DEFIANCE COUNTY

LOST CREEK DEMONSTRATION PROJECT

1982 DEMONSTRATION REPORT

DEFIANCE SOIL & WATER
CONSERVATION DISTRICT

UNITED STATES ENVIRONMENTAL
PROTECTION AGENCY

Defiance Soil and Water Conservation Dist

R R. 2, BOX 11, 66 NORTH DEFIANCE, OHIO 43512 PHONE 782-8751

To Defiance SWCD Landowners:

We are pleased to present you with the results of the 1982 Conservation Tillage Demonstration Project. The information is the results of the tillage plots on farms throughout the county and represents our second year of comprehensive tillage demonstrations. The District has been involved in limited tillage demonstrations since 1978. The farmers who participated in the project need to be commended for the time and effort they contributed to the project. Without their assistance and interest, this program would not have been possible.

Conservation tillage is a fairly new practice in this area and up until a few years ago it was not thought of as a viable practice because of our soils. Recent refinement of no-till planters and the introduction of ridge planting has opened a new frontier for conservation tillage on poorly drained soils as well as on the better drained soils.

The Defiance SWCD realizes there is a long way to go in this area of conservation. We have many problems to overcome to make conservation tillage a widely accepted practice. The funds provided by the U. S. EPA grant will aid us a great deal in solving these problems. But, all the money in the world will not get this practice adopted without the cooperation and dedication of farmers in Defiance County.

After reviewing this publication, we hope you will want to try a test on your farm.

Sincerely,

Donald R. Rethmel

Donald R. Rethmel, Chairman
Defiance SWCD

DEFIANCE COUNTY - LOST CREEK DEMONSTRATION PROJECT

1982 DEMONSTRATION REPORT

PROJECT REPORT FOR
GRANT S005553 01

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION V, GREAT LAKES NATIONAL PROGRAM OFFICE
CHICAGO, ILLINOIS

BY

THE DEFIANCE SOIL AND WATER CONSERVATION DISTRICT
DEFIANCE COUNTY, OHIO

COOPERATING AGENCIES:

COOPERATIVE EXTENSION SERVICE
HEIDELBERG COLLEGE
OHIO STATE UNIVERSITY
UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL STABILIZATION AND CONSERVATION SERVICE
SOIL CONSERVATION SERVICE

FEBRUARY 1983

DEFIANCE SWCD BOARD OF SUPERVISORS

Robert Heisler, Chairman

Brian Rohrs, Vice-Chairman

Albert Schroeder, Secretary-Treasurer

Greg Garmyn, Board Member

Don Rethmel, Board Member

PROJECT STAFF

Robert Rettig, Project Administrator, SWCD

Dennis Flanagan, Assistant County Agent, CES

Thanks to Tammy Groll and Miriam Hoshock
for typing this report.

DISCLAIMER: While Trade names of some products have been used, no endorsement is intended, nor is criticism implied of similar products not mentioned.

TABLE OF CONTENTS

Cover Photos: Top - No-till on ridges may help solve some of the drainage and erosion problems of the flat, poorly drained, clay soils in Defiance County. Here, the Project's International Harvester is planting no-till soybeans on old corn ridges. Bottom - Dr. David Baker, of the Water Quality Lab at Heidelberg College, explains the stream structure and water sampling devices during a Watershed meeting on August 11.

DEFIANCE COUNTY - LOST CREEK DEMONSTRATION PROJECT

INTRODUCTION

1982 was the second year for the Defiance County Lost Creek Demonstration Project. Started in the fall of 1980, the Project addresses the problem of sediment and phosphorus pollution of the Maumee River and Lake Erie. The major objectives of the program are to demonstrate and monitor various soil conservation practices, especially conservation tillage, on a wide range of soil types throughout Defiance County.

The United States Environmental Protection Agency provides major funds for the Project. Cooperating agencies include the Defiance Soil and Water Conservation District, the Soil Conservation Service, the Cooperative Extension Service, The Ohio State University, Heidelberg College, and the Agricultural Stabilization and Conservation Service.

During the first year of the Project (1981), 18 farms cooperated, planting 43 tillage demonstration plots. Most of these fields were planted late and did not have comparison check strips due to an extremely wet planting season. Specific information on 1981 plots and yields can be found in the 1981 Demonstration Report.

The Project greatly expanded in 1982, largely due to greater interest in the county, and better weather. 59 farms cooperated, with over 2,000 acres included in some type of demonstration. There were 58 fields of no-till corn (948 acres), 23 fields of no-till soybeans (220 acres), 23 fields of ridged corn or soybeans (505 acres), and 20 fields which used the disk-chisel plow as their primary tillage (410 acres).

More equipment was also available in 1982, consisting of 4 no-till planters, 1 no-till drill, a disk-ridger, a ridging cultivator, and a disk-chisel plow. The planters were a John Deere Max-Emerge, Hiniker Econ-O-Till, International Harvester Early Riser, and White Seed Boss. All planters were set for six 30 inch rows. The International and Hiniker came equipped with a tractor. The White planter was purchased with an add-on 5 row splitter, to allow planting of 15" narrow row soybeans.

The CrustBuster no-till drill was available through a cooperative effort with CrustBuster Inc. and Chevron Chemical Company. The drill was set for 22 eight inch rows, and equipped with 1 inch fluted coulters.

This report contains information on the demonstrations carried out in 1982. There are also sections on water quality monitoring, economic comparisons, ridge tillage, no-till management, and nitrogen management.

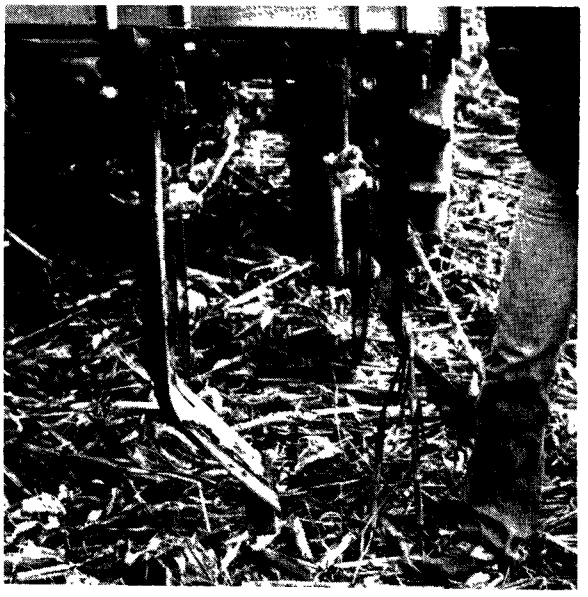
Equipment for 1983 will consist of the same planters, an improved no-till drill, the same ridging equipment and disk-chisel plow. In addition, a heavier ridging cultivator will also be available.

Farmers interested in participating in the Project are urged to contact the Defiance Soil and Water Conservation District.

NEW DEMONSTRATIONS

Some new demonstrations began in the fall of 1982. These were the Paraplow, no-till wheat, and shallow tile. The Paraplow is a new tillage tool designed to lift and crack the subsoil, improving internal drainage while not disturbing the soil surface. Originally developed in England, the implement is being tested in the United States for possible marketing by the Howard Rotavator Company. The Paraplow used in Defiance County had four legs that extended at 45 degree angles to a depth of 14 inches in the soil. The first version used had problems with clogging of heavy residue where the leg entered the soil. An improved version later in the fall seemed to have remedied this problem. (see photos)

The Paraplow lifts and loosens the subsoil, while leaving the surface undisturbed.



These legs on the Paraplow bend at 45° angles and extend 14" under the soil.

The theory is that through the use of the Paraplow, no-till will be more successful on compacted, poorly drained soils. Each of the 7 fields where the tool was used in Defiance County will have no-till on sections with and without the Paraplow, and yield checks should show any benefit.

The CrustBuster no-till drill provided an opportunity for several farmers to experiment with no-till wheat planted in soybean stubble. Seven farms planted no-till wheat. With the dry fall, the no-till wheat emerged more rapidly and had more consistent stands due to the conservation of soil moisture.

Here Roger Grandey is using the CrustBuster drill to plant no-till wheat.

A third new demonstration to be installed in the fall of 1982 was a series of shallow tile systems on Paulding Clay soils. Plans were drawn and a contractor planned to install the tile in November. However, heavy rainfall in November and December prevented installation. Whenever soil conditions permit, the tile will be laid.

Basically, the shallow tile systems will be placed at a depth of about 18 inches and at two spacing widths: 15 feet and 30 feet. There will also be an untiled section in the same fields. The Project plans to test the effectiveness of shallow tile and how crop yields respond to different tillage practices in the 3 areas of the fields. (15 ft. spacing, 30 ft. spacing, and untiled)

EDUCATIONAL ACTIVITIES

Several educational activities were held in 1982 to allow everyone interested in no-till, ridge tillage, and water quality, a chance to learn more. In March, the first "Alternative Tillage Systems Meeting" was held. Several interesting speakers discussed no-till and ridge tillage, and Project Results for 1981 were presented to the 80 farmers attending.

Three afternoon tours in June covered demonstration fields in the Western, Central, and Eastern parts of Defiance County. A Watershed Meeting and Tour was held on August 11 in the Upper Lost Creek Watershed to explain the water quality monitoring aspects of the Project.

On September 1, a very successful Ridge and No-till Field Day was held. Approximately 150 farmers attended to hear speakers on ridge tillage and water quality, and watch 3 ridging tools, 3 no-till drills, and 6 no-till planters demonstrated. Excellent cooperation between the machinery dealers, farmer, local agribusiness, and the sponsoring agencies made the day a big success.

150 people attended a Ridge and No-till Field Day on September 1.

1982 GROWING SEASON

The planting season in 1982 was compressed into three excellent, dry weeks in late April through mid-May. Soil conditions were dry during this period, and all of the no-till equipment worked well. One problem with the dry weather was the low activity of residual herbicides. Many fields had to be cultivated and/or sprayed with a post-emergent herbicide to control escaped weeds. Overall, the planting season extended from April 24 to July 1.

Heavy rainfall in June and July did damage some soybean fields. August, September, and October were drier than normal. This drought decreased crop yields, and especially hurt late planted soybeans. The dry weather also caused an early harvest with dry grain of excellent quality.

Table 1 DEFIANCE COUNTY RAINFALL - 1982

	Hicksville	Ney	Defiance	County Average	Normal*
April	2.07	2.15	2.20	2.14	3.41
May	4.89	3.88	4.44	4.40	3.74
June	4.35	4.63	3.17	4.05	3.73
July	5.21	4.52	5.02	4.92	3.51
August	1.61	1.72	1.55	1.63	2.76
September	2.22	2.57	0.83	1.87	2.66
October	1.12	1.16	0.68	0.99	2.45
TOTAL	21.47	20.63	17.89	20.00	22.26

*Normal - Average precipitation for Northwest Ohio from 1941 - 70 from OARDC R.B. #1139.

WATER QUALITY MONITORING

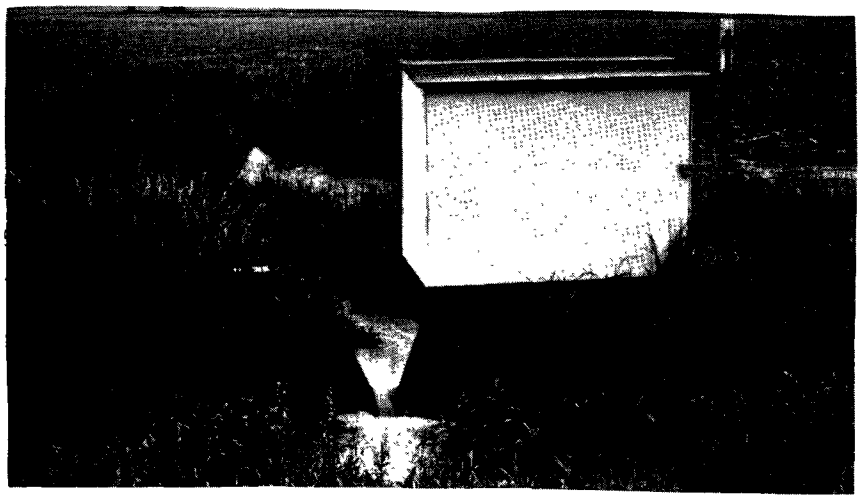
I. THE OHIO STATE UNIVERSITY

In 1982, flow, sediment, nitrate-nitrogen, ammonia-nitrogen, and dissolved inorganic phosphorus were measured on four watersheds in Defiance County. In addition, runoff flow was measured on an additional watershed, and flow, sediment and nutrients were measured in tile drainage on two of the watersheds. The soils studied included Paulding (3 sites), Roselms and Blount. Rainfall in 1982 was low and there was very little runoff or tile flow, especially in late spring and the summer months. No-till soybeans on the Blount soil gave lower erosion rates than in previous years when the soil was fall plowed.

Flow hydrographs from the two Paulding watersheds instrumented with flumes and water stage recorders showed that runoff was very rapid on these poorly drained soils and reached peak flow very soon after runoff began. Runoff continued at a lower rate, however, for several hours after rainfall stopped. This is attributed to the very low slope ($<2\%$) on these watersheds.

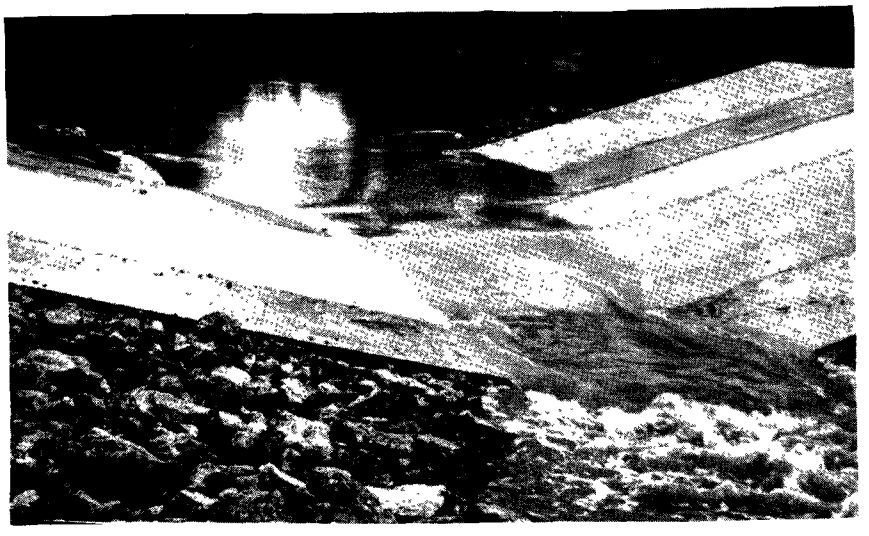
In a separate study, the decomposition rate of soybean residue in no-till fields was measured. Percent cover immediately after plant harvest was about 80-90%, and was still about 50-60% the following April. By May, the cover was about 40%, but this was reduced to 10% or less by the planting operation which buried much of the residue. The residue cover prior to planting protects the soil during the winter/early spring period when most of the runoff and soil loss occurs.

In the summer of 1983, the National Erosion Laboratory (Purdue University) will bring their rainfall simulator to Defiance County to measure erosion and phosphorus losses in runoff from Paulding soil with fall plowing and no-till ridges. This information will be used to predict the effectiveness of no-till ridges in reducing soil erosion.



This small plot monitor collects runoff samples every ½ hour during a storm event. These samples are analyzed for sediment and nutrients.

II. HEIDELBERG COLLEGE



This structure measures flow and collects water samples every 6 hours and every 1 hour during a storm event.

UPPER LOST CREEK RUN-OFF STUDIES

In northwestern Ohio, conservation tillage is an important part of water quality management plans for reducing phosphorus loading to Lake Erie. Through reducing soil erosion, conservation tillage should reduce both sediment and phosphorus transport in area streams and rivers. Although a variety of models allow estimation of the expected reductions in sediment and phosphorus transport that will accompany conservation tillage, all of these models involve considerable extrapolation from data obtained in plot and field studies. Actual documentation of reductions in sediment and phosphorus transport from large watersheds which have undergone substantial conversion to conservation tillage is lacking. The necessary data bases are being developed at several sites in northwestern Ohio to allow such documentation. Studies at these sites will also monitor possible adverse environmental effects of conservation tillage, such as increased nitrate and pesticide concentrations. A 2800 acre watershed in the Upper Lost Creek basin of Defiance County is one of these study sites. The progress of studies at this site are described below.

DISCHARGE MEASUREMENTS

A trapeziodal flume designed by the Agricultural Research Service was installed during the summer of 1981. Stage measurements are recorded at 15 minute intervals using an ISCO System 2500 level sensor and recording equipment. The stage data is transferred to magnetic tape at monthly intervals and stored in the Water Quality Laboratory computer at Heidelberg College. A rating curve for the flume was provided by the Agricultural Research Service and is used to calculate discharge. The stage monitoring system has worked very well except for the period from April 13 through June 20, 1982 when a malfunction of equipment caused a loss of stage data. Copies of the stage data for the 1982 water year have been provided to the Defiance Soil and Water Conservation District Office.

SAMPLING PROCEDURES

Water samples for nutrient and sediment analyses are collected at the gaging site using two ISCO Model 1680 water samplers. One sampler is used to collect samples at 6 hour intervals on a continuing basis. The second sampler is set to trigger on a rising stage and collect hourly samples for 28 hours. Project staff change sampler bases after runoff events so that hourly samples can be collected for multiple events during a single week. A printer is connected to the hourly sampler so that the time of sample collection is recorded for each bottle. During May and June of 1982, an ISCO Model 2100 Pesticide Sampler was used to collect two samples per day for pesticide analyses.

The automatic samplers have worked very well at this site. During periods of very low flow, the water level in the flume drops below the sampler intake line. During these low flow periods weekly samples are collected by the W.Q.L. staff who service the samplers. The low flow periods are not significant with respect to pollutant transport by the stream.

ANALYTICAL PROGRAM

The analytical program includes measurement of the following parameters: soluble reactive phosphorus, total phosphorus, nitrate plus nitrite, suspended solids, ammonia, conductivity, silica, chloride and total Kjeldahl nitrogen (TKN). Pesticide analyses are shown in Table 2. These same analyses are being conducted at 10 other river transport stations as part of a grant from the Great Lakes National Program Office of the U.S. EPA.

RESULTS

During the 1982 water year, which extends from October 1, 1981 to September 30, 1982, most of the material transport from the watershed took place during the March through July period. The results of the sampling program during this time are shown in Figure 1. The time base for the plots is days of the water year, where day 1 is October 1, 1981 and day 365 is September 30, 1982. The plots run from February 27 (day 150) to July 28 (day 300).

During the winter of 1982 considerable snow accumulated. A large snowmelt runoff event occurred in March during days 160 to 175. The snowmelt water contained relatively low concentrations of total phosphorus, suspended solids, dissolved solids (conductivity), nitrates plus nitrite and TKN.

During the period from March 29 (day 180) through July 28 (day 300), runoff events were accompanied by very high concentrations of suspended sediments, total phosphorus and TKN. High nitrates did not appear until runoff events in late May and June.

In comparison with studies at larger watersheds, such as Honey Creek at Melmore, the concentrations of suspended solids in runoff from the study watershed were much higher. Several storms had sediment concentrations which exceeded 3000 mg/l. These are the highest sediment concentrations we have observed in any of our transport stations. The concentrations of total phosphorus were also extremely high during runoff events. The frequency of runoff events with high sediment and phosphorus concentrations was greater for the study watershed than at other gaging stations.

In contrast with sediment, the nitrate concentrations were similar to those observed from other watersheds. Nitrate concentrations had peak values of about 23 mg/l as nitrogen.

Concentrations of atrazine and alachlor (Lasso) in runoff water are shown in Figures 2 and 3. These chemicals also showed peak concentrations in May and June. The peak concentration of pesticides monitored at all of the 1982 sampling stations is shown in Table 2. The sampling program for pesticides only involved two samples per day during runoff events. This frequency of sampling would probably not reveal the peak pesticide concentrations at the study site. Efforts to increase the sampling frequency during the initial storms following planting will be made in 1983.

In summary, the sampling program for the 1982 water year provides a good start toward characterizing runoff from the study watershed. Further analyses of the existing data plus the sampling program for 1983 and 1984 should contribute significantly to our understanding of pollutant runoff from the morainal areas of the Maumee Basin. Furthermore, the data base at this site should be very helpful in assessing the benefits of conservation tillage in reducing sediment and phosphorus export from agricultural lands.

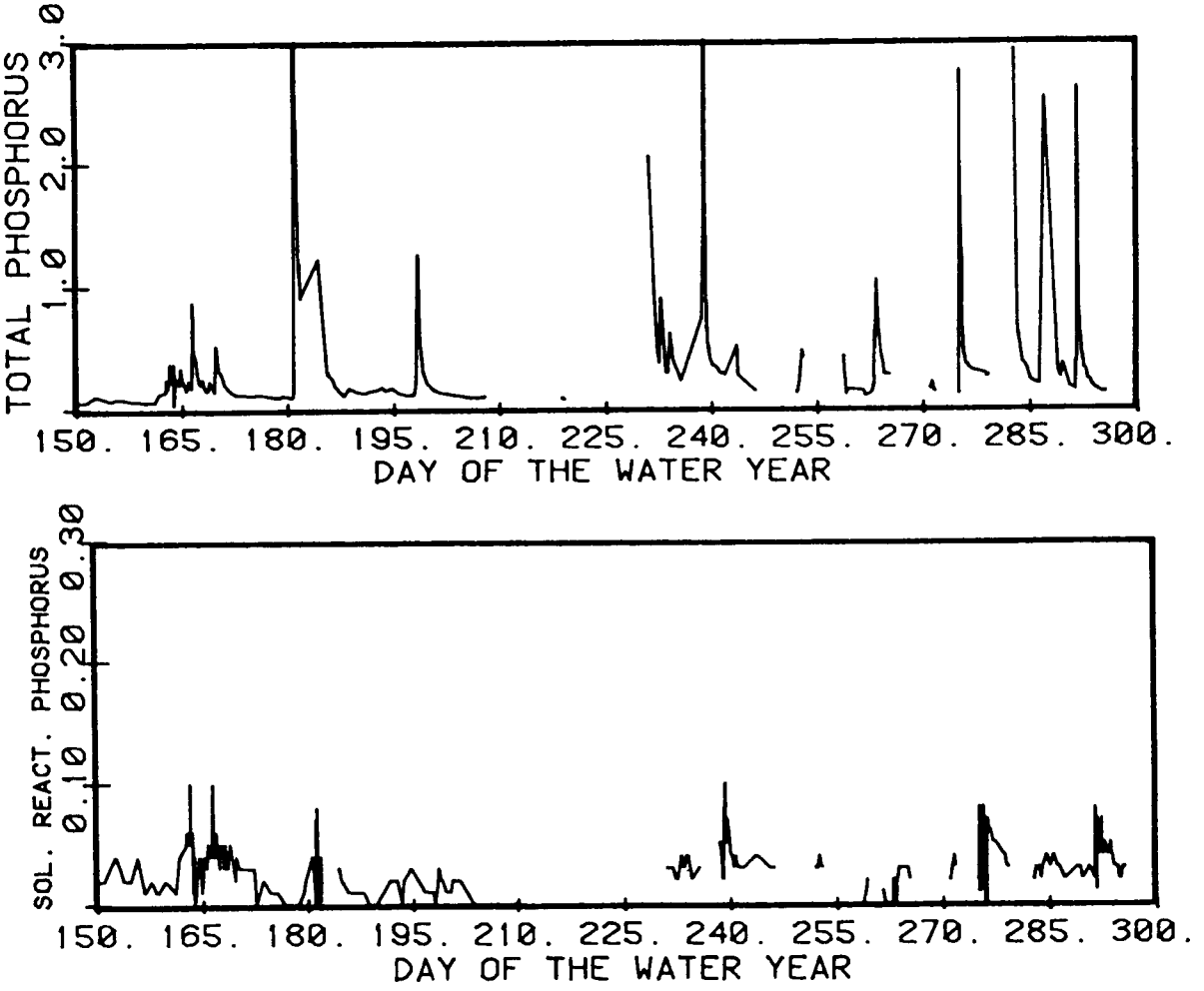
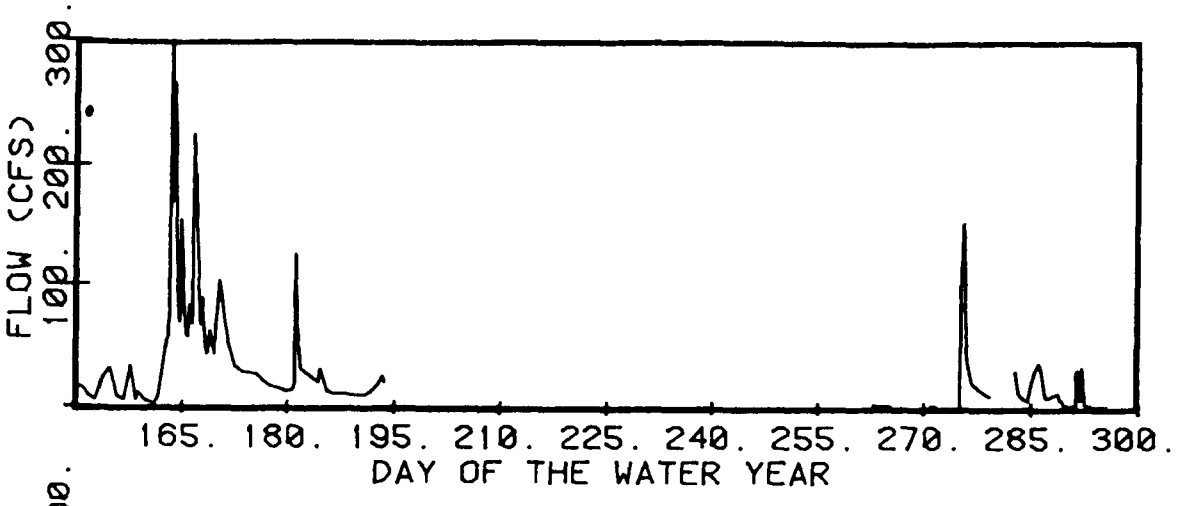
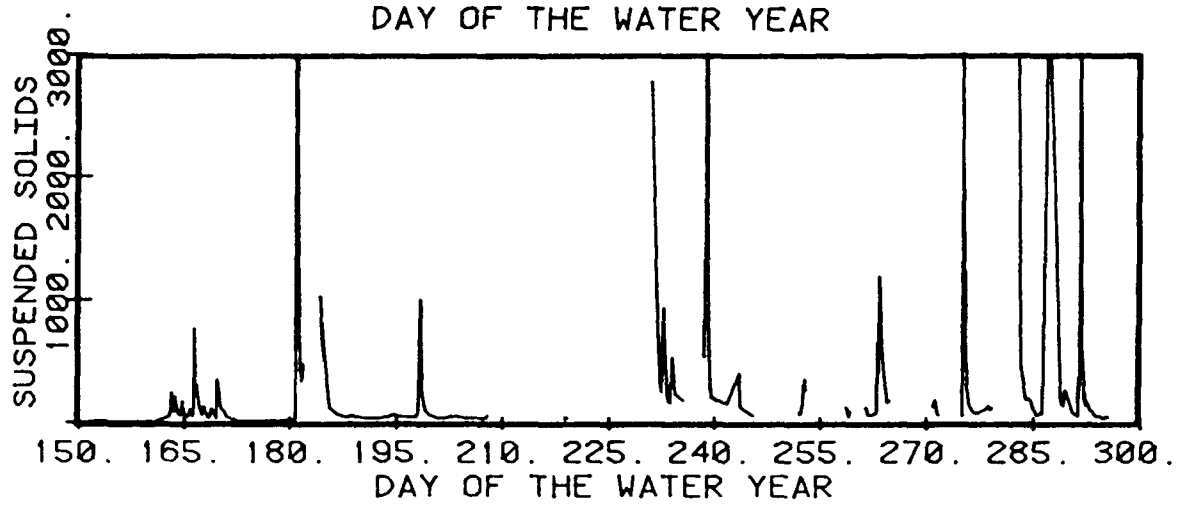
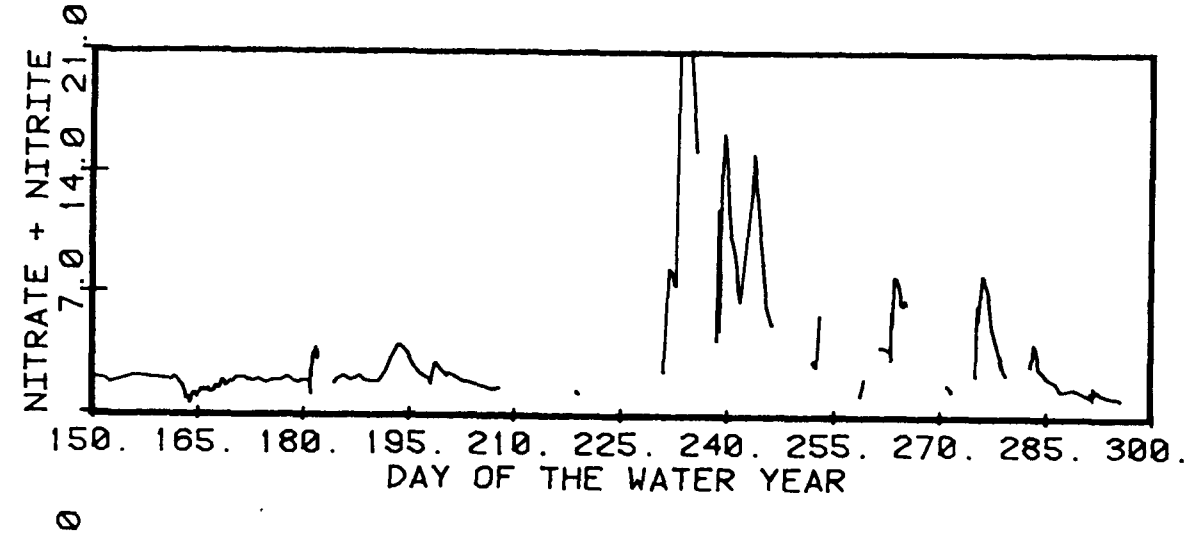


