Section I
General Information

1. Project Number: ENE-95-11
   Grant Number:
   Funding Period: 1996 and 1997

2. Project Title: "On-Farm Research and Extension Education Program"

3. Project Coordinator:

Dr. Phil E. Rzewnicki
Penn State University Extension
P.O. Box 449 Highland Hall Annex
Hollidaysburg, PA 16648

Ph: (614) 292-0117
Fax: (614) 292-3505
E-mail: przewnicki@agvax2.ag.ohio-state.edu

4. Type of Report: Final

5. Date of Report: 12/31/97

6. Reporting Period: 1/01/96 to 12/31/97

7. Major Participants: Same as Project Profile

8. Cooperators: Same as Project Profile

9. Project Status: The project is New: received SARE Chapter 3 Professional Development Program funding for the first time.

10. Statement of Expenditures: To be submitted by fiscal officer under separate cover.

    Cynthia Kunes
    Regional Directors Office
    401 Ag Admin Bldg
    University Park, PA 16802

    Ph: (814) 863-3439

Section II – Final Report

1. Objectives

A. Instruct Penn State Cooperative Extension agricultural agents and USDA personnel how to plan and conduct on-farm demonstrations and research.

A target of at least one-third of the agricultural agents to receive training was established. At the beginning of the project the state had 110 agriculture agents. Sixty-two of these agents cover special topic areas: Dairy-17, Commercial Horitculture-17, Agronomy-12, Farm Management-7, Livestock-4, Water Quality-3, Agricultural Engineering-1, and Agricultural Marketing-1. The remaining 48 agents have program activity across these various topics and are considered to be in general agriculture. The above disciplines are well distributed among the five extension regions with the exception of commercial horticulture. Twelve of the commercial horticulture agents are located in the eastern half of the state.

NRCS and soil/water conservation district field staff would be contacted through state and regional offices to encourage their participation in training activities.

B. Extension agents collaborate with farmers to plan on-farm trials, conduct trials, interpret the results, and disseminate the knowledge gained.

Agents and others trained in the project would be asked to involve farmers in conducting on-farm trials. They would be encouraged to involve farmers though the entire process of an on-farm study. Farmer stipends would be available to compensate producers for potential yield loss and time involvement in experiments.

C. Evaluate methods used and develop reference materials.

Recently developed on-farm demonstration and research methods would be used and evaluated. The principle investigator hoped to generate some new ideas in designing on-farm trials and evaluating their usefulness to farmers, extension agents, and researchers. Plans included the production of extension fact sheets and visual aids to extend information learned for future sustainable agriculture education efforts.

2. Abstract

The On-Farm Research and Extension Education Program trained extension agents, farmers, and conservation district field staff in skills needed to investigate the use of new practices in agriculture. Funds provided by the project enabled the project coordinator to devote about 40% of his extension time conducting the program.

During the two year project, 43 extension agents across the state's five extension regions were trained in reliable experimental techniques for on-farm research. This was 39% of the agricultural agents surpassing the original goal of one-third. Training was usually conducted in small groups of 3 to 4 agents each at a central county office location.

Ten farmers, one agricultural service owner, and one commercial nursery collaborated with extension agents in the planning and implementation of on-farm experiments. A few participated in the collection and interpretation of data. Two producers participated in the dissemination of results to others.

Through the month of September in 1996, 92 agency field staff consisting primarily of conservation district managers and technicians along with a few NRCS staff and state land resource personnel received on-farm demonstration and research training. The project coordinator was the main presenter at six of their regional quarterly training meetings.

Since training efforts directly resulted in only six replicated, randomized on-farm studies in the first year, the coordinator shifted publicity focus from field staff to farmers. Articles in the state's major agriculture publications generated some interest from producers. However, only one farmer proposal was adaptable to project objectives. More attempts at seeking agent participation only resulted in adding two more agents in the second year to the list of on-farm collaborators.

Two new ideas initiated by the project included a pair-wise comparison of paddocks in a pasture study and the testing of farm compost as potting media in a commercial greenhouse nursery study.

3. Specific Project Results

A. Accomplishments

Objective 1. Instruct Penn State Cooperative Extension agricultural agents and USDA personnel how to plan and conduct on-farm demonstrations and research.

During the two-year project, 43 extension agents across the state's five extension regions were trained in reliable experimental techniques for on-farm research. This was 39% of the agricultural agents surpassing the original goal of one-third. Training was usually conducted in small groups of 3 to 4 agents each at a central county office location.

Through the month of September in 1996, 92 agency field staff consisting primarily of conservation district managers and technicians along with a few NRCS staff and state land resource personnel received on-farm demonstration and research training. The project coordinator was the main presenter at six of their regional quarterly training meetings.

One unexpected result from the agent training sessions was a desire for knowledge of demonstrations and research projects being conducted by other agents within the state. Participants often noted that they didn't even know what agents in adjacent counties were doing. As a result, the coordinator compiled a booklet including reports of demonstrations being conducted by agents participating as well as those not participating in this project.

Another unexpected result of the project was an invitation by Ohio State University Extension agents and the Innovative Farmers of Ohio to conduct training sessions at two on-farm research workshops. This was a direct result of an Ohio staff person who attended an agent training session conducted by the project coordinator at the 1996 Annual Meeting of the Pennsylvania Association for Sustainable Agriculture.

Objective 2. Extension agents collaborate with farmers to plan and conduct on-farm trials, interpret results, and disseminate knowledge gained.

Ten farmers, one agricultural service owner, and one commercial nursery collaborated with extension agents in the planning and implementation of on-farm experiments as a direct result of agent training. A few participated in the collection and interpretation of data. Two producers participated in the dissemination of results to others.

Objective 3. Evaluate methods used and develop reference materials.

Two new ideas initiated by the project included a pair-wise comparison of paddocks in a pasture study and the testing of farm compost as potting media in a commercial greenhouse nursery study.

The pasture study using pair-wise comparison of paddocks resulted in a high coefficient of variation indicating that experimental technique needed to be improved. The rising plate method used to measure dry matter availability may be too variable. Further study is needed with an alternative measure such as grass clippings to determine available forage.

The greenhouse study resulted in a workshop sponsored by the Montgomery County extension agents. A booklet was locally developed by the agents using county funds explaining the techniques used so that workshop participants could potentially duplicate efforts on their own.

All other methods used were based on current literature. Copies of existing materials were provided to participating agents for future application of skills learned.

B. Publicity for Activities and Programs

August 11, 1995 – State-wide E-mail to all PSU Agricultural Agents during FY1996 program planning period advising them to set aside program time for on-farm testing in 1996 and 1997. Electronic mailing list includes agents in agronomy, livestock, dairy, horticulture, and farm management.

Fall, 1995 – PASA PASSAGES – Newsletter of the Pennsylvania Association for Sustainable Agriculture. Article entitled "Rzewnicki Receives Northeast SARE Grant for On-Farm Extension Training". Article described objectives of project to membership of PASA.

Fall, 1995 – Individual letters to PSU extension specialists in agronomic and horticultural crop production introducing training project and opportunity to engage agents and producers in on-farm applied research projects.

October 30, 1995 – Penn State University Sustainable Ag Task Force – Seminar on Funding Opportunities in Sustainable Ag. Project coordinator was one of featured speakers. Introduction of project was given to approximately 40 extension specialists and agents.

July, 1996 – Contact made with several state associations to plan training sessions at their annual conferences during the winter of 1996-97. Associations contacted: Pennsylvania Vegetables Growers, State Horticultural Association, PA Young Farmers Association, PA Vocational Agricultural Teachers Association, and Agronomics Products Association. Coordinator discovered agendas were already full and unable to accommodate an additional workshop.

July 17, 1996 – Contact made with state offices of NRCS to incorporate announcement of program training opportunity in agency's statewide communications.

July 25, 1996 – Present information on project to State Association of Soil And Water Conservation Districts to network with leadership.

August 1996 – Contact made with Pennsylvania Department of Environmental Protection and Bureau of Land and Water Conservation. Addresses of training coordinators of conservation district staff obtained. Chesapeake Bay Program offices for 37 counties targeted since technicians and specialists in program are regularly involved with farm demonstrations and field days focusing in best management practices. Letter sent to district manager in each of 37 counties encouraging participation of staff.

December 1996 and January 1997 – Lancaster Farming and Pennsylvania Farmer – Both published an article orientated to farmer clientele entitled "Farmer Demonstration Grants Available". Approximately three-fourths of all Pennsylvania farmers subscribe to these publications. Copies of article also sent to 16 smaller regional agricultural newspapers and 2 state horticultural newsletters.

February 1997 – Article in PSU Agronomy Department newsletter "Field Crop News" indicating continued availability of project mini-grants and consulting support for on-farm trials.

March 4, 1997 – Statewide E-mail to all Pennsylvania agriculture agents reminding them of the project and that this year was the final opportunity for them to participate.

May 5, 1997 – Statewide E-mail to Pennsylvania extension agents indicating on-farm demonstration assistance and funding was still available.

