply again thanking the organizers for having invited me to be with you this morning. I look forward to the outcome, the proceedings that will be published, as I suspect they will be relatively shortly after this event.

My challenge to all of you individually and collectively is that the responsibility now falls on your shoulders. Each of you, or collectively all of you, must acknowledge where out of the proceedings and resolutions that come out of this IPM Forum you fit in and where you need to follow up on your own or in groups to take the actions necessary to make those things happen. No one is going to be breathing down your neck and saying that you did or didn't do this well, but each has to accept a role and responsibility and begin to fit into a package deal in which the outcome of this meeting and the beliefs you all seem to share regarding integrated pest management will indeed be disseminated most widely and will be adopted as quickly as possible.

If we can do that, I think our job will have been accomplished.

Linda said it will take a while. I agree that it is going to take a while, but we can sure try to speed it up.

Thank you very much.

[Applause.]

DR. CATH: I never can get Harry to sit at the front because when he goes back down to the audience, when the lights go out, he slips out the side door.

[Laughter.]

DR. CATH: We have heard from the agencies, from State departments of agriculture, from industry, chemical, semiochemical, biotech, academia, Congress, private practitioners -- so what is left? We need to hear from the White House.

So representing that aspect of our Government is Gary R. Blumenthal, who is the special assistant to the President for Agricultural Trade and Food Assistance.

Gary is a cabinet liaison and special assistant to the President for Agricultural Trade and Food Assistance. Since January of 1990 Mr. Blumenthal has served as chief of staff to the Secretary of Agriculture. From May 1990 to December 1990, he was executive assistant to the Secretary of Agriculture. From 1983 to 1989, Mr. Blumenthal served in the Department of Agriculture's Foreign Agriculture Service, first as a legislative assistant and then as director of legislative affairs. From 1979 to 1981, Mr. Blumenthal was legislative assistant to Representative Larry Hopkins from Kentucky, a Republican. In 1981, he was staff assistant to the Secretary of the Air Force, Vern Orr. In 1982, he served as the field representative for the Republican National Committee in five States.

I see he is a good man because he was born in Kittery, Maine. Mr. Blumenthal was raised in Jacksonville, North Carolina, and he graduated from East Carolina University with a B.A. and lives in Arlington, Virginia with his wife and two children.

Larry?

[Applause.]

MR. BLUMENTHAL: Thank you.

Born in Maine and raised in North Carolina, which gives me an accent right about this area.

[Laughter.]

MR. BLUMENTHAL: Congratulations on what appears to be a successful conference, except this is a long, narrow room. Those of you in the back are way in the back. I will try to keep my voice up so that you all can hear.

I was asked to come and speak at noon time. That's a tough time to speak, being heard over all the grumbling stomachs. But I was also told that I was here to fill the void and that I should try to entertain waiting for the results of the voting.

[Laughter.]

MR. BLUMENTHAL: So I am going to talk for a while and then fade out before the voting is completed. I like to think of it as filling the Perot role.

[Laughter.]

MR. BLUMENTHAL: I do understand that this is one straw poll that will literally affect the grassroots.

[Laughter.]

MR. BLUMENTHAL: I gather that passions are running pretty high for the various options on which you all voted. I overheard someone saying that only a crazy ignorant fool would vote for that. I must admit that the idea of using ex-lax to remove the constraints to IPM sounded a little weird.

[Laughter.]

MR. BLUMENTHAL: But this Forum is co-sponsored by EPA and USDA. I must tell you, from the White House standpoint, that getting diverse agencies to work together on something is quite an accomplishment. I think it indicates quite a bit about the strength of the Administration's views on IPM.

Many thanks go to Steve Johnson from EPA and Richard Parry for doing a good job of pulling this all together.

I believe the team approach -- the idea of breaking this out into commodities and constraints and then ultimately voting -- is an innovative approach to a conference such as this. I also know how difficult it is in Government to get approval on innovative approaches, so congratulations on that as well.

I would also say that the diversity of the participants here today says a lot about IPM. To have growers, chemical companies, food companies, academia, the environmental community, and again the various Federal agencies says a lot about the support for IPM.

To me, IPM means efficiently maximizing environmentally sound production. This Forum is focused on the successes of IPM and also its limitations, probably the most important part being that of how to overcome the limitations. There can be no doubt about this Administration's continued strong support for IPM.

