the Practical Farmer

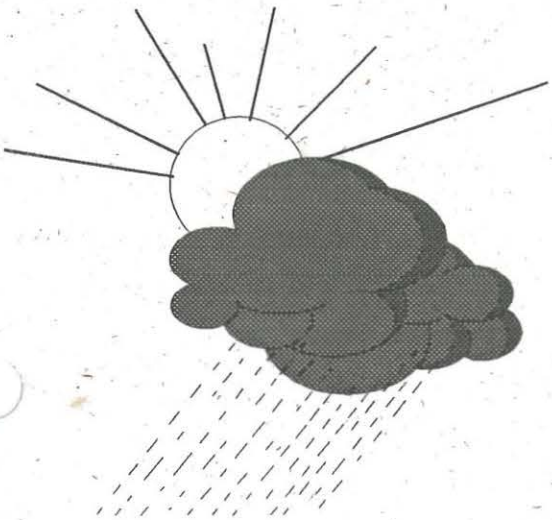
Practical Farmers of Iowa Newsletter

Vol. 5, #4
Winter 1990

PFI 1990 ON-FARM TRIAL RESULTS: SUSTAINABILITY IN A WET YEAR

1990 was the fourth year Practical Farmers of Iowa conducted on-farm trials around the state. During the first three years of this effort, Iowa suffered through a memorable drought. This presented its own challenges, but at the same time, the dry weather brought some opportunities. Mechanical weed control worked like a charm, given the right equipment. Carryover nitrogen, not used by previous crops or washed out of the root zone, allowed farmers who used the late spring soil nitrate test to save thousands of dollars on fertilizer. Small grain yields provided another bright spot, often going over 100 bushels per acre.

Last spring when the sky opened up over most of the state, everything changed. It was the year that tested the successful practices of the past.



This issue of *the Practical Farmer* summarizes the outcomes of PFI 1990 on-farm comparisons in weed management, nitrogen, oat production, starters, cover crops – what worked, what changed, what was learned: *sustainability in a wet year.*

(Continued on page 2)

IN THIS ISSUE

COOPERATIVE RESEARCH

In 1990, Practical Farmers of Iowa was fortunate to be involved in a number of research projects and demonstrations in cooperation with agricultural scientists. The replicated, randomized field trials provide a good field laboratory for scientific study.

- Cooperators continued to evaluate the late spring soil nitrate test for corn. The test was adapted for use in Iowa by Dr. Alfred Blackmer of Iowa State University. In 1990 they worked with an experimental early spring test as well.
- Cooperators also participated for a second year with ISU researcher Antonio Mallarino in the evaluation of a late season stalk tissue P and K test for corn.
- Dr. Richard Cruse, of Iowa State, continued his observations on the farms of PFI cooperators who drill oats on permanent ridges and who practice narrow strip intercropping.
- The Leopold Center for Sustainable Agriculture continued funding for ISU botanist Tom Jurik to conduct a detailed study of weed control in ridge-till with and without herbicides on three cooperators' farms.
- Several PFI members are cooperating in a study of oats as a winter cover crop. Researchers at the National Soil Tilth Laboratory began the study in 1990 with Leopold Center funding.
- On the farm of cooperators Richard and Sharon Thompson, scientists with the Tilth Lab are continuing an intensive study of the long-term effects of management on soil properties.
- Also, on the Thompson farm, Nebraska USDA researcher John Doran is observing soil microbial effects in ridge-till and conventional tillage.

ON-FARM RESEARCH DESIGN

The experimental design used in PFI field trials encourages cooperation with agricultural researchers. This is a very simple design appropriate to the modest goals of the trials. However, the experimental precision of PFI trials compares favorably with that of typical experiment station trials. For many situations, farmer-managed on-farm trials like those of PFI are both effective and the least expensive alternative.

The demonstration plots, Figure 1, use narrow strips (usually eight rows) that run side by side for the entire length of the field. To reduce effects of field variability, the side-by-side pair is replicated six to eight times, and the order of treatment strips in each pair is randomized. Customarily only two practices ("treatments") are used, reflecting the typical farmer question: "Is alternative practice 'B' superior to my customary practice 'A'?" The simplicity also makes statistical analysis easy. Many PFI cooperators now perform these calculations themselves with guidance from the coordinator and other cooperators.

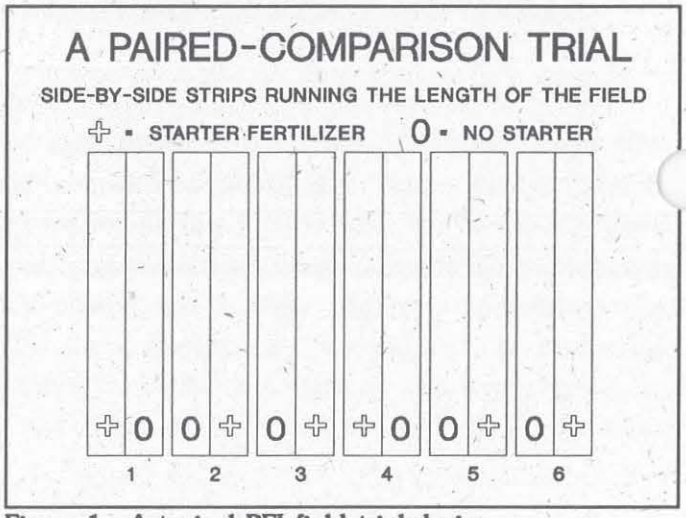


Figure 1. A typical PFI field trial design.

FARM TRIALS DATA: READING THE NUMBERS

Beginning on page seven are the results of over 60 on-farm trials carried out in 1990. Because there is more information from each trial than will fit on one line, most tables are carried across two pages. Most trials are shown on one line that runs across two sheets. It may help your eye move between the pages if you keep your place with a straightedge or another piece of paper.

(*Farm Trials Data* **continued on page 7)**

WINTER DISTRICT PFI MEETINGS

PFI members have been contacted about events taking place in the districts this winter. Some have occurred by now, others are coming up.

On Feb. 8, the North-Central District held a meeting in the Aplington Amvets Hall, in cooperation with ISU Extension. In the morning, there were presentations by Tom Smidt, of Smidt Crop Management (formerly the Butler County Project); George Kadrmas, Grundy County extension director; and Dale Thoreson, extension director for Butler County. After the noon meal, Extension PFI coordinator Rick Exner described replicated on-farm trials; cooperator Al Hagensick discussed PFI work with nitrogen rates; cooperator Ray Stonecypher talked about weed management; and cooperator Don Davidson covered PFI trials with starters and other P and K fertilizers.

Northwest Iowa held a supper Feb. 23 at Stubbs Restaurant in Spencer. The primary goal was to socialize with others in the district, and 42 people turned out. Member Steve Schuur showed slides of his tour of farming in the People's Republic of China, and Ron Vos described the Dordt College Agricultural Stewardship Center.

On Tuesday, March 12, the Northeast District will hold a meeting that will focus on livestock and intensive grazing. The event will take place from 1 to 4 pm in St. Lucas, in the basement of St. Luke's Catholic church. Dan Burkhart, Fayette County Extension director, is assisting with arrangements. The program includes cooperators Mike Reicherts and Dick Svoboda discussing manure sidedressing, Tom Frantzen on controlled grazing, and Extension PFI coordinator Rick Exner with an update on the late spring soil nitrate test.

The Southwest district is also planning a late winter affair, a potluck supper and get together at 7 pm, Friday, March 15. It will be held in Audubon, in the Home Federal Bank, which is ½ block east of

Tom Frantzen, New Hampton, has been selected as the new president of Practical Farmers of Iowa. See the article on page 4.

Highway 71, on Main Street Beverages will be provided. Call Vic or Cindy Madsen (712-563-3044) to tell them you're coming so they can have enough chairs. Paul Walther, Audubon County Extension agriculturalist, will bring specimens of prairie grasses and wildflowers and talk about their use in pastures and in roadside weed management. Vic will present an idea for a "low cost producer" project for southwest Iowa.

On Sunday, April 21, the Southeast District of PFI will present the dramatic production ***Planting in the Dust***, at 2 pm in the Durant High School auditorium. The one-woman play depicts the struggles of rural survival and land stewardship through the Great Depression and the Dustbowl. In connection with the play, the junior high and high school students will participate in a poster festival on the theme "Earth Day 1991." Selected posters will be on display in the school commons on the day of the play.

PFI members from around the state are invited to come to Durant for *Planting in the Dust*. Admission is free, with expenses covered by local organizations and a grant from *PFI Sustainable Projects 1991*.