Figure 1. Hydrograph and chemographs for runoff from the Upper Lost Creek Watershed during the February 27 (Day 150) to July 28 (Day 300) portion of the 1982 water year. Concentrations in mg/l.


FLOW (CFS)
100.
200.
300.
165. 180. 195. 210. 225. 240. 255. 270. 285. 300.
DAY OF THE WATER YEAR


SUSPENDED SOLIDS
1000.
2000.
3000.
150. 165. 180. 195. 210. 225. 240. 255. 270. 285. 300.
DAY OF THE WATER YEAR


NITRATE + NITRITE
7.0
14.0
21.0
150. 165. 180. 195. 210. 225. 240. 255. 270. 285. 300.
DAY OF THE WATER YEAR

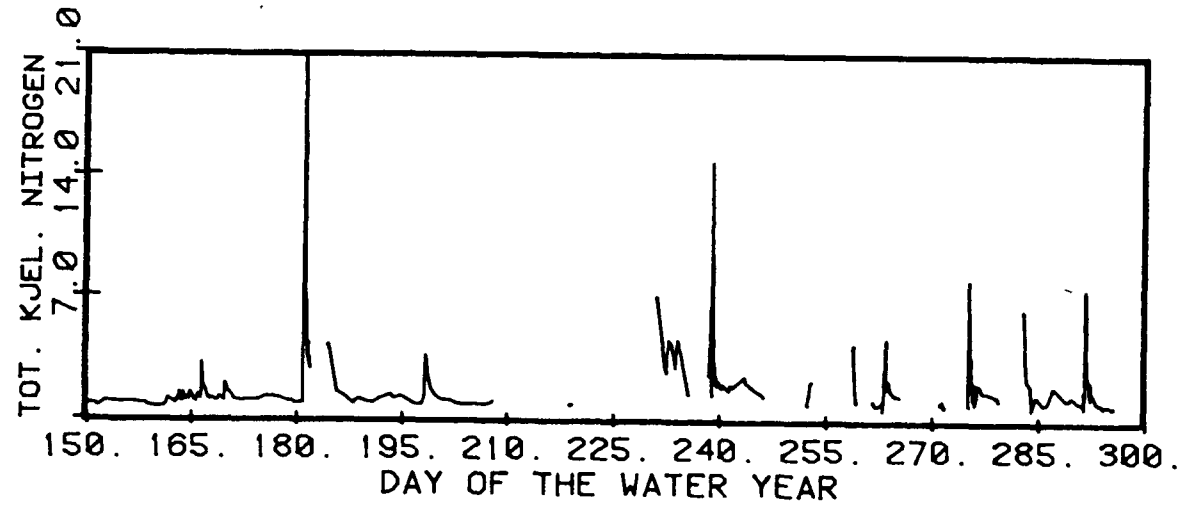

TOT. KJEL. NITROGEN
7.0
14.0
21.0
150. 165. 180. 195. 210. 225. 240. 255. 270. 285. 300.
DAY OF THE WATER YEAR

Table 2 Peak pesticide concentrations observed during the April - August sampling period in 1982.

	Maumee (6,313 mi^2) 50 Samples		Sandusky (1,251 mi^2) 50 Samples		Raisin (1,042 mi^2) 25 Samples		Melmore (149 mi^2) 63 Samples		Defiance (4.3 mi^2) 48 Samples		Cuyahoga (707 mi^2) 22 Samples	
	µg/L	Date	µg/L	Date	µg/L	Date	µg/L	Date	µg/L	Date	µg/L	Date
Linuron	2.32	06/02	3.51	05/26	2.79	05/28	13.1	05/25	5.66	06/21	7.68	06/14
EPTC	.187	06/02	.168	05/29	.103	05/29	.82	05/25	.837	05/28	2.84	05/11
Butylate	.160	06/02	.184	05/28	.094	06/02	.213	05/24	.248	07/11	.051	06/28
Ethoprop	.243	06/02	.129	07/29	.031	07/17	1.13	05/17	.112	05/22	.314	05/11
DIA	2.79	07/15	1.98	05/28	.635	06/02	4.65	05/25	5.81	07/11	3.62	06/07
DEA	1.37	07/13	2.57	07/08	.569	05/30	3.31	05/24	2.97	07/11	.43	05/24
Treflan	.056	08/06	.097	06/03	.041	06/02	.093	06/03	.316	07/11	.240	07/19
Phorate	.009	06/02	.019	05/28	.011	06/05	.022	05/28	.020	06/07	.019	05/11
Simazine	2.85	06/13	2.52	07/06	4.95	08/07	3.60	06/29	3.3	07/11	10.7	08/09
Atrazine	9.5	05/28	18.8	05/28	9.26	05/30	48.4	05/25	38.9	05/22	1.5	05/24
Terbufos	.158	07/15	.104	07/08	.127	07/03	.124	07/08	.09	07/13	.058	06/14
Fonofos	.026	05/30	.050	05/30	.205	05/28	.024	05/26	.08	05/28	.00	---
Diazinon	.023	05/27	.016	06/30	.010	07/17	.008	06/29	.013	06/28	.083	08/09
Cyanazine	4.26	05/30	3.82	05/26	4.29	05/29	14.9	05/25	10.1	05/22	6.62	05/03
Metribuzin	3.35	05/30	8.20	05/25	1.72	05/30	8.24	05/25	5.4	05/23	.284	07/19
Alachlor	9.27	05/28	18.19	05/29	8.16	05/29	69.6	05/25	18.5	05/22	.60	07/19
Metolachlor	10.1	05/28	40.6	05/25	3.30	05/28	90.8	05/28	12.7	05/28	.733	08/02
Chlorpyrifos	1.04	06/02	1.98	05/28	1.42	05/30	2.69	05/29	4.43	05/29	.147	05/24
Penoxalin	.37	06/11	.343	05/31	.448	06/01	.65	05/27	2.48	05/28	.793	07/19

Note: Linuron - Lorox, EPTC - Eptam, Butylate - Sutan, Ethoprop - Mocap, DIA - D-Isopropyl Atrazine, DEA - D-Ethyl Atrazine, Phorate - Thimet, Simazine - Princep, Terbufos - Counter, Fonofos - Dyfonate, Cyanazine - Bladex, Metribuzin - Sencor/Lexone, Alachlor - Lasso, Metolachlor - Dual, Chlorpyrifos - Lorsban, Penoxalin - Prowl.

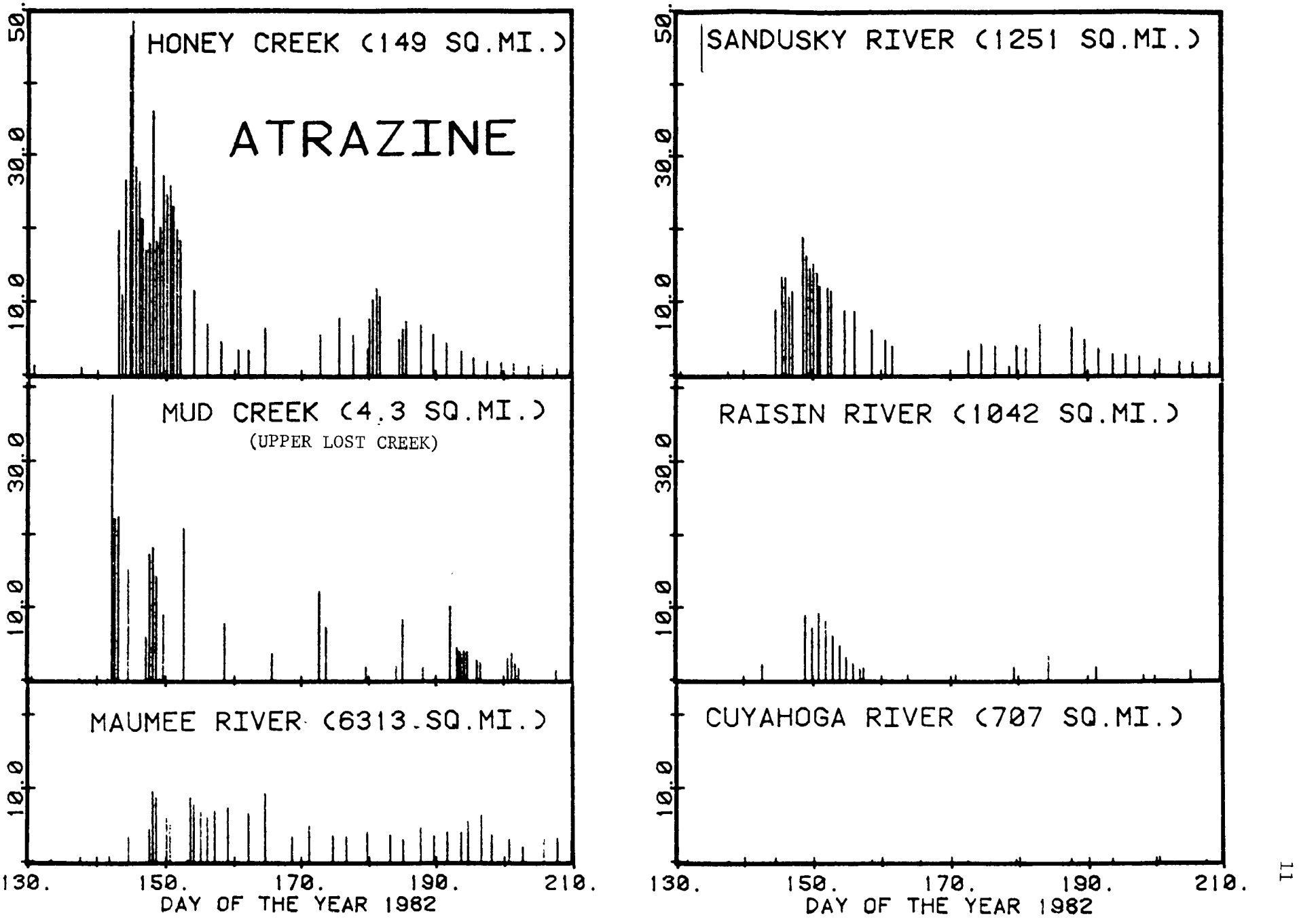


Figure 2. Atrazine concentrations (micrograms per liter) in Lake Erie tributaries.

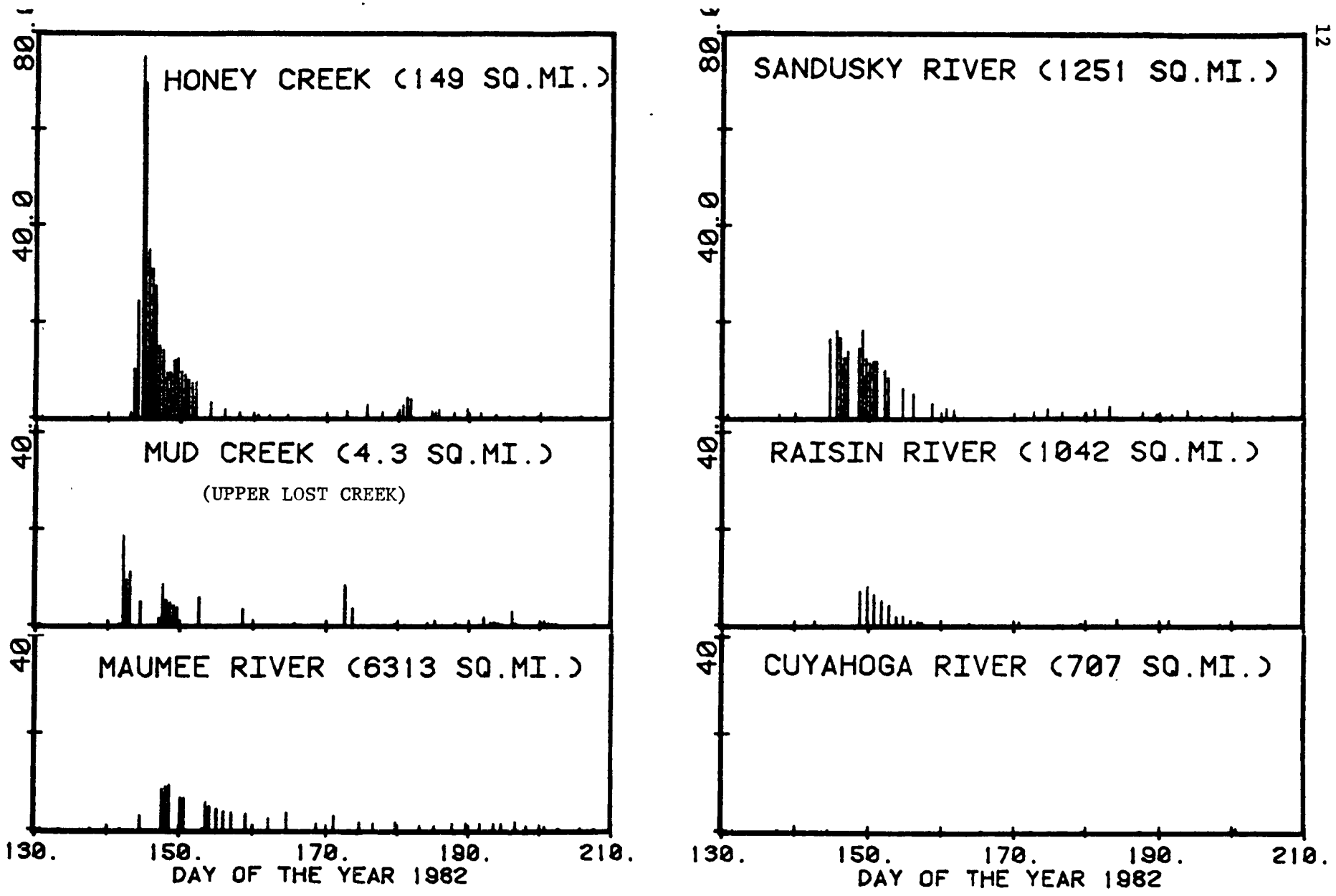


Figure 3. Alachlor concentrations (micrograms per liter) in Lake Erie tributaries.

1982 DEMONSTRATION PLOTS

The no-till and ridge plots were the main demonstrations of the Project. 1982 was an extremely good year for no-till planting, as the soil was dry in most cases, and the planters operated well. This was a stark contrast to the wet, delayed plantings of 1981. The dry weather did reduce the effectiveness of some herbicides.

Following an initial sign up period in early 1982, Project staff visited most cooperators before planting to help plan their demonstrations. Farmers were asked to give the SWCD at least 2 or 3 days notice before they intended to start planting their plot, so that equipment could be scheduled. There were very few planter scheduling problems in 1982.

Planters were delivered and Project staff helped set up the equipment and get the farmer started in the field. A comparison between the demonstration tillage and conventional tillage, and yield checks were requested in every field. To obtain a fair comparison, the same planters were used in both the no-till and comparison strips whenever possible.

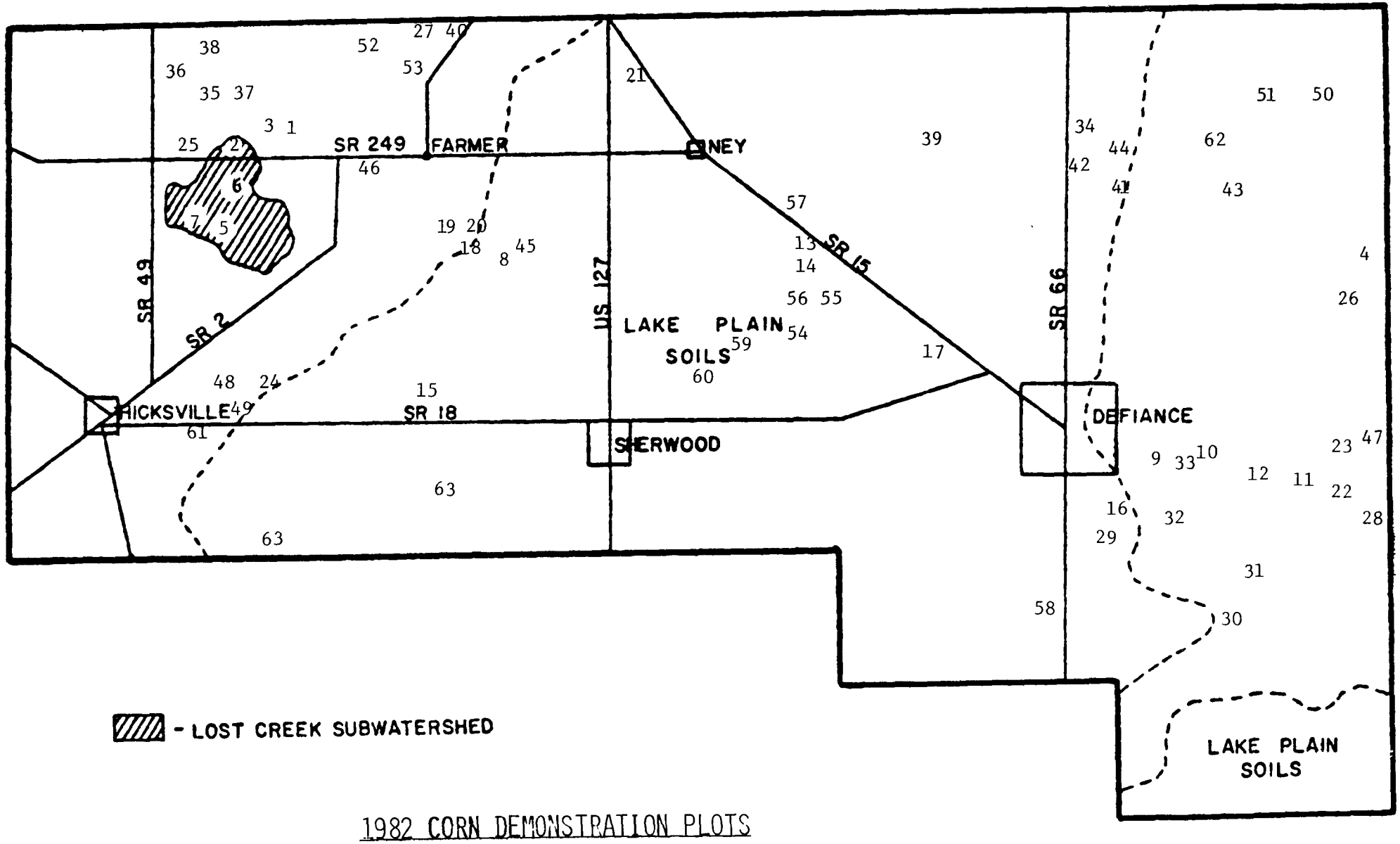
Those fields in which the SWCD's disk-chisel plow was used are also included in the demonstration plots. Most plots were scouted during the growing season for pests. In several cases, post-emergent herbicides were required, and in a few fields armyworms had to be controlled.

Cooperators were asked to keep good records of all cultural practices, and to schedule a yield check with the SWCD.

All corn yields have been adjusted to 15.5% moisture and all soybean yields were adjusted to 13.0% moisture. In the case of soybeans drier than 13.0%, yields were adjusted upward.

Yield checks are needed on every demonstration plot. This is the SWCD's grain-weighing device.

DEFIANCE COUNTY-LOST CREEK DEMONSTRATION PROJECT



1982 CORN DEMONSTRATION PLOTS

1982 CORN DEMONSTRATION PLOTS

1. Richard Appel & Sons #1
2. Richard Appel & Sons #2
3. Richard Appel & Sons #3
4. Richard Bockelman & Sons
5. Arnold Bok #1
6. Arnold Bok #2
7. Paul Bok
8. Ray Bok #1
9. Bob & Bruce Colwell #1
10. Bob & Bruce Colwell #2
11. Bob & Bruce Colwell #3
12. Bob & Bruce Colwell #4
13. Steve Coolman #1
14. Steve Coolman #2
15. John Crites
16. Lynn Davis
17. Hal DeTray
18. Jim Donze #1
19. Jim Donze #2
20. Jim Donze #3
21. Jim Donze #4
22. Duane Engel #1
23. Duane Engel #2
24. Greg Garmyn/Derrill Kline
25. Bob Heisler #1
26. Walt Helmke #1 and #2
27. Luther Hetrick
28. Art Hoellrich #1
29. Art Hoellrich #2 and #3
30. Bob & Jerry Hoshock #1
31. Bob & Jerry Hoshock #2
32. Bob & Jerry Hoshock #3
33. Tom & Joe Hoshock
34. Waldo Imbrock #1,2 and 3
35. John Koerner
36. Cleon Krill #1
37. Cleon Krill #2
38. Cleon Krill #3
39. Don Lehman
40. Tom Pendleton
41. Ted Pohlmann #1
42. Ted Pohlmann #2
43. Ted Pohlmann #3,4,5, and 6
44. Ted Pohlmann #7
45. Milo Renz
46. Bob & Don Rethmel #1
47. Bob Rettig #1,1P,2, and 2P
48. Brian Rohrs #1
49. Brian Rohrs #2
50. Albert Schroeder #1
51. Albert Schroeder #2
52. Owen Schroeder #1
53. Owen Schroeder #2
54. Bob Shininger #1,1P,2, and 2P
55. Bob Shininger #3
56. Bob Shininger #4
57. Louis Shininger #1
58. Clete Siler #1
59. Dan Singer #1
60. Dan Singer #2
61. Clete Vetter #1
62. John & Joe Wagner
63. Denver Zeedyk

NOTES ON THE INDIVIDUAL PLOT TABLES

The tillage/planter columns correspond with the variety, population, $\%H_2O$, and yield columns.