IPM is really founded on research. I think that that is the reason why President Bush has requested such substantial increases in funding for research and development in the Government. Obviously, it is the foundation for any new and sound policy.

Also education and training is very important. We have found that getting the word out to the public is the way to best get it utilized. I understand that you all are going to do some of that. Obviously the Cooperative Extension Service and others will be working on that.

Basically, we find that farmers, when they are told about something and they understand why it is good, they will implement it. They will use it. They will obviously use it if they find that it is good for profit. If they can reduce their inputs and save money on that end, that is good. But also they care about their soil and their water. They care about its impact upon their children, their grandchildren, and future generations. So there is no reason why this policy initiative can't be successful.

I should say that it should be limited to just agriculture, though. Maybe I shouldn't admit this, but my wife is a little squeamish about things. The other day we had a bug that made the misfortune of getting onto our kitchen floor. Instead of the easy thing of just stepping on it, I noticed that she got out a can of Raid super bug killer and put about 4 ounces on that thing.

[Laughter.]

MR. BLUMENTHAL: So we need to do some training in the urban areas as well.

Secretary Madigan likes to say that farmers don't get enough credit for the sound environmental things they do. I think that's correct, whether it is IPM or testing plants and soils before applying fertilizer, hand-spraying chemicals when that is viable, obviously from the soil standpoint building terraces, grassland waterways, employing conservation tillage, and of course

participating in the wetlands reserve program, conservation reserve program -- those are all solid things they are doing.

Likewise, I don't believe the President is getting enough credit for the environmental things he is doing. It is quite unfortunate. Obviously the 1990 Farm Bill is an example of environmental initiatives with which you all are very familiar, but we also have the Clean Air Act. As Linda would point out, there has been a 54 percent increase in EPA's budget. That is significant. We have doubled the amount of money we have spent on wetlands. EPA has imposed more civil penalties against violators of our environmental laws in the last 2 years than in the entire history of the agency.

I wasn't going to do this, but it is so frustrating to me for the President to come back from Rio and be criticized about his environmental policy, so I have to go through this.

An off-shore oil and gas moratorium. He has added $750 million for park expansion and improvement. He has accelerated the phase-out of CFCs. He has boosted recycling.

I must tell you that I have four trash cans around my desk. I have to always decide which one to use. I have waste paper, cans, food waste, and a burn bag. The burn bag is for classified materials. I don't know if you know this, but the Secret Service actually picks up our burn bag every day. I like to say that the White House is the only place besides New York City where the garbage man carries a gun.

[Laughter.]

MR. BLUMENTHAL: But the President has tripled funding for Federal facilities cleanup. There has been a fivefold increase in global climate change research funding. He has requested cabinet status for EPA. He has promoted a lot of international efforts, obviously, like preserving Antarctica. He has had the innovative debt for nature swaps with a lot of less developed countries, international protocols on handling oil spills. We have bans on drift net fishing, elephant ivory, and sea turtle shell imports. We have added awards, and studies, and reports, and all kinds of things.

Now here is my chance. I don't even know what the Congress said, but let me just say what the Congress has done for us.

They cut his superfund request. They cut his America the Beautiful program where we had a lot of money in there for tree planting. They cut his United States/Mexico border environmental protection plan. They zeroed his coastal protection initiative. They cut the wetlands reserve program.

Then they turned around and blamed him for being harmful to the environment. It sort of reminds me of the line about how many congressmen it takes to screw in an energy-conserving light bulb. It takes two, one to go on television to talk about it and the other one to screw it into the water faucet.

[Laughter.]

MR. BLUMENTHAL: I don't know if you know it or not, but you are spending $130 billion a year on pollution control, 2 percent of the GDP, and we're going to spend $1.2 trillion over the next decade. That is significant. The point is that this Nation is a world leader when

it comes to the environment. Efforts like IPM are the reason why. The beauty of IPM is that we stop it before we have to turn around and clean up after it. That is the great thing about IPM.

I could go on about what we have done, but I think the key to this is that we have to ignore the extremists. There is no way we can measure up to the illogical standards that they set. Rather we should do the good things that we know will help the environment and do them the best way we know how. That is exactly what this conference is all about, and you can help us accomplish that. I am all for that.