MARKETING UPDATE

In the last issue of the newsletter, some new opportunities for marketing "pesticide-free" grain were described (*"Pesticide-free Grain – A Market?"*). As spring approaches, some of the crucial details about seed types and premiums are being determined. And others are not.

Larry Tomsen, of West Central Co-op, reports that the Nichii Company will start production at its soybean flaking facility in Jefferson on May 1. Plans for this year are to run only one shift, which will mean a volume of about ½ million bushels through December 31. After alternating between a preference for "pesticide-free" and "organic", the company is now intending to buy soybeans that both pass a residue test for pesticides and for which the grower verifies that no pesticides were used on that bean crop.

Tomsen says the company is still "playing their cards close to the chest" about price. Nichii will have to start buying light hilum, pesticide-free soybeans by about April 15 to meet its startup target. Larry Tomsen may be contacted at 800-522-1946 or 515-386-4144.

A company not yet mentioned in this newsletter is Strayer Seed Farms, Inc., 162 West Hwy. 58, Hudson, Iowa, 50643. Dennis Strayer, general manager, says the firm deals in a number of specialty products. While Strayer presently does more business in organic grain than "pesticide-free" grain, it sees a long term market in both categories. The company also contracts with farmers to grow crops such as "customized" soybeans that have unique oil or protein composition. The company may be reached at 800-772-2958 in Iowa, or 319-988-4187.

The *Better Life* program of Pioneer Hi-Bred International will increase the number of receiving points for "pesticide-free" grain in 1991. Soybeans will be taken at Renwick, in Humboldt County; at Webster City, in Hamilton County; at Hedrick, in Keokuk County; and at Jackson, Minn. Corn, oats and barley will be received at Clinton. Premiums are approximately 35 cents for corn, 25 cents for barley and oats, and $1 to $1.50 for soybeans.

Everything Pioneer *Better Life* buys this year will be grown under contracts signed *before* the growing season. Specific Pioneer varieties must be grown. The company will reveal the varieties only when approached by a grower. Pioneer insists that, unlike last year, there are approved soybean varieties adapted to Iowa. Why the secrecy about varieties? The characteristics of some grains used for food are unique enough that Pioneer is trying to limit supply, thereby keeping up prices.

If you are interested in the *Better Life* program, contact Bob Kennedy (515) 245-3621, Dale Millis (515) 245-3615, or the front desk at (800) 356-0393.

PFI ELECTIONS HELD, BOARD CHOOSES OFFICERS

At the Dec. 12 membership meeting, two districts held elections for directors. Following the general meeting, a new PFI president and vice president were selected by the board.

The northwest district reelected Bob Graaf to a second two-year term. Bob and his wife Diane farm near Palmer. Bob has spearheaded the PFI activity in herb growing this past year, and the Graafs are becoming heavily involved in hothouse tomato production.

Members from the southwest region elected a new rep to replace Ron Rosmann, who has served the limit of two terms. Victor Madsen was their choice. Vic and Cindy Madsen farm near Audubon. Vic is a

A district caucus at the winter membership meeting.

cooperator and has served as associate board representative since last fall. He has taken on responsibilities connected with PFI's sponsorship of an FFA sustainable agriculture award.

The board of directors elected Tom Frantzen the new president of Practical Farmers of Iowa. Tom and his wife Irene farm east of Alta Vista. They have worked with ISU on narrow strip intercropping; they've demonstrated intensive grazing, reduced fertility, and alternative weed management; and last year they tried grain amaranth. Vic Madsen was selected as the new PFI vice president, demonstrating what can happen to people when they miss a board meeting.

Paul Mugge and Jeff Olson have agreed to serve as associate board members from the Northwest and Southeast districts, respectively. Congratulations to the new officers of PFI!

NOTES AND NOTICES

♪ Conservation Tillage Increases

In 1990, conservation tillage was practiced on more than 73 million acres in the U.S. This news comes from the Conservation Technology Information Center (CTIC), which defines conservation tillage as no-till, ridge-till, and mulch-till. The CTIC is a division of the National Association of Conservation Districts. It is administered cooperatively among agribusiness, governmental agencies, private foundations, institutions, organizations, and farmers.

Illinois is the state with the most no-till acres, Nebraska reported the most ridge-till acres, and Iowa is the state with the most mulch-till acres. No-till now covers 16.9 million acres, or 6 percent of total U.S. planted acres. Ridge-till increased for the ninth straight year, to over 3 million acres.

♪ Sustainable Ag Books and Videos from LSP

The Land Stewardship Project has announced the development of four practical information booklets and four professionally produced videos on sustainable farming practices.

Farmers making the transition to more sustainable methods of farming share what has and hasn't worked for them in four easy-to-understand booklets on mechanical weed control, nitrogen management, intensive rotational grazing, and composting.

In addition to the printed materials, LSP, Blue Moon Productions, and the Sustainable Farming Association of Minnesota have teamed up to produce a four-part video series on sustainable farming practices. The Nitrogen Management, Rotational Grazing, and Cover Crops titles are in production and will be available for sale and rental this spring. The 17-minute Rotary Hoe video is completed and can be purchased for $25. Each video features Midwestern farmers sharing their experience with environmentally sound and economically profitable farming methods.

Call LSP at (507) 523-3366, or write the Land Stewardship Project, P.O. Box 815, Lewiston, MN, 55952.

♪ LISA Videos: *First Steps*

A series of six videotapes have been produced by universities in the upper Midwest under LISA (Low Input Sustainable Agriculture) funding. The title for the series is *First Steps: Moving Toward Sustainability*. ISU was the principal partner on the project. PFI members attended an early planning meeting, and several PFI farms were used as taping sites. The final product combines a look at practices used by farmers with a survey of the latest university research.

Program titles and order numbers are: Machinery Management (75671), Pest Management (75672), Soil Management (75673), Nitrogen Management (75674), Livestock Management (hogs) (75675), and Economic Management (75676). Each is about 27 minutes in length, and is available through Area Extension offices in Iowa. The PFI board also has a set of tapes that was given to Practical Farmers of Iowa. Jerry DeWitt of ISU Extension says they may be legally copied.

♪ Herb Production Update

The first *Herb Bulletin* is out. This is a news sheet published by the Kirkwood Rural Development Center to update people on herb growing. Last September, PFI and RDC cosponsored a conference on

commercial herb production. A follow-up meeting has since been held for people already growing or ready to start. The group has gone right to the top, discussing marketing with Tones Spices, Inc. Tones has agreed to purchase everything these producers grow as long as it meets quality standards. Bob Graaf has agreed to serve as *Practical Farmer* correspondent for herb growers in northwest Iowa. PFI still needs someone from the eastern part of the state to keep the PFI newsletter informed of herb activity there.

♪ Flower Production Workshop

The Rural Development Center at Kirkwood College will hold an informational meeting on April 13 for people interested in commercial flower growing. Preregister by April 1. Call (319) 398-5699.

♪ Farm Program Options Guide

The 1990 Farm Bill offers some flexibility on nonprogram crops that may be grown without loss of crop base. A 32-page booklet, *Farm Program Options Guide*, has been produced by the Sustainable Agriculture Working Group to acquaint farmers with these "sustainable agriculture" options. The booklet covers the Integrated Farm Management Program Option, "0/92," the FmHA Soil and Water Loan Program, new CRP options and the Wetland Reserve Program. Field examples are offered to show changes these provisions make possible.

The guide is available for $3 from: Farm Guide, Center for Rural Affairs, P.O. Box 405, Walthill, Neb., 68067. PFI members who have been identified as farmers, farm managers, or farm owners were mailed copies in February.

♪ Test Oats for Germination This Year

(The following excerpt is from an ISU Extension news release.)

Germination rates for oats are testing lower this year. Tim Gutormson, manager of the Seed Testing Laboratory at Iowa State University, advised farmers to test the germination on all oat seed lots intended for planting. "We are seeing oat germination rates 4 to 5 percent under last year," said Gutormson. "Oat germination is averaging about 94 percent, compared to about 98 percent in an average year."

Some of the lower quality oat seed is related to the wet harvest season last year. Sprouting damage, weathered appearance, and the presence of storage fungi have all been noted by germination analysts.

Farmers can have their oat seed tested at the Seed Testing Laboratory located on the ISU campus. A germination test for cereals will cost $5.