Under herbicides, Paraquat is used only on the no-till sections unless otherwise noted. A non-ionic surfactant is always used with Paraquat.

Soil types are listed in the order of largest to smallest area in the field.

Fertilizer is usually listed in the order of broadcast, row, then sidedress applications. If 28% was sidedressed, this is indicated by the term "injected" under the listing.

Several fields do not have yields listed, for several reasons. The two major reasons are that the entire field was harvested as silage, or the farmer did not arrange a yield check with the SWCD. Some hand yield checks were made by Project staff, and some farmer estimates of yields are included in the plot comments, when available. Neither method is reliable enough to list in the yield column.

1982 CORN DEMONSTRATIONS

Cooperator, Plot, Planting Date	Tillage/Planter	Residue	Soil Type	Herbicides	Insecticides
Richard Appel & Sons #1 May 1	Fall chisel, disk (2x), power harrow	Wheat	Blount, Glynwood	1 qt/A Aatrex 2 qt/A Bladex	None
Richard Appel & Sons #2 May 4	No-till/White Sp. Disk/White No-till/White	Soybean Soybean Wheat/Clover	Blount & Glynwood Glynwood	1 qt/A Paraquat 1 qt/A Aatrex 2½ qt/A Bladex	Planter box seed treatment & 6.7#/A Dyfonat banded
Richard Appel & Sons #3 May 12	No-till/IH Disk (2x)/IH	Winter killed Wheat	Blount, Glynwood, Pewamo	1 qt/A Paraquat 1 qt/A Aatrex 2 qt/A Bladex	None
Richard Bockelman & Sons June 7	No-till/IH	Alfalfa	Hoytville	4 lb/A Atrazine & Oil 1 pt/A Banvel	Isotox F 4 oz/50# Seed treatmer
Arnold Bok #1 May 10	No-till/JD Sp. Plow, Disk Drag/JD	Wheat Straw, clover	Blount, Glynwood	1 qt/A Paraquat 2 qt/A Aatrex 2 qt/A Lasso	5 oz/bu. Isotox D Seed treatmer
Arnold Bok #2 May 12	No-till/JD	Winter killed Wheat	Blount, Glynwood	1 qt/A Paraquat 2 qt/A Aatrex	5 oz/bu. Isotox D Seed treatmen

Fertilizer Applied Total N-P_2O_5-K_2O	Plot Comments	Variety or Hybrid	Population/A (Drop/Stand)	%H_2O	Yield (bu/A)
250# 8-21-29 183# 82-0-0 preplant Total 170-52-72	Good field, but no comparison of tillage.	Robinson 3120	24000/-----	21.2	134.0
250# 8-21-29 177# 82-0-0 preplant Total 165-52-72	Planter overplanted above desired population of 24,500. Some thistles in clover section, other sections had no problems	Pioneer 3780	24500/26300 24500/24700 25400/26700	16.8 16.9 18.3	122.4 127.9 103.2
122 # 45-0-0 250# 8-21-29 110# 82-0-0 preplant Total 165-52-72	Planter overpopulated above desired population of 24,500. Excellent Field.	Pioneer 3780	24500/26800 24500/24000	18.0 17.2	130.6 127.2
140# 5-15-30 212# 28-0-0 Total 66-21-42	Planter had trouble in heavily compacted spots caused by hay wagon. Some alfalfa and dandelions not killed. Harvested as silage.	DeKalb XL25A	24200/23400	----	-------
150# 6-15-40 100# 6-24-24 125# 82-0-0 Total 115-46-84	Farmer commented that yield check was in poorest section of field. He was pleased with overall results this year.	P.A.G. 181	26100/26700	17.8 ---	100.0 ----
150# 6-15-40 150# 6-24-24 125# 82-0-0 Total 120-58-96	Farmer was pleased with overall results in field this year. Light weed pressure, field had no major problems.	P.A.G. 177 P.A.G. 181	26100/25600	21.9	94.0

Cooperator, Plot, Planting Date	Tillage/Planter	Residue	Soil Type	Herbicides	Insecticide
Paul Bok May 3	Sp. Chisel, Disk, Cultimulch Sp. Plow, Disk Cultimulch	Corn	Glynwood	1 lb/A Atrazine Post: 2 lb/A Atrazine & Oil	7#/A Dyfonate banded
Ray Bok #1 April 30	No-till/ Farmer's JD	Wheat straw Clover	Latty Toledo	1 qt/A Paraquat 3 qt/A Bicep	9#/A Counter banded 1#/A Sevin wi herb.
Bob & Bruce Colwell #1 April 27	No-till/IH Field cult./IH	Soybean	Hoytville	1.4 pt/A Paraquat 3 qt/A Lasso Post: 1 pt/A 2,4-D ½ pt/A Banvel	6 oz/bu Diazinon & Captan seed treatment
Bob & Bruce Colwell #2 April 27	No-till/IH Field cult./IH	Soybean	Hoytville, Nappanee	1.4 pt/A Paraquat 3 qt/A Lasso Post: ½ pt/A Banvel	6 oz/bu Diazinon & Captan seed treatment
Bob & Bruce Colwell #3 April 28	No-till/IH Field cult/IH	Soybean	Hoytville, Mermill	1.4 pt/A Paraquat 3 qt/A Lasso Post: 1 pt/A 2,4-D ½ pt/A Banvel	6 oz/bu Diazinon & Captan seed treatment
Bob & Bruce Colwell #4 April 28	No-till/IH Field cult./IH	Soybean	Hoytville, Haskins, Oshtemo	1.4 pt/A Paraquat 3 qt/A Lasso	6 oz/bu Diazinon & Captan seed treatment
Steve Coolman #1 May 1	No-till/White Disk & harrogate (2x)/ White	Soybean	Paulding	1 pt/A Paraquat 1 lb/A Atrazine 9-0 2 lb/A Bladex	8.7#/A Counte banded

Fertilizer Applied Total N-P_2O_5-K_2O	Plot Comments	Variety or Hybrid	Population/A (Drop/Stand)	%H_2O	Yield (bu/A)
300# 6-15-30 319# 28-0-0 100# 8-25-3 130# 82-0-0 Total 222-71-93	Used disk-chisel plow and also moldboard plow. Farmer commented that chiselled section did not excessively dry out, as compared to spring plow.	Rupp 1780	26000/----- 26000/-----	20.0 20.8	116.3 102.1
350# 9-23-30 140# 16-41-6 546# 28-0-0 injected Total 207-137-113	Moderate cocklebur infestation, overall good field.	Stauffer's 402	27700/26000	18.7	123.8
287# 28-0-0 220# 6-32-16 272# 28-0-0 injected Total 169-70-35	Good field, dry May weather decreased stand.	Landmark 733	28100/23000 28100/22000	32.6 34.6	132.1 115.3
131# 0-0-60 31# 18-46-0 286# 28-0-0 257# 8-32-16 321# 28-0-0 injected Total 196-96-120	Excellent field with no problems.	DeKalb XL55A Great Lakes 5922 Great Lakes 5922	28100/24800 28100/24300	19.9 20.0 19.5	146.1 155.1 152.8
333# 0-0-60 45# Magnesium 296# 28-0-0 240# 8-32-16 378# 28-0-0 injected Total 208-77-238	Some quackgrass patches, overall clean field with excellent yield. Stand was decreased by dry May weather.	Rupp 1780	28100/22000 28100/21300	18.8 18.8	164.2 159.6
131# 0-0-60 31# 18-46-0 321# 28-0-0 257# 8-32-16 357# 28-0-0 injected Total 216-96-120	Moderate amount of fall panicum and giant foxtail in west part of field. Cultivated strip not worked fine enough.	Rupp 1690	28100/25000 28100/20300	22.6 23.4	151.3 136.7
200# 10-30-0 300# 4-10-47 171# 82-0-0 Total 172-90-141	Paraquat not applied properly - no surfactant used and was mixed with a P fertilizer. Dry weather and some cutworms decreased stand. Also no-till yield area included end rows.	Funks 2790	26000/22700 26000/23700	18.1 16.8	102.0 101.5

Cooperator, Plot, Planting Date	Tillage/Planter	Residue	Soil Type	Herbicides	Insecticides
Steve Coolman #2 May 1	No-till/White Disk & harr-ogate (2x)/Wh.	Soybean	Roselms	1 pt/A Paraquat 1 lb/A Atrazine 2 lbs/A Bladex Post: 3 lbs/A Atrazine 9-0 & oil	8.7#/A Counter banded
John Crites June 16 & 18	No-till/Hin.	First cut-ting hay removed.	Latty	4 lbs/A Atrazine 1 qt/A Paraquat	10#/A Furadan banded
Lynn Davis May 15	Fall plow, disk, land-level, ridge Fall plow, di-sk, landlevel	Wheat 1980	Paulding, Roselms	3½ lbs/A Atrazine & oil 1½ lbs/A 2,4-D	None
Hal DeTray April 29	No-till/White Field cult/Wh.	Wheat, clover, soybeans, weeds.	Roselms, Paulding	1½ pt/A Paraquat 1¼ qt/A Aatrex 2 qt/A Bladex	None
Jim Donze #1 April 28	No-till/IH Fall plow/IH row cultivate	Wheat/ Clover	Hoytville	1 qt/A Paraquat 3 qt/A Bicep Post: ½ pt/A Banvel in no-till only	8.7#/A Counter banded
Jim Donze #2 April 28	No-till/ JD row cultivate Disk (2x)/JD row cultivate	Soybean	Hoytville Nappanee	1 pt/A 2,4-D 3 qt/A Bicep Spot spray: ½ pt/A Banvel	None
Jim Donze #3 April 28	No-till/IH No-till/JD's & row cult. --- Field cult/IH Field cult/JD & row cult.	Winter killed Wheat	Hoytville Nappanee	1 qt/A Paraquat 3 qt/A Bicep Spot spray: ½ pt/A Banvel	None

Fertilizer Applied Total N-P_2O_5-K_2O	Plot Comments	Variety or Hybrid	Population/A (Drop/Stand)	%H_2O	Yield (bu/A)
200# 10-30-0 300# 4-10-47 171# 82-0-0 Total 172-90-141	Same comments as field #1. Also, Atrazine & oil sprayed to control severe quackgrass infestation.	Funks 2790	26000/21600 26000/22500	16.0 16.9	112.3 116.8
140# 4-10-10 536# 28-0-0 injected Total 156-14-14	Field planted following hay harvest. Plot had some quackgrass patches and drowned out areas. Some armyworm feeding in July. Harvested as silage	Funks G 4323	24600/17700	35.9	51.8
300# 19-19-19 158# 82-0-0 Total 187-57-57	SWCD's ridger adjusted for 28" rows. Farmer used own AC no-till planter.	Mixture of late varieties	30000/----- 30000/-----	29.0 34.9	87.8 85.2
240# 8-17-33 393# 28-0-0 Total 129-41-79	Problem field: planted slightly too wet, Nitrogen lost (volatilized?), and no additional N applied. Drowned spots, moisture stress and heavy infestation of chicory.	DeKalb XL55A	23100/22000 23100/25400	---- -----	------ -------
250# 6-15-40 200# 16-41-6 150# 82-0-0 Total 170-120-112	Poor application of herbicides - some strips in no-till missed. Plowed section of field planted as it was - stale seedbed.	Jacques JX147	27900/20700 27900/24000	18.0 16.1	120.4 147.6
300# 6-15-40 200# 16-41-6 150# 82-0-0 Total 173-127-132	Both Farmer's JD and SWCD's IH used in field. Banvel spot sprayed on thistle patches. Row cultivated due to lack of rainfall to activate herbicide.	Jacques JX151	27900/26000 27900/-----	18.3 17.9	130.4 137.0
250# 9-23-30 150# 6-15-40 200# 16-41-6 150# 82-0-0 Total 186-162-147	Comparison between tillage and planters. Every 12 rows alternated between farmer's JD and SWCD - IH.	Jacques JX151	27900/22400 27900/ --- 27900/22000 27900/	16.6 16.4 --- 16.6 16.0	168.3 160.8 --- 167.8 171.6

Cooperator, Plot, Planting Date	Tillage/Planter	Residue	Soil Type	Herbicides	Insecticides
Jim Donze #4 May 1	No-till/ Farmer's JD	Corn	Genesee, Shoals	1 qt/A Paraquat 3 qt/A Bicep	8.7#/A Counter banded
Duane Engel #1 April 24	No-till/JD & row culti- vate Field cult (2x) JD & row cult.	Winter killed Wheat	Hoytville	1 pt/A Paraquat 1 qt/A Atrazine 2½ qt/A Bladex Spot spray: 1 pt/A Paraquat	Isotox seed treatment
Duane Engel #2 April 24	No-till/JD & row culti- vate Field cult(2x)/ JD & row cult.	Winter killed Wheat	Hoytville	1 pt/A Paraquat 1 qt/A Atrazine 2½ qt/A Bladex Spot spray: 1 pt/A Paraquat	Isotox seed treatment
Greg Garmyn Derrill Kline May 1 - 6	Fall chisel, spring disk, field culti- vate, drag	Corn	Lenawee, Del Rey	2 lb/A Atrazine 2 qt/A Lasso	10#/A Counter banded
Bob Heisler #1 April 29	No-till/AC row cultivate Sp. Disk/AC row cultivate	Soybean	Blount, Pewamo, Glynwood	2½ lb/A Atrazine	None
Walt Helmke #1 May 6	No-till/ Farmer's JD --- Field cult/ Farmer's JD & row cultivate	Soybean	Hoytville Nappanee	1.8 lb/A Atrazine 9-0 2 qt/A Dual 8E --- 1.8 lb/A Atrazine 9-0 2 qt/A Sutan	8#/A Dyfonate banded --- None
Walt Helmke #2 May 6	No-till/JD Fall plow/JD --- Fall chisel/JD Fall plow/JD	Wheat/ Clover	Hoytville Nappanee	No-till: 1 qt/A Paraquat 1.8 lb/A Atrz 9-0 2 qt/A Dual Conventional: 1.8 lb/A Atrz 9-0 2 qt/A Sutan	8#/A Thimet in no-till only (banded)

Fertilizer Applied Total N-P_2O_5-K_2O	Plot Comments	Variety or Hybrid	Population/A (Drop/Stand)	%H_2O	Yield (bu/A)
212# 3-18-24 536# 28-0-0 injected Total 156-38-51	Severe infestation of fall panicum, and moderate yellow nutsedge.	Jacques JX147	27900/27300	19.0	151.0
300# 6-24-24 214# 28-0-0 300# 19-19-19 195# 82-0-0 Total 295-129-129	Spots missed with first application of Paraquat sprayed again. Residual herbicides not activated because of dry weather. Entire field row cultivated.	Pioneer 3780	26100/25000 26100/27700	15.8 15.7	142.5 144.5
300# 6-24-24 214# 28-0-0 300# 19-19-19 195# 82-0-0 Total 295-129-129	Same as #1	Pioneer 3780	26100/24600 26100/25000	17.2 17.2	174.9 169.5
200# 0-0-60 150# 6-18-6 222# 82-0-0 Total 191-27-129	Three fields using disk-chisel in corn stalks. No equal comparisons. Yield given is from one field.	----------	----------	26.1	150.5
150# 10-26-26 214# 28-0-0 280# 10-26-26 183# 82-0-0 Total 253-112-112	Farmer used own AC no-till planter. Residual herbicide not activated due to dry weather - entire field row cultivated.	Landmark 626	30000/29200	20.5 20.6	147.2 143.2
100# 18-46-0 200# 0-0-60 254# 28-0-0 150# 8-33-17 198# 82-0-0 Total 263-96-146	Farmer used own JD planter with 36" rows. Field showed little difference between no-till and cultivated sections throughout season.	Pioneer 3780	30200/------	17.5 18.2	138.1 139.1
All conv. same as #1 For no-till substitute 637# 28-0-0 for the 82%. NT total 279-96-146	Farmer used own JD planter with 36" rows. All sections row cultivated once. Light armyworm infestation in no-till.	Pioneer 3780	27600/25000 30200/28300 ---------- 30200/------	17.5 16.5 ---------- 14.9 15.0	123.0 138.2 ---------- 129.6 127.9

Cooperator, Plot, Planting Date	Tillage/Planter	Residue	Soil Type	Herbicides	Insecticides
Luther Hetrick June 19	No-till/IH	First cutting hay removed	Blount Pewamo Glynwood	4½ lbs/A Atrazine 9-0 1 qt/A crop oil	Rescue Treatme 1½#/A Sevin
Art Hoellrich #1 April 24	Fall plow/JD Fall plow, field cult. (2x)/JD	-----	Hoytville	2 qt/A Bladex 1 qt/A Atrazine Post: ½ pt/A Banvel	10#/A Counter banded
Art Hoellrich #2 April 27	No-till/JD & row cult.	Soybean & rye cover	Tedrow, Ottokee, Mermill, Paulding	1 qt/A Paraquat 2 lb/A Atrazine 1½ qt/A Lasso	Rescue Treatme 1 1/3 qt/A Toxaphene
Art Hoellrich #3 April 27	No-till/JD V-Plow, Field cult. & drag (2x)/JD	Winter Killed Wheat	Rimer Mermill Wauseon Seward Paulding	1 qt/A Paraquat 2 lb/A Atrazine 1½ qt/A Lasso	None
Bob & Jerry Hoshock #1 April 26	No-till/JD Field cult. & packer (2x)/JD & row cult.	Soybean	Hoytville	1 pt/A Paraquat 1 lb/A Atrazine 2 lb/A Bladex	7#/A Dyfonate banded
Bob & Jerry Hoshock #2 April 28	No-till/IH	Soybean	Millgrove Gilford	1 pt/A Paraquat 3/4 qt/A Aatrex 4L 1¼ qt/A Bladex 2 qt/A Lasso	7#/A Dyfonate banded
Bob & Jerry Hoshock #3 May 3	No-till/IH	Wheat/Clover	Hoytville	1 qt/A Paraquat ½ pt/A Banvel 1 qt/A Aatrex 2 qt/A Bladex 1½ qt/A Lasso Post: ½ pt 2,4-D ¼ pt Banvel	7#/A Dyfonate banded

Fertilizer Applied Total N-P_2O_5-K_2O	Plot Comments	Variety or Hybrid	Population/A (Drop/Stand)	$\%H_2O$	Yield (bu/A)
300# 0-0-60 100# 45-0-0 428# 28-0-0 250# 13-34-15 Total 197-85-218	Planted following hay harvest. This field had a heavy armyworm infestation that had to be treated. Harvested as silage.	Blaney 773 Stauffers 4402	33000/28000	---	-----
300# 0-20-20 214# 28-0-0 265# 19-19-19 321# 28-0-0 injected Total 200-110-110	Majority of field planted into stale seedbed. Dry May weather probably decreased stand and yield in worked section.	DeKalb XL55A	26000/23200	19.9 19.9	191.8 164.1
214# 28-0-0 265# 19-19-19 134# 82-0-0 Total 220-50-50	Residual chemicals not activated due to dry weather, so field was row cultivated. Field had heavy armyworm infestation that was successfully treated.	DeKalb XL55A DeKalb XL32A	26000/23800	20.9 22.3	145.2 121.2
300# 6-24-24 214# 28-0-0 265# 19-19-19 134# 82-0-0 Total 238-122-122	Field had moderate armyworm infestation, but it did not require treatment. Both field #3 and #2 looked excellent throughout season.	DeKalb XL55A	26000/24800	23.7 21.1	148.1 135.2
214# 28-0-0 300# 8-32-16 307# 28-0-0 injected Total 170-96-48	Excellent field with no problems.	Landmark 747 Landmark 733 Landmark 733 DeKalb XL55A	26200/24300	24.7 21.0 22.0 20.2	167.3 170.4 149.1 163.9
214# 28-0-0 300# 8-32-16 112# 82-0-0 Total 176-96-48	Excellent field with no problems.	Bojac 432	28000/25000	18.9	182.2
214# 28-0-0 300# 8-32-16 307# 28-0-0 injected Total 170-96-48	Poor initial kill with contact herbicide, probably due to poor application. Corn showed slow emergence.	Landmark 533 Bojac 37 Great Lakes 516	26200/-----	18.5 21.5 20.5	130.0 148.9 142.8

Cooperator, Plot, Planting Date	Tillage/Planter	Residue	Soil Type	Herbicides	Insecticides
Tom & Joe Hoshock April 28	No-till/IH Field cult. & packer (2x)/IH	Soybean	Hoytville Nappanee	1½ lb/A Bladex 1 lb/A Aatrex 1 pt/A 2,4-D	None
Waldo Imbrock #1 May 3	Row cult. to reform old ridges/Hin. Field cult./ Hin.	1981 corn removed as silage	Paulding Roselms	2 qt/A Atrazine 1 pt/A Dual	8#/A Thimet banded
Waldo Imbrock #2 May 3	Row cult. to reform old ridges/Hin.	1981 corn removed as silage	Paulding Latty	2 qt/A Atrazine 2 pt/A Dual	8#/A Thimet banded
Waldo Imbrock #3 May 4	Row cult. to reform old ridges/Hin.	1981 corn removed as silage	Paulding	2 qt/A Atrazine 2 pt/A Dual	None
John Koerner June 5	No-till/Hin.	First hay cutting removed	Blount Pewamo Glynwood Bono Carlisle	2½ lb/A Atrazine 2½ lb/A Princep ½ pt/A Banvel	Rescue treatme 2#/A Sevin
Cleon Krill #1 June 12	No-till/ Farmer's JD	First hay cutting removed	Blount	1 qt/A Paraquat 2½ lb/A Atrazine 2 lb/A Princep	8#/A Counter banded --- Rescue treatme 2#/A Sevin
Cleon Krill #2 June 15	No-till/ Farmer's JD	First hay cutting removed	Pewamo	1 qt/A Paraquat 2½ lb/A Atrazine 2 lb/A Princep	8#/A Counter banded --- Rescue treatme 2#/A Sevin

Fertilizer Applied Total N-P_2O_5-K_2O	Plot Comments	Variety or Hybrid	Population/A (Drop/Stand)	%H_2O	Yield (bu/A)
214# 28-0-0 300# 8-32-16 307# 28-0-0 injected Total 170-96-48	Moderate amounts of milkweed and hedge bindweed. Overall a good field. Dry May weather probably hurt cultivated section.	Landmark 733	26200/22400	19.3 18.6	170.4 151.0
4800 gal liq man. 4 tn dry manure 160# 8-25-3 214# 28-0-0 85# 82-0-0 Fert(minus manure) Total 143-40-5	Moderate infestation of barnyardgrass and dandelions. Harvested as silage. Hand check yields were: ridge 132 and disk 108.	Pioneer 3780	24000/22400	---	----
4000 gal liq man. 1 tn dry manure 160# 8-25-3 214# 28-0-0 85# 82-0-0 Fert(minus manure) Total 143-40-5	Moderate amounts of fall panicum. Field harvested as silage. Hand yield check found about 102 bu/A.	Pioneer 3780	24000/23000	---	----
2000 gal liq man. 1 tn dry manure 160# 8-25-3 214# 28-0-0 85# 82-0-0 Fert(minus manure) Total 143-40-5	Field harvested as silage. Hand check yield was 109 bu/A.	Pioneer 3780	24000/------	---	-----
536# 28-0-0 100# 8-25-3 to ½ of field 183# 82-0-0 100# 8-25-3 to other ½ Total 158-25-3	Field had severe armyworm infestation requiring treatment. Moderate crabgrass and dandelions. Plot harvested as silage. Farmer indicated yield was about 90 bu/A.	Landmark 550 Landmark 533	27000/21400	---	-----
357# 28-0-0 330# 6-24-24 Total 120-79-79	Field had heavy armyworm infestation requiring treatment. Plot harvested as silage.	Landmark 399	23500/-----	---	-----
357# 28-0-0 330# 6-24-24 Total 120-79-79	Field had heavy armyworm infestation requiring treatment. Plot harvested as silage.	Landmark 399 Northrup King PX37	23500/-----	---	-----

Cooperator, Plot, Planting Date	Tillage/Planter	Residue	Soil Type	Herbicides	Insecticides
Cleon Krill #3 June 19	No-till/Farmer's JD	First hay cutting removed	Carlisle Pewamo Glynwood	1 qt/A Paraquat 2½ lb/A Atrazine 2 lb/A Princep	8#/A Counter banded
Don Lehman May 13	No-till/JD	Soybean	Roselms	1½ lb/A Atrazine 3 qt/A Lasso	None
Tom Pendleton May 3	No-till/Farmer's White --- Sp. chisel, disk(2x)/Farmer's White & row cultivate	Wheat/Clover	Blount, Glynwood	1 qt/A Paraquat 2 lb/A Atrz. 9-0 1½ qt/A Prowl --- Post: on ch. sect. 1 lb/A Atrz. 9-0 1 qt/A Basagran	5½#/A Dyfonat banded
Ted Pohlmann #1 April 29	New ridges/Hin. & row cultivate --- F. plow, sp. field cult./Hin & row cult	---	Hoytville Latty Nappanee	3 pt/A Aatrex 2 ½ qt/A Lasso	2 oz/bu Agrox D Seed treatment
Ted Pohlmann #2 April 30	No-till/Hin & row cult. --- Sp. Disk (2x) Drag, Pack, Roterra/Farmer's JD/row Cult.	Soybean	Latty	3 pt/A Aatrex 2 qt/A Bladex	2 oz/bu Agrox D Seed treatment
Ted Pohlmann #3 April 30	No-till/Hiniker & row cultivate	Soybean	Hoytville Oshtemo	1 pt/A Paraquat 3 pt/A Aatrex 2 qt/A Lasso ¼ qt/A 2,4-D	2 oz/bu Agrox D Seed treatment
Ted Pohlmann #4 April 30	No-till/Hiniker & row cultivate	Soybean	Hoytville Nappanee	1 pt/A Paraquat 3 pt/A Aatrex 2 qt/A Lasso ¼ qt/A 2,4-D	2 oz/bu Agrox D Seed treatment