I should point out also that it is largely because of the success of agriculture that we're able to deal with these problems. Our affluence enables us to then deal with our effluence. We now have the financial ability to resolve a lot of these problems. As the President pointed out when he went to Rio a week ago, growth and environmental protection are compatible.

I would like to point out just a few more things.

Over the last 20 years, the Nation's economy has grown 57 percent. At the same time, we have reduced lead going into the air by 97 percent, carbon monoxide by 41 percent, and reduced particulates by 59 percent. The same is true in agriculture. We have had good increases in net farm income, and yet our pesticide/fertilizer use remains just a fraction of that used in Europe. Our loss of soil is expected to plummet by two-thirds between now and 1995.

Sometimes leadership means not following the crowd, not doing the easy thing. That reminds me of Lee Simpson's vineyard out in California. The President went and visited this vineyard a couple of weeks ago. Lee Simpson has done something very interesting. Even though he has access to Federal water, he went through the investment and put in what is called a subsurface irrigation system, which is sort of the next step beyond drip irrigation, and he did it even though he had access to Federal water.

Likewise, I think the President did something that wasn't necessarily easy, and that was going down to Rio and despite a lot of immense pressure to sign a biodiversity treaty, he knew that ultimately it would be harmful to us because it removed the private sector incentives we need for initiatives like IPM so that we can get efforts like biotechnology moving. If we remove the incentives, as that biodiversity treaty would, IPM would be hurt in that particular area.

In conclusion, let me just say that this Administration is committed to an agricultural system that is both economically productive and environmentally sound. This Forum is focused on a sound methodology of moving both those goals forward. I encourage you to go out and leave here and continue to move it forward.

I think IPM is good. It deals with air pollution, water pollution. I was even contemplating whether to go back and see whether it would deal with some of the political pollution this year. But then watching the Watergate specials over the last couple of evenings I realize that that is what G. Gordon Liddy tried to do, take care of a couple of political pests. That's probably not the way to handle it.

[Laughter.]

MR. BLUMENTHAL: But I do encourage you very much to take all that has been discussed here over the last 3 days and make the most of it. We certainly will from the Federal Government's standpoint. I thank you all very much for the invitation.

[Applause.]

DR. CATH: Laura, would you want to come up here now and briefly explain to folks what we're going to do with the voting and how we're going to handle it?

MS. SMITH: Now that we have finished all the stalling with the speeches, we can talk about the multi- voting.

While everyone has been speaking, we have been furiously counting the multi-voting from this morning. We received approximately 200 ballots. These are the results. All the constraint ballots have been counted.

The top constraint was the lack of a national commitment to IPM. I think several of our speakers addressed this issue, including Ms. Fisher.

The second constraint is insufficient funding and support for IPM implementation, demonstration, and fundamental infrastructure. That was a close second to a national commitment.

Third is the lack of funding and support for long- term interdisciplinary research and extension education.

Close behind that was the EPA pesticide regulatory process being burdensome, expensive, time-consuming, and unclear. I think Ms. Fisher spoke to that also.

Again, the fifth constraint moves on to research and the lack of funding for applied research. Regulatory personnel to expedite product registration and education promotion for growers.

The next five constraints were a bit behind the first five. The first five were far out ahead of these five constraints.

Number six is the shortage of independent trained IPM practitioners.

Number seven is the inability of current USDA and EPA structures to effectively address cross-cutting agricultural and environmental concerns.

Close behind that was insufficient education of public about IPM and its benefits.

Agricultural policies were developed without considering IPM and the lack of common and specific goals for IPM.

Now we move on to the top constraints by constraint area, the four constraint breakout sessions that we had.

In the institutional area, the top constraint was insufficient funding and support for IPM implementation, demonstration, and fundamental infrastructure.

The second, which was far behind the first one -- the first one had 133 votes and the second had 54 -- was the inability of current USDA and EPA structures to address cross- cutting issues.

The third institutional constraint was insufficient education of the public.

The policy constraints -- three policy constraints were very similar in that the top policy constraint had 147 votes, the lack of national commitment, the second was far behind with 52 votes, agricultural policies developed without considering IPM, and third commodity programs.

