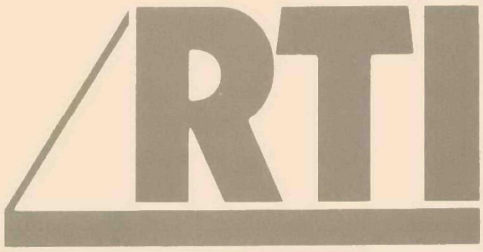

RESEARCH TRIANGLE INSTITUTE

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NATIONAL HOME AND GARDEN PESTICIDE USE SURVEY

FINAL REPORT

Executive Summary

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1. EXECUTIVE SUMMARY

1.1 Background

In March 1988, the EPA contracted Research Triangle Institute (RTI) to design the National Home and Garden Pesticide Use Survey (NHGPUS). After designing the survey and obtaining approval from the Office of Management and Budget (OMB), field data collection was conducted during August and September 1990. The study was designed as a national, probability-based sample of households with interviews conducted in person at the sample residences. Prior to the current survey, the last national survey of household pesticide use was conducted by the U.S. Environmental Protection Agency (EPA) in 1976-77.

The Agency's Office of Pesticide Programs (OPP) performs risk/benefit analyses for home and garden pesticide registrations that will be better informed using the survey data. Survey data on frequency of use and safety precautions will be used in risk assessments. Data on pests and sites treated and on consumer satisfaction will be used in benefit analyses. Information regarding child resistant packaging (CRP), disposal methods, and commercial pesticide treatments will help guide Agency policy in these areas.

1.2 Study Objectives and Target Population

The NHGPUS is a one-time, cross-sectional survey of the use of pesticides in and around homes in the United States. The dwellings in the target population are the housing units[1] in the 48 coterminous States and the District of Columbia that are occupied as primary residences,[2] excluding institutions, group quarters,[3] military reservations, and Indian Reservations. Questions regarding pesticide use in and around the home would not be well-defined for people living in institutions or group

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1 A housing unit, as defined by the U.S. Bureau of the Census, is a room or groups of rooms occupied or intended for occupancy as a separate living quarters in which the occupants (1) live and eat separately from any other persons in the building and (2) have direct access from the outside of the building or through a common hall.

2 A person's primary residence is defined as the home where the person lives for half the year or more.

3 A group quarters, as defined by the U.S. Bureau of the Census, is a housing unit occupied by 10 or more unrelated family units, counting sets of related people as family units.

quarters. Indian reservations and military reservations are excluded from the NHGPUS primarily because pesticide applications in these places are likely to be atypical of the remainder of the U.S. household population. The States of Alaska and Hawaii were excluded for the same reason and to control the costs of field data collection.

The following types of data were collected by the NHGPUS regarding use of pesticides by the households in the target population:[4]

1. which pesticides were used;
2. what they were used for;
3. how often they were used;
4. how they were applied, including safety precautions;
5. how unused portions were stored and/or disposed of;
6. how product containers were disposed of;
7. how child resistant packaging was used;
8. how effective the pesticides were judged to be; and
9. which pests were major problems (either treated or untreated).

Most data were collected for the 12-month reference period ending on the date of the interview. However, the data for specific pesticides were limited to those in storage at the residences at the time of the interview. Because pesticides tend to be used more in the summer than during the winter, data collection was performed late in the summer (August and September 1990) to temper the effects of these limitations.

The NHGPUS was not designed to collect quantitative usage data (i.e., estimates of aggregate quantities of pesticides actually used for a specific purpose over a period of time). However, the frequency of application data collected in the NHGPUS are helpful for preparing quantitative usage estimates because quantitative usage can be derived from frequency, extent, and rate of application. Moreover, the Agency has access to quantitative data from commercial subscriptions and from production reports submitted to EPA under the reporting requirements of Section 7 of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA).