Fertilizer Applied Total N-P_2O_5-K_2O	Plot Comments	Variety or Hybrid	Population/A (Drop/Stand)	$\%H_2O$	Yield (bu/A)
357# 28-0-0 330# 6-24-24 Total 120-79-79	Field had some armyworms present, but they were not treated. Harvested as silage.	Northrup King PX37	23500/------	----	-----
300# 19-19-19 214# 28-0-0 Total 117-57-57	Severe weed competition in this field. No contact herbicide used. Severe foxtails and other grasses.	Funks's 4323	26000/23700	24.0	58.9
200# 0-0-60 321# 28-0-0 150# 8-25-3 + 70# 82-0-0 on chiseled sect. Totals No-till 102-38 124 Chisel 159-38-124	Post herbicides in no-till: 2 applications of ¼ pt 2,4-D and ¼ pt/A Banvel. Poor weed control, esp. in no-till. Additional N not applied in no-till due to heavy mat of clover.	Stauffer 5660	27100/24300 27100/25300	----	-----
175# 0-0-60 67# 18-46-0 282# 28-0-0 155# 8-25-3 361# 28-0-0 injected Total 204-70-110	Planter cleared off too much of ridge top. Broadleaves not controlled by residual herbicides were row cultivated out of field.	Pioneer 3535 Pioneer 3572 Pioneer 3572	26200/24800 26200/24000	20.9 21.5 20.5	116.4 127.1 119.9
100# 0-0-60 50# 18-46-0 274# 28-0-0 155# 8-25-3 297# 28-0-0 injected Total 181-62-63	Stand probably decreased by dry spring weather. Moderate amounts of barnyardgrass and dock. Plants showed purpling of leaves in early June, indicating a Phosphorus deficiency.	Mixture of Bojac 432 & Pioneer 3747	26200/23000 26200/21300	20.8 20.4	91.9 88.6
200# 0-0-60 265# 28-0-0 155# 8-25-3 424# 28-0-0 injected Total 205-39-125	A herbicide combination of Paraquat and 2,4-D is not a recommended practice. Moderate giant foxtail in this field. Row cultivated to control escaped weeds.	Pioneer 3747	26200/26000	25.6	153.7
200# 0-0-60 265# 28-0-0 155# 8-25-3 446# 28-0-0 injected Total 211-39-125	A herbicide combination of Paraquat and 2,4-D is not a recommended practice. Row cultivated to control escaped weeds.	Bojac 432 Pioneer 3747	26200/26000	29.8 24.8	137.1 128.0

Cooperator, Plot, Planting Date	Tillage/Planter	Residue	Soil Type	Herbicides	Insecticides
Ted Pohlmann #5 May 1	No-till/ Farmer's JD	Winter Killed Wheat	Hoytville	2 pt/A Paraquat 3 pt/A Aatrex 2 qt/A Lasso ¼ qt/A 2,4-D	2 oz/bu Agrox I seed treatme ½ pt/A Toxaphe with herb.
Ted Pohlmann #6 May 1	No-till/ Farmer's JD Fall Plow, Sp. Field cult. (2x), Roterra/ Farmer's JD	Wheat with Rye cover	Oshtemo Hoytville Haskins Millgrove	2 pt/A Paraquat 3 pt/A Aatrex 2 qt/A Lasso ¼ qt/A 2,4-D	2 oz/bu Agrox I seed treatmen ½ pt/A Toxaphe with herb.
Ted Pohlmann #7 May 5	No-till/Hin. & Buffalo cult.	Wheat/Clover	Latty	2 pt/A Paraquat 3 pt/A Aatrex 2 qt/A Bladex	2 oz/bu Agrox I seed treatm ½ pt/A Toxapher with herb
Milo Renz April 27	No-till/IH Sp plow, disk/IH No-till/IH Sp disk/IH --- No-till/IH	Alfalfa sod Alfalfa sod Soybean Soybean --- Alfalfa	Latty Fulton	0.84 qt/A Paraquat 2 lb/A Bladex 2 qt/A Lasso	8.7#/A Counter banded
Bob & Don Rethmel #1 May 6	No-till/White Fall plow, Sp. field cult., harrogate, cult ipack/White	Wheat/Clover	Blount Belmore Colwood Digby Ottokee	2 pt/A Paraquat 1½ lb/A Aatrex 1½ lb/A Bladex 2 qt/A Lasso	2 oz/bu Agrox I seed treatme ½ pt/A Toxaphe with herb.
Bob Rettig #1 May 1	No-till/IH Fall plow, Sp. disk & field cult/IH	Wheat/ Soybean	Hoytville Nappanee	1½ pt/A Paraquat 1½ qt/A Aatrex 2 pt/A Dual Post: ¼ pt/A Banvel ½ pt/A 2,4-D	5 oz/bu Isotox seed treatme ---
Bob Rettig #1 P May 1	Fall plow, sp. disk, & field cult/IH	---	Hoytville Nappanee	1½ qt/A Aatrex 2 pt/A Dual Post: ¼ pt/A Banvel ½ pt/A 2,4-D	None

Fertilizer Applied Total N-P_2O_5-K_2O	Plot Comments	Variety or Hybrid	Population/A (Drop/Stand)	%H_2O	Yield (bu/A)
150# 0-0-60 100# K-MAG 265# 28-0-0 140# 8-25-3 446# 28-0-0 injected Total 210-35-116	Total micronutrients: 22 lbs/A sulfur and 18 lbs/A Mg. Paraquat and 2,4-D combination not recommended Planter overpopulated above desired population. Sprayer missed strip in field.	Asgrow RX777	28500/30700	23.6	187.4
150# 0-0-60 100# K-MAG 265# 28-0-0 140# 8-25-3 446# 28-0-0 injected Total 210-35-116	Total micronutrients: 22 lbs/A sulfur and 18 lbs/A Mg. Paraquat and 2,4-D combination not recommended Planter overpopulated above desired population. Excellent field.	Asgrow RX777	28500/29300	25.2 23.5	177.0 168.7
2 T/A Lime 270# 28-0-0 155# 8-25-3 223# 28-0-0 injected Total 150-39-5	Plants showed signs of Phosphorus deficiency in early June (purpling of leaves). Symptoms left later. Buffalo cult. did poor job in this field. Caused slabbing & poor ridg	Pioneer 3747	26200/26000	27.8	124.5
300# 6-24-24 536# 28-0-0 Total 168-72-72	Moderate to severe grass pressure in all no-till sections. Some armyworm in alfalfa sod. No yield checks arranged. (Two fields)	Stauffer Migrow	28000/26800 28000/22000 28000/26000 28000/22000 --- 28000/26400	-----	------
200# 0-0-60 75# 21-0-0 100# 8-32-16 482# 28-0-0 injected Total 159-32-136	Inconsistent seed planting depth. Ammonium sulfate fertilizer supplied 15 lbs/A of sulfur.	Trojan T 1058	27900/20200 27900/19300	24.5 20.4	118.4 150.0
170# 6-24-24 138# 82-0-0 Total 123-41-41	Post application of herbicides gave good control of escape annual broadleaf weeds and reduced pressure from scattered perrenials.	Cargill 924	26300/24000 26300/24300	21.3 19.8	111.4 126.4
117# 15-0-40 138# 82-0-0 Total 131-0-47 --- 170# 6-24-24 138# 82-0-0 Total 123-41-41	Phosphorus drawdown demonstration plot. Bray P1 soil test level was 108 lbs P/A	Cargill 924	26300/24300	19.5 19.8	114.6 126.4

Cooperator, Plot, Planting Date	Tillage/Planter	Residue	Soil Type	Herbicides	Insecticides
Bob Rettig #2 May 1	No-till/IH Sp. Field cult Disk, pack/IH	Soybean	Hoytville	1 pt/A Paraquat 1½ qt/A Aatrex 2 pt/A Dual Post: ¼ pt/A Banvel ½ pt/A 2,4-D	5 oz/bu Isotox seed treatmen ----------
Bob Rettig #2 P May 1	No-till/IH	Soybean	Hoytville	1 pt/A Paraquat 1½ qt/A Aatrex 2 pt/A Dual Post: ¼ pt/A Banvel ½ pt/A 2,4-D	5 oz/bu Isotox I seed treatment
Brian Rohrs #1 June 12	No-till/Hin.	Rye cover removed as silage	Lenawee Del Rey	1 pt/A Paraquat ½ pt/A Banvel 2 qt/A Bladex	Rescue treatmer 1#/A Lorsban
Brian Rohrs #2 June 17	No-till/Hin.	Rye cover removed as silage	Lenawee Del Rey	1 pt/A Paraquat ½ pt/A Banvel 2 qt/A Bladex	Rescue treatmen 1#/A Lorsban
Albert Schroeder #1 April 24	No-till/ Farmer's JD Fall chisel, sp. field cult /Farmer's JD	Soybeans	Mermill Digby Seward Rimer Hoytville	3.2 pt/A Aatrex 2 qt/A Lasso	9#/A Counter banded
Albert Schroeder #2 April 26	Fall chisel, sp. field cult /JD & row cult ---------- Fall plow, sp. field cult/JD & row cult.	Soybeans	Mermill	3.2 pt/A Aatrex 2 qt/A Lasso	9#/A Counter banded
Owen Schroeder #1 May 11	No-till/IH Sp. Chisel, disk (2x)/IH	Alfalfa sod	Blount Millgrove Rimer Rawson Oshtemo Glynwood	1 qt/A Paraquat 4 lb/A Atrazine Spot spray: ½ pt/A Banvel	13.3#/A Furadar

Fertilizer Applied Total N-P_2O_5-K_2O	Plot Comments	Variety or Hybrid	Population/A (Drop/Stand)	%H_2O	Yield (bu/A)
230# 6-24-24 138# 82-0-0 Total 127-55-55	Wet field; was crusted at planting, however planter did good job.	Cargill 922	26300/24400 26300/-----	21.3 21.8	85.6 97.3
117# 18-0-47 138# 82-0-0 Total 134-0-53 ----------	Phosphorus drawdown demonstration plot. Soil test level was 31 lbs P/A.	Cargill 924	26300/24400	21.5	105.0
230# 6-24-24 138# 82-0-0 Total 127-55-55				19.8	93.1
200# 9-23-30 133# 9-18-9 571# 28-0-0 injected Total 190-70-72	Planted following harvest of rye cover crop. Severe armyworm outbreak required treatment. Harvested as silage. Yield check taken but grain too wet for accurate yield.	Pioneer 3780	27500/25800	---	-----
200# 9-23-30 133# 9-18-9 571# 25-0-0 injected Total 190-70-72	Same as #1	Pioneer 3780	27500/24000	----	-----
200# 0-0-60 446# 28-0-0 240# 6-26-26 250# 28-0-0 injected Total 209-62-182	Excellent field with no problems.	Rupp 1624 Rupp 1690 Rupp 1690 Rupp 1780	25000/23700 25000/23300	19.2 19.5 18.6 21.8	162.4 182.6 175.2 170.2
200# 0-0-60 240# 6-26-26 536# 28-0-0 Total 164-62-182	Farmer used own JD planter He indicated yields were uniform in both sections, about 154 bu/A.	Pioneer	24000/-----	---	-----
100# 0-46-0 500# 28-0-0 Total 140-46-180	Severe infestation of fall panicum. Also, field had a light armyworm infestation. Harvested as silage. A hand check found yields of 146.4 for no-till and 146.8 for conv.	Pioneer 3780	25600/22400	---	-----

Cooperator, Plot, Planting Date	Tillage/Planter	Residue	Soil Type	Herbicides	Insecticides
Owen Schroeder #2 June 12	No-till/IH	First hay cutting removed	Blount Pewamo	4½ lb/A Atrazine & crop oil ½ pt/A Banvel	13.3#/A Furadan banded
Bob Shininger #1 April 26	No-till/White Sp. Field cult & harrogate (2x)/White	Corn Silage removed	Paulding Roselms	1.67 lb/A Atrz. 9-0 2½ qt/A Lasso	8.7#/A Counter banded
Bob Shininger #1 P April 26	No-till/White	Corn Silage removed	Paulding Roselms	1.67 lb/A Atrz. 9-0 2½ qt/A Lasso	11#/A Furadan banded
Bob Shininger #2 April 26	No-till/White Sp. Field cult & harrogate (2x)/White	Corn Silage removed	Paulding Roselms	1.67 lb/A Atrz. 9-0 2½ qt/A Lasso	8.7#/A Counter banded
Bob Shininger #2 P April 26	No-till/White	Corn Silage removed	Paulding Roselms	1.67 lb/A Atrz. 9-0 2½ qt/A Lasso	8.7#/A Counter banded
Bob Shininger #3 April 26	No-till/White	Corn Silage removed	Paulding Roselms	1.67 lb/A Atrz. 9-0 2½ qt/A Lasso	8.7#/A Counter banded
Bob Shininger #4 May 6	No-till/ Farmer JD No-till/IH No-till/IH	Alfalfa Sod	Roselms	0.9 qt/A Paraquat 1 pt/A Banvel II JD section only: 1.67 lb/A Atrz.9-0 2½ qt/A Lasso IH section only: 5.5 lb/A Atrz.9-0	8.7#/A Counter banded

Fertilizer Applied Total $N-P_2O_5-K_2O$	Plot Comments	Variety or Hybrid	Population/A (Drop/Stand)	$\%H_2O$	Yield (bu/A)
100# 0-46-0 300# 0-0-60 100# 15-30-30 129# 82-0-0 Total 121-76-210	Planted following hay harvest. Light infestation of armyworms. Harvested as silage.	Rupp 1690	25600/24000	---	-----
80# 0-0-60 150# 0-46-0 218# 28-0-0 170# 82-0-0 Total 200-69-48	Farmer desired population of 25000, but chain jumped sprocket, and planted 35000. Majority of field harvested as silage-grain yield check taken too early in fall.	DeKalb XL32A	35000/33700 35000/34700	32.9 39.8	99.2 87.6
80# 0-0-60 218# 28-0-0 170# 82-0-0 Total 200-0-48 Above plus 150# 0-46-0 Total 200-69-48	Phosphorus drawdown demonstration plot. Field had test level of 61 lbs P/A. Other comments same as plot #1.	DeKalb XL32A	35000/33700	37.0 33.6	91.0 98.2
80# 0-0-60 150# 0-46-0 218# 28-0-0 170# 82-0-0 Total 200-69-48	Chain on planter jumped and planted 35000 instead of 26000. Some moderate quackgrass patches.	Robinson 3122	35000/28600	20.8 20.7	122.5 114.5
80# 0-0-60 218# 28-0-0 170# 82-0-0 Total 200-0-48 Above plus 150# 0-46-0 Total 200-69-48	Phosphorus drawdown demonstration plot. Field had test level of 42 lbs P/A. Other comments same as plot #2.	DeKalb XL32A	35000/-----	18.0 18.6	115.1 114.9
80# 0-0-60 150# 0-46-0 218# 28-0-0 170# 82-0-0 Total 200-69-48	Planter planted 35000, not 26000 desired due to jumped chain. Stand count taken too early. Some quackgrass patches, overall clean field. Harvested as silage. Hand yield check was 124.2 bu/A.	Robinson 3122	35000/22000+	---	-----
125# 18-46-0 130# 12-60-45 198# 82-0-0 Total 200-136-59	Moderate amounts of fall panicum and dandelions throughout field. JD planter had trouble penetrating very hard, dry soil. Also 1 pt/A 2,4-D post applied to escaped dandelions.	Sohigro 39	26000/24800	21.3 20.2 21.5	82.1 93.4 96.4

Cooperator, Plot, Planting Date	Tillage/Planter	Residue	Soil Type	Herbicides	Insecticides
Louis Shininger #1 April 29	No-till on ridge/Farmer's JD & row cult.	Corn	Paulding Roselms Latty Fulton	2 lb/A Atrz. 9-0 2 pt/A Dual Post: ½ pt/A 2,4-D	None
Clete Siler #1 April 26	Fall plow, disk, cultimulch, field cult., ridge/JD & row cult. (2x)	-------	Paulding Roselms	1 qt/A Paraquat 2 qt/A Lasso Post: 1½ lb/A Atrazine & oil	None
Dan Singer #1 April 27	No-till/White Sp field cult. (2x), Roterra/White	Poor new alfalfa seeding	Paulding	1 pt/A Paraquat 4 qt/A Aatrex 1 qt/A Dual	8.7# Counter banded
Dan Singer #2 April 27	No-till/White	Poor new alfalfa seeding	Paulding Roselms	1 pt/A Paraquat 4 qt/A Aatrex 1 qt/A Dual Post: ½ pt/A 2,4-D ¼ pt/A Banvel	8.7# Counter banded
Clete Vetter #1 April 30	Fall plow, field cult (2x), ridge/IH Fall plow, sp. field cult/IH	---------	Lenawee, Del Rey	2 qt/A Lasso 2 lb/A Atrazine ½ pt/A Banvel Post: 4 lb/A Atrazine ½ pt/A Banvel	None
John & Joe Wagner April 25	No-till/Farmer's JD Fall chisel, sp field cult/Farmer's JD	Soybean	Hoytville	1 qt/A Aatrex 2 qt/A Bladex	4 oz/bu Diazinon seed treatment
Denver Zeedyk	Fall chisel, sp field cult. (2x), cultimulch Fall plow, sp. field cult (2x) cultimulch	Wheat	Latty Fulton	1½ lb/A Aatrex 2 qt/A Lasso	None

Fertilizer Applied Total N-P_2O_5-K_2O	Plot Comments	Variety or Hybrid	Population/A (Drop/Stand)	$\%H_2O$	Yield (bu/A)
150# 18-46-0 195# 82-0-0 Total 187-69-0	Planted no-till on old corn ridges. Some light grass pressure. Row cultivated once to control weeds and maintain ridge. These ridges were originally formed in fall 1978.	Supercross 2350 Stauffer 5260 Stauffer 606	26100/24000	17.9 19.6 21.7	132.3 137.9 136.6
200# 6-24-24 Intended to inject 28% if possible. Total 12-48-48	Corn had poor emergence. Most of field was worked flat and replanted. One strip of ridges were replanted. Wet soil conditions prevented application of additional N.	Landmark 533	21000/-----	---	-----
300# 0-26-26 183# 82-0-0 Total 150-78-78	No-till coulter ran too deep (4"). Dry May weather caused soil to crack open along seed trenches, and corn kernels fell to 4" depth. Luckily corn emerged before trenches closed shut.	Pioneer 3535	26900/24400 26900/26700	19.2 20.1	154.4 146.6
300# 0-26-26 536# 28-0-0 Total 150-78-78	Same comments as #1. Also field had moderate dandelions, that were sprayed with Banvel and 2,4-D.	Pioneer 3780	26900/25300	14.3	148.9
214# 28-0-0 125# 9-23-30 98# 82-0-0 Total 151-29-38	Field sprayed with Atrazine and Banvel to control thistles, quackgrass, and other weeds.	Landmark 733	26000/24000 26000/24000	20.7 20.5	137.6 141.4
250# 19-19-19 150# 8-33-14 321# 28-0-0 Total 150-97-68	Two separate fields, treated the same. No problems in either field. No yield check arranged. Farmer indicated yields of 150 bu/A for NT and chisel in one field. Other field: NT-140, Chisel-148	DeKalb XL55A	26100/-----	---	-----
400# 6-24-24 122# 82-0-0 Total 124-96-96	Two separate fields. No yield check arranged.	----------	-------	---	-----

1982 CORN YIELD SUMMARY

I. NO-TILL YIELDS BY SURFACE RESIDUE

Table 3

In rye or winter-killed wheat	No-till	Comparison
Richard Appel & Sons #3	130.6	127.2
Jim Donze #3	168.3	167.8
Jim Donze #3	160.8	171.6
Duane Engel #1	142.5	144.5
Duane Engel #2	174.9	169.5
Art Hoellrich #3	148.1	135.2
Ted Pohlmann #6	177.0	168.7
Average	157.5	154.9

Table 4

In soybean stubble or light residue	No-till	Comparison
Richard Appel & Sons #2	122.4	127.9
Bob & Bruce Colwell #1	132.1	115.3
Bob & Bruce Colwell #2	155.1	152.8
Bob & Bruce Colwell #3	164.2	159.6
Bob & Bruce Colwell #4	151.3	136.7
Steve Coolman #1	102.0	101.5
Steve Coolman #2	112.3	116.8
Jim Donze #2	130.4	137.0
Bob Heisler #1	147.2	143.2
Walt Helmke #1	138.1	139.1
Bob & Jerry Hoshock #1	170.4	149.1
Tom & Joe Hoshock	170.4	151.0
Tod Pohlmann #2	91.9	88.6
Bob Rettig #2	85.6	97.3
Albert Schroeder #1	182.6	175.2
Bob Shininger #1	99.2	87.6
Bob Shininger #2	122.4	114.5
Dan Singer #1	154.4	146.6
Average	135.1	130.0

Table 5

In wheat straw, clover	No-till	Comparison
Jim Donze #1	120.4	147.6
Walt Helmke #2	123.0	138.2
Bob & Don Rethmel #1	118.4	150.0
Bob Rettig #1	111.4	126.4
Average	118.3	140.6

AVERAGE YIELDS OVER ALL RESIDUE TYPES

No-till	Comparison
138.2	137.5

In examining the average corn yields by surface residue, it appears that in 1982 heavy residues decreased yields. Since all the yields for no-till in table 5 are substantially less than the comparison, this is probably a safe generalization. However, it should be noted that in one of the fields, good depth control at planting was not achieved, thereby reducing the stand. On another of the fields in table 5, drainage was less than adequate.

II. NO-TILL YIELDS BY SOIL GROUPS

As classified by OARDC Research Bulletin 1068

Group I - Well drained soils, should show yield increase with no-till.
Group II- No-till yields comparable to conventional, with improved soil drainage.
Group III- Poorly drained soils, may yield less wtih no-till than conventional.
Group IV- Very poorly drained soils, may yield less with no-till than conventional. No-till more favorable than deep spring tillage.

Group V - Paulding - very poorly drained high clay soil - no-till not recommended.

Table 6

Groups I and II	Soil Type	No-till	Comparison
Richard Appel & Sons #2	Blount, Glynwood	122.4	127.9
Richard Appel & Sons #3	Blount, Glynwood	130.6	127.2
Bob Heisler #1	Blount, Pewamo	147.2	143.2
Art Hoellrich #3	Rimer, Mermill, Wauseon	148.1	135.2
Ted Pohlmann #6	Oshtemo, Haskins, Millgrove	177.0	168.7
Bob & Don Rethmel #1	Blount, Belmore, Colwood	118.4	150.0
Albert Schroeder #1	Mermill, Digby, Seward	182.6	175.2
	Average	146.6	146.8

In analyzing the yields by soil grouping, table 6 does not give any advantage in favor of no-tillage on plots in soil groups I and II. Most of the plots in this table are in group II and it is doubtful if all the fields are adequately tile drained. If the Rethmel data was omitted from this table, since there is a question if the reduction in yield was a result of problems encountered with planting, the average yields for the remaining six plots would be 151.3 bushels per acre for no-till and 146.2 bushels per acre for the comparison.

Table 7

Groups III and IV	Soil Type	No-till	Comparison
Bob & Bruce Colwell #1	Hoytville	132.1	115.3
Bob & Bruce Colwell #2	Hoytville, Nappanee	155.1	152.8
Bob & Bruce Colwell #3	Hoytville, Mermill	164.2	159.6
Bob & Bruce Colwell #4	Hoytville, Haskins, Oshtemo	151.3	136.7
Steve Coolman #2	Roselms	112.3	116.8
Jim Donze #1	Hoytville	120.4	147.6
Jim Donze #2	Hoytville, Nappanee	130.4	137.0
Jim Donze #3	Hoytville, Nappanee	168.3	167.8
Jim Donze #3	Hoytville, Nappanee	160.8	171.6
Duane Engel #1	Hoytville	142.5	144.5
Duane Engel #2	Hoytville	174.9	169.5
Walt Helmke #1	Hoytville, Nappanee	138.1	139.1
Walt Helmke #2	Hoytville, Nappanee	123.0	138.2
Bob & Jerry Hoshock #1	Hoytville	170.4	149.1
Tom & Joe Hoshock	Hoytville, Nappanee	170.4	151.0
Ted Pohlmann #2	Latty	91.9	88.6
Bob Rettig #1	Hoytville, Nappanee	111.4	126.4
Bob Rettig #2	Hoytville	85.6	97.3
	Average	139.1	139.4

Table 8

Group V	Soil Type	No-till	Comparison
Steve Coolman #1	Paulding	102.0	101.5
Bob Shininger #1	Paulding, Roselms	99.2	87.6
Bob Shininger #2	Paulding, Roselms	122.4	114.5
Dan Singer #1	Paulding	154.4	146.6
	Average	119.5	112.6

As can be seen on table 7, there was no reduction in yield for the plots in soil group III and IV while table 8 shows a slight advantage to no-till on group V soils. It is interesting to note the general decrease in yields from group I thru group V soils which would be expected and also adds validity to the data presented.