PFI USE OF SUSTAINABLE AGRICULTURE BIBLIOGRAPHIES

Jerry DeWitt, ISU Cooperative Extension

Last year farmer members of PFI were informed of a new service from the National Agricultural Library. Special bibliographies on more than 37 topics are offered from the Alternative Farming Information Systems Center. PFI was selected as a test market for this new information. The results show that 24 responses were received from Iowa with requests for more than 193 bibliographies. The most frequently requested bibliography was *Compost and Composting of Organic Waste*, which was followed by *Allelopathy: The Effects of Chemicals Produced*; *Cultural and Mechanical Weed Control*; *Alternative Farming Systems--Economic Aspects*; *Forage Legumes*; *Green Manures and Cover Crops*; *IPM and Biological Control of Plant Pests*; *IPM and Biological Control of Weeds*; and *Rotational Grazing and Intensive Pasture Management*.

This is a good response from Iowa farmers. The Cooperative Extension Service will be announcing the availability of these materials to the public in the near future. County Extension Offices will have lists available for the public to use when ordering from the National Agricultural Library. If you still want to order materials, the quick bibliographies are still available at no cost. Order them today.

(*Farm Trials Data*, continued from page 2)

Most tables show input levels or weed counts, estimated relative costs, and crop yields. There will usually be a column for the difference in yields, "Yield Diff.," between the two practices or "treatments." Then you will find the "Yield Sig." column, which tells you whether the difference in yields is considered to be chance or "real" (statistically significant). A difference small enough to be a chance occurrence gets a "N.S." (Not Significant). If a "*" occupies the Yield Sig. column, then statistical calculation has shown that a yield difference of that size would not occur by the laws of chance more than 5 percent of the time.

These calculations are possible because of the field design used by PFI. With only two practices in a trial, you can calculate a handy yardstick to evaluate the difference between average practice yields. It is the "LSD," or "least significant difference," that 95 percent of the time would be correct in identifying a difference as not due to chance alone. If the yield difference is larger than the "Yld. LSD," then there is also a significance star "*" in the "Yld. Sig." column.

The same star and "N.S." apply to "Leaf N Sig." and "Weed Sig.," reflecting statistical evaluation of differences in leaf tissue nitrogen and weed counts, respectively.

The "$ Benefit" columns show the relative profitability of one treatment over another. A dollar amount shown in parentheses ( ) is a negative, or a net loss. Where crop yields have not been proven to be statistically different, these figures reflect input costs alone. In cases where statistics says there is a real yield difference, the value of the crop also comes into the financial calculations. Corn is priced at $2.27 per bushel, soybeans at $5.75, and oats at $1.30.

So if the LSD is 1.2 bushels and the average yield difference is 1.3 (*or* -1.3) bushels, the value of the 1.3 bushels is added to or subtracted from the difference in input costs. On the other hand, if the yield difference is only 1.1 bushels, the crop value is not included. This may not make much sense to you, but bear with us. We are just assuring that we are sure of how sure we *are* (95%) of what we are sure *of*.

Equipment costs are derived from ISU Extension bulletin FM-1712, *Estimated Costs of Crop Production in Iowa – 1990*. Labor is figured from cooperator information about size of machinery, bean walking time, etc., and is charged at $6 per hour. The numbers in the table show the difference in return to management, so labor is calculated as just another cost. Of course, if you have the choice of paying *yourself* $6 an hour or spending the money on a product, your decision will take into account the wage income and your available time.

One last twist: Some PFI trials have not two, but three or four treatments, which are necessary sometimes. For example, when you compare two different fertilizer forms of the same nutrient, you probably also need a "control" or "check" treatment that gets none of that nutrient at all. That way if you see no yield difference between fertilizers, you can also tell if the crop even needed that nutrient.

"$ Benefit" for multiple-treatment trials is figured relative to the least profitable practice. If there are no significant yield differences, this is done on input costs alone. If specific yield differences are significant (relative to the least profitable treatment), then the crop value is also used. The least profitable practice in multiple-treatment trials is assigned a $ Benefit of $0.00, and other treatments figured relative to that.

NITROGEN TRIALS

In the first two years that PFI cooperators used the late spring soil nitrate test, the nitrogen rate trials in corn paired a "high," or typical rate of N, with a low rate recommended by the test. In the dry springs of 1988 and 1989, the soil typically contained a lot of carryover nitrogen from the previous year, and the test allowed farmers to take advantage of that in reducing their fertilizer rates. Everyone was waiting to see what the test would say in a wet year.

The answer came in 1990. Whereas in 1989, PFI soil nitrate readings averaged in the low 20s (parts per million nitrate nitrogen), in the spring of 1990 they were often in the low teens or below. Farmers using the test sometimes found themselves sidedressing more nitrogen than they had used in years. At the same time, the test allowed a field-by-field determination of what corn needed a high rate and what did not. (See *Rain Turns the Tables, the Practical Farmer*, Summer 1990.) In showing where a profitable response to nitrogen could be obtained, the test probably made new friends in the farming community last year.

Figure 2 shows the average yields and nitrogen applications for PFI 1990 nitrogen rate trials. As in previous years, yields were usually similar between the rates. In 1989, the average low and high rates were 69 and 126 lbs of N per acre, a difference of 57 lbs. In 1990, reflecting the weather, the average low and high were 95 and 141 lbs N, a difference of 46 lbs N.

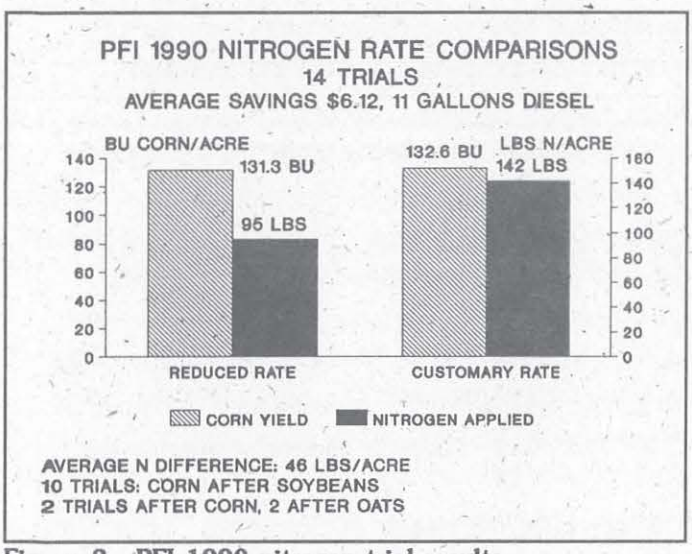


Figure 2. PFI 1990 nitrogen trial results.

It takes a lot of energy to make a pound of nitrogen fertilizer. The 1990 low rate energy savings, figured in gallons of diesel fuel, comes to 11.1 gallons per acre. That is higher than last year's estimate because PFI adopted an Iowa State University figure for the energy value of nitrogen fertilizer.

This year a number of cooperators chose to "bracket" the recommendation window, making their high rate the high end of the recommendation and their low rate the low end. *Both* of Vic Madsen's N rates were technically below the window. The yield in his low rate strips was significantly reduced. This is the exception that proves the rule. The nitrate test had recommended a higher sidedress rate.

The year 1990 saw the nitrate test released to the public. Confusion may have arisen because there were two sets of recommendation guidelines - PFI's and the guidelines released by Iowa State University. Figure 3 shows sidedress recommendations under the two schemes. The ISU recommendations were based on yield goal, nitrate test results, and soil group. The PFI method was to sidedress 7 to 15 lbs nitrogen for each part-per-million below 21 ppm on the test. Of course, this range was not formulated by PFI. It represented a scientific "guess" of the amount of N needed by the crop.

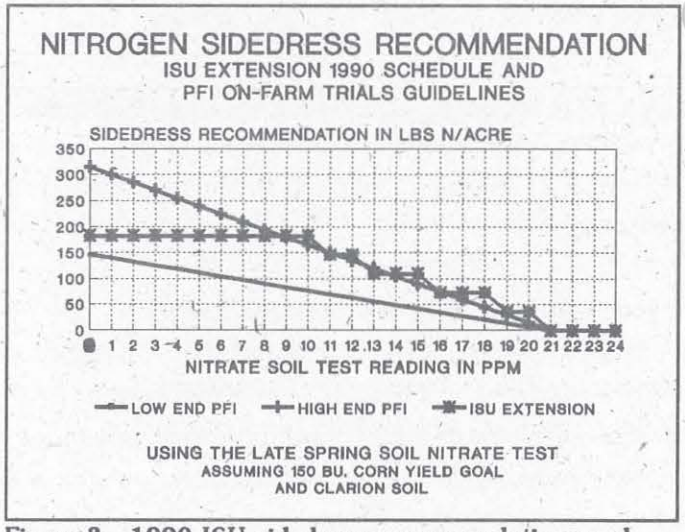


Figure 3. 1990 ISU sidedress recommendations and PFI guidelines.