4. Potential Contributions and Practical Applications of the Professional Development Program

A. Trainee Adoption and Direct Impact

The 43 extension educators who received training in on-farm experimental design through the project were surveyed at the end of the project to determine the impact on them. Thirty percent (13 agents) returned the survey. Responses were as follows:

- Was the information presented on planning and conducting on-farm research understandable?
  1=Very Much/5=None *Participant Average Response = 1.7*
- Did the training increase your knowledge of experimental designs for farms and/or commercial horticulture units? 1=Very Much/5=No Increase *Participant Average Response = 2.5*
- Did the training increase your confidence in conducting demonstrations and/or applied research trials on producer fields and/or commercial horticulture units?
  1=Very Much/5=No Increase *Participant Average Response = 2.7*
- When participants were asked to define in their own words the importance of replication and randomization, 83% of respondents were able to describe adequately why these procedures are needed.
- When asked if they sought more information on on-farm research methods after the training, 12 responded no and 1 said yes. The one affirmative respondent indicated more study done to find "other patterns of research design to produce statistically significant results."

Comments from participating extension agents:

"The project has motivated me to do more on-farm research. I believe that this is an area that extension staff can do a lot more with and can make significant educational impact."

"I wish the specialists would work with us to design the experiments. Research and demonstration work is fulfilling and valuable for our clients, but the time required for the agents to do all phases of on-farm research makes it prohibitive."

"Need more to get more agents involved in demonstration type education."

"I have a strong background in statistics so the training was mainly a review for me."

"I am now convinced randomized replication is worth the extra time and effort."

"I took it into foreign assignment and it proved useful."

"I would like to see more support from PSU specialist staff to utilize county agents for on farm demos."

"Requires an interested producer; needs to be at least partly his/her idea to work best. Ease of yield checking is important."

"I am planing on applying this info next year with a producer we are working with 'new' this year – needed to gain his support and trust in implementing this procedure. Thus, application of this knowledge continues and could not be applied immediately."

B. Potential Benefits or Impacts

The same evaluation survey as above asked the participating agents about their level of involvement with field demonstration plots or research trials on farms and/or commercial horticulture units in their counties. Eleven agents (85% of the respondents) indicated they were involved with on-farm research during 1996 and/or 1997. These agents reported being involved with a total of 44 on-farm trials. During the two years prior to the project (1994 and 1995), these same agents were involved with only 18 on-farm trials. This represents more than a 200% increase in experimentation. Only one of the respondents was new to Extension at the beginning of the two-year project accounting for only 1 of the 44 trials reported by respondents.

Those who conducted trials in 1996/97 were asked if the training influenced them to increase the involvement of cooperating producers in the planning, implementation and analysis of the demonstrations or trials. There was some effect indicated by a score of 2.7 on a scale of 1 = Very Much and 5 = No Effect.

On a scale of 1=Very Much and 5=No Effect, those who involve producers in on-farm trials were asked to rate the effectiveness of the training in increasing their use of experimental design principles. One rated it with 1, three rated it 2, four rated it 3, one rated it 4 and two rated it 5. Therefore, 9 out of 11 who reported conducting on-farm trials in

1996/97 were better able to design experiments with producers as a result of the training. The skills applied as a result of training were randomization, replication, proper plot size, and statistical analysis.

The potential impact on the producers involved and the environment can be illustrated by the individual trials conducted as a result of agents implementing skills learned:

- Effects of starter fertilizer and/or additives for corn production on fields receiving dairy manure – None found in trials on four farms.
- Comparison of sorghum silage and corn silage yields - Corn silage much better when precipitation is normal.
- Vegetable variety trials – Father and son potato farmers who wanted to diversify were able to select vegetable varieties after two years of trials.
- Compost container media trial on landscape nursery plants - Greenhouse business in urban area able to use farmer compost as a potting medium.
- Soil aeration of permanent pasture using the Aerway machine – No significant pasture improvement found. Further testing needed to investigate effects of timing of aeration and dry matter measurements.
- Corn silage variety performance trials – Dairy farmer able to select silage varieties for yield performance and forage quality.
- Application of composted waste from packing plant to fertilize a pasture – Began at end of project, results yet to be determined.
- Pasture irrigation using milk house wastewater – Began at end of project, results yet to be determined.
- Investigate various calcium sources and applications for potatoes in a calcium deficient soil – Began at end of project, results yet to be determined.

C. Feedback from Farmers

Project coordinator did not interact with producers directly to receive comments or feedback regarding trainees' knowledge or use of sustainable agriculture topics after the training events. Coordinator was impressed with the fact that one of the producers conducted

all the yield and quality assessment for the vegetable variety performance trial investigating 7 varieties of cauliflower and 5 varieties of broccoli. Five letters from extension agents are attached to this report indicating some agent and farmer feedback.

5. Individuals Involved:

Number of extension and/or NRCS personnel in attendance: Through informal group meetings and scheduled staff training sessions the project reached 43 extension agents, 3 NRCS staff, and 89 county and state soil and water conservation personnel.

6. Future Recommendations & Areas Needing Additional Professional Development Efforts

Training/education needs beyond the scope of this project would be to train an extension staff person to remain as a resource specialist to support agents and clientele in the development, design and analysis of on-farm trials. Also, this person or another staff person should be given the responsibility of gathering and publishing reports of the variety of demonstrations and on-farm research being conducted by agents across the state.

Recommended changes to the procedures used in this project would be to assess the attitudes of state extension specialists regarding their support of on-farm research at the program proposal stage. Also, if collaboration with state grower associations is needed, up to one year prior to planned activities is needed to incorporate change into routine agendas.

Future educational programs in this area should probably assess staffing patterns of a state's extension system. If there has been a severe cutback in agricultural agent positions, the interest for on-farm research may be very high, but the capacity to actually implement new programming may be limited.

PENNSTATE

College of Agricultural Sciences - Cooperative Extension

How to Compare Growing Media?

Penn State, U. S. Department of Agriculture, and Pennsylvania Counties Cooperating

Table of Contents:

Introduction

The Purpose of this publication is to provide growers a introductory guide in the comparison of different growing media. Inside you will find an outline to help you set up your own growing media trial, preliminary results of a on-going compost growing media trail, and resources to help you use and evaluate different composts.

For additional information on compost contact:

Sally Pick
Director of the Recycling Education Program,
Montgomery County Cooperative Extension
1015 Bridge Road, Suite H
Collegeville, PA 19426

Phone: 610-454-1245
Fax: 610-489-9277
or

David J. Suchanic
Extension Agent, Ornamental Horticulture
Penn State Cooperative Extension
1015 Bridge Road, Suite H
Collegeville, PA 19426

Phone: 610-489-4315
Fax: 610-489-9277

Testing the Performance of a Potting Media

Why Do You Need to Test a Media?

Many of you have been contacted by salespeople marketing the newest potting media and pressuring you to give it a try. Or you have fooled around with a few of your own mixes. Before you risk a large portion of your plants on a media you are not sure will work well, you can follow the procedures below to set up a small test that will show you the basic performance of the mix. This flier provides guidelines for professional nursery growers on testing the performance of a potting media in the field.

What Does the Testing Involve?

These guidelines help you test potting media with simple monitoring procedures already followed by most growers. Depending on the time and resources you can spend on such a field trial, you can make it as simple or as in-depth as you'd like.

Setting Up Your Own Trial: An Example

Let's assume you are able to use 60 plants, let's say sand cherries, to test a new mix. You should compare the performance of the new mix (let's call it Media B) with your standard mix (that we'll call Media A).

The most important part of setting up a field test is making randomized replications where you take 3-4 sets of plants growing in the same media you are testing and randomly place them in 3-4 different locations of the hoophouse; this ensures that any one situation, such as a dripping overhead sprinkler, a sunny, shady, or windy spot, does not skew the results of your trial too heavily. The hoophouse layout below is an example of how you might randomly place 4 sets of 15 sand cherries in Media A and Media B in different areas of the house. You should have your standard media, "Media A," as a "control" next to each block of new media in each replication; this allows you to compare how the standard media performs in each location in contrast to your new mix.

Replication 1 **Replication 2**

15 Sand cherries Media A						
15 Sand cherries Media B					15 Sand cherries Media B	
					15 Sand cherries Media A	
Aisle						
		15 Sand cherries Media B				
		15 Sand cherries Media A		15 Sand cherries Media A		
				15 Sand cherries Media B		

Replication 3 **Replication 4**

Sample Layout of 4 Replications in a Hoophouse

Appendices
Project No. ENE-95-11

1. Five letters from participating extension agents.
2. Survey form sent to participating extension agents.
3. Written comments from extension agents.
4. Handout used in training to summarize project and provide a quick list of principles taught.
5. News articles publicizing program in two major agricultural publications.
6. Copy of training program agenda for conservation district personnel.
7. Booklet compiled as a result of extension agents desiring awareness of projects conducted by colleagues. Booklet includes three reports on trials supported by project funds.
8. Copy of cover and table of contents of booklet developed locally by participating agents in Montgomery County.