1.3 Summary Description of the Sampling Design

The sampling design for the NHGPUS can be summarily described as a stratified, three-stage probability sampling design. The areas selected at

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[4] Pesticides that were used solely for crops or livestock grown for sale were excluded from consideration.

the first two stages of sampling were selected with probabilities proportional to estimates of the numbers of housing units currently in these areas. This strategy achieved approximately equal overall probabilities of selection with approximately equal interviewer assignments within each sample county.

Fifty-eight sample counties located in 29 different States were selected at the first stage of sampling. The locations of the 58 sample counties are shaded on a map of the United States in Figure 1.1. Approximately five subcounty areas defined by Census blocks and enumeration districts were selected at the second stage of sampling within each sample county for a total of 298 sampled subcounty areas, called sample segments. A list of current housing units was then prepared for each segment, from which the third-stage sample of housing units was selected.

A sample of 2,674 housing units was selected, of which 2,447 housing units were eligible for the NHGPUS (i.e., occupied primary residences). Of these 2,447 eligible households, 2,078 participated in the survey for a response rate of 84.9 percent (2,078/2,447). Because of the high response rate, the potential for nonresponse bias affecting the survey statistics is low.

The NHGPUS was designed to provide defensible national inferences, not regional inferences. Regional inferences would require a much larger sample. A sample of approximately 30 or more counties per region would be necessary. Because the NHGPUS is based on a sample of 60 counties, no more than limited inferences for two regions that each contain approximately 30 counties are supported. Limited regional analyses were performed by combining the Northeast and North Central Census Regions and comparing them to the combined South and West Regions.

1.4 Overview of Results

1.4.1 Population Characteristics

The estimated breakdown of the NHGPUS target population by selected household characteristics is presented in Table 1.1. The statistics presented in Table 1.1 are relative frequencies of occurrence for urban versus rural households,[5] single- versus multi-family households, and

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[5] based on interviewer observation.

Figure 1. NHGPUS Sample Counties

Table 1.1 Selected Characteristics of Households in the Target Population

Population Characteristic	Estimated Thousands of Households	Estimated Percentage of All Households
All Households	84,573	100.00
Urbanization[a]		
Urban	70,468	83.32
Rural	14,105	16.68
Type of Dwelling		
Single-Family	63,335	74.89
Multi-Family	21,237	25.11
Have private lawn		
Yes	66,828	79.02
No	17,744	20.98
Have private swimming pool		
Yes	5,978	7.07
No	78,595	92.93
Have hot tub		
Yes	2,500	2.96
No	82,073	97.04
Grew edible fruit/nut trees or grape vines[b]		
Yes	18,421	21.78
No	66,151	78.22
Grew tomatoes, vegetables, berries, or melons in past year[b]		
Yes	23,180	27.41
No	61,392	72.59
Grew roses in the past year[b]		
Yes	27,150	32.10
No	57,423	67.90

[a]The interviewers were instructed to classify each residence as located in either an urban area or a rural area in their best judgement so that homes in suburban neighborhoods located adjacent to rural farmland would be coded as urban, while farm homes would be coded as rural.

[b]Excluding any grown for sale.

potential pesticide application sites, such as lawns, swimming pools, fruit trees, vegetable gardens, and roses.

1.4.2 Storage of Pesticide Products

One task of the NHGPUS data collection was to construct an inventory of all the pesticide products in storage at each sample residence, excluding plant growth regulators, pool chemicals, anti-fouling paints, and products used exclusively for agricultural production. The types of pesticide products inventoried include disinfectants, fungicides, insecticides, molluscicides, rodenticides, herbicides, and repellents. The total number of pesticide products identified and inventoried in storage at the 2,078 participating residences was 7,945. The estimated total number of pesticide products in storage at residences in the target population at the time of the NHGPUS survey (August and September 1990) is approximately 324,538,000 with a standard error of 22,213,000. Thus, a 95 percent confidence interval estimate of the number of pesticide products in storage at residences in the target population at that time is 280,102,000 to 368,954,000. Likewise, a 95 percent confidence interval estimate of the mean number of products that were in storage at residences in the target population is 3.34 to 4.34, or 3.84 ± 0.50.