In 1989, with high test results common, the ISU sidedress recommendations were generally on the high side of the PFI range. PFI, willing to take a risk, could test the 7-15 hypothesis, whereas the recommendations for public consumption were of necessity more conservative. In 1990, however,

nitrate readings were sometimes so low that the ISU method led to rates well within the PFI range. As scientific understanding of nitrogen dynamics increases, recommendations will evolve. The 1991 ISU guidelines (Figure 4) combine the range concept from the PFI procedure with the flat plateau of the ISU method.

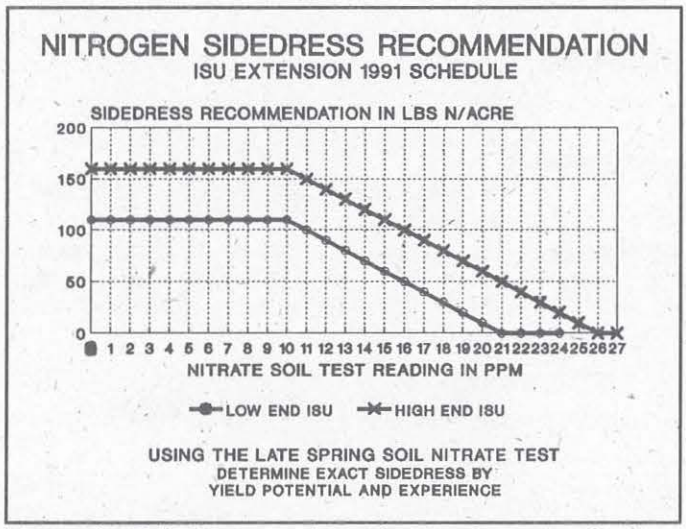


Figure 4. Sidedress recommendations for using the late spring test in 1991.

COVER CROP TRIALS

Cooperators continue to search for ways to succeed with winter cover crops, and interest around the Midwest continues as well. The three cover crop trials conducted in 1990 illustrate that seeding costs are a drawback. The National Soil Tilth Laboratory is presently working with several PFI members on methods and timing of seedings.

MANURE

Mike Reicherts applied 141 lbs of purchased nitrogen, comparing that to corn sidedressed with the same amount of manure nitrogen. Only about half the nitrogen in unincorporated liquid manure is available to the crop. Still, the sidedressed corn yielded at least as well as corn with purchased N. The manure system came out ahead financially too, if only spreading costs were charged against the crop.

Dick Svoboda also compared manure and purchased nitrogen. The manured corn yielded significantly better, even though, again, there was less N available from the manure applied. Leaf tissue tests showed significantly higher potassium with the manure treatment. In the past dry years, some early season potassium deficiency symptoms have appeared on the farm. Dick has been assisted in the trial by Alan Britten, Extension coordinator of the Integrated Farm Management Demonstration Program manure project.

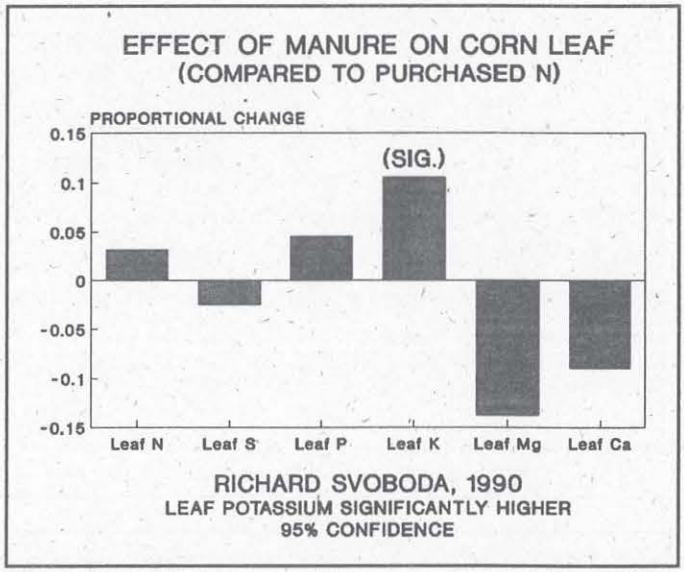


Figure 5. Leaf tissue at silk, manure vs. purchased N.

TILLAGE

Two oats trials can be found in the table of tillage experiments on pages 14-15. Both compare oats on ridges to oats on flat ground. Tom Frantzen found similar yields between the two practices. Paul Mugge observed a nearly 12 bushel advantage to ridge-till oats, but the trial was not randomized.

Todd Hartsock continued his comparison of ridge-till and conventional tillage. In 1990 there was a small but significant soybean yield advantage to ridge tillage. The difference in equipment operating costs added to the yield advantage. Rod Treimer saw no difference in yield or weed numbers between ridge-till and no-till planting, but the burn-down in no-till was costly. Dordt College found no soybean yield improvement to justify subsoiling.

COVER CROP TRIALS IN CORN

COOPERATOR	TREATMENT A COVER CROP	TREATMENT A COVER CROP COST	TREATMENT A CROP YIELD	TREATMENT B COVER CROP	TREATMENT B COVER CROP COST	TREATMENT B CROP YIELD
STONECYPHER	OATS+VETCH (10 LBS)	$13.68	146.5	OATS (2 BU)	$7.68	145.8
DAVIDSON	OATS+VETCH+RYE	$22.60	122.9	NO COVER	$0.00	126.9
DAVIDSON	VETCH+RYE	$33.82	122.3	NO COVER	$0.00	127.7

TRIALS USING MANURE

COOPERATOR	PREVIOUS CROP	MANURE TREATMENT FORM/METHOD	N CONTENT	N AVAILABLE	LEAF N	YIELD	$ COST
REICHERTS	CORN	LIQUID INJECT SIDEDRESS	141	81	--	137.7	$6.94
SVOBODA	SOYBEAN	LIQUID MANURE + STARTER	171	87	2.82	118.7	$21.96

TILLAGE COMPARISONS

COOPERATOR	CROP	PREVIOUS	RIDGE-TILL TRT COSTS	BU. YIELD
MUGGE	OAT	CORN	$24.07	93.5
FRANTZEN	OAT	SOYBEAN	$5.23	63.4
HARTSOCK	SOYBEAN	CORN	$0.00	35.9
			RIDGE-TILL PLANT	
TREIMER	SOYBEAN	CORN	$8.90	47.6
			SUBSOILER	
DORDT	SOYBEAN	CORN	$11.93	43.7

WEED TRIALS

Since 1987, PFI cooperators have conducted ridge-till trials with and without herbicides. This continuing work has helped raise awareness of the potential of ridge tillage in managing weeds without herbicides. For the past two years, ISU botanist Thomas Jurik has intensively studied this practice on four PFI farms, with support from the Leopold Center for Sustainable Agriculture. (See the report on page 20.) In 1990, a third treatment was added to these trials that combines mechanical and chemical control.

Figure 6, on page 14, shows 1990 yields from four trials in corn and seven with soybeans. Because of the weather in 1990, farmers were not able to rotary hoe or cultivate in a timely manner, and many operations were not carried out at all. Postemergence herbicides are an option in such cases, and Mark Mays may have considered them in his weed trial. But the figure and the table show that overall yields were not adversely affected in these trials.

COVER CROP TRIALS IN CORN

TRT. A OVER B SEED COST	YIELD DIFF.	YLD SIG.	YLD LSD	TRT. A OVER B TOTAL $ BENEFIT	COMMENTS
$6.00	0.7	N.S.	2.0	($6.00)	LEAF N WAS SIG. LOWER IN OATS/VETCH
$22.60	-4.0	N.S.	6.3	($22.60)	LOOKED FOR N CONTRIBUTION FROM COVER
$33.82	-5.4	N.S.	8.1	($33.82)	COVER CROP DID NOT REDUCE WEEDS

TRIALS USING MANURE

ADDITIONAL INPUT TREATMENT N RATE	INPUT TYPE	LEAF N	YIELD	$ COST	DIFFERENCE RATE DIFF	YIELD DIFF.	YLD. SIG.	YLD. LSD	LEAF N SIG.	MANURE $ BENEFIT	COMMENTS
141	STARTER + 28% N	--	127.2	$20.40	60	10.5	N.S.	15.3	--	$13.46	
135	PURCHASED N	2.74	107.4	$22.44	48	11.3	*	10.8	N.S.	$26.21	LEAF K WAS HIGHER WITH MANURE

TILLAGE COMPARISONS

CONVENTIONAL TRT COSTS	BU. YIELD	YIELD DIFF.	YLD. SIG.	YLD. LSD	RIDGE-TILL $ BENEFIT	COMMENT
$37.75	81.8	11.8	--	--	$13.68	(UNRANDOMIZED)
$5.41	62.0	1.4	N.S.	3.4	$0.18	PRECULTIVATED RIDGES
$4.85	34.4	1.5	*	1.1	$8.22	SAME TRIAL IN CORN LAST YEAR
NO-TILL PLANT						
$22.82	44.6	3.1	N.S.	3.6	$13.92	

NO SUBSOILER					SUBSOILER $ BENEFIT	
$0.00	47.2	-3.5	N.S.	4.1	($11.93)	

In addition to yields, weeds were counted in the soybean and most of the corn trials. For the seven soybean trials shown in Figure 6, the average broadleafed weed count was 300 weeds per acre where herbicide was used and 306 per acre where alternative control was practiced. These averages are somewhat weighted by the fields with the higher weed numbers. Another way of looking at it is that there was an average of 59 percent more broadleafed weeds in the field strips without herbicide. This is similar to PFI results previous years.