III. NO-TILL YIELDS BY SOIL GROUPS AND RESIDUES

Groups I and II

Table 9

In rye or W.K. Wheat	Soil Type	No-till	Comparison
Richard Appel & Sons #3	Blount, Glynwood	130.6	127.9
Art Hoellrich #3	Rimer, Mermills, Wauseon	148.1	135.2
Ted Pohlmann #6	Oshtemo, Haskins, Millgrove	177.0	168.7
	Average	151.9	143.9

Table 10

In soybean stubble or light residue	Soil type	No-till	Comparison
Richard Appel & Sons #2	Blount, Glynwood	122.4	127.9
Bob Heisler #1	Blount, Pewamo	147.2	143.2
Albert Schroeder #1	Mermill, Digby, Seward	182.6	175.2
	Average	150.8	148.8

Table 11

In wheat straw/clover	Soil Type	No-till	Comparison
Bob & Don Rethmel #1	Blount, Belmore, Colwood	118.4	150.0

Groups III and IV

Table 12

In winter killed wheat	Soil Type	No-till	Comparison
Jim Donze #3	Hoytville, Nappanee	168.3	167.8
Jim Donze #3	Hoytville, Nappanee	160.8	171.6
Duane Engel #1	Hoytville	142.5	144.5
Duane Engel #2	Hoytville	174.9	169.5
	Average	161.6	163.4

Table 13

In wheat straw/clover	Soil Type	No-till	Comparison
Jim Donze #1	Hoytville	120.4	147.6
Walt Helmke #2	Hoytville, Nappanee	123.0	138.2
Bob Rettig #1	Hoytville, Nappanee	111.4	126.4
	Average	118.3	137.4

Table 14

In soybean stubble	Soil Type	No-till	Comparison
Bob & Bruce Colwell #1	Hoytville	132.1	115.3
Bob & Bruce Colwell #2	Hoytville, Nappanee	155.1	152.8
Bob & Bruce Colwell #3	Hoytville, Mermill	164.2	159.6
Bob & Bruce Colwell #4	Hoytville, Haskins, Oshtemo	151.3	136.7
Steve Coolman #2	Roselms	112.3	116.8
Jim Donze #2	Hoytville, Nappanee	130.4	137.0
Walt Helmke #1	Hoytville, Nappanee	138.1	139.1
Bob & Jerry Hoshock #1	Hoytville	170.4	149.1
Tom & Joe Hoshock	Hoytville, Nappanee	170.4	151.0
Ted Pohlmann #2	Latty	91.9	88.6
Bob Rettig #2	Hoytville	85.6	97.3
	Average	136.5	131.2

Group V

Table 15

In soybean stubble, etc.	Soil Type	No-till	Comparison
Steve Coolman #1	Paulding	102.0	101.5
Bob Shininger #1	Paulding, Roselms	99.2	87.6
Bob Shininger #2	Paulding, Roselms	122.4	114.5
Dan Singer #1	Paulding	154.4	146.6
	Average	119.5	112.6

In tables 9 - 15, all soil groups responded well with no-tillage with the exception of tables 11 and 13, where the residue was wheat straw and/or clover. As was suggested earlier, there may have been reasons other than the residue for this yield reduction. Results from previous years' work have not shown this drastic yield reduction under similar circumstances.

IV. CORN YIELDS ON NEW RIDGES

Table 16

	Ridge	Flat Comparison
Lynn Davis	87.8	85.2
Ted Pohlmann #1	127.1	119.9
Clete Vetter #1	137.6	141.4
Average	117.5	115.5

V.. CORN YIELDS NO-TILL ON OLD RIDGES

Table 17

Louis Shininger #1	Average of 3 varieties	136.6

Regarding corn on ridges, there is no significant difference in the no-till on ridges and flat comparison average. However, since the spring was early and dry in 1982, the benefit of planting on a dry ridge while the flat soil was still moist did not occur. Even though the soils in table 15 are those where the most benefit from ridging should be observed, one must not compare the yields in table 16 to table 15 since the plots vary widely in soil type, drainage, and fertility.

VI. NO-TILL CORN YIELDS WITHOUT COMPARISONS

Including multiple varieties in the same field.

Table 18

Richard Appel & Sons #2	103.2
Arnold Bok #1	100.0
Arnold Bok #2	94.0
Ray Bok #1	123.8
John Crites	51.8
Jim Donze #4	151.0
Art Hoellrich #2	145.2
Art Hoellrich #2	121.2
Bob & Jerry Hoshock #1	167.3
Bob & Jerry Hoshock #2	182.2
Bob & Jerry Hoshock #3	130.0
Bob & Jerry Hoshock #3	148.9
Bob & Jerry Hoshock #3	142.8
Don Lehman	58.9
Ted Pohlmann #3	153.7
Ted Pohlmann #4	137.1
Ted Pohlmann #4	128.0
Ted Pohlmann #5	187.4
Ted Pohlmann #7	124.5
Albert Schroeder	162.4
Bob Shininger #4	82.1
Bob Shininger #4	93.4
Bob Shininger #4	96.4
Dan Singer #2	148.9
Average	126.4

VII. OVERALL NO-TILL CORN AVERAGES

With Comparisons Average 138.2 N = 29
Without Comparisons Average 126.4 N = 24

Overall No-till Corn Average = 132.9 bu/A

VIII. PHOSPHORUS DRAWDOWN PLOTS

Table 19

	Bray P-1 Soil test	Pounds of P_2O_5 added	Yield	
			With P	Without P
Bob Rettig #1P	108#	41	126.4	114.6
Bob Rettig #2P	31#	55	93.1	105.0
Bob Shininger #1P	61#	69	98.2	91.0
Bob Shininger #2P	42#	69	114.9	115.1
Average	60	58	108.2	106.4

Demonstration plots are marked with signs, so that passersby will know that a tillage demonstration is in progress.

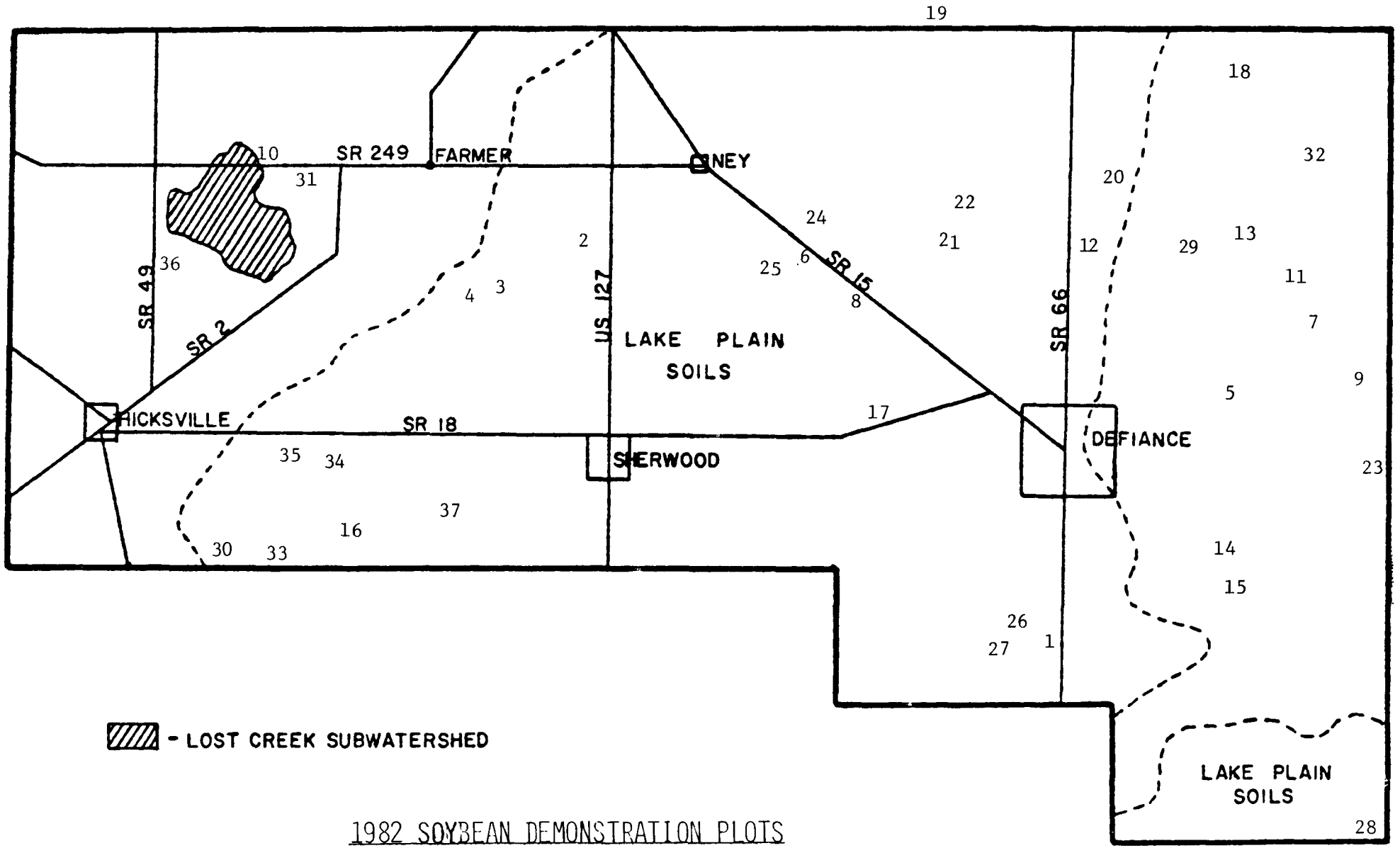
COMPARISON YIELDS BY TILLAGE & SOIL GROUPS

Table 20

	Fall Plow	Fall Chisel	Spring Plow	Spring Chisel	Spring Disk	Spring Field Cult.	New Ridges	No-Till
Soil Groups I & II								
Richard Appel & Sons #2					127.9			122.4
Richard Appel & Sons #3					127.2			130.6
Paul Bok			102.1	116.3				
Bob Heisler #1					143.2			147.2
Art Hoellrich #3				135.2*				148.1
Ted Pohlmann #6	168.7							177.0
Bob & Don Rethmel #1	150.0							118.4
Albert Schroeder #1		175.2						182.6
Soil Groups III & IV								
Bob & Bruce Colwell #1						115.3		132.1
Bob & Bruce Colwell #2						152.8		155.1
Bob & Bruce Colwell #3						159.6		164.2
Bob & Bruce Colwell #4						136.7		151.3
Steve Coolman #2						116.8		112.3
Jim Donze #1	147.6							120.4
Jim Donze #2					137.0			130.4
Jim Donze #3						167.8		168.3
Jim Donze #3						171.6		160.8
Duane Engel #1						144.5		142.5
Duane Engel #2						169.5		174.9
Walt Helmke #1						139.1		138.1
Walt Helmke #2	138.2							123.0
Walt Helmke #2	127.9	129.6						
Bob & Jerry Hoshock #1						149.1		170.4
Tom & Joe Hoshock						151.0		170.4
Ted Pohlmann #1	119.9						127.1	
Ted Pohlmann #2					88.6			91.9
Bob Rettig #1	126.4							111.4
Bob Rettig #2						97.3		85.6
Clete Vetter #1	141.4						137.6	
Soil Group V								
Steve Coolman #1					101.5			102.0
Lynn Davis	85.2						87.8	
Bob Shininger #1						87.6		99.2
Bob Shininger #2						114.5		122.4
Dan Singer #1						146.6		154.4

* V-Plow and field cultivate

DEFIANCE COUNTY-LOST CREEK DEMONSTRATION PROJECT



1982 SOYBEAN DEMONSTRATION PLOTS

1982 SOYBEAN DEMONSTRATION PLOTS

1. Bob Austermiller
2. Ray Bok #2
3. Ray Bok #3
4. Ray Bok #4
5. Virg Cameron #1 and 2
6. Steve Coolman #3
7. Ned Dunbar #1 and 2
8. John & Larry Hammersmith
9. Gary Hammon
10. Bob Heisler #2
11. Walt Helmke #3
12. Phil Hornish
13. Dick Hoschak
14. Bob & Jerry Hoshock #4
15. Dick & John Hoshock
16. Peter Kennerk #1 and 2
17. Don Meyer
18. Art Michaelis
19. Ted Pohlmann #8
20. Ted Pohlmann #9
21. Bud Ream
22. Bob & Don Rethmel #2
23. Bob Rettig #3
24. Louis Shininger #2
25. Louis Shininger #3
26. Clete Siler #2 and others
27. Richard Siler
28. Bill Temple
29. Tinora FFA
30. Clete Vetter #2
31. Clair Vollmer
32. John & Joe Wagner
33. Denver Zeedyk
34. Roger Zeedyk, Jr.
35. Zane Zeedyk #1
36. Zane Zeedyk #2
37. Zane Zeedyk #3

NOTES ON THE INDIVIDUAL PLOT TABLES

The tillage/planter columns correspond with the variety, population, $\%H_2O$, and yield columns.

Under herbicides, Paraquat is used only on the no-till sections, unless otherwise noted. A non-ionic surfactant is always used with Paraquat.

Soil types are listed in the order of largest to smallest area in the field.

Several fields do not have yields listed. The major reason is that the farmer did not arrange a yield check with the SWCD. Some farmer estimates of yields are included in the plot comments, when available. These estimates are not accurate enough to include in the yield column.

1982 Soybean Demonstrations

Cooperator, Plot, Planting Date	Tillage/Planter	Residue	Soil Type	Herbicides	Insecticides
Bob Austermiller May 12	Fall chisel, disk, ridge/ Hiniker	-------	Paulding Roselms	1 pt/A Paraquat 2½ qt/A Lasso Other part of field 1½ qt Roundup 2½ qt/A Lasso	None
Ray Bok #2 May 11	No-till/White Fall chisel, sp field cult. (2x), seedbed cond./Farmer's JD	Corn	Fulton Latty	½ pt/A 2,4-DB 1 pt/A Lorox 4L 1 pt/A Dual 2/3 lb/A Lexone	None
Ray Bok #3 May 11	Fall chisel, field cult (2x) seedbed cond. Fall plow, field cult (2x) seedbed cond.	Wheat	Latty Nappanee	1 qt/A Dual 2/3 lb/A Lexone	None
Ray Bok #4 May 14	No-till/ Farmer's JD	Corn	Toledo Gilford	½ pt/A 2,4-DB 1 pt/A Lorox 4L 1 pt/A Dual	None
Virg Cameron #1 May 10	No-till/JD Sp. Disk (2x)/JD	Corn	Hoytville	1 pt/A Paraquat 2/3 lb/A Lexone DF 2½ qt/A Lasso Ropewick Roundup (20 A/gal)	2 oz/bu Isotox seed treatment
Virg Cameron #2 May 10	No-till/Crust Buster Sp. Disk (2x) /Crust Buster	Corn	Hoytville	1½ pt/A Paraquat 2/3 lb/A Lexone DF 2½ qt/A Lasso Spot spray 2½ pts/A Poast &	2 oz/bu Agrox seed treatment

Fertilizer Applied Total N-P_2O_5-K_2O	Plot Comments	Variety or Hybrid	Population/A Drop Rate/Stand	%H_2O	Yield (bu/A)
2T/A Lime 90# 0-0-60 90# 0-46-0 Total 0-41-54	Severe patches of quackgrass. Moderate amounts of giant foxtail, smartweed, ragweed, bindweed, and thistles.	Beeson 80	60#/83600	16.1	20.3
None	No-till White has 15" rows, Chisel JD was 15" rows with two 30" skips. Moderate cocklebur infestation.	Agripro 26	85#/185900	13.2 13.3	37.0 40.2
300# 0-23-30 Total 0-69-90	Farmer used own JD planter with 15" rows and two 30" skips.	Washington 5	75#/-----	11.8 12.6	40.7 42.0
None	Farmer used own JD planter with 30" rows. This field had some fall panicum and also some assorted broadleaves. Some water damage in field.	SRF 307	60#/121000	12.5	36.5
None	Dry May weather decreased stand in disked section. Planter set for 30" rows. Roundup applied with ropewick to control milkweed and hemp dogbane.	Voris 295	60#/102800 60#76700	11.3 10.6	37.5 32.8
None	Plot had several quackgrass patches - Poast & oil applied to control. Roundup was ropewick applied to control milkweed and hemp dogbane.	Vickery	85#/261400 85#/202800	13.4 13.3	44.1 42.3

Cooperator, Plot, Planting Date	Tillage/Planter	Residue	Soil Type	Herbicides	Insecticides
Steve Coolman #3 May 20	No-till/White No-till/Crust-Buster Sp. disk 3x, harrogate/ Crust Buster	Corn	Paulding	1½ pt/A Paraquat ½ lb/A Sencor DF 2 qt/A Lasso	None
Ned Dunbar #1 June 4	No-till/Crust Buster Sp field cult/CB Sp. fld. cult. Roterra/30"rows	Soybean	Hoytville Nappanee	2 qt/A Roundup 1 qt/A Dual 2/3 lb/A Lexone	None
Ned Dunbar #2 June 4	No-till/Crust Buster	Soybean	Hoytville Nappanee	2 qt/A Roundup 1 qt/A Dual 2/3 lb/A Lexone	None
John & Larry Hammersmith May 3	Fall chisel, field cult (2x)/drill Sp. field cult. (2x)/drill	Soybean	Roselms	18 lb/A Lasso II through drill Post: 1 qt/A Blazer	None
Gary Hammon May 15	No-till/Crust Buster Sp. disk/ Farmer's drill	Winter Killed Wheat	Hoytville Nappanee	1 qt/A Paraquat 2/3 lb/A Lexone DF 2½ qt/A Lasso	None
Bob Heisler #2 May 12	No-till/White Fall chisel/ White Fall chisel/ Drill Fall plow/drill	Soybean	Blount Pewamo	1 pt/A Paraquat 2 qt/A Lasso 3/4 lb/A Sencor	None
Walt Helmke #3 May 18	No-till/Crust Buster	Soybean	Hoytville	½ lb/A Lexone 1 qt/A Dual	None

Fertilizer Applied Total N-P_2O_5-K_2O	Plot Comments	Variety or Hybrid	Population/A Drop Rate/Stand	%H_2O	Yield (bu/A)
None	Field was to compare no-till drill and no-till 15" planter. However, heavy June rainfall flooded majority of field, forcing replanting under conventional tillage.	Rupp 3110 w/Grandstand	85#/145200 85#/261600 -------- 85#/272500	---	-----
None	Farmer used own 30" planter and 8" row Crust Buster no-till drill. Field had severe quackgrass infestation, not controlled by Roundup - especially hurt NT.	Vickery	90#/228700 90#/222200 90#/179500	12.9 12.5 12.6	39.7 40.6 37.9
None	Field had severe quackgrass infestation, not adequately killed by Roundup. Farmer had another field (#3) same as #1 and #2 but no yield checks.	Vickery	90#/248300	12.9	41.3
None	Field had heavy amounts of cocklebur. Plot suffered from severe moisture stress dry summer.	SRF 307 P	150#/--------	---	-----
None	Poor initial contact kill with Paraquat.	Vickery	85#/261400 85#/287500	13.8 13.7	39.7 42.1
300# 0-0-60 Total 0-0-180	Secondary tillage on plowed and chiseled strips was disk (2x) and cultimulch. Poor spray job on no-till section; did not get good top burn back with contact herbicide.	Asgrow 3127	97#/250900 97#/243900	14.7 15.7 15.7 16.3	38.5 42.6 42.6 46.1
None	Excellent field with no problems.	Vickery	85#/254900	12.9	47.8

Cooperator, Plot, Planting Date	Tillage/Planter	Residue	Soil Type	Herbicides	Insecticides
Phil Hornish June 7	Fall plow, disk (2x), field cult., ridge/IH & Buff. cult.	------	Paulding	2 pt/A Paraquat 1 qt/A Dual 8E 2/3 lb/A Sencor DF	None
Dick Hoschak May 14	Fall chisel, sp field cult. landlevel	Corn	Hoytville Nappanee	6 pt/A Amiben	None
Bob & Jerry Hoshock #4 May 13	No-till/White No-till/White Disk, pack/White	Soybean	Hoytville	1 pt/A Paraquat 2 qt/A Lasso 1 pt/A Sencor	None
Dick & John Hoshock May 13	No-till/White	Soybean	Hoytville	1 pt/A Paraquat 2 qt/A Lasso 1 pt/A Sencor	None
Peter Kennerk #1 May 13	No-till/Crust-Buster	Soybean	Fulton Shoals Wabasha Rawson	1 pt/A Paraquat 3/4 pt/A Sencor 4L 2 qt/A Lasso	None
Peter Kennerk #2 May 14	No-till/Crust-Buster Sp. Disk (2x), harrogate/Crust Buster	Soybean	Toledo Lucas Fulton Latty	1 pt/A Paraquat 3/4 pt/A Sencor 4L 2 qt/A Lasso	None
Don Meyer May 12	No-till/Crust-Buster Sp. disk (2x), harrogate, pack/CB	Soybean	Paulding	1½ pt/A Paraquat 1 pt/A Sencor 2 qt/A Lasso	None

Fertilizer Applied otal N-P_2O_5-K_2O	Plot Comments	Variety or Hybrid	Population/A Drop Rate/Stand	%H_2O	Yield (bu/A)
None	Excellent field of new ridges, with good weed kill. Yield was probably decreased by drought in late summer.	Vickery & others	156800/139400	10.8	27.0
None		Vickery	60#/-----	13.9	40.7
None	Planter had good penetration and depth control. Excellent field.	Gold Tag 1250 Amcor Amcor	90#/219500 90#/ 90#/202100	12.5 12.6 12.8	43.7 45.9 44.5
None	Fairly clean field with no problems.	Vickery	90#/223000	10.8	48.1
300# 0-0-60 Total 0-0-180	Excellent initial stand, then some beans browned and died. Possibly herbicide or disease injury. Some strips replanted. No other problems.	Williams 79	85#/228700	13.0	37.8
300# 0-0-60 Total 0-0-180	Same comments as field #1. Very good, clean fields.	Williams 79	85#/239800 85#/218000	12.9 13.2	37.6 39.0
None	Used Grandstand on half of field.	Landmark FFR224	85#/272500 85#/218000	14.1 13.1	33.7 33.5

Cooperator, Plot, Planting Date	Tillage/Planter	Residue	Soil Type	Herbicides	Insecticides
Art Michaelis May 10	Fall chisel, sp. field cult cultimulch Sp field cult. cultimulch	Soybean	Hoytville Mermill	½ lb/A Sencor 2 qt/A Lasso	None
Ted Pohlmann #8 May 18	No-till/Frm JD & row cult(2x) Disk (2x)/Frm JD & row cult (2x)	Corn	Kibbie Genesee Tuscoala	2 pt/A Paraquat ½ lb/A Lexone 2 pt/A Prowl Post: 2 pt/A Blazer	2 oz/bu Agrox 2 way Seed Treatment
Ted Pohlmann #9 May 21	No-till on old corn ridges/IH & row cult(2x) Disk (2x), drag, pack/IH then work/drill replant	Corn	Latty	None	2 oz/bu Agway Seed Treatment
Bud Ream July 1	No-till/IH double back (15" row beans) - - - - - - - Sp. chisel, disk, roll/IH 15"	Clover hay Harvested	Roselms Paulding	2 qt/A Roundup 2 qt/A Lasso 3/4 pt/A Sencor	None
Bob & Don Rethmel #2 May 24 Replant June 9	Offset disk (2x), ridge/IH Replant JD Offset disk/IH Replant JD	------	Paulding Roselms	None	None
Bob Rettig #3 June 7	No-till/White	Winter Killed Wheat	Hoytville	1 qt/A Paraquat 1 pt/A Sencor 2 pt/A Dual Post: 2 pt/A Blazer	None
Louis Shininger #2 May 15	No-till on old corn ridge/ Farmer's JD No-till on old corn ridge/IH	Corn	Paulding Roselms	1 pt/A Paraquat 1 lb/A Surflan 2 pt/A Lorox	None

Fertilizer Applied Total N-P_2O_5-K_2O	Plot Comments	Variety or Hybrid	Population/A Drop Rate/Stand	%H_2O	Yield (bu/A)
200# 0-0-60 Total 0-0-120	Chisel plowing soybean stubble leaves too little residue on the soil surface to protect against erosion.	Vickery	65#/-----	11.5 10.8	48.2 47.3
None	This field had a serious problem with hedge bindseed. Sprayed with Blazer and row cultivate twice to control.	Pfizer CX380	160000/137600 160000/125500	11.6 11.7	45.8 48.1
175# 3-12-30 2% S 4% Mn Total 5-21-52	Comparison strip had to be replanted on June 15 due to crusting and damping off. Beans on ridges not replanted suffered from Rhizoctonia damping off.	Pfizer CX380	156800/111500 -------	13.2 12.5	25.1 29.3
None	Planting soybeans into clover is not a recommended practice. Field had moderate to severe weed pressure from regrowth not killed by Roundup. Drought further decreased yield.	Wayne	209100/-----	---	-----
None	Rained 3" before emergence and crusted. Replanted in same rows. Row cultivated once before replant, twice after. Moderate ragweed, smartweed, and nutsedge.	Pfizer CX380 replanted Pfizer CX290	60#/54000 60#/40100	12.9 12.8	28.3 25.5
None	Planted with White 15" row planter. Field has some drainage problems. Ragweed infestation required post application of Blazer. Field had high harvest losses. Yield check showed about 19 bushels/A.	Vickery Beeson Agripro 26	90#/205600	---	----
None	Excellent field with good ridges.	Agripro 26	60#/145200 60#/148100	14.7 14.8	38.1 35.1