The estimated distribution of the number of products in storage at residences in the target population at the time of the survey (August and September 1990) is shown in Table 1.2 for single-family and multi-family residences.[6] The estimated percentage of residences that had at least one pesticide product in storage is 90 percent for single-family residences, which is significantly greater than the estimated 70 percent for multi-family residences. About 85 percent of all households had at least one pesticide product in storage at the time of the survey. Most households (about 63 percent) had one to five products in storage. About 22 percent had more than five products in storage.

The estimated number of products in storage at the time of the survey is presented for each type of pesticide product in Table 1.3 by when the product was last used. About 5 to 10 percent of each type of pesticide product (disinfectants through repellents) that was found in storage had not been used yet. With the exception of disinfectants, about 15 to 30

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6 A product found at more than one residence is counted once for each residence.

Table 1.2 Household Distribution of the Number of Products in Storage by Type of Dwelling

Number of Products	Single-Family		Multi-Family		TOTAL	
	Estimated Thousands of HH	Estimated Percentage of HH	Estimated Thousands of HH	Estimated Percentage of HH	Estimated Thousands of HH	Estimated Percentage of HH
TOTAL	63,335	100.00	21,237	100.00	84,574	100.00
0	6,364	10.05	6,454	30.38	12,818	15.16
1-5	39,613	62.55	13,765	64.80	53,378	63.12
6-10	11,148	17.60	700	3.29	11,848	14.01
>10	6,207	9.80	323	1.52	6,530	7.72

Abbreviations: HH = Households.

Table 1.3 Number of Products in Storage by Type of Pesticide and When Last Used[a]

Type of Pesticide	Not Used Yet		Used in Past Year		Used Over 1 Year Ago		TOTAL	
	Estimated Thousands of Prod.[b]	Estimated Percentage of Prod.	Estimated Thousands of Prod.[b]	Estimated Percentage of Prod.	Estimated Thousands of Prod.[b]	Estimated Percentage of Prod.	Estimated Thousands of Prod.[c]	Estimated Percentage of Prod.
ALL TYPES OF PESTICIDES	23,153	7.13	227,767	70.18	73,619	22.68	324,538	100.00
Disinfectant	3,515	4.55	69,898	90.40	3,907	5.05	76,888	100.00
Fungicide	3,144	4.60	54,024	79.00	11,216	16.40	68,190	100.00
Insecticide	14,301	8.09	114,556	64.82	47,864	27.08	176,454	100.00
Molluscicide	250	4.42	3,995	70.69	1,407	24.89	5,551	100.00
Rodenticide	328	7.01	3,499	74.73	855	18.25	4,829	100.00
Herbicide	3,255	9.90	19,447	59.12	10,191	30.98	32,984	100.00
Repellent	1,838	5.78	21,357	67.19	8,592	27.03	32,260	100.00

Abbreviations: Prod. = Products.

[a]For pesticide products (excluding those used exclusively for agricultural production, plant growth regulators, pool chemicals, and anti-fouling paints) in storage at residences in the target population at the time of the survey (Aug-Sept 1990).

[b]An individual pesticide product can be of more than one type (e.g., insecticide and fungicide). Therefore, the estimates for the individual types of pesticides sum to more than the total for all types of pesticides within a column.

[c]The estimated totals are not identical to the sum of the columns. The totals were estimated separately and are more reliable than the sum of the columns.

percent of the pesticide products of each type had last been used over a year ago. Only about 5 percent of the disinfectants in storage had last been used over a year ago.

Table 1.4 presents the estimated distribution of the number of pesticide products in storage at the time of the survey by size of container and length of time in storage. The length of time in storage was found to decrease with increasing size of container. This pattern of storage was observed consistently for all types of pesticide product containers except bait boxes, which are seldom found in large containers.

Most pesticide products have labels that ask the users to keep the products out of the reach of children. Products found in storage at sample residences were classified as being stored "securely" if they were:

1. stored in a locked or childproof room or cabinet, or
2. stored more than 4 feet off the floor (i.e., out-of-reach for small children).