Besides these "traditional" weed trials, cooperators in 1990 found different questions to ask about weeds. Dick Thompson doubled his weed population by preplant cultivating the valleys between ridges. Jeff Olson looked for effects on weed numbers that might be caused by the 28 percent N banded as carrier.

Rod Treimer kept track of weed numbers in comparing a ridge-till planting system with one of no-till planting on ridges. Weed numbers were similar,

WEED TRIALS TABLE

COOPERATOR	LOW RATE TRT DESCRIPTION	YIELD	BROADLEAF PER ACRE	LOW RATE TRT OTHER WEED INFORMATION	HIGH RATE TRT DESCRIPTION
(CORN)					
MUGGE	NO HERBICIDE	139.4	134	HOEING LOWERED STAND ~10%	DUAL/MARKSMAN
DORDT	NO HERBICIDE	130.4	--	2 HOEINGS, 2 CULTIVATIONS	3 QT LASSO + MECHANICAL CONTROL
THOMPSON	NO PRECULTIVATION, NO HERB.	132.1	1498	WEEDS COUNTED IN SUBPLOTS	PRECULTIVATION, NO HERB.
DAVIDSON	NO COVER CROP	127.7	188	115 GRASS PLANTS/ACRE	VETCH/RYE COVER BEFORE CORN
OLSON	28% CARRIER, NO HERBICIDE (NO PREPLANT N)	145.7	31	APPROX. 500 GRASS/ACRE	HERBICIDE + 28% N CARRIER (NO PREPLANT N)
OLSON	NO CARRIER, NO HERBICIDE (PREPLANT ANHYDROUS)	135.0	34	ABOUT 950 GRASS/ACRE	HERBICIDE + 28% N CARRIER (PREPLANT ANHYDROUS)
(SOYBEANS)					
TREIMER	RIDGE-TILL PLANT	47.6	342		NO-TILL PLANT ON RIDGES
THOMPSON	SINGLE 2ND HOEING, NO HERB.	40.4	441		2 DOUBLE HOEINGS, NO HERB.
THOMPSON	NO LIQUID FERTILIZER	48.5	29	AVG. OF 200 GRASS/ACRE	LIQUID FERTILIZER BELOW SEED
CARLSON	SONIC BLOOM + POAST, DAY 2 (HUDSON RD. SITE)	50.0	--	86% GRASS CONTROL (VISUAL)	POAST ONLY, DAY 1 (HUDSON RD. SITE)
CARLSON	SONIC BLOOM + POAST, DAY 1 (U.N.I. SITE)	--	--	76% GRASS CONTROL (VISUAL)	POAST ONLY, DAY 2 (U.N.I. SITE)
MAYS	NO HERBICIDE, ONE HOE	51.5	424	GRASS RATED 3.0 (OUT OF 5)	HERBICIDE, ONE HOE
MUGGE	NO HERBICIDE	51.9	40		HERBICIDES PREPLANT & AT PLANT
STONECYPHER	NO HERBICIDE	40.9	109		HERBICIDES PREPLANT & AT PLANT
THOMPSON	ROTARY HOE, NO HERBICIDE	41.4	340	90 VELVETLEAF/ACRE	3 PINTS DUAL, NO HOE

MULTIPLE TREATMENT WEED TRIALS

COOPERATOR	CROP	YIELD SIGN.	WEEDS SIGN.	TREATMENT "A" DESCRIPTION	YIELD	WEEDS	BENEFIT
HARTSOCK	SOYBEAN	N.S.	N.S.	NO HERBICIDE, 2 HOEINGS	30.9	977	$4.46
THOMPSON	SOYBEAN	N.S.	*	NO HERBICIDE, 2 HOEINGS	43.1	96	$3.85
GRAU	SOYBEAN	N.S.	N.S.	NO HERBICIDE, 2 HOEINGS	36.5	155	$2.70
FRANTZEN	SOYBEAN	N.S.	N.S.	PREPLANT HERBICIDE ONLY	58.1	57	$5.81

WEED TRIALS TABLE

BROADLEAF YIELD	PER ACRE	HIGH RATE TRT OTHER WEED INFORMATION	YIELD DIFF.	YLD. SIG.	YLD. LSD	WEED SIG.	LOW RATE $ BENEFIT	COMMENTS
143.9	2		-4.4	N.S.	7.1	*	$10.44	
129.2	--		1.2	N.S.	2.0		$17.43	BOTH TRTS HOED TWICE
130.1	3177		2.0	N.S.	4.0	*	$4.92	
122.3	241	84 GRASS PLANTS/ACRE	5.4	N.S.	8.1	N.S.	$33.82	COVER CROP DID NOT REDUCE WEEDS
137.1	37	APPROX 45 GRASS/ACRE	-8.7	N.S.	9.4	N.S.	$3.39	ONE ROTARY HOEING
136.6	30	APPROX. 132 GRASS/ACRE	-1.6	N.S.	9.3	N.S.	$9.17	PRECULTIVATED NO-HERBICIDE STRIPS, 1 HOEING
44.6	471		3.1	N.S.	3.6	N.S.	$13.92	USED PREEMERGE BURNDOWN IN NO-TILL
42.4	218		-2.0	N.S.	2.4	*	$2.94	FELT WEED REDUCTION JUSTIFIED DOUBLE HOEING
46.5	200	AVG. OF 7,400 GRASS/ACRE	2.0	*	2.0	*	$39.20	STARTED AS A FERTILIZER EXPERIMENT
45.0	--	39% GRASS CONTROL (VISUAL)	5.0	*	2.7	*	$28.55	HALF RATE OF POAST, FULL RATE AFTER WEED EVAL.
--	--	75% GRASS CONTROL (VISUAL)	--	--	--	N.S.	--	LOW WEED PRESSURE - HALF RATE FOLLOWED BY FULL
54.7	390	GRASS RATED 1.4 (OUT OF 5)	-3.2	*	2.8	N.S.	($0.58)	
52.9	14		-1.0	N.S.	7.1	*	$13.64	
41.4	30		-0.5	N.S.	1.8	*	$13.09	
43.2	717	245 VELVETLEAF/ACRE	-1.8	N.S.	2.9	*	$8.55	4 PAIRS, RANDOMIZED

MULTIPLE TREATMENT WEED TRIALS

TREATMENT "B" DESCRIPTION	YIELD	WEEDS	BENEFIT	TREATMENT "C" DESCRIPTION	YIELD	WEEDS	BENEFIT	OVERALL COMMENTS
HERBICIDE + 1 ROTARY HOE	31.0	418	$0.00	HERBICIDE, NO ROTARY HOE	30.8	612	$2.95	ISU WEED COUNTS
HERBICIDE + 1 ROTARY HOE	43.8	92	$0.00	HERBICIDE, NO ROTARY HOE	44.5	159	$2.94	FARMER WEED COUNTS
HERBICIDE + 1 ROTARY HOE	38.8	24	$0.00	HERBICIDE, NO ROTARY HOE	39.7	179	$2.94	ISU WEED COUNTS
24 OZ LASSO+LI700+PREPLANT	58.3	16	$1.34	32 OZ LASSO+PREPLANT	58.9	16	$0.00	HOE TRT YIELDED BETTER IN HALF THE FIELD, WORSE IN THE OTHER

OAT TRIALS

COOPERATOR	CROP	TREATMENT "A" DESCRIPTION	YIELD
ROSMANN	OATS	4 BU/ACRE SEEDING	80.0
REICHERTS	OATS	SOLID DRILLED	123.0
FRANTZEN	OATS	48 LBS 28% N PRE-AND FOLIAR	75.6
REICHERTS	OATS AFTER SOYBEAN	52 LBS PREPLANT NITROGEN	83.5

but the preemergence burndown was expensive. Dick Thompson, on the other hand, significantly reduced his weed numbers where he double-hoed on the second rotary hoeing. Thompson also made a weed study of a fertilizer study trial. The fertilizer reduced the soybean stand, leading to a foxtail infestation.