Survey of Pennsylvania Extension Agents

1. Was the information presented on planning and conducting on-farm research understandable?

Very Much None
1 -------- 2 -------- 3 -------- 4 --------5

2. Did the training increase your knowledge of experimental designs for farms and/or commercial horticulture units?

Very Much No Increase
1 -------- 2 -------- 3 -------- 4 --------5

3. Did the training increase your confidence in conducting demonstrations and/or applied research trials on producer fields and/or commercial horticulture units?

Very Much No Increase
1 -------- 2 -------- 3 -------- 4 --------5

4. In your own words, what is the importance of replication? _____

_____

_____

5. In your own words, what is the importance of randomization? _____

_____

_____

6. Were you involved with field demonstration plots or research trials on farms and/or commercial horticulture units in your county(ies) during 1996 and 1997? Yes or No

If the answer to question #6 is no, please skip to question #11,
If the answer to question #6 is yes, please answer the remaining questions:

7. During 1996 and 1997, how many different farms or commercial horticulture units collaborated with you in conducting field research trials or demonstration plots? _____

8. How many collaborated with you in 1994 and 1995? _____

9. Did the training influence you to increase the involvement of the cooperating producers in the planning, implementation and analysis of the demonstrations or trials?

Very Much No Effect
1 -------- 2 -------- 3 -------- 4 --------5

(over)

10. Did the training increase your application of experimental design principles?

Very Much No Effect

1 -------- 2 -------- 3 -------- 4 --------5

If you answered 1, 2, 3,or 4, describe the skills applied _____

_____

11. Have you sought more information on on-farm research methods since the training? Yes or No

If yes, describe briefly the information you sought: _____

_____

12. Any additional comments on on-farm research or demonstration work involving extension agents and their farm clientele would be appreciated: _____

_____

_____

_____

_____

_____

Return by August 15, 1997 to: Blair County Cooperative Extension
P.O. Box 449 Highland Hall Annex
Hollidaysburg, PA 16648

10. Did the training increase your application of experimental design principles?

Very Much — No Effect

1 -------- 2 -------- 3 -------- 4 --------5

If you answered 1, 2, 3,or 4, describe the skills applied I have participated in Dr Hatley's SB; Wheat programs. (replicated design by multiple sites).

11. Have you sought more information on on-farm research methods since the training? Yes or No – would if I had the time!

If yes, describe briefly the information you sought: _____

_____

12. Any additional comments on on-farm research or demonstration work involving extension agents and their farm clientele would be appreciated: _____

I am planning on applying this info next year w/ a producer we are working w/ "new" this year - needed to gain his support and trust in implementing this procedure. Now, application of this knowledge continues and could not be applied immediately.

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10. Did the training increase your application of experimental design principles?

Very Much — No Effect

1 -------- 2 -------- 3 -------- 4 --------5

If you answered 1, 2, 3,or 4, describe the skills applied I made a concerted effort to use randomization techniques in designing my experiments.

11. Have you sought more information on on-farm research methods since the training? Yes or (No)

If yes, describe briefly the information you sought: _____

12. Any additional comments on on-farm research or demonstration work involving extension agents and their farm clientele would be appreciated: I wish the specialists would work with us to design the experiments. Research + demonstration work is fulfilling and valuable for our clients but the time required for the agents to do all phases of on-farm research makes it prohibitive.

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10. Did the training increase your application of experimental design principles?

Very Much — No Effect

1 -------- 2 -------- 3 -------- 4 --------5

If you answered 1, 2, 3,or 4, describe the skills applied _____

Affirming information & procedures

11. Have you sought more information on on-farm research methods since the training? Yes or No

If yes, describe briefly the information you sought: _____

12. Any additional comments on on-farm research or demonstration work involving extension agents and their farm clientele would be appreciated: _____

Need more to get more Agents involved in demonstration type education.

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10. Did the training increase your application of experimental design principles?

Very Much — No Effect

1 -------- 2 -------- 3 -------- 4 -------(5)

If you answered 1, 2, 3,or 4, describe the skills applied _____

_____

11. Have you sought more information on on-farm research methods since the training? Yes or (No)

If yes, describe briefly the information you sought: _____

_____

12. Any additional comments on on-farm research or demonstration work involving extension agents and their farm clientele would be appreciated: _____

I have a strong background in statistics so the training I received was mainly a review for me.

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10. Did the training increase your application of experimental design principles?

Very Much 1 ------- (2) ------ (3) ------- 4 -------- 5 No Effect

If you answered 1, 2, 3,or 4, describe the skills applied I used randomized replication.

11. Have you sought more information on on-farm research methods since the training? Yes or (No)

If yes, describe briefly the information you sought: _____

_____

12. Any additional comments on on-farm research or demonstration work involving extension agents and their farm clientele would be appreciated: I am now convinced randomized replication is worth the extra time and effort.

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10. Did the training increase your application of experimental design principles?

Very Much — No Effect

1 -------- 2 -------- 3 -------- 4 --------5

If you answered 1, 2, 3,or 4, describe the skills applied _____

_____

11. Have you sought more information on on-farm research methods since the training? Yes or (No)

If yes, describe briefly the information you sought: _____

_____

12. Any additional comments on on-farm research or demonstration work involving extension agents and their farm clientele would be appreciated: _____

I took info to foreign assignment + it proved useful.

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P.O. Box 449 Highland Hall Annex
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10. Did the training increase your application of experimental design principles?

Very Much — No Effect

1 -------- 2 -------- 3 -------- (4) --------5

If you answered 1, 2, 3,or 4, describe the skills applied Importance of Replication

11. Have you sought more information on on-farm research methods since the training? Yes or (No)

If yes, describe briefly the information you sought: _____

12. Any additional comments on on-farm research or demonstration work involving extension agents and their farm clientele would be appreciated: _____

Requires an interested cooperator; needs to be at least partly his/her idea to work best. Ease of yield checking is important.

Return by August 15, 1997 to:

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Hollidaysburg, PA 16648

10. Did the training increase your application of experimental design principles?

Very Much No Effect

1 -------- 2 -------- 3 --✓---- 4 --------5

If you answered 1, 2, 3,or 4, describe the skills applied I am aware of the principles, but because of time and resources I was unable to utilize replicate or randomization

11. Have you sought more information on on-farm research methods since the training? Yes or (No)

If yes, describe briefly the information you sought: _____

_____

12. Any additional comments on on-farm research or demonstration work involving extension agents and their farm clientele would be appreciated: I would like to see more support from PSU staff (Specialist) to utilize County agents for on farm Demo.

_____

_____

_____

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Hollidaysburg, PA 16648

10. Did the training increase your application of experimental design principles?

Very Much — No Effect

1 ------- (2) ------- 3 -------- 4 --------5

If you answered 1, 2, 3,or 4, describe the skills applied Research design, principles of randomization and replication

11. Have you sought more information on on-farm research methods since the training? (Yes) or No

If yes, describe briefly the information you sought: Other patterns of research design to produce statistically significant results.

12. Any additional comments on on-farm research or demonstration work involving extension agents and their farm clientele would be appreciated: This has motivated me to do more on-farm research. I believe that this is an area that extension staff can do a lot more with and can make significant educational impact.

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On-Farm Research and Extension Education Program

Objectives:

1. Instruct Penn State Cooperative Extension agricultural agents, USDA and agency field staff, and agribusiness consultants on how to plan and conduct on-farm demonstrations and research.

Demonstration and research trials conducted on farms involving farmers, their equipment and facilities, extension agents and other agency field staff can provide unique opportunities for obtaining information and transferring technology. Recommended practices and newly developed ideas can be examined for how they fit into whole farm systems.

2. Extension agents and agency field staff collaborate with farmers to plan on-farm trials, conduct trials, interpret the results and disseminate knowledge gained.

Farmers should be involved in the planning process to assess the agricultural practices they need to enhance environmental conditions and increase the profitability of their operations. Demonstrations and research on practices identified by farmers themselves will very likely attract the interest of other producers. Results will evolve into recommendations that incorporate the input of farmers, extension educators, and agency field staff.

3. Evaluate methods used and develop reference materials.

Recently developed on-farm demonstration and research methods will be used and evaluated. The project will likely generate some new ideas in designing on-farm trials and evaluating their usefulness to farmers, extension agents and researchers. Extension fact sheets and visual aids will be produced to extend this information for future sustainable agriculture educational efforts.

Project Organization:

Project Length: January, 1996 to December, 1997

Funding: Primarily funded by USDA Sustainable Agriculture and Research Education (SARE) Chapter III funds. Project allows for stipends ($250 to $400) to participating producers.

Project Leader: Phil E. Rzewnicki, Penn State Cooperative Extension, Blair County, P.O. Box 449, Highland Hall Annex, Hollidaysburg, PA 16648. Ph. (814) 695-5541 x210

Current Projects: Vegetable variety trials (Potter Co.), Starter fertilizer additives (Northumberland, Blair, and Huntingdon counties), Pasture aeration (Columbia Co.), Sorghum silage (Lebanon Co.), Compost potting media (Montgomery Co.)