Otherwise, when the products were:

1. stored no more than 4 feet off the floor, and
2. not stored in a locked or childproof room or cabinet,

they were classified as being stored "insecurely." Tables 1.5 and 1.6 present estimates of the conditional percentages of households that had each type of pesticide stored "insecurely," given that the household had at least one product of the given type in storage. Table 1.5 presents the results for households with children under 5 years of age (a cut-off for regulations regarding CRP), and Table 1.6 presents the results for all other households.

Table 1.6 shows that approximately 75 percent of households that had no children under 5 years of age and had pesticides in storage had at least one stored "insecurely." The corresponding estimate from Table 1.5 for households <u>with</u> children under 5 years of age is about 47 percent, which is significantly less. For each type of pesticide, except rodenticides, the estimated percentage of households with the pesticide in storage that had at least one stored "insecurely" is <u>less</u> for households with children under 5 years of age. For rodenticides, there is no significant difference because of the small numbers of rodenticide products in storage. Therefore, the overall impression is that households with small children

Table 1.4 Percentage of Products in Storage by Size of Container and Time in Storage[a]

Size of Container[b]	Months in Storage				TOTAL
	<6	6-12	13-24	>24	
	Estimated Percentage of Products				
All Sizes of Containers	42.58	19.74	14.95	22.74	100.00
≤ 4 Ounces	40.65	18.82	12.62	27.90	100.00
4 < Ounces ≤ 8	32.95	20.25	15.04	31.77	100.00
8 < Ounces ≤ 16	37.93	20.72	16.92	24.44	100.00
16 < Ounces ≤ 32	47.61	19.14	15.18	18.07	100.00
32 < Ounces ≤ 128	58.19	16.75	9.73	15.32	100.00
> 128 Ounces	55.66	20.05	12.47	11.82	100.00

[a] For pesticide products (excluding those used exclusively for agricultural production, plant growth regulators, pool chemicals, and anti-fouling paints) in storage at residences in the target population at the time of the survey (Aug-Sept 1990).

[b] The number of ounces can be considered either ounces by weight (avoirdupois ounces) or ounces by volume (fluid ounces) assuming an equivalency rate of 8 pounds per gallon.

Table 1.5 Number of Households with at least One Pesticide Product Stored Insecurely by Type of Pesticide for Households with Children under 5 Years of Age[a]

Type of Pesticide	At least One Stored Insecurely		None Stored Insecurely		TOTAL	
	Estimated Thousands of HH	Estimated Percentage[b] of HH	Estimated Thousands of HH	Estimated Percentage[b] of HH	Estimated Thousands of HH	Estimated Percentage[b] of HH
All types of Pesticides	6,078[c]	46.88	6,887[c]	53.12	12,965[c]	100.00
Disinfectant	3,481	41.61	4,885	58.39	8,366	100.00
Fungicide	2,831	38.12	4,594	61.88	7,425	100.00
Insecticide	3,749	36.04	6,655	63.96	10,404	100.00
Molluscicide	43[d]	6.45[d]	617	93.55	660	100.00
Rodenticide	319[d]	40.65	466	59.35	786	100.00
Herbicide	617	21.18	2,295	78.82	2,912	100.00
Repellent	1,261	24.30	3,928	75.70	5,189	100.00

Abbreviations: HH = Households.

[a]For pesticide products (excluding those used exclusively for agricultural production, plant growth regulators, pool chemicals, and anti-fouling paints) in storage at residences in the target population at the time of the survey (Aug-Sept 1990).

[b]Conditional percentage, given that at least one product of the designated type was in storage.

[c]An individual pesticide product can be of more than one type (e.g., insecticide and fungicide). Therefore, the estimates for the individual types of pesticides sum to more than the total for all types of pesticides.

[d]Estimate has poor precision because of the small number of observations in this cell.