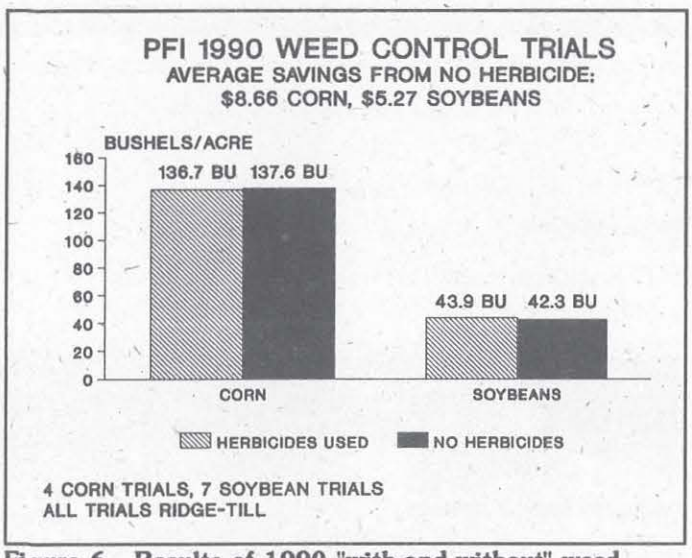


Figure 6. Results of 1990 "with-and-without" weed trials.

Two trials examined herbicide "extenders." Jerry Carlson used a high frequency sound generator with the aim of getting more uptake of a half-rate of Poast®. Grass was significantly reduced in the sound treatment strips in the field with high grass pressure.

Tom Frantzen used an adjuvant with a three-fourths rate of Lasso® for equivalent weed control. However, he was so successful in controlling weeds in the preplant-only strips that this treatment was the most profitable of all.

OAT TRIALS

Although the present market price for oats is unexciting, and yields were down in 1990, many PFI farmers remain oat growers. They may like what it does for livestock, what it does for the land, the way it breaks up the work routine, or just the way it looks. In any event, cooperators continue to tinker with the crop.

Ron Rosmann tested the idea that higher seeding rates are needed for top yields. But the three-bushel oats actually outyielded the oats drilled at four bushels per acre. Mike Reicherts sought to take advantage of the fact that oats drilled in valleys yield less than oats on the ridges. He left the valleys unseeded - and the result was a pronounced yield reduction.

Reicherts and Tom Frantzen applied preplant and foliar nitrogen to oats. The crop reportedly looked great, but, like many of the starter fertilizer trials, early appearances did not translate into yields.

OAT TRIALS

TREATMENT "B" DESCRIPTION	YIELD	DIFFERENCE YIELD	YLD LSD	YLD SIG.	$ BENEFIT OF TRT "A"	COMMENT
3 BU/ACRE	89.2	-9.1	7.8	*	($24.58)	
DRILLED ON RIDGE TOPS ONLY	103.4	19.6	2.5	*	$39.15	
NO ADDED NITROGEN	79.1	-3.5	8.8	N.S.	($16.82)	
6 LBS PREPLANT NITROGEN	82.2	1.2	4.0	N.S.	($7.82)	LEAF P SIG. LOWER, BUT Mg AND Ca SIG. HIGHER WITH HIGHER NITROGEN

OTHER FERTILITY TRIALS

The other soil fertility trials relate to one of four areas: starter fertilizers, banded phosphorus and potassium, sulfur, and "biologicals." PFI trials in 1990 did not close the book on any of these subjects, but they continued to build on past work.

Response to starters was erratic. Of four with-and-without starter trials, only one showed a significant yield benefit.

Dick Thompson and Todd Hartsock carried out multiple-treatment starter trials. Dick compared dry starter, liquid, and none. The yield differences, shown in the table on pages 16 and 17, were statistically significant. Even before the yield difference, the liquid starter cost about $8 more per acre. In a separate trial, Thompson evaluated three rates of the dry starter, but the yields were similar.

Todd Hartsock compared similarly priced dry and liquid applications, no starter at all, and both together. Dry came out ten bushels on top, with liquid yielding better than no starter at all. In these trials the advertised availability of liquid nutrients seemed to be less of a factor than the difficulty of getting sufficient product on the field at a reasonable cost.

Cost is important with any fertilizer. Harlan Grau and Al Hagensick each ran two trials with deep banded P and K. Hagensick saw no yield effect of a spring injected band requiring a separate trip across the field. Harlan Grau did harvest an extra nine bushels of corn where he deep banded phosphate and potash in the fall of 1989. The yield increase left him $2.32 per acre after he paid for the fertilizer and application trip. Soybeans did not respond to a two-year-old band applied for the '89 corn.

Sulfur was a much discussed nutrient in 1990, and some farmers are buying a sulfur fertilizer out of curiosity. Fertilizers like ammonium sulfate and

What do *you* see? PFI member Cindy Madsen encouraged people to take their own readings with the nitrate test kit.

OTHER FERTILITY TRIALS

COOPERATOR	CROP	TREATMENT "A" DESCRIPTION	YIELD	TREATMENT "B" DESCRIPTION
BUMGARNER	SOYBEAN AFTER CORN	LIQUID STARTER (+3+9+18)	35.6	NO STARTER FERTILIZER
DAVIDSON	CORN AFTER SOYBEAN	BANDED STARTER (+5+13+13)	136.7	NONE
HAGENSICK	SOYBEAN	STARTER FERTILIZER	48.1	NO STARTER FERTILIZER
HANKS	CORN AFTER SOYBEAN	STARTER (+8+20+6+3+.5)	109.4	NONE
SVOBODA	CORN AFTER SOYBEAN	LIQUID STARTER (+3+7+17)	109.8	NO STARTER FERTILIZER
GRAU	CORN AFTER SOYBEAN	FALL BAND (+12+30+60), STARTER	97.2	STARTER ONLY
GRAU	SOYBEAN AFTER CORN	FALL BAND IN 1988 - RESIDUAL	37.1	NO P & K FERTILIZER
HAGENSICK	SOYBEAN AFTER CORN	PREPLANT INJECTED (+2+6+35)	47.0	NO P & K FERTILIZER
HAGENSICK	CORN AFTER SOYBEAN	PREPLANT INJECTED (+5+15+55)	143.9	NO PREPLANT P & K
FRANTZEN	CORN AFTER CORN	2 GAL AMMONIUM THIOSULFATE	116.9	NONE
FRANTZEN	CORN AFTER SOYBEAN	1 GAL AMMONIUM THIOSULFATE	130.7	NONE
HAGENSICK	SOYBEAN	N + AMMONIUM THIOSULFATE	50.3	NONE
MAYS	CORN	N AS AMMONIUM SULFATE	112.5	N AS 32%
BUMGARNER	SOYBEAN	TRIPLE NOCTIN L	39.0	CONTROL
REICHERTS	CORN AFTER OATS	BIOLOGICAL SOIL INOCULANT	158.1	NONE
CARLSON	CORN	MICRONUTRIENTS AT PLANTING	131.8	NONE
LEAZER	CORN AFTER CORN	82 LBS N PREPLANT ANHYDROUS	134.0	81 LBS N 28% SIDEDRESS

MULTIPLE-TREATMENT FERTILITY TRIALS

COOPERATOR	CROP	YIELD SIGN.	WEEDS SIGN.	TREATMENT "A" DESCRIPTION	YIELD	WEEDS	BENEFIT	TREATMENT "B" DESCRIPTION
THOMPSON	CORN	*	--	DRY STARTER (+26+18+58)	120.0	--	$17.34	LIQUID STARTER (+6+14+13)
THOMPSON	CORN	N.S.	--	DRY STARTER (+26+18+58)	136.2	--	$0.00	DRY STARTER (+20+13+44)
HARTSOCK	CORN		--	DRY AND LOW SALT LIQUID	111.7	--	$10.59	+9+23+60 DRY BAND ONLY
BUMGARNER	SOYBEAN	N.S.	--	N + AMMONIUM THIOSULFATE	34.6	--	$0.00	N ONLY (30 LBS)
LEAZER	CORN	*	--	AG SPECTRUM + GROZYME	108.6	--	$0.00	NO STARTER FERTILIZER