Cooperator, Plot, Planting Date	Tillage/Planter	Residue	Soil Type	Herbicides	Insecticides
Louis Shininger #3 May 19	No-till/Crust-Buster Disk (2x), Roterra/Crust-Buster	Soybean	Paulding Roselms	1.2 pt/A Paraquat 2/3 lb/A Lexone	None
Clete Siler #2 May 7	No-till on old corn ridges/IH & row cult (3x) No-till on old corn ridges/Hin & row cult (3x)	Corn	Paulding Roselms	1½ pt/A Paraquat 1 lb/A Lexone 2 qt/A Lasso	None
Clete Siler Other fields May 6 - 10	New ridges/ Hiniker and farmer's own planter & row cultivate (3x)	-----	Paulding Roselms	1½ pt/A Paraquat 1 lb/A Lexone 2 qt/A Lasso	None
Richard Siler May 5	Fall plow, disk, cultmlch field cult., ridge/Farmer's planter & row cultivate (2x)	------	Paulding Roselms	1½ pt/A Paraquat 1 lb/A Lexone 2 qt/A Lasso	None
Bill Temple May 5	Fall plow, disk, field cult., ridge/ IH	--------	Paulding	1 pt/A Paraquat 1 pt/A Lexone 2½ qt/A Lasso	None
Tinora FFA May 12	No-till/Crust-Buster Sp. disk/ Crust Buster	Corn	Hoytville	1 qt/A Paraquat ½ lb/A Lexone DF 2½ qt/A Lasso	None
Clete Vetter #2 May 14	No-till on old corn ridges/IH " /Hin. Fall plow, disk (2x) roterra/IH " 7/18" AC	Corn	Lenawee Del Rey Millgrove	1 pt/A Paraquat 0.6 lb/A Sencor 2.7 pt/A Lasso ½ pt/A 2,4-D Conv. with IH: 7 lb/A Amiben banded	None

Fertilizer Applied Total N-P_2O_5-K_2O	Plot Comments	Variety or Hybrid	Population/A Drop Rate/Stand	%H_2O	Yield (bu/A)
200# 0-0-60	Heavy amount of hemp dogbane in field, moderate weeds overall.	Vickery	90#/261400	16.2	37.8
Total 0-0-120			90#/196000	16.4	40.8
3 gallon/A of a 9% Nitrogen foliar fertilizer was applied on July 20.	Field damaged by heavy rainfall in early July. Plants were stunted and yellowing - too late to replant.	Gold Tag 1250	1 bu/95800	15.0	16.6
				14.9	22.7
None	4 fields total. In 2, ridges formed with no other tillage in soybean residue. Other 2 plowed, worked, then ridged. Farmer indicated yields of about 22 bu/A.	Gold Tag 1250 Vickery Landmark 337	1 bu/------	---	-----
None	Good field with well formed ridges.	Gold Tag 1250	1 bu/------	15.5	43.9
235# 3-12-30	Clean field, with well formed ridges. Field had comparisons between certified and bin run seed at 2 rates	Wayne (bin)	156800/146700	13.8	31.0
		Wayne (cert)	156800/144600	13.8	27.6
		Wayne (bin)	191700/167700	13.5	29.0
Total 7-28-70		Wayne (cert)	191700/134200	13.7	27.1
None	Disk section fairly rough at planting. Paraquat applied over entire field. Some light assorted weeds.	Voris 295 w/Grandstand	85#/209100	12.0	42.6
			85#/182300	12.2	43.8
None	Herbicides with 18" planter in conv. tillage were ½ lb/A Sencor and 2 qt/A Lasso. Combination of Paraquat and 2,4-D is not recommended. Row cultivated all 30" rows.	Peterson 3081	50#/101600	13.3	46.1
		Gutwein 331		12.1	47.6
		Gutwein 331		14.7	40.9
		Peterson 3081		14.3	46.0
		Peterson 3081	70#/169400	14.6	44.8

Cooperator, Plot, Planting Date	Tillage/Planter	Residue	Soil Type	Herbicides	Insecticides
Clair Vollmer May 8	No-till/Frm. AC Sp. Disk, field cult./Frm. AC	Corn	Blount Glynwood	2 qt/A Lasso 1 lb/A Lorox Post: 2 pt/A Blazer	None
John & Joe Wagner May 4	Fall chisel, Sp field cult, disk, harrogate Fall plow, Sp. field cult, disk, harrogate	Corn	Hoytville	14 lb/A Amiben	None
Denver Zeedyk	Fall chisel, sp. field cult. 2x, cultimulch --- Fall plow, sp. field cult 2x, cultimulch	Wheat	Latty Fulton	½ lb/A Sencor 2 pt/A Lasso	None
Roger Zeedyk Jr. May 13	Fall chisel, sp. disk (2x) cultimulch --- Sp. disk (2x), cultimulch	Wheat	Latty Millgrove Fulton	3/4 lb/A Sencor 1 qt/A Dual	None
Zane Zeedyk #1 May 14	No-till Crust-Buster Disk (2x)/CB Disk (3x)/CB Disk (3x)/Fm. drill	Corn	Latty Fulton	1 lb/A Sencor	None
Zane Zeedyk #2 May 14	No-till/Crust-Buster Disk (1x)/CB Disk (1x)/Fm drl.	Soybeans	Glynwood	1 lb/A Sencor	None
Zane Zeedyk #3 May 12	Fall chisel, sp. disk (2x) cultimulch/drill	Wheat	Latty Fulton	3/4 lb/A Sencor 3/4 lb/A Treflan	None

Fertilizer Applied Total N-P_2O_5-K_2O	Plot Comments	Variety or Hybrid	Population/A Drop Rate/Stand	%H_2O	Yield (bu/A)
None	Severe infestation of fall panicum, caused either by lack of contact herbicide, or lack of rainfall to activate Lasso. Farmer indicated yield in NT was 20 and in Conv. was 42.	Asgrow 3127	70#/125500 70#/-----	---	-----
None	Farmer indicated yields in two sections were about the same - 48 bu/A. Planted with farmer's 30" row JD planter.	SRF 307	60#/-----	----	-----
None	No yield check arranged		----------	---	-----
None	Farmer used grain drill to plant. No yield check provided.	SRF 307 P	82#/-----	---	-----
None	Disk (3x) sections were also cultimulched. Good field with light weed pressure.	Washington 5	85#/137200 85#/150300 85#/143700	13.9 14.2 14.1 14.0	36.4 39.4 39.2 36.4
None	Field had light to moderate weed pressure. Also, late summer drought probably hurt this field.	Washington 5	85#/261200	14.9 14.8 15.0	29.4 31.5 30.3
None	Farmer commented that this field was dryer than the rest of farm. No yield check provided. Farmer indicated overall yield about 36.	Gutwein 331	93#/-------	---	-----

1982 SOYBEAN YIELD SUMMARY

I. NO-TILL YIELDS BY SURFACE RESIDUE

Table 21

In Corn Stalks	No-till	Comparison
Ray Bok #2	37.0	40.2
Virg Cameron #1	37.5	32.8
Virg Cameron #2	44.1	42.3
Ted Pohlmann #8	45.8	48.1
Tinora FFA	42.6	43.8
Zane Zeedyk #1	36.4	39.3
Average	40.6	41.1

Table 22

In Soybean Stubble	No-till	Comparison
Ned Dunbar #1	39.7	40.6
Bob Heisler #2	38.5	42.6
Bob & Jerry Hoshock #4	45.9	44.5
Peter Kennerk #2	37.6	39.0
Don Meyer	33.7	33.5
Louis Shininger #3	37.8	40.8
Zane Zeedyk #2	29.4	31.5
Average	37.5	38.9

Table 23

In Winter Killed Wheat	No-till	Comparison
Gary Hammon	39.7	42.1

AVERAGE YIELDS OVER ALL RESIDUE TYPES

No-till	Comparison
39.0	40.1

II. NO-TILL YIELDS ON OLD CORN RIDGES

Table 24

	No-till Ridge	Flat Comparison
Ted Pohlmann #9	25.1	29.3
Clete Vetter #2	46.1	46.0
Average	35.6	37.6

III. NO-TILL YIELDS BY SOIL GROUPS

As classified by OARDC Research Bulletin 1068*

Group I - Well drained soils, should show yield increase with no-till.
Group II - No-till yields comparable to conventional with improved soil drainage.
Group III- Poorly drained soils, may yield less with no-tillage than conventional.
Group IV - Very poorly drained soils, may yield less with no-till than conventional. No-till more favorable than deep spring tillage.
Group V - Paulding - very poorly drained high clay soil - no-till not recommended.

Table 25

Groups I and II	Soil Type	No-till	Comparison
Bob Heisler #2	Blount, Pewamo	38.5	42.6
Ted Pohlmann #8	Kibbie, Genesee, Tuscola	45.8	48.1
Zane Zeedyk #2	Glynwood	29.4	31.5
	Average	37.9	40.7

Table 26

Groups III and IV	Soil Type	No-till	Comparison
Ray Bok #2	Fulton, Latty	37.0	40.2
Virg Cameron #1	Hoytville	37.5	32.8
Virg Cameron #2	Hoytville	44.1	42.3
Ned Dunbar #1	Hoytville, Nappanee	39.7	40.6
Gary Hammon	Hoytville, Nappanee	39.7	42.1
Bob & Jerry Hoshock #4	Hoytville	45.9	44.5
Peter Kennerk #2	Toledo, Lucas, Fulton	37.6	39.0
Tinora FFA	Hoytville	42.6	43.8
Zane Zeedyk #1	Latty, Fulton	36.4	39.3
	Average	40.1	40.5

Table 27

Group V	Soil Type	No-till	Comparison
Don Meyer	Paulding	33.7	33.5
Louis Shininger #3	Paulding, Roselms	37.8	40.8
	Average	35.8	37.2

*Note: OARDC Bulletin 1068 - "An Evaluation of Ohio Soils in Relation to No-tillage Corn Production" was based on research work on no-till corn, not no-till soybeans. No-till soybeans are normally planted from mid-May to mid-June when soil moisture is usually lower than that for no-till corn planted from mid-April to mid-May.

IV. NO-TILL YIELDS BY SOIL GROUPS AND RESIDUES

Groups I and II

Table 28

In soybean stubble	Soil Type	No-till	Comparison
Bob Heisler #2	Blount, Pewamo	38.5	42.6
Zane Zeedyk #2	Glynwood	29.4	31.5
	Average	34.0	37.0

Table 29

In corn stalks	Soil Type	No-till	Comparison
Ted Pohlmann #8	Kibbie, Genesee, Tuscola	45.8	48.1

Groups III and IV

Table 30

In corn stalks	Soil Type	No-till	Comparison
Ray Bok # 2	Fulton, Latty	37.0	40.2
Virg Cameron #1	Hoytville	37.5	32.8
Virg Cameron #2	Hoytville	44.1	42.3
Tinora FFA	Hoytville	42.6	43.8
Zane Zeedyk #1	Latty, Fulton	36.4	39.3
	Average	39.5	39.7

Table 31

In soybean stubble	Soil Type	No-till	Comparison
Ned Dunbar #1	Hoytville, Nappanee	39.7	40.6
Bob & Jerry Hoshock #4	Hoytville	45.9	44.5
Peter Kennerk #2	Toledo, Lucas, Fulton	37.6	39.0
	Average	41.1	41.4

Table 32

In winter killed wheat	Soil Type	No-till	Comparison
Gary Hammon	Hoytville, Nappanee	39.7	42.1

Group V

Table 33

In soybean stubble	Soil Type	No-till	Comparison
Don Meyer	Paulding	33.7	33.5
Louis Shininger #3	Paulding, Roselms	37.8	40.8
	Average	35.8	37.2

V. YIELDS ON NEW RIDGES WITHOUT COMPARISONS

Table 34

Bob Austermiller	20.3
Phil Hornish	27.0
Richard Siler	43.9
Bill Temple (average)	28.7
Average	30.0

VI. YIELDS ON NEW RIDGES WITH COMPARISONS

Table 35

	Ridge	Flat
Bob & Don Rethmel #2	28.3	25.5

VII. NO-TILL ON OLD CORN RIDGES WITHOUT COMPARISONS

Including multiple varieties or planters in the same field.

Table 36

Louis Shininger #2	35.1
Louis Shininger #2	38.1
Clete Siler #2	15.0
Clete Siler #2	14.9
Clete Vetter #2	40.9
Clete Vetter #2	47.6
Average	31.9

VIII. NO-TILL SOYBEAN YIELDS WITHOUT COMPARISONS

Including multiple varieties in the same field.

Table 37

Ray Bok # 4	36.5
Ned Dunbar #2	41.3
Walt Helmke #3	47.8
Bob & Jerry Hoshock #4	43.7
Dick & John Hoshock	48.1
Peter Kennerk #1	37.8
Average	42.5

IX. OVERALL NO-TILL SOYBEAN YIELD AVERAGES

With comparisons = 39.0 N = 14
Without comparisons = 42.5 N = 6
Overall average = 40.0 bu/A

1982 SOYBEAN DEMONSTRATION PLOTS

COMPARISON YIELDS BY TILLAGE & SOIL GROUPS

Table 38

	Fall Plow	Fall Chisel	Spring Disk	Spring Field Cult.	New Ridges	No-till on ridge	No-Till
Soil Groups I & II							
Bob Heisler #2		42.6					38.5
Bob Heisler #2	46.1	42.6					
Ted Pohlmann #8			48.1				45.8
Zane Zeedyk #2			31.5				29.4
Soil Groups III & IV							
Ray Bok #2		40.2					37.0
Ray Bok #3	42.0	40.7					
Virg Cameron #1			32.8				37.5
Virg Cameron #2			42.3				44.1
Ned Dunbar #1				40.6			39.7
Gary Hammon			42.1				39.7
Bob & Jerry Hoshock #4			44.5				45.9
Peter Kennerk #2			39.0				37.6
Art Michaelis		48.2		47.3			
Ted Pohlmann #9			29.3			25.1	
Tinora FFA			43.8				42.6
Clete Vetter	46.0					46.1	
Zane Zeedyk #1			39.3				36.4
Soil Group V							
Don Meyer			33.5				33.7
Bob & Don Rethmel #2		25.5*			28.3		
Louis Shininger #3			40.8				37.8

* Fall offset disk

1982 OBSERVATIONS

The entire atmosphere of the agricultural community during 1982 was much improved over what it was in 1981. Even though economically things have not been good for the farmer, the 1982 growing season was almost ideal. There was an extremely dry period late in the summer, which probably had a negative effect on yields, but the early dry spring allowed timely planting which was a problem in 1981.

In analyzing our yields for 1981 we determined that our data would have much more meaning if in each of our plots we required a comparison of some type. Therefore, in 1982 each of our cooperators were requested in addition to the no-till plot to provide a conventionally tilled strip wide enough to allow a mechanical yield check. Even though sometimes the conventional tillage section may not reflect a true yield as if the entire field had been conventionally tilled, much can be learned from demonstrating several kinds of tillage in the same field.

The dry spring did create a few problems which have not been encountered to any extent in Defiance County in past years. One was planting depth. On fields planted in April we normally recommend a shallow planting depth to avoid slow germination due to planting deep in moist, cold soil. Normally frequent rains in early May provide adequate moisture to germinate seeds planted too shallow. This problem was probably more of a concern than a problem this year, however, there were a few fields where stands were decreased due to shallow planting and lack of moisture.

Lack of rainfall also affected herbicide activity early in the season. In several cases, the contact herbicide eliminated existing vegetation, but there was not enough rainfall to activate residual herbicides this year. It was necessary to treat several fields with a post-emergent herbicide.

In regards to herbicides a continual problem is proper application of contact herbicides. Equipment set up to apply herbicides under conventional tillage systems may not be adequate in the no-till situation. Coverage of all existing green plant growth is necessary for the contact herbicide to be effective. Any errors made in the spraying operation are more evident in no-tillage than where tillage disguises some of the errors. While farmers and custom applicators are becoming more aware of the importance of the spraying operation to no-tillage, proper chemical application cannot be overemphasized.

Very few insect problems occurred in 1982. The most prevalent was armyworm and only five plots required treatment for this insect. Armyworm is found most frequently in fields where a cover crop has been growing in the early spring.

In reviewing our yield data for 1982, one area that needs to be emphasized is the ridge-tillage. While a number of farmers are experimenting with ridges, we need to stress comparison tillage and accurate reporting of data. To demonstrate the benefit of earlier planting on the ridges, it is often difficult to get a tillage comparison because of wet soil conditions, but there is a need for the comparison even if it means the farmer must come back to the field later and plant it with his own equipment.

One of the problems in building ridges while cultivating growing crops during the past two seasons has been that the Buffalo cultivator has not performed well in fields that have been planted no-till on the flat. This cultivator has worked

to rebuild ridges, but in the heavy clay soils planted with no-tillage there is either a problem with penetration or "slabbing" of the soil thus covering plants. A Hiniker cultivator will be used in 1983 and will hopefully add to the number of acres and plots being successfully ridged during cultivation.

In regards to planter operation there were very few problems with any of the planters in 1982. Once again a tractor was supplied with the Hiniker planter while the farmer supplied his own for the White and John Deere planters. A tractor was also supplied with the leased International planter. Each of these planters has features which are better than a competitor but it likely also has features not as desirable as a competitors. The farmer considering purchasing a no-till planter should decide which features he feels are important to his operation and make his decision accordingly.

The following pages list cost breakdowns on each of the comparison plots that had yield checks. Most of the herbicide, insecticide, and fertilizer prices were obtained from local elevators as their May 1982 listings. Some prices that could not be obtained from the elevators were provided by the Defiance Area Extension Agronomist as suggested retail prices. Where cost of a certain chemical formulation was not available, the cost of a comparable formulation of the same chemical was used.

The value of shelled corn was set at $2.25/bushel, while soybeans were valued at $5.50/bushel. Drying charges were assessed using a local elevator's rates.

Machine costs were based on Cooperative Extension Service estimates of "Farm Custom Rates Paid in Ohio, 1981" plus 5%. Some of these machine costs were adjusted for use by area demonstration projects. The costs of ridging and landleveling are only estimates, as they do not appear in the Custom Rate bulletin.

Fuel usage rates were taken from the OSU Agricultural Engineering Department Farm Machinery Bulletin No. 10, and from the O.S.U. Agronomy bulletin, "Selecting a Tillage System."

Remember as you are looking over these comparisons that the costs are only best estimates, and that no land, labor or management charges were included.

Table 41 lists the individual plot cost comparison, while Table 42 lists average costs and net return for various tillage systems. The comparisons averaged had the same type of tillage. For example for the no-till corn in soybean stubble, all the comparisons averaged were either spring disk or spring field cultivate. Tillage systems with less than 3 plots were not averaged. Also note that some no-till fields have a cost under secondary tillage. This cost is for one or more row cultivations.

By studying Table 42, a few points can be made. No-till corn into soybean stubble or other light residue was more profitable than spring disking or cultivating on the average. No-tilling corn into winter-killed wheat was about equal to disking or cultivating those fields.

No-till corn in heavy residues of wheat straw and clover was much less profitable than fall plowing, due largely to the yield differences as total costs per acre were about the same. As mentioned earlier in this report, the yield differences between the no-till and conventional tillage were much wider than would be expected, based on previous years' work.

In three fields of corn on new ridges and on the flat, there was little difference in costs or net return/acre. If the same ridges are used for several years, we would expect the total machine costs to drop as there would be no cost for ridge formation.

In both no-till soybeans in soybean stubble and in corn stalks, total costs and net return per acre are about equal between no-till and light spring tillage.

Besides the monetary advantages or disadvantages to no-till or ridge-till, one should also consider some other benefits. These include time and labor savings, and soil erosion control.

UNIT COSTS OF MATERIALS

Table 39

Fertilizer	Cost
45-0-0	$215/ton
28-0-0	$135/ton
82-0-0	$260/ton
All other N	$ .23/lb actual N
All P_2O_5	$ .24/lb actual P_2O_5
All K_2O	$ .16/lb actual K_2O

Herbicides	Cost
Atrazine 4L	$11.10/gal.
Atrazine 9-0	2.50/lb
Banvel	45.25/gal
Banvel II	27.75/gal
Bicep	21.28/gal
Bladex 4L	17.42/gal
Blazer	72.98/gal
Dual 8E	50.12/gal
Lasso EC	19.48/gal
Lexone 4L	91.00/gal
Lorox	40.85/gal
Paraquat & Surf.	45.00/gal
Poast	105.00/gal
Prowl	33.00/gal
Roundup	73.50/gal
Sencor 4L	91.00/gal
Surflan	50.45/gal
Sutan	23.68/gal
2,4-DB	14.50/gal
2,4-D amine	12.02/gal
2,4-D ester	15.28/gal
X-77	13.22/gal
Crop Oil	8.15/gal
Amiben	.89/lb

Insecticides	Cost
Counter 15G	$1.37/lb
Dyfonate 20G	1.64/lb
Furadan 10G	0.98/lb
Lorsban 4E	37.90/gal
Sevin XLR	20.22/gal
Thimet 20G	1.18/lb
Toxaphene	9.50/gal

Seed Treatments

$1.00/A

Seed Costs

Corn $ .80/1000 kernels
Soybeans $15/bushel

MACHINE COSTS

Table 40

		Cost	Fuel (gal/A)
Primary Tillage	Moldboard Plow	$11.81/A	$1.82
	Chisel Plow	8.92/A	1.12
Secondary Tillage	Field Cultivator	6.82/A	.70
	Tandem Disk	6.30/A	.56
	Harrow	5.78/A	.45
	Cultimulcher	5.25/A	.45
	Ridging	6.30/A	
	Landleveling	6.30/A	
Planting	No-till	11.81/A	.65
	Conventional	8.66/A	.75
Row Cultivate		5.25/A	.39
Rotary hoeing		2.89/A	.30
Spray liquids		3.68/A	.11
Spread Dry Fertilizer		3.68/A	
Sidedress Nitrogen		6.82/A	
Harvest Corn		21.26/A	
Harvest Soybeans		19.95/A	
Truck/grain (300+ bu. loads, 10+ miles)		.09/bu	

Table 41 TILLAGE SYSTEMS COST COMPARISON ON A PER ACRE BASIS

	Richard Appel #2		Richard Appel #3		Paul Bok		Bob & Bruce Colwell #1		Bob & Bruce Colwell #2		Bob & Bruce Colwell #3	
Tillage	No-till	Disk	No-till	Disk (2x)	Sp. Chisel	Sp. Plow	No-till	Field Cult	No-till	Field cult.	No-till	Field cult
Yield bu/A	122.4	127.9	130.6	127.2	116.3	102.1	132.1	115.3	155.1	152.8	164.2	159.6
Value of Crop ($)	275.40	287.78	293.85	286.20	261.68	229.72	297.22	259.42	348.98	343.80	369.45	359.10
Material Costs												
Seed	19.60	19.60	19.60	19.60	20.80	20.80	22.48	22.48	22.48	22.48	22.48	22.48
Fertilizers	51.61	51.61	56.02	56.02	76.33	76.33	63.17	63.17	89.19	89.19	106.43	106.43
Herbicides	24.92	13.67	22.74	11.49	10.36	10.36	26.82	18.94	25.32	17.44	26.82	18.94
Insecticides	11.99	10.99	00	00	11.48	11.48	1.00	00	1.00	00	1.00	00
Total Material ($)	108.12	95.87	98.36	87.11	118.97	118.97	113.47	104.59	137.99	129.11	156.73	147.85
Machine Costs												
Primary Tillage	00	00	00	00	8.92	11.81	00	00	00	00	00	00
Secondary Tillage	00	6.30	00	12.60	11.55	11.55	00	6.82	00	6.82	00	6.82
Planting	11.81	8.66	11.81	8.66	8.66	8.66	11.81	8.66	11.81	8.66	11.81	8.66
Spread Fert.,etc.	6.82	6.82	10.50	10.50	10.50	10.50	6.82	6.82	14.18	14.18	14.18	14.18
Spraying	3.68	3.68	3.68	3.68	7.36	7.36	7.36	7.36	7.36	7.36	7.36	7.36
Harvesting	21.26	21.26	21.26	21.26	21.26	21.26	21.26	21.26	21.26	21.26	21.26	21.26
Trucking	11.02	11.51	11.75	11.45	10.47	9.19	11.89	10.38	13.96	13.75	14.78	14.36
Drying	2.45	2.56	6.53	4.45	11.63	11.23	35.67	34.01	15.51	12.99	11.49	11.17
Total Machine ($)	57.04	60.79	65.53	72.60	90.35	91.56	94.81	95.31	84.08	85.02	80.88	83.81
TOTAL COSTS/ACRE ($)	165.16	156.66	163.89	159.71	209.32	210.53	208.28	199.90	222.07	214.13	237.61	231.66
NET RETURN/ACRE ($)	110.24	131.12	129.96	126.49	52.36	19.19	88.94	59.52	126.91	129.67	131.84	127.44

	Bob & Bruce Colwell #4		Steve Coolman #1		Steve Coolman #2		Lynn Davis		Jim Donze #1		Jim Donze #2	
Tillage	No-Till	Field cult.	No-Till	Disk (2x)	No-Till	Disk (2x)	New Ridges	Stale Seedbed	No-Till	Stale Seedbed	No-Till	Disk (2x)
Yield bu/A	151.3	136.7	102.0	101.5	112.3	116.8	87.8	85.2	120.4	147.6	130.4	137.0
Value of Crop ($)	340.42	307.58	229.50	228.38	252.68	262.80	197.55	191.70	270.90	332.10	293.40	308.25
Material Costs												
Seed	22.48	22.48	20.80	20.80	20.80	20.80	20.80	20.80	22.32	22.32	22.32	22.32
Fertilizers	93.98	93.98	73.75	73.75	73.75	73.75	56.45	56.45	77.03	77.03	82.60	82.60
Herbicides	22.49	14.61	16.83	11.21	26.37	20.75	16.26	16.26	30.04	27.21	17.46	17.46
Insecticides	1.00	.00	11.92	11.92	11.92	11.92	.00	.00	11.92	11.92	.00	.00
Total Material ($)	139.95	131.07	123.30	117.68	132.84	127.22	93.51	93.51	141.31	138.48	122.38	122.38
Machine Costs												
Primary Tillage	.00	.00	.00	.00	.00	.00	11.81	11.81	.00	11.81	.00	.00
Secondary Tillage	.00	6.82	.00	12.60	.00	12.60	18.90	12.60	.00	.00	5.25	17.85
Planting	11.81	8.66	11.81	8.66	11.81	8.66	11.81	11.81	11.81	11.81	11.81	8.66
Spread Fert.,etc.	14.18	14.18	6.82	6.82	6.82	6.82	6.82	6.82	10.50	10.50	10.50	10.50
Spraying	3.68	3.68	3.68	3.68	7.36	7.36	3.68	3.68	7.36	3.68	3.68	3.68
Harvesting	21.26	21.26	21.26	21.26	21.26	21.26	21.26	21.26	21.26	21.26	21.26	21.26
Trucking	13.62	12.30	9.18	9.14	10.11	10.51	7.90	7.67	10.84	13.28	11.74	12.33
Drying	21.18	19.82	6.12	2.03	.00	2.34	17.56	25.56	6.02	1.48	7.82	6.85
Total Machine ($)	85.73	86.72	58.87	64.19	57.36	69.55	99.74	101.21	67.79	73.82	72.06	81.13
TOTAL COSTS/ACRE ($)	225.68	217.79	182.17	181.87	190.20	196.77	193.25	194.72	209.10	212.30	194.44	203.51
NET RETURN/ACRE ($)	114.74	89.79	47.33	46.51	62.48	66.03	4.30	-3.02	61.80	119.80	98.96	104.74