Table 1.6 Number of Households with at least One Pesticide Product Stored Insecurely by Type of Pesticide for Households with No Children under 5 Years of Age[a]

Type of Pesticide	At least One Stored Insecurely		None Stored Insecurely		TOTAL	
	Estimated Thousands of HH	Estimated Percentage[b] of HH	Estimated Thousands of HH	Estimated Percentage[b] of HH	Estimated Thousands of HH	Estimated Percentage[b] of HH
All types of Pesticides	43,909[c]	74.69	14,881[c]	25.31	58,790[c]	100.00
Disinfectant	26,149	77.35	7,658	22.65	33,806	100.00
Fungicide	21,461	67.55	10,310	32.45	31,771	100.00
Insecticide	28,934	61.57	18,062	38.43	46,996	100.00
Molluscicide	1,427	34.89	2,663	65.11	4,090	100.00
Rodenticide	791	21.20	2,942	78.80	3,734	100.00
Herbicide	5,006	34.77	9,390	65.23	14,396	100.00
Repellent	8,462	48.10	9,130	51.90	17,591	100.00

Abbreviations: HH = Households.

[a]For pesticide products (excluding those used exclusively for agricultural production, plant growth regulators, pool chemicals, and anti-fouling paints) in storage at residences in the target population at the time of the survey (Aug-Sept 1990).

[b]Conditional percentage, given that at least one product of the designated type was in storage.

[c]An individual pesticide product can be of more than one type (e.g., insecticide and fungicide). Therefore, the estimates for the individual types of pesticides sum to more than the total for all types of pesticides.

are less likely to have pesticide products stored within their reach. Of course, children can be exposed to pesticides at homes other than their own (e.g., at homes of friends or relatives).

1.4.3 Difficulty Opening Containers

The NHGPUS questionnaire asked if any of the users of pesticide products had difficulty opening the container. If so, the ages of the users who had difficulty opening the package were determined. Table 1.7 shows that approximately 10.5 percent of pesticide product users reported difficulty opening CRP pesticide containers, which was significantly greater than the estimated 1.5 percent for non-CRP pesticide containers.

The data suggest that the percentage of users aged 75 or older who have difficulty opening CRP pesticide containers (18 percent) is greater than the percentage for other age groups, but this difference is not statistically significant. The data also suggest that the percentage of users aged 75 or older (5 percent) who have difficulty opening non-CRP pesticide containers is greater than the percentage for other age groups, but again this difference is not statistically significant.

1.4.4 Disposal of Pesticides

Households participating in the NHGPUS were asked about their disposal, if any, of insecticides, herbicides, fungicides, or empty containers thereof during the past year. Table 1.8 shows that approximately 62 percent of households (about 52 million) disposed of at least one empty ready-to-use container of insecticide, fungicide, or herbicide in the past year, and that approximately 23 percent (about 19 million) disposed of an empty concentrate container. Much smaller percentages of households (under 10 percent) disposed of leftover insecticides, fungicides, or herbicides (concentrate, diluted, or ready-to-use).

Among the households that disposed of leftover concentrates of insecticide, fungicide, or herbicide in the past year, approximately 13 percent took the leftover chemicals to special collection sites and 67 percent disposed of the concentrates in their regular household trash. For disposing of empty containers (either for concentrated or ready-to-use products), only about 2 to 3 percent of households took them to a special collection site. However, because many more households disposed of empty containers than disposed of leftover pesticides, the overall percentage of

Table 1.7 Difficulty in Opening Child Resistant Packaging by Age of Household User[a]

Age Group	Products in CRP Containers		Products in non-CRP Containers		All Products	
	Estimated Thousands of Users	Estimated Percentage of Users[b]	Estimated Thousands of Users	Estimated Percentage of Users[c]	Estimated Thousands of Users	Estimated Percentage of Users[d]
All Ages	5,478[e]	10.48	3,768[e]	1.68	9,246[e]	3.34
18-44	2,722	11.04	1,515	1.32	4,237	3.03
45-59	1,206	8.74	742	1.63	1,949	3.28
60-74	905	8.95	843	2.44	1,749	3.92
75 or Older	391	18.02	582	4.97	974	7.01

[a]For pesticide products (excluding these used exclusively for agricultural production, plant growth regulators, pool chemicals, and anti-fouling paints) in storage at residences in the target population at the time of the survey (Aug-Sept 1990) that were used in the past year.