OTHER FERTILITY TRIALS

YIELD	DIFFERENCE YIELD	YLD LSD	YLD SIG.	BENEFIT OF "A"	COMMENTS
32.9	2.7	4.8	N.S.	($8.82)	48% HAIL DAMAGE
128.0	8.7	2.7	*	$11.94	SOIL TESTS HIGH IN P & K
47.5	0.6	1.2	N.S.	($8.00)	
112.0	-2.6	4.3	N.S.	($10.56)	TRIAL FLOODED 48 HRS.
110.2	-0.4	6.6	N.S.	($15.65)	
88.2	9.0	5.8	*	$2.32	K HIGHER, Mg AND Ca SIGN. LOWER WITH FERTILIZER
36.6	0.5	2.5	N.S.	$0.00	CORN RESPONDED TO THE BAND IN 1989
46.8	0.1	1.0	N.S.	($15.88)	INJECTED IN ALTERNATING VALLEYS
143.7	0.2	3.5	N.S.	($24.22)	INJECTED IN ALTERNATING VALLEYS
110.7	6.3	5.9	*	$11.23	SOIL pH: 6.2, SOIL S: 19 ppm
127.2	3.5	2.3	*	$6.45	
50.5	-0.1	1.8	N,S	($12.17)	
114.5	-2.1	4.8	N.S.	($10.75)	SULFATE SIGNIFICANTLY INCREASED LEAF TISSUE S
44.2	-5.2	5.1	*	($13.95)	45% HAIL DAMAGE
156.7	1.4	4.3	N.S.	($25.58)	
130.5	1.4	5.5	N.S.	($5.50)	
130.6	3.3	4.0	N.S.	$0.31	2 VARIABLES - EARLY ANHYDROUS VERSUS LATE 28%

MULTIPLE-TREATMENT FERTILITY TRIALS

YIELD	WEEDS	BENEFIT	TREATMENT "C" DESCRIPTION	YIELD	WEEDS	BENEFIT	OVERALL COMMENTS
116.0	--	$0.00	NO STARTER FERTILIZER	111.1	--	$14.05	TREATMENTS A AND C COMPARED TO BENEFIT FOR TREATMENT B
134.8	--	$3.99	DRY STARTER (+14+9+30)	134.5	--	$8.08	
110.9	--	$25.05	+1.6+9.9+9.9 LIQUID ONLY	101.5	--	$1.00	
			TREATMENT "D" NO STARTER FERTILIZER	93.9	--	$0.00	
33.3	--	$4.50	NO N, NO THIOSULFATE	32.6	--	$12.74	45% HAIL DAMAGE
116.6	--	$46.86	STANDARD 7-21-7 STARTER	112.5	--	$19.77	NO-STARTER YIELD WAS SIGNIFICANTLY GREATER THAN AG SPECTUM, BUT COMMERCIAL STARTER WAS NOT

ON-FARM TRIALS – DAVE LUBBEN

YEAR	TRIAL	TREATMENT "A"	YIELD (BU.)	TEST WT. (LBS)
1989	* GROZYME VS. NONE	GROZYME + UAN	151.4	57.9
1989	ϕ MOLASSES VS. NONE	MOLASSES + UAN	137.5	57.4
1990	* GROZYME VS. NONE	GROZYME	53.5	56.1
1990	ϕ MOLASSES VS. NONE	MOLASSES	53.5	55.9
1990	ϵ DEEP TILLAGE VS. NONE	STROHM AERATOR	151.3	
1990	∩ TRANSNATIONAL AGRONOMY VS. CUSTOMARY FERTIZER	TNA PACKAGE	157.6	BRIX 5.6

* 12 oz/acre applied preplant and incorporated. In corn accompanied by 9 lbs N as 28%.

ϕ 3 gal/acre applied preplant and incorporated. In corn accompanied by 56 lbs N as 28%. Molasses cost $4.00 per acre.

ammonium thiosulfate acidify the soil and contribute some nitrogen in addition to the sulfur. Some of these other properties may be responsible when yield increases are observed. While Al Hagensick, Hal Bumgarner, and Mark Mays found no significant yield change in their trials with sulfur fertilizers, Tom Frantzen obtained a significant yield increase in both of his trials - even though his soil already tests high in sulfur and is on the acid side.

Several cooperators tried biological products of different kinds. These contained combinations of microbes, enzymes, and micronutrients. None panned out in yield or profit in 1990. They were associated with significantly *lower* yield in two trials. Steve Leazer compared a package of biological products including Grozyme® (recommended by a consultant) to his customary starter, and he included a control treatment consisting of neither material. The control yielded significantly better than the biological package, with the customary starter in between. The biological cost him $20 per acre more than the starter. PFI member Dave Lubben (rhymes with nubbin), who farms near Monticello, has completed year two of a three-year trial with Grozyme. In 1990, he received a *PFI Sustainable Projects* grant to help with this research. Some of his results are presented in the table above. In 1991 Dave will be a new PFI cooperator.

AND MORE ...

The list of on-farm investigations goes on. Not every question that comes up lends itself to a replicated field trial. In these cases, simple demonstrations of a practice help in the exchange and development of management pointers.

For example, interest continues to build around narrow strip intercropping. As mentioned, several PFI

ON-FARM TRIALS – DAVE LUBBEN

TREATMENT "B"	YIELD (BU.)	TEST WT. (LBS)	YIELD DIFF.	YIELD SIG.	YLD LSD (BU)
UAN ONLY	149.9	58.1	1.5	N.S.	2.8
UAN ONLY	138.0	57.3	-0.5	N.S.	2.2
NONE	53.2	56.3	0.3	N.S.	1.2
NONE	53.9	56.3	-0.4	N.S.	0.5
NO DEEP TILL	149.8		1.5	N.S.	3.1
CUSTOMARY FERT.	166.2	BRIX 5.9	-8.6	*	4.1

€ Deep till to 10-12" every other row at 6-leaf stage. (4 replications)

∩ TNA recommendation package cost $64.86 per acre. Customary fertilizer cost $28.60 per acre.

cooperators are working with ISU agronomist Richard Cruse to document the technology. Crop strips of four, six, or eight rows in width can more efficiently use light and other resources - *if* managed well. In 1990, five cooperators exhibited narrow strips at field days.

Paul Mugge recorded the following observations on crop yields in strips versus large fields.

Intensive grazing management, or intensive rotational grazing, is another practice that has caught the public interest. In allowing farmers to better conserve the land while increasing stocking rates, intensive management has the potential to make cattle profitable in regions where they have not been. Intensive grazing is a practice that exemplifies sustainable agriculture in its low capital investment, its management requirements, and its profitability. In 1990, five PFI field days included intensive grazing.

STRIP INTERCROPPING YIELDS – PAUL MUGGE

CROP	DIRECTION	STRIP YIELD	FIELD YIELD	DIFFERENCE	COMMENT
CORN	E-W	141.5	130.5	11.0	AFTER BEANS
SOYBEAN	E-W	59.5	58.0	1.5	AFTER CORN
OAT	E-W	89.8	94.0	-4.3	AFTER CORN

WEED POPULATIONS IN RIDGE-TILLED SOYBEANS WITH HERBICIDE AND/OR ROTARY HOEING

Thomas W. Jurik
Department of Botany
Iowa State University

This study assessed the interactions between ridge-till cultivation, pre-emergence herbicide application, weed populations, and crop yield of soybeans. The project, which began in 1989, was funded by the Leopold Center for Sustainable Agriculture. In 1990, the objective was to contrast ridge-till cultivation with and without herbicide application at planting, to determine the effects of herbicide application or non-application on environmental conditions, weed population dynamics, and crop yield.

Three farms operated by members of the Practical Farmers of Iowa were used for field studies in 1990. These sites were in central and northcentral Iowa, on Clarion-Webster soils. Farm operators were Dick and Sharon Thompson, near Boone; Harlan and Sharon Grau, near Newell; and Todd and Linda Hartsock, near Rolfe. Each operator used his own equipment, seed, fertilization practices, and herbicide to establish and grow a soybean crop on the field sites.

Fertilization practices and herbicide used varied among sites, but were consistent on a site. Herbicide was banded in the row at planting. Three experimental treatments were used:

1. Herbicide with no rotary hoeing
2. Herbicide with one rotary hoeing
3. No herbicide, with two (or one) rotary hoeings

On each site, there were six replicates of each treatment arranged in a randomized complete block design, with each set of three treatments constituting a

Table 1. Soybean cultivar and herbicide used, cultural conditions, and plant densities in 1990.

	Farm		
	Thompson	Grau	Hartsock
Cultivar	Mohawk	Latham 750	Latham 671
Herbicide	Amiben	Dual+Lexone	Dual
Mean row width	36"	36"	36"
Row length	1,247'	2,625'	2,625'
Rows/plot	8	8	8
Seeding rate (#/acre)	180,000	160,000	174,000
August plant density (#/acre)			
herbicide, 0 RH	89,600	105,000	121,000
herbicide, 1 RH	82,200	88,700	129,000
no herb., 1 or 2 RH	83,500	85,700	107,000
May-August rainfall	24.9"	27.7"	19.9"

Table 2. Dates of planting, rotary hoeing, and cultivation on the three farms.