Table 41 (cont.) TILLAGE SYSTEMS COST COMPARISON ON A PER ACRE BASIS

	Jim Donze #3 IH		Jim Donze #3 JD		Duane Engel #1		Duane Engel #2		Bob Heisler #1		Walt Helmke #1	
Tillage	No-Till	Field cult.	No-Till	Field cult.	No-Till	Field cult(2x)	No-Till	Field Cult.(2x)	No-Till	Disk	No-Till	Field cult.
Yield bu/A	168.3	167.8	160.8	171.6	142.5	144.5	174.9	169.5	147.2	143.2	131.1	139.1
Value of Crop ($)	378.68	377.55	361.80	386.10	320.62	325.12	393.52	381.38	331.20	322.20	310.72	312.98
Material Costs												
Seed	22.32	22.32	22.32	22.32	20.88	20.88	20.88	20.88	24.00	24.00	24.16	24.16
Fertilizers	96.39	96.39	96.39	96.39	108.64	108.64	108.64	108.64	92.92	92.92	96.18	96.18
Herbicides	27.21	15.96	27.21	15.96	19.29	13.67	19.29	13.67	6.94	6.94	29.56	16.34
Insecticides	.00	.00	.00	.00	1.00	.00	1.00	.00	.00	.00	13.12	.00
Total Material ($)	145.92	134.67	145.92	134.67	149.81	143.19	149.81	143.19	123.86	123.86	163.02	136.68
Machine Costs												
Primary Tillage	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
Secondary Tillage	5.25	12.07	5.25	12.07	5.25	18.89	5.25	18.89	5.25	11.55	.00	12.07
Planting	11.81	8.66	11.81	8.66	11.81	8.66	11.81	8.66	11.81	8.66	11.81	8.66
Spread Fert.,etc.	14.18	14.18	14.18	14.18	10.50	10.50	10.50	10.50	10.50	10.50	10.50	10.50
Spraying	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68
Harvesting	21.26	21.26	21.26	21.26	21.26	21.26	21.26	21.26	21.26	21.26	21.26	21.26
Trucking	15.15	15.10	14.47	15.44	12.82	13.00	15.74	15.26	13.25	12.89	12.43	12.52
Drying	3.37	3.36	1.61	.00	.00	.00	6.12	5.93	16.19	17.18	4.83	8.35
Total Machine ($)	74.70	78.31	72.26	75.29	65.32	75.99	74.36	84.18	81.94	85.72	64.51	77.04
TOTAL COSTS/ACRE ($)	220.62	212.98	218.18	209.96	215.13	219.18	224.17	227.37	205.80	209.58	227.53	213.72
NET RETURN/ACRE ($)	158.06	164.57	143.62	176.14	105.49	105.94	169.35	154.01	125.40	112.62	83.19	99.26

	Walt Helmke #2		Walt Helmke #2		Art Hoellrich #1		Art Hoellrich #3		Bob & Jerry Hoshock #1		Tom & Joe Hoshock	
Tillage	No-Till	Fall Plow	Fall Chisel	Fall Plow	Stale Seedbed	Fall Plow	No-Till	V-Plow	No-Till	Field cult(2x)	No-Till	Field cult(2x)
Yield bu/A	123.0	138.2	129.6	127.9	191.8	164.1	148.1	135.2	170.4	149.1	170.4	151.0
Value of Crop ($)	276.75	310.95	291.60	287.78	431.55	369.22	333.22	304.20	383.40	335.48	383.40	339.75
Material Costs												
Seed	22.08	24.16	24.16	24.16	20.80	20.80	20.80	20.80	20.96	20.96	20.96	20.96
Fertilizers	113.44	96.18	96.18	96.18	91.61	91.61	96.30	96.30	71.41	71.41	71.40	71.40
Herbicides	40.81	16.34	16.34	16.34	14.32	14.32	24.10	12.85	17.11	11.49	10.81	10.81
Insecticides	9.44	.00	.00	.00	13.70	13.70	.00	.00	11.48	11.48	.00	.00
Total Material ($)	185.77	136.68	136.68	136.68	140.43	140.43	141.20	129.95	120.96	115.34	103.17	103.17
Machine Costs												
Primary Tillage	.00	11.81	8.92	11.81	11.81	11.81	.00	8.92	.00	.00	.00	.00
Secondary Tillage	5.25	12.07	12.07	12.07	.00	13.64	.00	13.64	.00	18.89	.00	13.64
Planting	11.81	8.66	8.66	8.66	11.81	8.66	11.81	8.66	11.81	8.66	11.81	8.66
Spread Fert.,etc.	10.50	10.50	10.50	10.50	10.50	10.50	10.50	10.50	6.82	6.82	6.82	6.82
Spraying	3.68	3.68	3.68	3.68	7.36	7.36	3.68	3.68	3.68	3.68	3.68	3.68
Harvesting	21.26	21.26	21.26	21.26	21.26	21.26	21.26	21.26	21.26	21.26	21.26	21.26
Trucking	11.07	12.44	11.66	11.51	17.26	14.77	13.33	12.17	15.34	13.42	15.34	13.59
Drying	4.30	1.38	.00	.00	19.18	16.41	22.22	16.90	20.45	19.38	14.48	10.57
Total Machine ($)	67.87	81.80	76.75	79.49	99.18	104.41	82.80	95.73	79.36	92.11	73.39	78.22
TOTAL COSTS/ACRE ($)	253.64	218.48	213.43	216.17	239.61	244.84	224.00	225.68	200.32	207.45	176.56	181.39
NET RETURN/ACRE ($)	23.11	92.47	78.17	71.61	191.94	124.38	109.22	78.52	183.08	128.03	206.84	158.36

Table 41 (cont.) TILLAGE SYSTEMS COST COMPARISON ON A PER ACRE BASIS

	Ted Pohlmann #1		Ted Pohlmann #2		Ted Pohlmann #6		Bob & Don Rethmel #1		Bob Rettig #1		Bob Rettig #1-P	
Tillage	New Ridges	Fall Plow	No-Till	Disk (2x)	No-Till	Fall Plow	No-Till	Fall Plow	No-Till	Fall Plow	Fall Plow without P	Fall Plow P Added
Yield bu/A	127.1	119.9	91.9	88.6	177.0	168.7	118.4	150.0	111.4	126.4	114.6	126.4
Value of Crop ($)	285.98	269.78	206.78	199.35	398.25	379.58	266.40	337.50	250.65	284.40	257.85	284.40
Material Costs												
Seed	20.96	20.96	20.96	20.96	22.80	22.80	22.32	22.32	21.04	21.04	21.04	21.04
Fertilizers	83.32	83.32	68.33	68.33	77.48	77.48	67.44	67.49	36.64	36.64	29.60	36.64
Herbicides	16.34	16.34	12.87	12.87	25.90	14.65	31.68	20.43	27.29	18.85	18.85	18.85
Insecticides	1.00	1.00	1.00	1.00	1.59	.00	1.59	.00	1.00	.00	.00	.00
Total Material ($)	121.62	121.62	103.16	103.16	127.77	114.93	123.08	110.24	85.97	76.53	69.49	76.53
Machine Costs												
Primary Tillage	11.81	11.81	.00	.00	.00	11.81	.00	11.81	.00	11.81	11.81	11.81
Secondary Tillage	24.67	18.37	5.25	23.63	.00	19.42	.00	12.60	.00	13.12	13.12	13.12
Planting	11.81	8.66	11.81	8.66	11.81	8.66	11.81	8.66	11.81	8.66	8.66	8.66
Spread Fert.,etc.	10.50	10.50	10.50	10.50	10.50	10.50	10.50	10.50	6.82	6.82	6.82	6.82
Spraying	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	7.36	7.36	7.36	7.36
Harvesting	21.26	21.26	21.26	21.26	21.26	21.26	21.26	21.26	21.26	21.26	21.26	21.26
Trucking	11.44	10.79	8.27	7.97	15.93	15.18	10.66	13.50	10.03	11.38	10.31	11.38
Drying	15.89	13.19	11.03	9.75	29.20	24.46	18.35	16.50	13.92	12.64	9.74	12.64
Total Machine ($)	111.06	98.26	71.80	85.45	92.38	114.97	76.26	98.51	71.20	93.05	89.08	93.05
TOTAL COSTS/ACRE ($)	232.68	219.88	174.96	188.61	220.15	229.90	199.34	208.75	157.17	169.58	158.57	169.58
NET RETURN/ACRE ($)	53.30	49.90	31.82	10.74	178.10	149.68	67.06	128.75	93.48	114.82	99.28	114.82

	Bob Rettig #2		Bob Rettig #2P		Albert Schroeder #1		Bob Shininger #1		Bob Shininger #1P		Bob Shininger #2	
Tillage	No-Till	Field cult.	No-Till Without P	No-Till P added	No-Till	Fall Chisel	No-Till	Field cult.	No-Till Without P	No-Till P added	No-Till	Field cult.
Yield bu/A	85.6	97.3	105.0	93.1	182.6	175.2	99.2	87.6	91.0	98.2	122.5	114.5
Value of Crop ($)	192.60	218.92	236.25	209.48	410.85	394.20	223.20	197.10	204.75	220.95	275.62	257.62
Material Costs												
Seed	21.04	21.04	21.04	21.04	20.00	20.00	28.00	28.00	28.00	28.00	28.00	28.00
Fertilizers	43.16	43.16	31.25	43.16	94.20	94.20	61.06	61.06	44.50	61.06	61.06	61.06
Herbicides	24.47	18.85	24.47	24.47	14.18	14.18	16.36	16.36	16.36	16.36	16.36	16.36
Insecticides	1.00	.00	1.00	1.00	12.33	12.33	11.92	11.92	10.78	10.78	11.92	11.92
Total Material ($)	89.67	83.05	77.76	89.67	140.71	140.71	117.34	117.34	99.64	116.20	117.34	117.34
Machine Costs												
Primary Tillage	.00	.00	.00	.00	.00	8.92	.00	.00	.00	.00	.00	.00
Secondary Tillage	.00	13.12	.00	.00	.00	6.82	.00	13.64	.00	.00	.00	13.64
Planting	11.81	8.66	11.81	11.81	11.81	8.66	11.81	8.66	11.81	11.81	11.81	8.66
Spread Fert.,etc.	6.82	6.82	6.82	6.82	10.50	10.50	10.50	10.50	10.50	10.50	10.50	10.50
Spraying	7.36	7.36	7.36	7.36	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68
Harvesting	21.26	21.26	21.26	21.26	21.26	21.26	21.26	21.26	21.26	21.26	21.26	21.26
Trucking	7.70	8.76	9.45	8.38	16.43	15.77	8.93	7.88	8.19	8.84	11.02	10.30
Drying	10.70	12.65	13.12	9.31	15.52	12.26	26.78	30.66	29.12	28.48	14.70	13.74
Total Machine ($)	65.65	78.63	69.82	64.94	79.20	87.87	82.96	96.28	84.56	84.57	72.97	81.78
TOTAL COSTS/ACRE ($)	155.32	161.68	147.58	154.61	219.91	228.58	200.30	213.62	184.20	200.77	190.31	199.12
NET RETURN/ACRE ($)	37.28	57.24	88.67	54.87	190.94	165.62	22.90	-16.52	20.55	20.18	85.31	58.50

Table 41 (cont.) TILLAGE SYSTEMS COST COMPARISON ON A PER ACRE BASIS

	Bob Shininger #2P		Dan Singer #1		Clete Vetter #1		Ray Bok #2		Ray Bok #3		Virg Cameron #1	
Tillage	No-Till Without P	No-Till P added	No-Till	Field cult.	New Ridges	Fall Plow	No-Till	Fall Chisel	Fall Chisel	Fall Plow	No-Till	Disk (2x)
Yield bu/A	115.1	114.9	154.4	146.6	137.6	141.4	37.0	40.2	40.7	42.0	37.5	32.8
Value of Crop ($)	258.98	258.52	347.40	329.85	309.60	318.15	203.50	221.10	223.85	231.00	206.25	180.40
Material Costs												
Seed	28.00	28.00	21.52	21.52	20.80	20.80	21.25	21.25	18.75	18.75	15.00	15.00
Fertilizers	44.50	61.06	54.21	54.21	42.75	42.75	.00	.00	30.96	30.96	.00	.00
Herbicides	16.36	16.36	29.25	23.63	32.05	32.05	12.27	11.38	23.91	23.91	32.86	27.24
Insecticides	11.92	11.92	11.92	11.92	.00	.00	.00	.00	.00	.00	1.00	.00
Total Material ($)	100.78	117.34	116.90	111.28	95.60	95.60	33.52	32.63	73.62	73.62	48.86	42.24
Machine Costs												
Primary Tillage	.00	.00	.00	.00	11.81	11.81	.00	8.92	8.92	11.81	.00	.00
Secondary Tillage	.00	.00	.00	19.42	19.94	6.82	.00	13.64	13.64	13.64	.00	12.60
Planting	11.81	11.81	11.81	8.66	11.81	8.66	11.81	8.66	8.66	8.66	11.81	8.66
Spread Fert.,etc.	10.50	10.50	10.50	10.50	6.82	6.82	.00	.00	3.68	3.68	.00	.00
Spraying	3.68	3.68	3.68	3.68	7.36	7.36	3.68	3.68	3.68	3.68	7.36	7.36
Harvesting	21.26	21.26	21.26	21.26	21.26	21.26	19.95	19.95	19.95	19.95	19.95	19.95
Trucking	10.36	10.34	13.90	13.19	12.38	12.73	3.33	3.62	3.66	3.78	3.38	2.95
Drying	5.76	8.04	13.12	16.13	16.51	15.55	0.56	0.60	.00	.00	.00	.00
Total Machine ($)	63.37	65.63	74.27	92.84	107.89	91.01	39.33	59.07	62.19	65.20	42.50	51.52
TOTAL COSTS/ACRE ($)	164.15	182.97	191.17	204.12	203.49	186.61	72.85	91.70	135.81	138.82	91.36	93.76
NET RETURN/ACRE ($)	94.83	75.55	156.23	125.73	105.71	131.54	130.65	129.40	88.04	92.18	114.89	86.64

	Virg Cameron #2		Ned Dunbar #1		Gary Hammon		Bob Heisler #2 (15" rows)		Bob Heisler #2 (drill)		Bob & Jerry Hoshock #4	
Tillage	No-Till	Disk (2x)	No-Till	Field cult.	No-Till	Disk	No-Till	Fall Chisel	Fall Chisel	Fall Plow	No-Till	Disk
Yield bu/A	44.1	42.3	39.7	40.6	39.7	42.1	38.5	42.6	42.6	46.1	45.9	44.5
Value of Crop ($)	242.55	232.65	218.35	223.30	218.35	231.55	211.75	234.30	234.30	253.55	252.45	244.75
Material Costs												
Seed	21.25	21.25	22.50	22.50	21.25	21.25	24.25	24.25	24.25	24.25	22.50	22.50
Fertilizers	.00	.00	.00	.00	.00	.00	28.80	28.80	28.80	28.80	.00	.00
Herbicides	35.68	30.06	60.66	60.66	34.81	25.56	23.89	18.27	18.27	18.27	26.74	21.12
Insecticides	1.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
Total Material ($)	57.93	51.31	83.16	83.16	56.06	44.81	76.94	71.32	71.32	71.32	49.24	43.62
Machine Costs												
Primary Tillage	.00	.00	.00	.00	.00	.00	.00	8.92	8.92	11.81	.00	.00
Secondary Tillage	.00	12.60	.00	6.82	.00	6.30	.00	17.85	17.85	17.85	.00	6.30
Planting	11.81	8.66	11.81	8.66	11.81	8.66	11.81	8.66	8.66	8.66	11.81	8.66
Spread Fert.,etc.	.00	.00	.00	.00	.00	.00	3.68	3.68	3.68	3.68	.00	.00
Spraying	7.36	7.36	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68
Harvesting	19.95	19.95	19.95	19.95	19.95	19.95	19.95	19.95	19.95	19.95	19.95	19.95
Trucking	3.97	3.81	3.57	3.65	3.57	3.79	3.46	3.83	3.83	4.15	4.13	4.00
Drying	0.66	0.63	.00	.00	1.19	1.26	2.70	4.69	4.69	5.99	.00	.00
Total Machine ($)	43.75	53.01	39.01	42.76	40.20	43.64	45.28	71.26	71.26	75.77	39.57	42.59
TOTAL COSTS/ACRE ($)	101.68	104.32	122.17	125.92	96.26	88.45	122.22	142.58	142.58	147.09	88.81	86.21
NET RETURN/ACRE ($)	140.87	128.33	96.18	97.38	122.09	143.10	89.53	91.82	91.82	106.46	163.64	158.54

Table 41 (cont.) TILLAGE SYSTEMS COST COMPARISON ON A PER ACRE BASIS

	Peter Kennerk #2		Don Meyer		Art Michaelis		Ted Pohlmann #8		Ted Pohlmann #9		Bob & Don Rethmel #2	
Tillage	No-Till	Disk (2x)	No-Till	Disk (2x)	Fall Chisel	Field cult.	No-Till	Disk (2x)	No-till on Ridge	Disk flat	New Ridges	Offset Disk
Yield bu/A	37.6	39.0	33.7	33.5	48.2	47.3	45.8	48.1	25.1	29.3	28.3	25.5
Value of Crop ($)	206.80	214.50	185.35	184.25	265.10	260.15	251.90	264.55	138.05	161.15	155.65	140.25
Material Costs												
Seed	21.25	21.25	21.25	21.25	16.25	16.25	16.00	16.00	15.68	31.36	30.00	30.00
Fertilizers	28.80	28.80	.00	.00	19.20	19.20	.00	.00	14.51	14.51	.00	.00
Herbicides	23.89	18.27	29.55	21.11	15.43	15.43	43.43	32.18	.00	.00	.00	.00
Insecticides	.00	.00	.00	.00	.00	.00	1.00	.00	1.00	1.00	.00	.00
Total Material ($)	73.94	68.32	50.80	42.36	50.88	50.88	60.43	48.18	31.19	46.87	30.00	30.00
Machine Costs												
Primary Tillage	.00	.00	.00	.00	8.92	.00	.00	.00	.00	.00	17.84	8.92
Secondary Tillage	.00	12.60	.00	12.60	11.55	11.55	10.50	23.10	10.50	18.38	22.05	15.75
Planting	11.81	8.66	11.81	8.66	8.66	8.66	11.81	8.66	11.81	17.32	23.62	23.62
Spread Fert.,etc.	3.68	3.68	.00	.00	3.68	3.68	.00	.00	.00	.00	.00	.00
Spraying	3.68	3.68	3.68	3.68	3.68	3.68	7.36	7.36	.00	.00	.00	.00
Harvesting	19.95	19.95	19.95	19.95	19.95	19.95	19.95	19.95	19.95	19.95	19.95	19.95
Trucking	3.38	3.51	3.03	3.02	4.34	4.26	4.12	4.33	2.26	2.64	2.55	2.30
Drying	.00	0.58	1.68	0.51	.00	.00	.00	.00	0.38	.00	.00	.00
Total Machine ($)	42.50	52.66	40.15	48.42	60.78	51.78	53.74	63.40	44.90	58.29	86.01	70.54
TOTAL COSTS/ACRE ($)	116.44	120.98	90.95	90.78	111.66	102.66	114.77	111.58	76.09	105.15	116.01	100.54
NET RETURN/ACRE ($)	90.36	93.52	94.40	93.47	153.04	157.49	137.73	152.97	61.96	55.99	39.64	39.71

	Louis Shininger #3		Clete Vetter #2		Zane Zeedyk #1		Zane Zeedyk #2		Tinora FFA		
Tillage	No-Till	Disk (2x)	NT on Ridge	Fall Plow	No-Till	Disk (2.5x)	No-Till	Disk (1x)	No-Till	Disk	
Yield bu/A	37.8	40.8	46.1	46.0	36.4	39.3	29.4	31.5	42.6	43.8	
Value of Crop ($)	207.90	224.40	253.55	253.00	200.20	216.15	161.70	173.25	234.30	240.90	
Material Costs											
Seed	22.50	22.50	12.50	12.50	21.25	21.25	21.25	21.25	21.25	21.25	
Fertilizers	19.20	19.20	.00	.00	.00	.00	.00	.00	.00	.00	
Herbicides	18.13	11.38	22.26	6.23	11.38	11.38	11.38	11.38	25.87	25.87	
Insecticides	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	
Total Material ($)	59.83	53.08	34.76	18.73	32.63	32.63	32.63	32.63	47.12	47.12	
Machine Costs											
Primary Tillage	.00	.00	.00	11.81	.00	.00	.00	.00	.00	.00	
Secondary Tillage	.00	18.38	5.25	23.63	.00	15.75	.00	6.30	.00	6.30	
Planting	11.81	8.66	11.81	8.66	11.81	8.66	11.81	8.66	11.81	8.66	
Spread Fert.,etc.	3.68	3.68	.00	.00	.00	.00	.00	.00	.00	.00	
Spraying	3.68	3.68	3.68	.00	3.68	3.68	3.68	3.68	3.68	3.68	
Harvesting	19.95	19.95	19.95	19.95	19.95	19.95	19.95	19.95	19.95	19.95	
Trucking	3.40	3.67	4.15	4.14	3.28	3.54	2.65	2.84	3.83	3.94	
Drying	4.91	5.30	0.69	2.30	1.09	1.96	2.06	2.20	.00	.00	
Total Machine ($)	47.43	63.32	45.53	70.49	39.81	53.54	40.15	43.63	39.27	42.53	
TOTAL COSTS/ACRE ($)	107.26	116.40	80.29	89.22	72.44	86.17	72.78	76.26	86.39	89.65	
NET RETURN/ACRE ($)	100.64	108.00	173.26	163.78	127.76	129.98	88.92	96.99	147.91	151.25	

Table 42 AVERAGE COSTS OF TILLAGE SYSTEMS

	NO-TILL CORN						RIDGE CORN		NO-TILL SOYBEANS			
	Soybean stubble or light residue		In winter - killed wheat		In wheat straw and clover		New Ridges		In soybean stubble		In corn stalks	
Tillage	No-Till	Sp. Disk or cult	No-Till	Disk or cult	No-Till	Fall Plow	Ridge	Fall Plow	No-Till	Disk or cult	No-Till	Disk
Yield bu/A	132.3	127.3	154.2	152.6	118.3	140.6	117.5	115.5	37.4	38.3	41.3	41.3
Value of Crop ($)	297.68	286.42	346.95	343.35	266.18	316.35	264.38	259.88	205.70	210.65	227.15	227.15
Material Costs												
Seed	22.53	22.53	21.13	21.13	21.94	22.46	20.85	20.85	21.87	21.87	18.95	18.95
Fertilizers	73.78	73.78	93.73	93.73	73.64	69.34	60.84	60.84	8.00	8.00	.00	.00
Herbicides	20.63	15.69	23.31	13.93	32.46	20.71	21.55	21.55	28.39	23.99	29.84	25.35
Insecticides	6.01	4.89	0.33	.00	5.99	2.98	0.33	0.33	.00	.00	0.60	.00
Total Material ($)	122.95	116.89	138.50	128.79	134.03	115.49	103.57	103.57	58.26	53.86	49.39	44.30
Machine Costs												
Primary Tillage	.00	.00	.00	1.49	.00	11.81	11.81	11.81	.00	.00	.00	.00
Secondary Tillage	0.93	12.72	3.50	14.69	1.31	9.45	21.17	12.60	.00	10.50	2.10	14.07
Planting	11.81	8.66	11.81	8.66	11.81	8.66	11.81	9.71	11.81	8.66	11.81	8.66
Spread Fert.,etc.	9.63	9.63	11.73	11.73	9.58	9.58	8.05	8.05	1.23	1.23	.00	.00
Spraying	4.76	4.76	3.68	3.68	5.52	4.60	4.91	4.91	3.68	3.68	5.89	5.89
Harvesting	21.26	21.26	21.26	21.26	21.26	21.26	21.26	21.26	19.95	19.95	19.95	19.95
Trucking	11.91	11.46	13.88	13.73	10.65	12.65	10.58	10.40	3.36	3.45	3.72	3.72
Drying	13.67	13.54	6.64	5.11	10.65	8.00	16.65	18.10	1.44	1.43	0.29	0.52
Total Machine ($)	73.97	82.03	72.50	80.35	70.78	86.01	106.24	96.84	41.47	48.90	43.76	52.81
TOTAL COSTS/ACRE ($)	196.92	198.92	211.00	209.14	204.81	201.50	209.81	200.41	99.73	102.76	93.15	97.11
NET RETURN/ACRE ($)	100.76	87.50	135.95	134.21	61.37	114.85	54.57	59.47	105.97	107.89	134.00	130.04
	N = 17		N = 6		N = 4		N = 3		N = 6		N = 5	

SOIL LOSS AND WATER QUALITY

This section will discuss the soil loss and water quality benefits of no-tillage systems. Table 43 represents the 11 corn plots and 6 soybean plots that had no-till compared to conventional and reduced tillage systems. The percent of surface residue was measured at planting time.