[b]Percentage of users of pesticide products in CRP containers who have difficulty opening the container.

[c]Percentage of users of pesticide products in non-CRP containers who have difficulty opening the container.

[d]Percentage of users of pesticide products who have difficulty opening the container (either CRP or non-CRP).

[e]The total across all age groups includes some users under 18 years of age and, hence, exceeds the sum of the other rows.

Table 1.8 Percentage of Households Using Specified Disposal Methods in the Past Year for Insecticides, Herbicides, or Fungicides

Type of Item Disposed	Households Disposing of Pesticides		Disposal Method Used			
	Estimated Thousands of HH	Estimated Percentage of All HH	Regular Trash	Special Home Collection	Special Collection Site	Other Disposal Methods
			Estimated Percentage of HH[a]			
Concentrated Pesticide	1,458	1.72	66.53	2.69[b]	12.96	20.51
Diluted from Concentrate	3,194	3.78	28.83	-[c]	2.47[b]	68.69
Ready-to-Use Product	6,414	7.58	86.36	1.29[b]	6.16	6.88
Empty Concentrate Container	19,240	22.75	91.90	2.95	2.91	3.58
Empty Ready-to-Use Container	52,368	61.92	95.15	1.46	2.36	2.33

Abbreviations: HH = Households.

[a]Conditional percentages, given disposal. Percentages may add to more than 100 percent because a household may have used multiple disposal methods in the past year.

[b]Estimate has poor precision because of the small number of observations in this cell.

[c]None observed in the survey.

households that took empty pesticide containers to special collection sites, about 1 percent, was greater than the percentage of households that took leftover pesticides, less than 0.5 percent, to those sites.

In response to a separate, but related question, the survey also determined that about 6 percent of all households in the survey population had pesticides in storage at the time of the survey (August and September 1990) that they had not disposed of because they did not know how to do so safely. Many households have products in storage for registrations that have been cancelled by the Agency. For example, approximately one million households (1.4 percent) still have products containing chlordane; about 150,000 (0.2 percent) have products containing DDT; around 70,000 (0.1 percent) have heptachlor; and about 85,000 (0.1 percent) have silvex.

1.4.5 Severity of Pest Problems

Each household that participated in the NHGPUS was asked to identify: (a) all types of pests that had been treated by a household member in the past year; and (b) all types of pests that had been a major problem (in the respondent's opinion) in the past year, whether or not the pest had been treated. Table 1.9 presents the estimated percentage of households that had a major problem with each pest in the past year and the estimated percentage of households that treated each type of pest. In addition, the four sites of application that were reported most frequently (for household treatment) are presented for each pest.

The two types of pests most frequently reported to be a major problem are household nuisance pests, ants, and cockroaches. The next two pests most frequently reported to be a major problem are pests that directly attack people and pets, namely mosquitoes and fleas. The estimated percentage of households that had a major problem with fire ants in the past year, about 6 percent, is quite high considering that fire ants only inhabit certain regions of the U.S. Pests that inhibit the growth of ornamental plants, gardens, and lawns (plant-sucking and -chewing insects plus related pests and weeds) were less frequently reported to be a major problem.

The pest category treated by the highest percentage of households, nearly 50 percent, is "mildew, mold, bacteria, or virus," even though this

Table 1.9 Households Reporting Major Pest Problems or Problems Treated by a Household Member