Planning and Conducting On-Farm Research:

Selecting Treatments: Determine the question to be explored

- Avoid numerous objectives
- Farmer's objectives
- Agent's objectives

Replicating Treatments

- To obtain meaningful differences between treatments
- To determine if treatment differences are real or due to chance

Randomization

- To avoid favoring any treatment

Site Selection

- Previous history
- Accessibility

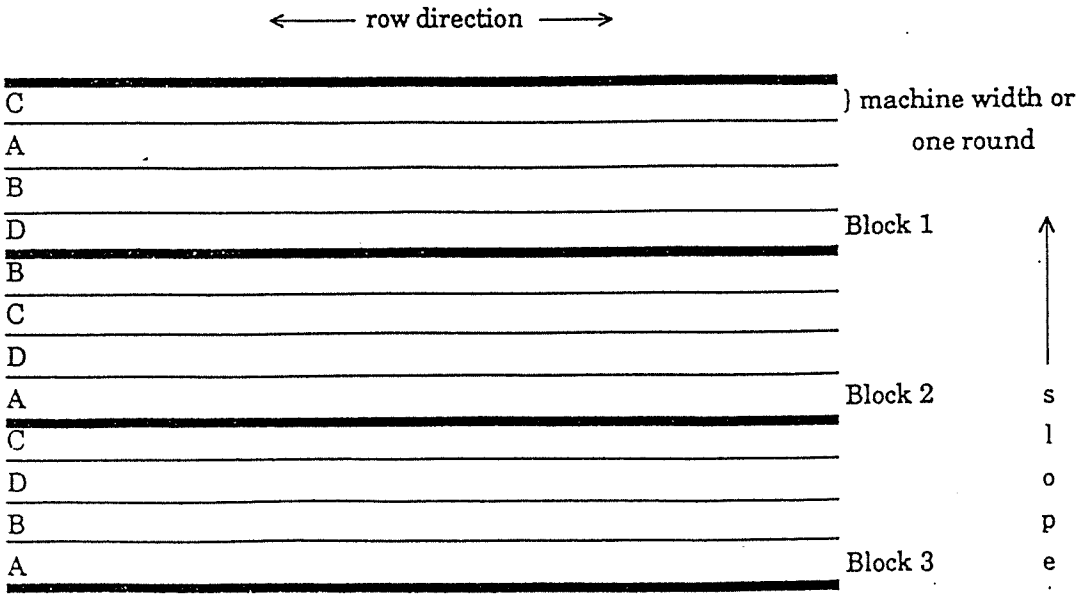
Plot Size and Orientation

- Minimal variation
- Replicates perpendicular to slope

Data Collection and Observation: Climate, pests, growth characteristics, grain moisture, yield or other index

Statistical Analysis and Interpretation

Example of an on-farm experiment of four treatments (A,B,C, D) replicated three times using the randomized complete block design.



Monroe County Young Farmers Capture Young Farmer Achievement Award

ROCHESTER, N.Y. — James and Alayne Doan of Hamlin, Monroe County, took first place honors, in New York Farm Bureau's Young Farmer Achievement Award at the organization's state convention at the Holiday Inn-Genesee Plaza in Rochester.

As the winners of the annual award, the Doans received $500 from Dodge Truck, a 486 computer, and a trip to the American Farm Bureau convention in January, in Nashville, to vie for national honors. The runners-up were Mike and Linda Cole of Montgomery County and Randy and Elizabeth Ooms of Franklin County.

The Doans own and operate 1,200 hives of honey bees in Monroe County. A graduate of Cornell University, James is president of the Empire State Honey Producers Association, on New York Farm Bureau's State Commodity Committee, and is active in Monroe County Farm Bureau.

Dale Mattoon, of Union Springs, Cayuga County, was the winner of the New York Farm Bureau's 1996 Young Farmer Discussion Meet, part of the 27,000 member farm organization's annual policy convention.

Mattoon edged out three other New York farmers to win the Discussion Meet. Mattoon was presented with a check for $500 from Dodge Truck, and will attend the American Farm Bureau Federation National Meeting in Nashville next month. Mattoon, 31, owns and operates a 500-cow dairy operation with his partner. The dairy farm employs eight.

Runners-up were Eric Ooms, of Columbia County, and Marc Kreiger and Jeff Werner, both of Monroe County. Each were presented with prizes of $150.

The Discussion Meet centered on the topic of Environmental Laws and Regulations, and required Mattoon and his fellow contestants to discuss in a round table format the affects these laws have on American farmers' ability to compete in the world marketplace.

Farmer Demonstration Grants Available

HOLLIDAYSBURG (Blair Co.) — Pennsylvania farmers who conduct experiments on their farms or who would like assistance to do so may be eligible for small grants to cover expenses.

Grants ranging from $300 to $500 were provided in 1996 to producers involved with experiments on fertilizer additives, vegetable variety comparisons, pasture aeration, and greenhouse potting media using farm compost.

Experiments should involve the comparison of at least two practices on the same farm or at least two levels of the same practice. The experiment must include at least three replicates of each practice. Assistance is available in designing the test and interpreting the results.

On-farm testing that uses statistically valid experimental designs is having a significant impact on farmer conducted research across the country. Farmers are achieving a much higher degree of trust in their experimental results, and find it easier to interest others in their ideas. An on-farm test can be a low risk, high return method for a producer to experiment with a new practice of innovative idea.

Farmers from any part of Pennsylvania are invited to participate. More information on applying for an on-farm testing grant is available from Phil Rzewnicki at the Blair County office of Penn State Cooperative Extension at P.O. Box 449, Highland Hall, Hollidaysburg, PA 16648 or by calling (814) 695-5541 ext. 210.

Rzewnicki may also be contacted through the assistance of local agricultural extension agents. The funding is part of a USDA Sustainable Agriculture and Research Education project to promote on-farm testing as a method of technology transfer.

Farm Update

ACE Expo proceedings available for sale

Couldn't make it to the Ag Computing and Electronics Expo (ACE Expo '96) in December? You can still get the speakers' proceedings to learn what was covered.

Send your request to: ACE Expo Proceedings, *Pennsylvania Farmer*, P.O. Box 4475, Gettysburg, PA 17325. Include a check for $15 payable to ACE Expo.

BY KIM BOWER-SPENCE

Nutrient management training scheduled

Training for farmers and ag professionals who want to be certified nutrient management planners in Pennsylvania must attend one of six precertification training workshops offered throughout the state, and then pass an exam. Certification qualifies individuals to write plans under the Keystone State's Nutrient Management Act.

This training is required for everyone seeking certification, stresses Melanie Wertz of the Ag Department. It will cover what's required in a nutrient management plan, and will assume a basic knowledge of soil fertility, crop and manure management, and conservation practices.

The locations and dates for training workshops and the certification exams are:

- *Berks County:* Workshop will be Feb. 3 and 4 and the Berks County Extension office (no lunch). There will be no exam at this location.
- *Wilkes-Barre:* Workshop is Feb. 6 and 7 at the Technology Center at Penn State Lehman Campus (lunch is $7). The exam is March 11 at the Hayfield House, Penn State Lehman Campus.
- *Clarion:* Workshop is Feb. 18 and 19 at the Clipper Motel, Exit 9 on I-80 (lunch is $7). The exam is March 25 at the Clarion County Extension office.
- *Greensburg:* Workshop is Feb. 20 and 21 at the Westmoreland Extension office (no lunch). Exam is March 26 at the same location.
- *University Park:* Workshop is Feb. 26 and 27 in Room 324 Ag Science and Industry Building (lunch is $7). Exam is March 20 in Room 301 Ag Administration Building.
- *Lancaster:* Workshop is March 10 and 11 at Lancaster Farm and Home Center (lunch is $8). Exam is March 18 at the same location.

The exam is free for "individual" specialists (those being certified to write plans for their own farms). Commercial and public nutrient management specialists must pay $50. Exam time will be 9 a.m. to noon at each location.

For more information, contact Wertz at (717) 772-5218.

Grant money available for on-farm experiments

Pennsylvania farmers interested in conducting on-farm experiments may be eligible for small grants to cover expenses. In 1996, money from a USDA Sustainable Ag and Research Education project funded grants of $300 to $500. Experiments involved fertilizer additives, vegetable variety comparisons, pasture aeration and greenhouse potting media using farm compost.

Experiments should compare at least two practices on the same farm, or at least two levels of the same practice. They must include at least three replications of each practice. Assistance is also available for designing any tests and interpreting results.

Farmers from any part of the state are invited to participate. Contact Phil Rzewnicki, Blair County Cooperative Extension, P.O. Box 449, Highland Hall, Hollidaysburg, PA

Who will be next year's Masters?

Know someone worthy of the Master Farmer title? If so, send in the accompanying nomination form to get his or her name in the running for 1998! Then urge them to apply.

Those who earn the Master Farmer title must submit an application detailing progress of their business, financial success, stewardship of resources, and participation in the community. An expert panels reviews the applications and selects the winners.

Farmers in Pennsylvania, Delaware, Maryland, New Jersey and West Virginia qualify. When submitting names, think about who on the farm makes the operation a success; you may nominate individuals, husband-wife or parent-child teams, or entire families.

Nominations are due March 15. The names of both nominees and those submitting nominations are kept confidential.