Type of surface residue (previous crop), percent of surface cover, soil type, slope, length of slope, and cropping sequence directly affect the rate of soil loss. Previous crop, percent surface cover, and cropping sequence are the factors that can be managed by the farmer.

Regardless of the type of tillage system used, the previous crop affects soil loss. The soil loss rate increases for both corn and soybeans as one progresses from a previous crop of meadow to corn to small grain to soybeans. For instance, soil loss is reduced more than half when corn or soybeans follow meadow as when following soybeans.

As the percent of surface cover is increased, soil loss decreases. Mulches (residues) on the surface intercept the falling raindrops so near the surface that drops regain no full velocity before contacting the soil. This substantially reduces the amount of soil detached by raindrops. In addition, the mulch on the surface obstructs runoff flow and reduces the sediment transport. Therefore, anything done to change, reduce, or eliminate tillage to keep more residue on the surface will reduce soil loss.

Cover (residues or crops) on the soil surface during winter and spring is very important to control soil loss. Preliminary findings from the monitoring program show that a large portion of the total yearly soil loss occurs during winter and spring on unprotected soils. Therefore, avoiding fall plowing could significantly reduce soil loss and improve the water quality.

The cropping sequence is the remaining factor that the farmer can manage to influence soil loss. By keeping more meadow, small grains, and corn in the rotation, as opposed to soybeans, soil loss is reduced. Soybeans are one of the most erosive crops grown. If an intense rotation is used that includes soybeans then additional care should be taken to maintain more residues on the surface and use the no-till system of soybean production.

Phosphorus is the major nutrient thought to be responsible for the degradation of our lakes and streams. Since phosphorus is attached to soil particles, soil erosion contributes not only sediment to our lakes and streams but also the attached phosphorus and other associated pollutants. Therefore, it stands to reason if soil erosion can be reduced, even on those soils that are already well below the acceptable soil loss, water quality should be the major benefactor.

The following table lists the erosion predicted by the Universal Soil Loss Equation for the specific conditions and for the 1982 crop on each plot. The data readily shows the effectiveness of reduced tillage and no-till in reducing erosion. The plots are listed in order of increasing erosion potential due to slope and length of slope.

TABLE 43 DEMONSTRATION PLOT SOIL LOSS COMPARISONS

Name	Soil Type	Residue	Crop	% Cover	% Slope	Slope Length	Tillage Performed	Soil Loss tons/acre/year Conventional:	Reduced 2/:	No-till
D. Singer #1	Paulding	New Alfalfa	Corn	70	0.2	200	2-Spring Field Cultivate 1 Roterra	1.16 3/	0.63	0.06
D. Singer #2	Roselms	Alfalfa	Corn	45	0.2	200	2-Spring Field Cultivate 1 Roterra	1.33 3/	0.82	0.32
J. Donze #2	Hoytville	Soybean	Corn	50	0.2	400	1 Spring Disc 1 Cultiv-ation	1.43 3/	1.01	0.42
M. Renz	Fulton	Alfalfa	Corn	65	0.2	400	Spring Plow 1-Disc	0.69	----	0.16
M. Renz	Fulton	Alfalfa	Corn	50	0.2	400	Spring Plow 1-Disc	0.69	----	0.43
H. Detray	Paulding	Wheat Stubble	Corn	75	0.5	250	No Compar-ison	1.42 3/	----	0.19
B. Shininger #4	Roselms	Alfalfa	Corn	85	0.7	200	No Compar-ison	0.88 3/	----	0.10
R. Appel #2	Blount	Wheat Stubble	Corn	90	2.5	450	Spring Plow 2-Disc 1-Power Harrow	6.45	----	0.64
A. Bok #1	Blount	Wheat Stubble	Corn	85	3.0	350	Spring Plow 1-Disc & Drag	8.35	----	0.90
O. Schroeder #1	Glynwood	Alfalfa	Corn	85	3.0	450	1-Spring Chisel 2-Disc	4.11 3/	1.93	0.48
A. Bok #2	Blount	Wheat Cover Crop	Corn	20	3.2	350	No Compar-ison	10.13 3/	----	5.68

TABLE 43 (Cont.) DEMONSTRATION PLOT SOIL LOSS COMPARISONS

Name	Soil Type	Residue	Crop	% Cover	% Slope	Slope Length	Tillage Performed	Soil Loss tons/acre/year Conventional:	Reduced 2/:	No-till
D. Meyer	Paulding	Soybean	Soybeans	30	0.2	450	Spring 2 Discing w/ Culti-packer	1.46 3/	1.19	0.61
C. Vetter #2	Del Rey	Corn Old Ridges	Soybeans	85	0.2	500	Fall Plow 2-Disc 1-Roterra	2.36	----	0.29
Z. Zeedyk #1	Latty	Corn	Soybeans	70	0.2	500	3-Disc 1-Culti-mulch	1.19 3/	0.42	0.30
P. Kennerk #2	Shoals	Soybean	Soybeans	65	2.5	150	Spring 2 Discing w/Harro-gator	4.74 3/	3.74	1.62
B. Heisler #2	Blount	Soybean	Soybeans	50	3.0	400	Fall Chisel -2 Disc -1 Culti Mulch	8.98	7.33	3.07
C. Vollmer	Glynwood	Corn	Soybeans	70	4.0	300	Spring 1-Disc 1-F.Culti-vate	10.33 3/	3.66	2.66

1/ Refers to % cover on No-Till Area.

2/ At least 20% of the surface was still covered after planting.

3/ Projected Comparison.

The SWCD's disk ridger forms ridges 8 to 10 inches high. Fields should be plowed, worked, then land leveled before ridging. The ridges should provide a warmer and drier growing environment for young plants.

No-Till on Ridges on the poorly drained clay soils provides crop residues to protect the soil surface, while also providing an elevated seedbed to help reduce water damage to crops.

RIDGE TILLAGE SYSTEMS

Defiance County is composed of some of the worst soils in terms of drainage and, therefore, crop production. Soil types such as Paulding, Latty, Roselms, and Fulton have clay contents ranging from 35% to 80%. The major problems with these soils are their poor internal drainage and their usually level topography which slows surface drainage. Fields with these heavy, clay soils are normally wet and tillage is often difficult to accomplish under ideal conditions.

Ridge tillage systems attempt to elevate the young corn or soybean seedlings above the level of surface water in a field. By elevating the plant to a drier and warmer environment, healthier growth can occur and yields can possibly increase. Ridge systems can't solve all problems; excessive flooding in fields caused by heavy rainfall covers ridges too. In normal years ridges should reduce flooding problems. With ridges it is critical to have a good surface drainage system. A power rotary ditcher can be used for temporary surface drainage. However, a constructed shallow surface ditch or waterway would be best.

There are two basic ridge forming methods; fall ridging, and ridging through cultivation. Fall ridging is done in a field that has been plowed, worked, then land leveled. The ridger consists of opposing disks which throw up ridges in the loose dirt, approximately 8" to 10" high. By spring these have settled and the ridges are about 6" to 8" high. Crops are planted on top of the ridges, and some cultivation may be used through the summer to maintain these ridges.

Ridging through cultivation is simply that: fields are planted to corn and once the corn is up ridges are formed using a special cultivator.

In neighboring areas, farmers are trying fall ridging after harvest using the cultivator-ridger and no other tillage on lighter soils. This, of course, incorporates residues into the ridges but does not allow for any land-leveling. It has been reported that in the case of heavy residues, particularly wheat straw, the mat of straw covered by the ridge has acted as a water barrier, thus leaving the ridge too wet in the spring for early planting. In the case of soybean stubble where there is much less residue this system may offer a simple means of getting ridges built during a busy and sometimes wet season of the year where land leveling is not required.

To reduce costs involved in fall ridging fields every year, a tillage practice called No-Till on Ridges uses the same ridges for several years. A no-till planter plants the crops, and all equipment tires are spaced to straddle the rows. Cultivation during the summer helps to rebuild ridges which have settled. This system has the advantage of planting soybeans in rotation with corn. With a ridging through cultivation practice, ridges could not be made high enough without covering soybean plants the first year. Ridges that have been formed through cultivation can be planted no-till in the following years.

No-till on ridges protects the soil during critical erosion times of the year, late winter and early spring. Residues are left on the surface at harvest, but by planting time the top of the ridge is almost entirely exposed thus allowing warming and drying of the area where the new row will be planted.

NO-TILL MANAGEMENT

Our experience in no-tillage over the past five years has confirmed that no-till is not the answer for poor management, but will require top-notch management to be successful. It is imperative that a first time no-tiller start with a small acreage and grow into the system, expecting to make mistakes along the way. It is important to learn from these mistakes and make the experiences work for you. The following management items are a guide for the person beginning in no-till and if given careful attention should increase the chance of success.

FIELD SELECTION

In field selection, considerations must be given to soil type, drainage, residue, weed problems and cover crops.

Drainage

The best situation for no-till is in a field that is naturally well drained or on soils that have artificial drainage that improves surface runoff, subsurface drainage or both. The glacial moraine soils, Pewamo, Blount, Glynwood, in the northwestern part of Defiance County have better natural internal drainage than our lake plain soils and therefore are more suitable to no-till. Tile drains should be installed in low areas of Pewamo and Blount to improve the internal drainage.

Lake plain soils, Paulding, Latty, Fulton and Roselms, and glacial till plain soils, Hoytville and Nappanee, present different and more severe obstacles to successful no-tillage. These soils are very high in clay content, have poor to very poor natural internal drainage, poor surface drainage, and tend to warm up and dry out later in the spring.

The Hoytville soils respond extremely well to tile drainage which overcomes many of the problems of this soil. Our experience shows no-till is successful on these soils if drained and crops are rotated.

Lake plain soils do not respond to tile drainage, therefore surface drains are needed to remove excess surface water. Ridges are a means of overcoming some of the drainage problems. They raise the seed bed which should promote earlier drying, warm-up and subsequently planting.

Residue

First time no-tillers should consider planting into a light residue, such as soybean stubble. Experience has shown this is the residue that should provide the best chance for success. A growing crop, such as clover, also provides for a good chance of success. Large amounts of non-growing residues tend to keep the soil cooler and wetter in the spring. Crop residues should be well distributed because bunches of residue cause the soil to dry unevenly.

Weed Problems

Serious weed-infested fields should be avoided. A problem weed can be controlled in no-till but most likely will be harder and more costly than in conventional tillage. Farmers should pick an easy field to start with.

Cover Crops

Our work with cover crops is very limited. A growing cover crop may help pull moisture in the spring and help to dry fields. At this time it is recommended to avoid any heavy cover crops.

FERTILIZATION

Current soil tests should be used to determine nutrient levels and pH. Fertilizers should be applied according to these tests with yield goals established.

Phosphorus and Potassium

If soil tests show phosphurus and potassium levels are high all the P and K can be broadcast on the surface. If soil test levels are low, phosphorus and potassium should be applied as row fertilizer. Many farmers apply their P and K as a combination of surface applied and row fertilizer.

Nitrogen

Nitrogen management is a critical aspect of no-till and very difficult to assure the desired results. Please refer to the nitrogen management section of this publication.

pH

In a continuous no-till corn situation, it is important to check the pH of the top 2" layer because 28% nitrogen tends to depress the surface pH, which could render certain herbicides less effective. Crop rotation and changing tillage or frequent applications of small amounts of lime should remedy this problem.

PLANTING

Planting to obtain an adequate stand is the objective of all farmers using conventional tillage and is equally important in no-till. Successfully obtaining a stand depends on soil temperatures, soil conditions at planting, seed drop, seed treatment, and planting equipment and operation.

Soil Temperatures

Planting should begin when temperatures reach 50 degrees at mid-morning, with the reading taken at a 2 inch depth. This rule of thumb should be followed unless May 1 arrives and soil temperatures have not reached 50 degrees. If May 1 arrives and soil conditions are right for planting go ahead and start planting.

Soil Conditions

The soil must be dry enough to allow for proper functioning of the planter. This may be difficult to determine but should be easier with experience. A day or two can make a big difference in the soil conditions, so don't rush this critical operation. If the soil is too wet when planted it is difficult to get proper soil-seed contact and if drying occurs after planting, the slot may have a tendency to open, exposing the seed to birds, rodents, and dehydration.

Seed Drop

Base seed drop should be the recommendations of the hybrid used and then adjusted according to planting conditions. Until further experience is obtained on our soil types it is recommended that seed drop be increased 10-15 percent to obtain the desired stand.

Seed Treatment

A planter box treatment is recommended under all conditions and is extremely important under no-till conditions. A planter box treatment will help control seed corn beetles, seed corn maggots and wireworms. A planter box treatment is extremely important when soils are wet or cold.

Planting Equipment

A planter designed and equipped to plant no-till should be used. Important components of a no-till planter are a ripple or fluted coulter, depth gauge wheels, spring loaded press wheels, down pressure springs on the parallel unit linkage and double disc seed openers. The ripple coulter will throw less soil at higher speeds with slightly better penetration than wider coulters. Wide coulters work a wider area that provides a larger area in which to insure proper planting. This is not critical when coulters are located just ahead of the seed opener.

Planting

Proper planting may be the most critical operation in a successful no-till operation. It is important to slow down when planting. Start at about 3 mph and increase speeds if soil conditions will permit. Excessive speed will throw loose soil away from the planting slot and could affect depth and seed-soil contact.

Corn should be planted 1½ inches deep and soybeans no deeper than 1 inch. Make sure adequate cover is obtained on the seed, especially corn. If too many seeds are close to the surface or exposed set that row down to the proper depth. Run the coulter no deeper than ½ inch below the seed depth.

WEED CONTROL

It is important to start with a field that has no serious weed infestations. The farmer should look at weed history, check in early spring to determine what weeds may need to be controlled, be honest about this, select herbicides to control these weeds and apply them properly.

Herbicide Selection

Many times grasses will be the major problem weeds in no-till especially fall panicum, foxtail and quackgrass. The presence of these grasses must be considered in herbicide selection. Contact herbicides are normally required in no-till with Round-up or Paraquat the common ones used. Do not short change your herbicide program by reducing or eliminating the contact herbicides just beacause no green is apparent from the road. Get out in the field and check. Post-emergent treatment of broadleafs may be necessary. In all cases follow current label and Extension guidelines when selecting materials and rates to use.

Herbicide Application

Use of the contact herbicides requires complete coverage of any growing plants. Coverage depends on volume of carrier applied, nozzle spacing, pressure and boom height. Follow the following guides to get the job done right when using Paraquat:

1. Stay within the range of 25-50 lbs. pressure.
2. Flat fan nozzles at a 20 inch spacing with 30-40 gallon of carrier will do the best job.
3. Small floods (less than TK 30) at a 40 inch spacing are acceptable in the 40-60 gallon of carrier range. Floods on a 60 inch spacing are acceptable if complete overlap and 55-60 gallon of carrier is used.
4. Large flood nozzles and wide spacings (floater type set-up - 120" spacings) do not do an acceptable job. This set-up should be used only with caution and more than 70 gallon/ac. carrier.
5. When using floods turn them down and angle forward slightly!
6. The more the green growth the higher the volume of carrier needed. Even when growth is small the herbicide has to get down through the trash and get already germinated small weeds. Don't omit Paraquat because you "think" a field looks clean.
7. Always use non-ionic surfactant with Paraquat. Double the rate of surfactant when 28% nitrogen is the carrier. Never use phosphate fertilizer or dirty water as a carrier.
8. Measure spray pressure at the boom, not at the nozzle.

Boom Height

Set the boom high enough that the spray pattern will meet over the top of the vegetation. This will give uniform chemical application. Proper height will vary according to height of the vegetation.

CONTROLLING INSECTS

Insect problems may increase with no-till but this is not necessarily the case. Specific insect problems may increase and need to be scouted for to determine their presence.

Soil Insecticide

Follow current Extension recommendations concerning rootworm control in corn after corn. We had problems with cutworms in soybean residue. We feel an insecticide should be used in all no-till fields and if growing cover is present Furadan is recommended because it provides some help in suppression of armyworms. Always follow the label recommendations for the specific chemical, as misapplication can reduce germination of seed corn.

POST-PLANTING SCOUTING

Once a no-till field is planted it is imperative that the field be checked periodically. Items to check for are emergence, weed control, armyworms and cutworms. All of these items can be corrected and/or controlled but the key is identifying the problem and attacking it before excessive damage or losses occur. No-till fields should be checked 2 or 3 times each week from planting to lay-by and specialists contacted if questions or problems arise.

FULL SEASON NO-TILL SOYBEANS

Although our experience is limited, no-till soybeans is a viable alternative. When no-tilling soybeans, critical management factors include row width, variety selection, and herbicide application.

Row Width

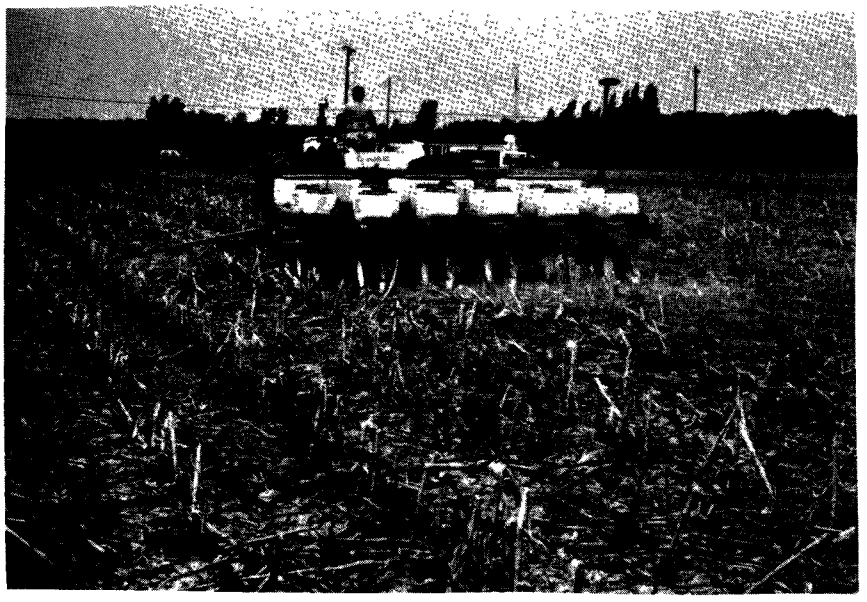
No-till soybeans should be planted in 15 inch rows or narrower to get quick ground cover which should help reduce weed pressures through shading of the soil.

Variety Selection

A branching type soybean is recommended for no-till. The branching will help get quick ground cover and compensate for imperfect stands. Varieties selected should have good phytophthyra root rot tolerance.

Herbicide Application

If a broadleaf problem exists it is recommended to apply 2,4-D ester 7-10 days prior to planting and then apply Paraquat and residuals at planting. The type of weed problem will determine the herbicide application program.



No-till soybeans should be planted in narrow rows to help reduce weed pressure. This is the Project's White planter set up for 11 - 15" rows.

NITROGEN MANAGEMENT

According to both Ohio State and Purdue University reports, one of the major factors in a successful no-till corn production program is nitrogen (N) management. In this area there are three or four materials available as N sources and there are several ways of applying these materials. Each of the materials and means of application has advantages and disadvantages in the no-till situation.

An important consideration in nitrogen management is the amount of N loss. The extent of this loss is affected by the type of N fertilizer used, the application method used, soil surface pH, soil drainage, the weather and the nature of the crop residue. The two most common means of N loss are volatilization and immobilization.

Volatilization is the gaseous loss of ammonia from urea based fertilizers. In its conversion from urea to ammonium nitrogen, an intermediate is formed which can release ammonia gas. Conditions favoring volatilization are large amounts of surface residue, hot, dry weather and high soil pH.

Immobilization is the tie-up of nitrogen by soil microorganisms. When applying N to large amounts of low nitrogen residue, such as corn stalks and rye, the potential for immobilization exists. This is not totally bad since the majority of N will be released eventually, however, the problem is one of timing. The N may be unavailable when plant demand is high.

ANHYDROUS AMMONIA

Anhydrous Ammonia is an excellent source of N in no-tillage systems if applied properly. Since this material is injected it is unlikely that any problems would be encountered with residues immobilizing the N, however, a coulter in front of the knives may be necessary to cut through heavy residues. Surface pH should be less affected thereby maintaining a more suitable pH for weed control. A good N program would include applying 25-50 lb. N/A on the surface or with the planter to promote early root growth and then sidedressing anhydrous ammonia.

UREA

Urea is the least desirable as a N source in most no-tillage situations. The losses from volatilization are likely to be the greatest from this source of N, especially when heavy crop residues are present. An enzyme in the crop residue converts the urea to ammonium carbonate which can escape into the atmosphere as ammonia gas. Conditions contributing to high N loss from this source are heavy crop residues such as corn stalks, high surface pH or a warm dry period following application. Early application (early April) of urea will slow N loss as temperatures are cooler. Other means of reducing losses would be applying urea prior to anticipated rains which would wash the urea into the soil, or banding it between the rows and below residues. Since high surface pH will increase losses, urea should never be used on freshly limed fields. Lime should be applied in the fall to hold N losses at a minimum.

NITROGEN SOLUTIONS

Losses from using nitrogen solutions (28%) are generally less than when using urea even though these solutions contain significant amounts of urea. Conditions conducive to losses are also hot, dry weather or application to heavy residues. In dry springs losses can occur as volatilization while much of the N applied to residues, especially rye and corn stalks, is immobilized. The fact that this form of N is a solution increases the chances of it being absorbed by residues whereas with prilled or granular urea the material may roll off the residues and come in contact with the soil. Methods of reducing losses from N solutions include banding, split applications, applying just prior to anticipated rains and injection. Where surface applications of urea or 28% solutions are used, N rates should be increased 15% to compensate for losses.

AMMONIUM NITRATE

Ammonium nitrate is the safest of these materials for surface application since it contains no urea. Handling has been a problem with this material thus limiting its widespread adoption. In comparing ammonium nitrate to broadcast urea, ammonium nitrate has produced higher yields when significant urea loss occured.

Many of the problems associated with the various forms of N can be overcome by various application methods. While anhydrous ammonia must be injected and properly sealed, injection is also the preferred method for N solutions and urea. Not only does injection reduce losses, but it also eliminates any problems with surface pH which may in turn affect the activity of triazine herbicides.

PHOSPHORUS MANAGEMENT

Phosphorus is a key nutrient necessary to crop production, but it is also being cited as the key nutrient responsible for pollution problems in our streams and lakes. There is some concern that farmers may be adding more phosphorus to farmland than is economical or necessary for optimum crop production, thus adding to phosphorus loading of waterways. Agronomists are indicating the optimum Bray P_1 soil test levels to be 30, 40, and 55 pounds per acre for soybeans, corn and wheat respectively. The optimum level is that level at which crop production is most economical in terms of getting the most return on each dollar spent.

In 1982, a total of 330 soil samples from Defiance County were analyzed at the OARDC Research Extension Analytical Lab. The following table lists the number of samples falling in various ranges of phosphorus readings from these tests.

Table 44 1982 SOIL PHOSPHORUS TESTS

Bray P_1 Soil Test	# of Samples
0 - 19 #	24
20 - 39 #	76
40 - 59 #	72
60 - 79 #	60
80 - 99 #	34
100 -119 #	18
120 -134 #	14
135+ #	32
	330

If a farmer desired to maintain his phosphorus levels optimum for wheat production, he should maintain a level of 55 pounds per acre. From the above table, 158 or about 48% of the samples analyzed exceeded 60 pounds per acre. Thus, almost half the samples tested had phosphorus levels higher than necessary for the crop requiring the greatest optimum phosphorus reading.

Referring to the table again, 64 or 19% of the samples were excessively high with readings of 100 pounds per acre or greater. Over the years phosphorus fertilization has been stressed on phosphorus poor soils. However, many of these soils have now become enriched to the point that continued high phosphorus fertilization is not only poor economics, but may also be a contributing factor in phosphorus pollution.

The method of applying phosphorus fertilizer also needs to be considered since most phosphorus in streams is leaving fields via run-off. Hence, unless a field is unreasonably low in phosphorus, surface applications should be avoided. Also, it should be noted that the fertilizer is most efficiently used by the plant if it is placed in a band to the side and below the seed zone.

In most no-till situations it is recommended that a starter fertilizer be applied. If phosphorus levels are at or slightly above optimum levels a maintenance program of approximately 0.4 pounds phosphate per expected harvested bushel be applied. Thus, if a field tested 40 pound per acre phosphorus and the corn yield goal was 150 bushels per acre, 60 pounds phosphate should be sufficient to maintain the 40 lb/A phosphorus test.

To demonstrate the effect of phosphorus applications on yields and fertility levels over several years, the project has set-up several phosphorus draw-down plots. As can be seen in the table below, one of the plots has a very high reading, one is low and the remaining two are at optimum or slightly above. One section of each field will have phosphorus applied annually while another section will have no phosphorus applied. Over the term of the study, the "with and without" sections will be sampled and analyzed annually to determine the effect phosphorus withdrawal has on soil test levels. Yields will also be monitored closely.

Table 45 PHOSPHORUS DRAWDOWN PLOTS

	Bray P-1 Soil test	Pounds of P_2O_5 added	Yield	
			With P	Without P
Bob Rettig #1P	108#	41	126.4	114.6
Bob Rettig #2P	31#	55	93.1	105.0
Bob Shininger #1P	61#	69	98.2	91.0
Bob Shininger #2P	42#	69	114.9	115.1
Average	60	58	108.2	106.4

Yield response to phosphorus applications was not as would be expected for 1982 and these yield variations on the individual plots can be attributed to field variation.