Pest Problem	Households Reporting Major Problem		Households Reporting Treated Problem		Most Frequently Treated Sites[a] (in order of treatment frequency)
	Estimated Thousands of HH	Estimated Percentage of All HH	Estimated Thousands of HH	Estimated Percentage of All HH	
MICROORGANISMS					
Mildew, Mold, Bacteria, Virus	2,486	2.94	40,361	47.72	Bathroom; Kitchen; Living area; Fabric
Plant Diseases	1,826	2.16	8,356	9.88	Roses; Ornamentals[c]; Lawn; Garden[d]
INSECTS AND RELATED PESTS					
Ants[b]	10,830	12.81	30,443	36.00	Kitchen; OOA[e]; Bathroom; OIA[f]
Mosquitoes	6,884	8.14	24,056	28.44	Person; OOA[e]; Living area; Kitchen
Cockroaches	8,320	9.84	20,687	24.46	Kitchen; Bathroom; Living area; OIA[f]
Fleas	6,482	7.66	20,107	23.77	Cat, dog or kennel; Living area; Kitchen; Bathroom
Flies, Gnats, Midges	4,961	5.87	17,448	20.63	Person; Kitchen; OOA[e]; Living area
Bees, Hornets, Wasps	4,995	5.91	15,611	18.46	OOA[e]; OIA[f]; Detached structures; Living area
Spiders, Crickets, Pillbugs, Milli/Centipedes	5,105	6.04	13,177	15.58	OOA[e]; OIA[f]; Kitchen; Living area
Plant-Chewing Insects	3,468	4.10	11,858	14.02	Ornamentals[c]; Garden[d]; Roses; Lawn
Plant-Sucking Insects and Mites	2,994	3.54	11,730	13.87	Ornamentals[c]; Roses; Garden[d]; Lawn
Ticks, Chiggers	1,659	1.96	9,542	11.28	Cat, dog or kennel; Person; Lawn; OOA[e]
Fire Ants	4,966	5.87	7,907	9.35	Lawn; OOA[e]; Kitchen; OIA[f]
Mice, Rats	2,571	3.04	7,388	8.74	Kitchen; OIA[f]; Bathroom; Living area
Slugs, Snails	2,076	2.45	5,100	6.03	Ornamentals[c]; Lawn; OOA[e]; Garden[d]

(continued)

Table 1.9 Households Reporting Major Pest Problems or Problems Treated by a Household Member (cont.)

Pest Problem	Households Reporting Major Problem		Households Reporting Treated Problem		Most Frequently Treated Sites[a] (in order of treatment frequency)
	Estimated Thousands of HH	Estimated Percentage of All HH	Estimated Thousands of HH	Estimated Percentage of All HH	
PLANTS					
Broadleaf Weeds	3,692	4.37	12,345	14.60	Lawn; OOA[e]; Ornamentals[c]; Garden[d]
Grass-Like Weeds	3,158	3.73	11,707	13.84	Lawn; OOA[e]; Ornamentals[c]; Roses

Abbreviations: HH = Households.

[a]"Treated" or "not treated" refers to treatment by a household member; thus, pests treated only by a pest control service are reported as "not treated" in this table.

[b]Excluding fire ants, carpenter ants, and termites.

[c]Roses are the only ornamental identified separately.

[d]Food crops such as tomatoes and vegetables (excluding fruit or nut trees and grapes).

[e]Other Outside Area (such as walls, driveway, patio, deck, fences, or roof, including air treated by fogging).

[f]Other Inside Area (such as attached garage, attic, basement, crawlspace, attached utility room or workshop, etc.).

pest was not often reported to be a major problem.[7] The top five insect pests in terms of the estimated percentage of households treating the pest in the past year are: ants; mosquitoes; cockroaches; fleas; and flies, gnats, or midges. The sites most frequently treated for these pests were kitchen, person, or pet. For other pests, other outside areas, including lawns and ornamental plants, were often reported as the sites treated.

1.4.6 Consumer Satisfaction

For each pesticide product in storage that had been used in the past year, the NHGPUS questionnaire determined if the household users were satisfied with its effectiveness. For each pest, Table 1.10 presents the number of pesticide products for which the household was not satisfied with the effectiveness of the product as a percentage of all products used to treat the pest. The percentage of products with which the household was not satisfied was significantly greater than the overall average of 8 percent for two pests:

1. mammals other than mice, rats, or bats (36 percent) and
2. fleas (14.5 percent).