MASTER FARMER NOMINATION FORM

NAME _____
ADDRESS _____
TOWN _____ STATE ____
ZIP _____ COUNTY _____

NAME _____
ADDRESS _____
TOWN _____ STATE ____
ZIP _____ COUNTY _____

NOMINATED BY: _____
ADDRESS _____
_____

Mail to: Master Farmer Award, *Pennsylvania Farmer*, P.O. Box 4475, Gettysburg, PA 17325

16648. You can call him at (814) 695-5541 ext. 210. Deadline is Feb. 15.

Apply for safety grants before Jan. 30

Qualified Pennsylvania organizations are urged to apply for a second round of statewide farm safety grants.

"The Farm Safety and Occupational Health grant program will provide $25,000 in 1997 toward educational or training projects that increase awareness of farm safety and occupational health issues in Pennsylvania, especially among young people," says Pennsylvania Ag Secretary Charles Brosius.

Direct grants of up to $2,500 are available to farm organizations, volunteer fire companies, ambulance services and rescue squads for farm safety, occupational health and emergency response programs. Deadline for applications to be received at the Ag Department is Jan. 30.

For an application and list of program guidelines, call the Ag Department's Gay Kreiser at (717) 787-7204. Organizations that applied in 1996 but did not receive funding are encouraged to reapply.

Committee seeks corn promotion

Corn promotion may come to Pennsylvania. Ag Secretary Charles Brosius recently appointed a 22-farmer committee to look into developing a producer-funded program to promote state corn.

The Pennsylvania Master Corn Growers Association board of directors voted unanimously to request the committee, as they may do under the Pennsylvania Ag Commodities Marketing Act of 1968. The committee must prepare a proposal and list affected producers. That could lead to public hearings and a referendum allowing producers to vote on any proposed program.

Marketing and research programs already exist in Pennsylvania for apples, dairy, peaches and nectarines, potatoes, sheep and lambs, and vegetables.

Agonomy Guides available now

1997-98 Penn State Agronomy Guides are now available at county extension offices throughout Pennsylvania. Cost is $9.

Extension agronomist Elwood Hatley reports that besides updated pest management information, the guides include two new sections: budgeting, and using computers in home and business.

People you know

Angela Marie Werley of Hamburg, Pa., is the new Pennsylvania Dairy Princess. She is the daughter of Phillip and Donna Werley.

First alternate is **Merideth Weiderspahn** of Cochranton, daughter of Francis and Cheryl Weiderspahn. Second alternate is **Lisa Fitch** of Roaring Branch, daughter of Elwin and Charlene Fitch.

- Farmers recently appointed to the Pennsylvania State Conservation Commission are: **Richard Mains,** Cumberland County; **Irk A. McConnell,** Washington County; **Ronald L. Meck,** Lancaster County; and **Dennis Zimmerman,** Snyder County.
- **Bob Rumler** of Chambersburg, Pa., was named International Person of the Year at the World Dairy Exposition in Madison, Wis.
- **Duane Duncan,** county extension director in Cumberland County, Pa., has been re-elected secretary of the National Association of County Ag Agents.

Pennsylvania Department of Environmental Protection

615 Howard Avenue
Altoona, PA 16601-4838
August 30, 1996

(814) 946-7290

Altoona District Office

Dear Conservation District Manager and Nutrient Management Technician,

The September Quarterly Chesapeake Bay meeting will be held September 19, 1996. We will meet at Chilcoat's Restaurant, East Freedom, Pennsylvania. Starting time will be 9:30 A.M.

Agenda items are as follows:

1). Update Status Report

2). Experimental design for Soil and Water Conservation projects
Dr. Phil Rzewnicki, PSU, Extension Service

3). 319 Program - - Carl Rohr

4). Streambank fencing projects completed this year - - NMS

5). SRBC study on fencing projects - - Don Fiesta

6). Nutrient Management Delegation Agreement - - Lynn Langer

7). Project Grass - Accomplishments per county - - NMT

8). Allocations - - NMS

If there is any suggested agenda items, please let me know.

Last September's meeting we viewed a wetland area to treat milkhouse wastewater. This was a good learning experience. Do you know of any such farm practice for this years meeting?

If any suggestions please let me know ASAP.

Sincerely,

William D. Botter
Nutrient Management Specialist
Bureau of Land and Water Conservation

WDB/jp

On-Farm Demonstrations 1996

Cooperative Extension Agents of Pennsylvania

PENNSTATE

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College of Agricultural Sciences • Cooperative Extension

PREFACE

Special thanks to the Pennsylvania Extension agents who were willing to share information about their 1996 demonstrations with their colleagues. During training sessions on the planning and conducting of on-farm experiments, many of the participants indicated a desire to know more about the on-farm demonstrations of their fellow agents. To address that desire, I offered to compile brief reports from all interested agents in the state.

Funding for three projects was provided by the Northeast Region Sustainable Agriculture Research and Education (SARE) program. These projects are indicated by a single asterisk * in the Table of Contents. Thanks are also due to the leadership of the Northeast Region SARE program in enabling me to provide training in on-farm research methods to Extension agents and producers in Pennsylvania during 1996 and 1997.

Funding for seven projects was provided by the Pennsylvania Association for Sustainable Agriculture. These projects are indicated by a double asterisk **.

A few projects reported here are still in progress and due to be completed in 1997. Readers are advised to address questions about any particular project with the Extension agent submitting the report.

Phil E. Rzewnicki
County Extension Director/Agriculture Agent
Blair and Huntingdon Counties
P.O. Box 449, Highland Hall Annex
Hollidaysburg, PA 16648-0449

April, 1997

TABLE OF CONTENTS

Corn Demonstration Plot

Del Voight

Rationale

As a result of an advisory research committee, a demonstration plot was planned to show the differences between hybrids from several different companies. The goal was to design a plot that could give producers an understanding of how a strip trial is conducted along with criteria used to determine a hybrids usefulness.

Materials and Methods

A multiple strip plot was planted on May 15, 1996with a John Deer 7240 planter at a planting rate of 28,000 plants per acre to achieve a final population of 26,000 ppa. The plot was located on the Glenn Krall farm . Plots were 6 rows wide by 508 ft in length. A check hybrid P3394 was used as a check hybrid and placed every third plot to provide information on the variability in the plot area. Hybrids were requested from various companies in the 112-114 day maturity or 2700-2800 heat unit requirement area. The plot was harvested on November 21, 1996. Weights from plots were achieved using a weigh wagon and moisture was determined by using a hand held moisture tester. Population, down and barren counts were determined by measuring 100 feet and counting the plants.

Cultural information

The soil type is a Duffield soil with a b class slope. The field received a starter fertilizer, 230 units of nitrogen derived from 6000 gallons of dairy manure, 150 lbs of urea and soybean nitrogen from the previous year. Clean tillage was used to prepare the seed bed. Extrazine™+ Marksman™ were used to manage weeds and applied when the corn was at the 3 leaf stage. The previous crop was soybeans.

Discussion

Table 1. represents the grain yields of the treatments. The first point is that this information is from one year of information and one test site. No comparison may be made to single out one hybrid from another unless further information is acquired. Harvest populations averaged 21498, much less than the at plant population. Many factors may have affected the population. One factor of interest would be seed size. Medium rounds were requested from the companies but in some cases large flats and large rounds were delivered to plant. This may account for some of the population differences. The average of the plot was 199 bushels per acre and there were 8 hybrids of 12 above the average and 4 of 12 below average. The check hybrid did not vary significantly in the plot area so it may be said that the soil performed evenly across the plot. On average 3% of all the hybrid population was down and 5% was barren. 3 of 12 hybrids had 0% down which includes the Bt corn.

Conclusions

Strip trials such as this, are difficult to accurately measure a hybrids performance and do not substitute for seed company or University trial information. Seed companies have information on performance from multiple sites and years. When analyzing strip trial information one should be sure it includes a check hybrid, accurate planting, spraying and nitrogen, and close maturity groupings.