In the regulatory area it was a little closer between the top two. The EPA regulatory process had 103 votes and lack of funding for applied research had 88 votes. Then the third, which was farther behind, was the burdensome experimental use permit procedures.

In research and extension, again it was the lack of funding and support for long-term research, the shortage of independent trained IPM practitioners, and the lack of common and specific goals for IPM.

Now if we move on to the resolutions, we see that the resolutions line up very well with the top constraints that were chosen. We have not counted all the resolution ballots. As you know, they were much longer than the constraint ballots by about 100 options.

The number one choice was a national commitment to IPM, which I think was addressed by several of our speakers already.

Second was an increase in public and private funding for IPM research and extension. Several of our top constraints involved that area.

The third is another increase in funding to the Cooperative Extension Service to provide long-term stability for IPM education.

Fourth is another research resolution, the combination of research and extension programs.

Number five is to implement the EPA safer pesticide policy.

Numbers six through ten include social science and marketing strategies in IPM development, the long-term reevaluation of agricultural policies with IPM in mind, the establishment of an EPA IPM ombudsman, and the establishment of a formal interagency task force on IPM. We don't have a tenth because beyond number nine there were quite a number that were tied for ten. I think there were seven or eight that were tied for number ten.

Again, if we look at the resolutions by specific constraint area that we addressed before the breakout sessions, it again lines up very well with the constraints that we chose. The resolutions pretty much directly address the constraints that were chosen.

Institutional was an increase in public and private funding for IPM research, formal interagency task force on IPM, and to utilize interdisciplinary teams for IPM research.

Policy is again the national commitment to IPM, the combination of research and extension programs, and the long- term reevaluation of ag policies with IPM in mind.

In the regulatory area we had the implementation of the safer pesticide policy, the EPA ombudsman, and to permit semiochemical field tests without EUPs. That was an odd one thrown in.

Research and extension identified the same constraint as the institutional team, an increase in public and private funding for IPM research, an increase in funds to CES, and the inclusion of social sciences in IPM development.

We will be verifying the ballots. We counted them rather quickly. We will be counting them again. Hopefully in the proceedings that come out of the conference you will have complete lists of how the voting went and which options came out where.

Thank you.
[Applause.]

DR. CATH: At this time, I would like to call the two co-chairs. I will leave the decision up to you as to who will lead off. I guess it depends on which agency wants to have the last word.

But the two co-chairs will wrap it up for you today.

MR. JOHNSON: It is with heartfelt thanks I wanted to thank all of you for participating in our Forum, for all the speakers, and for everyone, but particularly our commodity co-chairs and constraint co-chairs, planning committee, and a special thanks to particularly the EPA staff who helped make this possible. You must know that to try to put the ballots together from all the discussions yesterday, there were several people here until 4:30 in the morning. They did comment that some of you were coming back in at 4:30 in the morning, but at least they were working.

[Laughter.]

MR. JOHNSON: I would like to acknowledge a person especially. I was asked not to do it, but I couldn't help it. The individual is Therese Murtagh, who is director of my front office staff and who really is the one responsible for keeping things going over the many months and seeing that the assistance of ARI and SRA and all of you came together in a fine fashion.

Therese, would you stand up, please?

[Applause.]

MR. JOHNSON: She has done a wonderful job, and all of you have. I want to thank all of you.

Just to let you know in terms of numbers on the first day, we had over 500 participants. The room was only supposed to accommodate only about 400, so there was standing room only. We certainly appreciate that and it certainly is a reflection on the interests and the seriousness with which everyone was participating in this Forum.

I think it was clear that we received a great deal of support for promoting IPM. I think the other thing is that what has happened as a result of the efforts, the discussions, the constraints, the resolutions, and the voting that was done is that there are a number of compelling things that we, particularly as Government officials, I would say are compelled to do.

I think we are compelled to meet your expectations; to actively respond to what you have told us this week; to work with you to develop plans for both the immediate and future actions; to start projects to meet the objectives which you have set for us; but also to -- and we believe you are compelled to work with us -- in trying to achieve these goals.

As a first step, there are a number of specific activities which we are going to undertake. The first is compiling the results of the Forum. We do intend to publish proceedings of the Forum that will include all of the comments the speakers have made, but also a summary of the