Dates	Thompson	Grau	Hartsock
Planting	June 1	May 30	June 5
1st RH	June 4	June 25	June 25
2nd RH	June 25	--	--
1st cultivation	June 27	July 6	July 5
2nd cultivation	July 17	July 15	July 22
3rd cultivation.		August 1	July 30

block. Each plot consisted of eight rows, approximately 1,300 feet or 2,600 feet in length. Rotary hoeing in June was followed by two or three ridge-building cultivations in June or July.

Weed populations were sampled at irregular intervals from late April to early August, usually one or two days before a field operation by the cooperator. On each date, number of weed seedlings, non-fruiting adults, and fruiting adults of all weed species were recorded in each sample area.

Soybean cultivars, herbicide used, cultural conditions, plant densities, and total May-August rainfall for the three study farms are shown in Table 1. Mid-August plant densities were 46-74 percent of the seeding densities. Rainfall was higher than normal on all farms, particularly in May and June. Table 2 shows dates of planting, rotary hoeing, and cultivation on each farm.

Major weeds found over the growing season included redroot pigweed, lambsquarters, foxtail

Table 3. Weed populations and soybean yield in 1990. There were no statistically significant differences (Analysis of Variance, F-test, alpha=0.05) between treatments within a farm for any variable.

	Farm		
Maximum number of broadleaf weeds observed:	Thompson	Grau	Hartsock
in early June (#/acre)			
herbicide, 0 RH	6000	125	19,500
herbicide, 1 RH	6900	61	75,000
no herb., 1 or 2 RH	3800	304	75,700
in early August (#/acre)			
herbicide, 0 RH	526	178	757
herbicide, 1 RH	680	24	538
no herb., 1 or 2 RH	676	405	943
Soybean yield (bu/acre)			
herbicide, 0 RH	44.5	39.3	30.7
herbicide, 1 RH	43.8	38.3	30.9
no herb., 1 or 2 RH	43.1	36.0	30.8

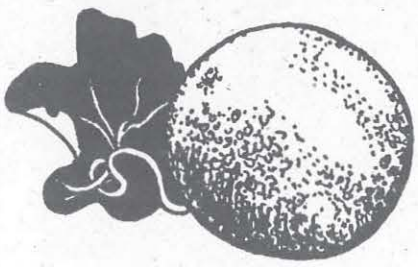
species, and Pennsylvania smartweed. Other species were less common.

Almost no seedlings were found in any plot in late April and early May. Weed seedlings, defined as stems less than 2 cm (¾") tall, appeared in greatest numbers in late May and early June, with practically no seedlings appearing after the last cultivation in late July. Adults present late in the season arose almost entirely from seedlings appearing before the last cultivation. Total number of weed stems was highest in early June and declined over the summer.

Total numbers of broadleaf weeds on each farm are summarized in Table 3. Maximum weed populations in June varied widely among farms, with no consistent pattern and no statistically significant differences among the three treatments. The Grau farm had unusually low numbers of weeds appearing in all treatments. Cultivation led to reasonably low numbers of weeds in August on all farms, again with no significant differences among treatments. Soybean yield was not significantly different among treatments on any of the farms (Table 3).

Conclusions

Herbicide banded in the row at planting reduced final broadleaf weed numbers slightly, but weed densities were not significantly different from those in plots without herbicide. The results from the past two years indicate that the ridge-till system used without herbicide does an excellent job of controlling weeds and has no adverse effects on yield. This suggests that ridge-till is a system of mechanical tillage that can be an effective alternate to herbicides in a sustainable farming system.



1990 TRIALS REPORT CORRECTIONS

If you attended the Dec. 12 PFI general meeting, you received a 28-page booklet detailing the results of the 1990 on-farm trials. That booklet was assembled quickly to be available at the meeting. Inevitably, some mistakes were made. Here are the corrections, so get out your meeting booklet and your red pencil.

On page 13, in the nitrogen rate trial after corn done by Ted and Donna Bauer, the "test rate sidedress" is the 117 lb rate, not the 69 lb rate. In Don Davidson's trial, on page 14, "Leaf Sig." is "N.S."

On pages 19 and 20, the first weed trial by Jeff and Gayle Olson *did* use 28 percent carrier in both practices, as originally listed. The yields were reversed, however. The "no herbicide" practice yielded an average of 145.7 bu., and the "herbicide" practice yielded 137.1 bu. In the second weed trial by the Olsons, the "no herbicide" treatment also received no 28 percent carrier. That changes the "low rate benefit" of that trial from $3.39 to $9.17.

Potassium chloride was incorrectly priced, which changes the economics of two fertility trials listed on pages 23 and 24. Where Harlan and Sharon Grau banded fertilizer in the fall before corn (the first of their deep band trials listed), the "benefit of 'A'" should be $2.32, not ($3.28). Remember, the parentheses ( ) meant a negative number, or loss. In the multiple-treatment trial by Todd and Linda Hartsock listed near the bottom of pages 23 and 24, the "Benefit" value of treatment "A" should be $10.59, not $4.99, and the benefit of treatment "B" should be $25.05, not $19.45.

PFI members and nonmembers may obtain a copy of the 1990 cooperator report (with a correction sheet) for $1. Contact the Extension PFI coordinator Rick Exner, 2104 Agronomy Hall, Iowa State University, Ames, Iowa, 50011.

PAUL JOHNSON – "WHERE DO WE GO FROM HERE?"

Former State Representative Paul Johnson gave the keynote address at the Dec. 12 PFI annual membership meeting. He took that opportunity to reflect on the state of sustainable agriculture: *"Where Do We Go from Here?"* His talk was set in the context of budgetary threats to environmental programs hard won by the legislature over the years of his terms in office.

Johnson, who himself farms near Decorah, described sustainable agriculture as a process, an "immense journey." We don't have all the answers, he said, so it is important to ask some basic questions: "What is wrong with what we are doing?" "Are we the most efficient we can possibly be?" "Who is going to farm?" Johnson noted wryly that "Probably half the young farmers in the state are sitting here now!"

In terms of asking the right questions, Johnson said it is intellectually dishonest to set up unrealistic "straw men" to destroy. He gave the example of Texas A&M University, which accepted money to make a projection of the national effects of a complete ban on pesticides. In contrast, the University of Nebraska accepted the money but changed the hypothesis to a *50 percent reduction* in pesticide use. The conclusions of the UNL study were understandably very different than those of Texas A&M.

Paul Johnson spoke at the annual membership meeting.

Johnson had kind words for Practical Farmers of Iowa, which he recently joined. "We don't see you down in Des Moines telling legislators what to do. Each of you working quietly on your own farms has allowed PFI to move the state," he said.

In closing, Paul Johnson raised another question: "Are we as gentle as we can be with the land? We give life, protect life, are part of life. If we don't *have* to destroy life in farming, let's choose that course."

PFI Membership Application and Renewal Form

Name _____

Address _____

City _____

County _____

State _____

Zip Code _____

Phone # ( ) –

This is a ___ new membership
___ renewal

Do you derive a significant part of your income directly from farming?
Yes ___ No ___

Please enclose check or money order for $10.00 payable to "Practical Farmers of Iowa" and mail to:

Practical Farmers of Iowa
RR 2, Box 132
Boone, Iowa 50036

CORRESPONDENCE

Correspondence to the PFI directors' addresses is always welcome. Member contributions to *the Practical Farmer* are also welcome and will be reviewed by the PFI board of directors.

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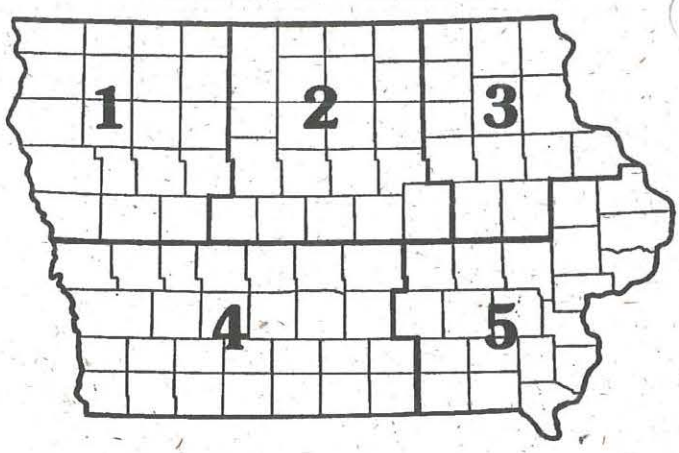

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