Cooperat	Krall	Planted	Harvest	Width	length	Row widt	Planter	Tillage						
Trial	Hybrid	15-May	21-Nov	205ft	508.53	30"	JD7240	Minimum						
Plant pop	26,000													
Plot numb		101	102	103	104	105	106	107	108	109	110	111	112	113
	Border 3394	Pioneer 3394	Chemgro 7496	Funk's 4496	Agway AG 657	Pioneer 3394	Dekalb 628	CFS W 7779	Doebler's 737XP	Pioneer 3394	Pioneer 3335	NC+ 5445	X 6800Bt (NK)	Agripro 619
# of Ro	12	4	6	6	6	6	6	6	6	6	6	6	6	6
Trial	AVG	101	102	103	104	105	106	107	108	109	110	111	112	113
Yield in lbs		1358	2052	1826	2102	2062	1822	1794	2094	2074	2224	2096	2292	2130
Moisture	0.19331	0.189	0.191	0.172	0.186	0.189	0.195	0.233	0.192	0.189	0.189	0.203	0.192	0.193
Harvest	21498.5	20909	21606	21083	20038	19166	20038	16727	23348	22477	21083	23522	26484	23000
Down	3%	6.67%	2.42%	0.00%	3.48%	3.64%	2.61%	4.17%	2.99%	2.33%	3.31%	2.22%	0.00%	0.00%
Barren	5%	3%	4%	4%	3%	4%	9%	9%	4%	3%	4%	6%	4%	5%
Yield Conv		23.2743	35.0817	31.9511	36.1587	35.3399	30.99556	29.0786	35.7555	35.5455	38.11631	35.3025	39.1364	36.3252
Yield/Acr	199.25	198.925	200.32	182.441	206.466	201.791	176.985	166.039	204.164	202.965	217.644	201.577	223.47	207.417
deviation		-0.32	1.07	-16.81	7.22	2.54	-22.26	-33.21	4.92	3.72	18.40	2.33	24.22	8.17
Hybrid Information														
Maturity		111	114	114	108	111	112	114	112	111	115	113	114	114
Heat Units/PM		2700	NR	NR	2700	2700	2850	2905	NR	2700	2810	2515	2690	2560
Field Information														
Nitrogen	150lb	Urea	Manure	Dairy										
Weed Mar	Extrazine	Marskman												
Previous C	Soybean													
Insecticide	None													
Soil Type	Dfb													

Fayette County Corn Population Study

by
Donald C. Fretts
Penn State Cooperative Extension

Participants

Farm Cooperators -	Richard Burd Uniontown, PA	Bruce Shaffer Acme, PA
	Stouffer Bros. Acme, PA	F&F Farms Scottdale, PA
Extension Agent -	Donald C. Fretts Fayette County	
Ag. Industry -	Pioneer Hybrids	

Objectives

Discussions with farmers and seed dealers concluded that many farmers might benefit from some localized corn plant population demonstration plots. The supposition was that many producers are under planting modern hybrids and are sacrificing yield as a result. the objectives of the applied research plots were to:

1. Establish different planting population levels, 22,000, 25,000 and 28,000 kernals per acre on at least three different farms.
2. Use farmer owned corn planters and set the kernal drop rate as close to the desired drop by following the directions of the farmer's corn planter manual.
3. Allow each farmer to manage every other variable, fertilizer rate, tillage method, herbicide program, etc. as he so chose. An attempt was made to use the same hybrid on each farm if possible.
4. Measure mechanically the yield response on each farm for each population level.
5. Publish the results to farmers in the southwest Pennsylvania area.

Procedures

Farmers were selected to represent the two differing elevation levels of the county. Each farmer planted the plot normally as the rest of his corn crop, with the exception of plant population. Each farmer made a map of his plot and provided the extension agent the accompaning management information individual to his farm.

Plots were monitored during the summer for any irregularities that might occur. Each farmer used his own combine to harvest the plots and I measured plant population, acres harvested, weighed the corn weights. and tabulated the data.

Observations and Conclusions

All producers provided enough inputs to not limit the yield potential for the respective hybrids. Yields, if compared to date of planting, support the importance of early planting date. Elevation was not a significant factor in the performance of the selected Pioneer hybrid. The planter setting for the low population on the Shaffer plot apparently was incorrect, harvest population was significantly higher than the desired planting population.

In all cases the medium population yielded better than the low population, including the Shaffer harvest population for the minimum planted count. Statistically, 3 of 4 had the highest yields at the high plant population.

The conclusion might be that in 1997, high plant populations, 28000 kernal drop, support additional yields in Fayette County when inputs are adequate.

Just what is the optimum plant population for Fayette County soils and conditions has not yet been determined. Additional plots are planned for 1997 to continue the investigation.

1996 FAYETTE COUNTY CORN POPULATION STUDY
Machine Harvest

Cooperator	*Richard Burd*	*Bruce Shaffer*	*Stouffer Bros.*	*F&F Farms*
Variety	Pioneer 3525	Pioneer 3525	Pioneer 3525	CIBA 4393
Plant Date	May 22	May 21	June 2	June 4
Tillage	No-till	Chisel	Chisel	No-till
Starter Fert.	100/MAP	300/12-24-24	250/12-24-24	120/10-30-10
Side Dress/A	30GAL/30%UAN	150/Urea	110/Urea	20Gal/30%UAN
Weed Control				
Pre-Emerge	1.8 Atrazine 1.8 Princep 1.25 pt Roundup	2.5 qts.Bicep	2Lbs AAtrex	1 qt Roundup
Post-Emerge	1/2 pt Banvel			.67 oz Accent .5 pt Banvel
Insect Control				
Planter Box	Yes	Yes	Yes	Yes
Row	No	No	No	No

96 Corn Population Yield Results

Plant Pop.	Harvest Pop.	Acres Harvested	Gross Yield.(Lbs)	% Moisture	Adj.Bu.Yield/A
Richard Burd					
26600	26000	.986	7780	26.6	122.38
21900	21000	.99	7740	26.4	121.58
24500	23000	.99	8600	23.7	138.6
26600	26300	2.21	17020	24.7	122.9
Bruce Shaffer					
22000	23800	.172	1640	24.9	151.3
25000	24750	.172	1420	27.7	126.5
28000	28000	.172	1640	27.5	146.08
Stouffer Bros.					
22500	22000	1.18	8000	34.9	82.7
25000	24700	1.23	8760	35	98
28000	27400	1.25	9340	35	102.34
F&F Farms					
22100	22000	.614	4120	19	114.85
24000	23750	.614	4100	19	114.3
27700	26600	.614	4780	19	133.25

Rye, Fall-Applied Manure, and No-Till Corn Silage Demonstrations

Participants: John and Todd Ishler Farm, Spring Mills; Mel Brown, Extension Agent; Greg Roth, Department of Agronomy, PSU; Pennsylvania Association for Sustainable Agriculture; Agway Crops Center, Pleasant Gap; and, Pioneer Hi-Bred International, Inc.

Objectives: Many dairy farmers face the same dilemma. They need to grow corn silage and spread manure, and they would like to plant no-till corn to conserve soil and labor resources. For many, results with no-till corn silage production have been less than satisfactory, while some others make the system work quite well. A field demonstration conducted in Centre County during the past year addressed some of the management considerations necessary to make the system work more effectively.

Procedures: Two eight-acre, third-and fourth-year corn fields were used to demonstrate rye cover crop management effects and to assess the practical problems of using a rye/corn silage system in Centre County.

In early October, rye was no-tilled into 2/3 of each strip. Fall rye growth was excellent, and in November, the fields received 6,000 gallons of dairy manure per acre. The rye was completely and uniformly covered with manure at that point. Almost immediately, the field was covered with snow for most of the winter, except for the January thaw and flood. The rye and manure appeared to limit erosion fairly well, since during the winter, runoff caused some erosion in the bare strips but not in the areas seeded to rye. By spring, the manure had decomposed to the point that it was difficult to see much evidence of it. Based on this experience, it appears that corn stubble fields with a good rye cover crop are excellent candidates for fall-applied manure. The manure application and rye cover limit erosion and provide a good, no-till seedbed in the spring.

In the spring, the rye was killed on two different dates with an application of Roundup Ultra with 2,4-D added for broadleaf weed control. The herbicide was applied on April 18, when the rye was four to five inches tall or on May 4, when the rye was eight to ten inches tall. Due to wet weather, planting was delayed until May 15. The soil under the late-killed rye dried out more slowly because of the mulching effect and was marginal at planting. Soil conditions in the early-kill and no-rye plots were excellent. Rye residue from the early-killed rye decomposed rapidly and was minimal at planting.

Observations/Conclusions: Stands were good in all treatments, averaging 24,000-26,000 plants per acre. Plant growth was good as well, except that corn in the late-killed rye was slightly yellow for about two weeks early in the season. We concluded from this that the early-kill treatment gave the best compromise of the following three treatments: good overwinter erosion control; a reduced potential for possible negative effects (i.e., allelopathy) from the rye; and minimal residue to interfere with planting and soil drying.

In mid-June, we conducted a PSNT to estimate the N requirement for the field. Test results called for 75 units of N, which was applied at the eight-leaf stage. By this time, most of the rye residue from the late planting was decomposed. Growth was good in all plots

throughout the season. Two-row strips were harvested from the middle of each plot for the length of the field. The late-killed rye treatment averaged 27.1 tons per acre, the early-killed rye treatment averaged 26 tons per acre, and the no-rye treatment averaged 24.6 tons per acre, all at 65 percent moisture. We speculate some of the advantage of the rye treatments may have been that they helped to conserve some of the manure nitrogen, which was lost in the no-rye treatment. This was probably more important this year than usual due to the excessive rainfall that occurred during the season.

We concluded from this demonstration that no-till corn can be successful in a manured, rye cover crop system, but careful management is important. Avoiding soil compaction, spreading manure in fall rather than late spring, timely rye planting and kill, and careful nitrogen management are all components of the system that need to be addressed to make it work well. Producers who attended the field day indicated they often encounter problems with late-spring manure applications that make no-till corn silage production difficult. Consequently, not all corn silage fields may be candidates for this system. Many corn silage fields, however, are bare over the winter and have manure spread on them during the fall as we did in this demonstration. On these fields, we can take advantage of the labor savings and reduction of soil erosion and runoff the no-till corn silage/rye system provides.