The "other mammals" category includes squirrels, moles, skunks, prairie dogs, woodchucks, and rabbits, plus cats and dogs for repellent products. Other pests for which elevated levels of dissatisfaction with the pesticide products were recorded include:

1. mice or rats (14.5 percent),
2. broadleaf weeds (13 percent),
3. grass-like weeds (11.5 percent),
4. ticks or chiggers (11 percent), and
5. soil-dwelling insects or nematodes (11 percent).

Household dissatisfaction with pesticide products could be the result of poor product efficacy or a number of other factors, including improper applications, not treating as frequently or extensively as recommended, or poor sanitation.

1.4.7 Use of Pest Control Services

Each household that participated in the NHGPUS was asked about their use of a commercial lawn care company or a pest control service for

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7 Some household cleaning products that are labeled for treating these pests were reportedly used "just for cleaning" and are not included in this estimate.

Table 1.10 Number of Pesticide Products for Which Households Were Not Satisfied with Their Performance by Type of Pest Treated[a]

Pest Treated	Estimated Thousands of Products Not Efficacious	Estimated Percentage of Products Not Efficaceous[b]
All Pests	25,033	8.17
Plant Diseases	593	8.99
Cockroaches	1,550	7.96
Fire Ants	579	8.67
Other Ants	2,425	8.21
Bees, Hornets, Wasps	913	7.77
Mosquitoes	1,586	7.41
Flies, Gnats, Midges	1,603	9.13
Fleas	3,453	14.51
Ticks, Chiggers	1,289	11.09
Spiders, Crickets, Pillbugs, Millipedes, Centipedes	986	8.27
Soil-Dwelling Insects, Nematodes	395	10.73
Plant-Chewing Insects	1,032	7.59
Plant-Sucking Insects and Mites	1,082	7.70
Grass-Like Weeds	1,213	11.52
Broadleaf Weeds	1,654	13.21
Mice, Rats	384[c]	14.62[c]
Other Mammals[d]	426	35.59

[a]For pesticide products (excluding those used exclusively for agricultural production, plant growth regulators, pool chemicals, and anti-fouling paints) in storage at residences in the target population at the time of the survey (Aug-Sept 1990) that were used in the past year. Moreover, this analysis assumes that the product satisfaction reported in response to Question 32 is applicable to all the pests reported in response to Question 28a.

[b]Conditional percentage of products used to treat the pest specified.

[c]Estimate has poor precision because of the small number of observations in this cell.

[d]Such as squirrels, moles, skunks, prairie dogs, woodchucks, and rabbits, plus cats and dogs for repellent products.

treatment of fleas, roaches, or ants in the home. About 15 percent of the 66.8 million households that have a private lawn (about 10 million households) had pesticides applied in the past year by someone other than a member of the household, usually by a commercial lawn care company. Also, about 20 percent of all households (about 16 million) had their homes commercially treated for indoor pests, such as cockroaches, ants, or fleas.

Estimates of the percentages of the households utilizing these services that received written notification of the chemicals used and safety precautions to be taken are presented in Table 1.11. The estimates indicate that the proportion of households receiving written notification is higher for commercial lawn-care companies than for pest control companies.

Table 1.11 Number of Households That Used Pest Control Services and Received Written Precautions in the Past Year

TYPE OF SERVICE Utilization Written Precautions	Estimated Thousands of Households	Estimated Percentage of Households
COMMERCIAL LAWN-CARE COMPANY[a]		
Utilized	8,003	12.07
Informed of Chemicals Used[c]	3,626	49.51
Informed of Safety Precautions[c]	3,746	50.42
TREATMENT FOR FLEAS, ROACHES, ANTS[b]		
Utilized	16,557	19.58
Informed of Chemicals Used[c]	3,637	23.46
Informed of Safety Precautions[c]	3,216	20.67

[a]The inference population for lawn care services is the population of all households with a private lawn.

[b]The inference population for treatment of fleas, roaches, or ants is the population of all private households.

[c]Conditional percentages, given that the service was used.