--Mel Brown, Retired Extension Agent
--Greg Roth, Department of Agronomy

STARTER FERTILIZER YIELD RESPONSE

Participants : Scott Cox, Harold and Bernard Bailey, Dennis and Douglas Smith, farmer cooperators; Phil Rzewnicki, Extension Agent; Amanda Ritchey, Ridge and Valley Project, PASA and Extension program assistant.

Objectives: This trial was initiated in order to test the value of starter fertilizer on well manured fields. The use of the products ACA and Asset (which stimulate root growth), on two of the three farms which completed the demonstration, was also evaluated.

The Scott Cox farm located outside of Warriors Mark, Huntingdon County, tested the yield response of corn planted with starter and Asset against neither. Six replications were made in a 9 acre strip, with an average field length of 2,350 feet. The soil is a Morrison sandy loam manured once a year with 4,000 gallons of dairy manure. Soil test information showed that the soil phosphorus (P) level was 67 lbs./A and the potash (K) was at 117 lbs./A. Both of levels are in the low range of soil fertility. Starter fertilizer was 8-28-12 applied at a rate of 100-120 lbs./A. The insecticide, Force was used at 6.8 lb/A.

The Harold and Bernard Bailey farm is located south of Martinsburg, Blair County. Mr. Bailey applies 3,500 gallons per acre of dairy manure to the 6.5 acre strip mapped as a Hublersburg cherty silt loam soil. Soil test levels of the P were 288 lb/A and 271 lb/A for K. These levels are both in the high range of soil fertility. The Bailey's utilize ACA at planting. The use of ACA and starter versus, starter without ACA, versus nothing were compared at this site. The starter fertilizer was 10 gallons/A of 10-34-0. Aztec at a rate of 6.8 lb/A was used to control corn rootworm.

The Dennis and Douglas Smith farm is located north of Martinsburg, Blair County. The Smiths apply 9,000 gallons per acre of dairy manure per year to the 6 acre field mapped as a Hublersburg cherty silt loam soil. Soil test levels in this field were in the excessive range for fertility. P was at 388 lb/A and K was at 459 lb/A. This trial was simply 150 pounds/A of 9-43-10 starter versus none.

Procedures: All three farms planted in 30" rows. All fields have been in corn for at least one year after alfalfa. The Bailey farm used no-till for establishment, whereas the others were established using minimum till.

Cox farm- The corn was planted for silage on 4/29/96. Soil temperature was 49oF. Site evaluations following emergence showed little if any noticeable variation between the two treatments. The Pre-sidedress Soil Nitrate Test (PSNT) was performed on the field. The test indicated N levels were high. Stand losses due to wet, cold soil and weeds were a problem with this plot. Average height and population counts were taken on 8/8/96 for all farms. The average height was 107.4 inches and the average

population was 19,750. The differences between the plots were found to be insignificant.

Bailey farm- The corn was planted on 5/23/96. The soil temperature was 64oF. Early visual differences between the plots were very evident. The strips with no starter and no ACA were much lighter in color and were smaller. Samples were taken on 6/25/96 for the PSNT test and showed no additional nitrogen was needed. The corn with no starter and no ACA continued to lag behind in size and color. By mid-summer, visual differences had mostly disappeared. Average height on 8/8/96 was 98.8 inches. Average population count was 21,375. Neither height nor population was significantly different, statistically, among the three treatments.

Smith farm- The Smiths planted on 5/4/96 with a soil temperature of 58oF. Site evaluations on 6/11/96 showed the corn with starter was noticeably greener. By 6/25/96 when the PSNT test was taken, visual differences were no longer evident. The nitrogen level was high requiring no additional nitrogen. Average height of the corn on 8/8/96 was 91.7 inches with only an inch difference between the two treatments. The population counts were 19,747 for the corn with starter and 21,606 without.

Results: Cox farm- Mr. Cox harvested the test field for silage between September 19 and 21. The yields were adjusted for moisture at 65%. The corn with no starter or Asset yielded 19.9 tons/A. The corn with starter and Asset averaged 19.2 tons/A. With six paired replications, there were no significant, statistical differences between the two treatments. We concluded that the application of starter fertilizer plus Asset did not increase yield in this trial.

Bailey farm- The corn was harvested for grain on 11/22/96. The average moisture level in the field was 36.9%. The treatment means adjusted to 15.5% moisture were: 116.9 bushels for the corn without starter and ACA, 122.8 bushels with just starter, and 118.0 bushels where starter and ACA were both used. Again we determined that there was no statistical difference between the three treatments with four replicated sets.

Smith farm- The corn was harvested for grain on 11/23/96. The average moisture level in the field was 19.7%. At yields adjusted to a standard moisture of 15.5%, the corn with starter yielded 167.1 bushels and the corn without starter yielded 171.1 bushels. With five replications this trial also showed that the starter fertilizer provided no yield benefit.

Coefficients of variation (CV) for the Cox, Bailey, and Smith trials were 9.4%, 14.5%, 5.9%, respectively. The CVs were all within acceptable levels to indicate adequate control of experimental error. All three trials indicated that starter fertilizer did not increase corn silage or grain yields in 1996. We feel the comparisons of the root growth hormones, ACA and Asset, were inconclusive due to the wetness of the growing season. It is very likely root growth was not a limiting factor in 1996.

Weed Control In No-till Corn

Participants: John Rowehl; York County Extension Agent, Chilcoat Farms; cooperator, Dr. William Curran; Extension Weed Specialist

Objectives: Several new products available for weed control in corn were evaluated in a replicated demonstration plot. Triazine resistant lambsquarter and giant foxtail are the major problem weed species in the area. They have been particularly hard to control consistently in no-till fields.

Procedures: A field with an anticipated weed problem was identified with the cooperator. The cooperator has been planting no-till for many years. Treatments were selected by the agent and specialist. The specialist provided chemicals and a plot plan. The cooperator applied the burndown herbicide. Following planting the agent applied the treatments, rated the percentage of control, conducted a field meeting and measured yield. A treatment list and the control ratings are shown on the accompanying page. Plot size was 7.5 ft x 25 ft with three replications. Planting date was May 15. Row width was 22 ". The control ratings on 6-13 reflect the control from the pre-emergence applied products and the early-post applied products only.

Treatments	Applied	corn stage	lambsquarter	giant foxtail
Pre	May 17	---	----	----
Early post	May 31	3 leaf (1 collar)	cotyledon	1-2 leaf
Post	June 14	6-7 leaf (4 collars)	coty- 3 "	up to 4-5 leaf

Observations and Conclusions: Giant foxtail pressure was not very high. Lambsquarter pressure was not high in the first replication block. Yield data was taken only from the second and third replication blocks. The corn in the plots where Basis was applied at the post timing was observed to be shorter and had some leaf distortion. However the yield was not statistically different. Control ratings (averaged for reps 2&3) for Harness Extra suggest that it (the acetochlor component) will control lambsquarter better than Bullet (Lasso) or Dual, but analysis needs to be done to show if this is statistically significant. The performance of Basis - early post was a bit disappointing. All the post applied products controlled lambsquarters well. Grass control was good with all treatments in this low grass weed pressure situation.

Prepared by John Rowehl, Extension Agent, York County, PA

	LQ 6-13	LQ 7-2		13-Jun			2-Jul		
Replication>>>2-3	Ave	Ave	1	2	3	1	2	3	
Check	0	0	0	0	0	0	0	0	
Bullet	55	53	90	60	50	90	20	85	
Harness Extra	83	63	85	75	90	95	65	60	
Dual II atrazine	50	15	80	30	70	92	20	10	
Dual II/Exceed	35	95	80	70	0	98	99	90	
Dual II/Exceed-Banvel	50	100	90	30	70	99	100	99	
Harness/Permit-Banvel	78	100	95	85	70	99	100	100	
Dual II/Scorpion III	40	99	80	60	20	99	99	99	
Frontier/Banvel	70	99	80	60	80	99	98	99	
Basis early post	50	50	80	50	50	90	50	50	
Basis/Banvel early post	85	75	95	80	90	95	60	90	
Basis post	0	99	0	0	0	99	99	99	
Accent/ Banvel post	0	95	0	0	0	100	99	90	
Accent-rimsulfuron post	0	85	0	0	0	100	95	75	

	GF 6-13	GF 7-2		13-Jun			2-Jul		
Replication>>>1-3	Ave	Ave	1	2	3	1	2	3	Yield
Check	0	0	0	0	0	0	0	0	70.9
Bullet	99	91	99	99	99	98	90	85	116.3
Harness Extra	99	93	99	99	99	99	90	90	171.5
Dual II atrazine	99	93	99	99	99	99	90	90	143.9
Dual II/Exceed	96	88	95	95	99	95	90	80	136.0
Dual II/Exceed-Banvel	95	83	95	99	90	90	80	80	149.8
Harness/Permit-Banvel	96	88	90	99	99	90	85	90	
Dual II/Scorpion III	98	88	99	95	99	95	80	90	143.9
Frontier/Banvel	99	91	99	99	99	98	85	90	138.0
Basis early post	96	86	99	99	90	98	80	80	161.7
Basis/Banvel early post	99	87	99	99	99	95	85	80	177.4
Basis post	0	100	0	0	0	100	99	100	169.6
Accent/ Banvel post	0	97	0	0	0	100	100	90	163.6
Accent-rimsulfuron post	0	100	0	0	0	100	100	99	159.7
									LSD=77.7

Pre-Cutting Seed Potatoes To Improve Performance

Participants: John Rowehl, York County Extension Agent; Dennis Peters , cooperator; Dr. Mike Orzolek and Terry Simpson, Penn State Horticulture Department.

Objectives: Pre-cutting seed potatoes has long been known to improve the perfomance of potato plants. Cutting and warming the seed a week to ten days before planting allows the cut surface to heal before planting and promotes faster emergence. Two varieties of potatoes used in this demonstration, Somerset and Yukon Gold, are known to be poor emergers. They are promising table stock varieties but are not grown extensively. A way to improve the yield, of Somerset particularly, needs to be found in order for growers to produce it profitably. Pre-cutting requires additional handling so that in itself is a cost to overcome.

Procedures: This demonstration was planted as an additional treatment in the variety evaluation trial conducted by Penn State on the cooperating farm. Certified seed from the grower was cut by hand approximately a week ahead of the anticipated planting date. Because of delays due to weather, planting did not occur until May 15. On the day of planting additional seed was cut so a comparison could be made. The grower's planter was used to open up rows and apply fertilizer. Four rows each containing 34 seed pieces (25 ft) were planted by hand and covered mechanically with disk hillers.

Observations and Conclusions: We thought the fact that planting was delayed would nullify the benefit of pre-cutting the seed. On June 6 the number of plants emerged in the two center rows of each variety was counted. The total number of plants is reported below.

Somerset pre-cut	56	Yukon Gold pre-cut	38
Somerset fresh cut	35	Yukon Gold fresh cut	27

The results of the yield measurements from the plots were not available at this time.

Prepared by John Rowehl, Extension Agent, York County, PA

Sorghum Silage versus Corn Silage

Del Voight

Rationale

Some areas in northern portion of Lebanon contain soils prone to drought. The predominant soil types require particular management in that it tends to remain wet in the spring and becomes dry quickly in the summer. The shallow depth of soil proves to be detrimental in dry years due to the low water holding capacity. It has been proven that sorghum has a much greater tolerance than corn to drought. In addition it may be planted later in the spring giving a much larger window to plant. The goal of this study is to compare corn versus sorghum yields. Funds were secured from the Pennsylvania Association for Sustainable Agriculture.

Materials and Methods

A strip plot was planted on June 4, 1996 at the Doug Blauch farm in Northern Lebanon. Forage sorghum and corn were planted in 30" rows using a White New Idea planter. The strips alternated six rows of corn and six rows of sorghum. There were 4 replications in the field.

Cultural information

The plot was planted no till with plant populations of corn at a 25,000 ppa and sorghum at 110,000 ppa. Final stands were achieved of 24,380 and 98,000 respectively. Roundup™ and Bullet™ were used to manage weeds. An insecticide was used due to the previous crop being corn and root worms were present. The soil type is a Markes type with a b slope.

The plot was harvested on September 21, 1996 by measuring 1/1000th of an acre and removing the plants by hand and weighing the yield with a dairy scale. The moisture was determined by using a Koster Tester.

Discussion

The wet year limited the usefulness of the study but provided some base line information by which to compare. The sorghum averaged 12 tons and corn average 16 tons both corrected to 65% moisture.

Conclusions

Corn out yielded sorghum by 4 tons in a season where moisture is plentiful. More research is need over a couple of years to compare sorghum versus corn.

Cooperator	Blauch	Corn vs Sorghum			
Date	Sept. 21, 1996				
Method	Hand	1/1000th acre	4 reps		
	lbs/2000 sq.	moisture%	yield at 65%	Deviation from average	
corn1	68	0.66	16.51429	2.064285714	
sorghum2	70	0.7	15	0.55	
corn3	80	0.64	20.57143	6.121428571	
sorghum 4	52	0.71	10.77143	3.678571429	minus
corn 5	60	0.66	14.57143	0.121428571	
sorghum 6	52	0.69	11.51429	2.935714286	minus
corn 7	62	0.66	15.05714	0.607142857	
sorghum 8	56	0.71	11.6	2.85	minus
		Average	14.45		
		LSD .05	0.7225		
		Corn Average	16.67857		
		Sorghum Avera	12.22143		

Nightshade Management Plot

Del Voight

Rationale

Nightshade is a weed that reproduces by seed each year. A single plant may produce 1000 berries, each containing 50 seeds surrounded by a sticky juice. During harvest the sticky juices causes the nightshade seed, soil and other foreign material to adhere to the soybeans. This may produce a pasty mixture that clogs and gums the sieves of the combine and augers of combine. In addition the increase in moisture in the soybeans due to the berries can result in dockage at the mill. For this reason, a test plot was set up on the farms of Steve Wenger and Jody Parker with known nightshade populations. The goal was to assess the effectiveness of three herbicide treatments. Steve Fisher from FMC has a new product Authority which he wanted to test in the county. He was interested in how well his product performed in the control of nightshade.

Materials and methods

A side by side strip plot comparison was used to determine the differences in control of three herbicides. Plots were planted using 15" row equipment with the soybean variety of choice. The beans were planted May 20 for Wenger and sprayed the 22nd. Parkers beans were planted May 23 and sprayed May 24. Rain was received on May 28 (1.3"). More than enough to incorporate the herbicides. The plots were sprayed with large sprayers calibrated to deliver 20 gallons per acre. Plot areas were 2 acres in size. The treatments were as follows:

Authority™ .26lb/acre + Classic 25DF 1.5oz/acre
Cobra™+ Pinnacle™ 75DF .125oz/acre
Dual™ 8E 2.5pt/acre + Canopy™75DF 8oz/acre
The total area was sprayed late post with Assure II at 10 ounces per acre.

Plots were harvested with a combine and yields measured with a weigh wagon. Moisture was determined by using a hand held moisture tester. Yields are reported in yield per acre corrected to 13.5% moisture.

Discussion

Both preemergent treatments provided excellent control of nightshade. the total post plot with Cobra had weed escapes due to the weed canopy limiting the herbicide from reaching seedlings below. Yields were different due to variation in the field and not from the herbicide alone although there may have been some limiting factor from the products.

Conclusion

This plot showed that nightshade may be controlled effectively with either Dual™ 8E or Authority™ 75DF. Because other products have activity on nightshade, the study was not complete and the Agronomy guide should be consulted to make weed management decisions. Pursuit™ has activity on nightshade and was originally planned in the plot but due to weather problems the nightshade exceeded the 3 inch hieght limit on the label and Cobra was used instead. This points out the fact that too much reliance on a post program may prove to be detrimental in years where conditions limit field activities.

Trial	Nightshade							
Location	Parker							
Treatment	lbs./area	area330' * 18	conversion	lbs/acre	test weight	yield bu/a	deviation	
1 Dual + Canopy	440	0.13636364	7.33333333	2855.6	51.9	55.0211946	4.37668593	below
2 Cobra + Pinn	473	0.13636364	7.33333333	3069.77	51.9	59.1477842	0.25009634	below
3 Authority	512	0.13636364	7.33333333	3322.88	51.9	64.0246628	4.62678227	above
Moisture	11.50%			0				
				0	Average	59.3978805		
RU Soy 9396	2150	0.73215	1.36584033	2587.10647	51.9	49.8479088		
Moisture	11.9							
Trial	Nightshade							
Location	Wenger							
Treatment	lbs./area	area	conversion	lbs/acre	test weight	yield bu/a	deviation	
1 Dual + Canopy	802	0.27006061	3.70287253	2604.43021	51.9	50.1816995	5.71818775	below
2 Cobra + Pinn	798	0.25478788	3.92483349	2746.77902	51.9	52.9244513	2.97543605	below
3 Authority	948	0.248	4.03225806	3352.40323	51.9	64.5935111	8.6936238	above
Moisture	12.30%							
					Average	55.8998873		

Deer Damage Control in Vegetables

Farm Cooperators: Eckel Farms, Pallman Farms, Rudolph Chapin, and Landsiedel Farms.
Extension Agent: John Esslinger

Objectives- Deer damage may have hit an all time high in summer of 1995. Tomato growers experienced extensive damage. One grower lost eight of the twelve acres in his field. The 1996 cost of production for tomatoes is over $1,100 per acre. Hunting is not an option due to the residential development throughout many areas. The mobility of vegetable production eliminates fencing as a practical solution. Growers identified repellents as the most practical and cost effective means of deer control. Three repellents were recommended.

Procedures - The three repellents demonstrated were Hinder at $88.65 per acre, Thiram-65 at $14.06 per acre, and Frank's Hot Sauce at $11.39 per acre. Hinder was applied at 2 and 1/3 gallons per 50 gallons of solution. Thiram was applied at 7 and 1/2 lbs. per 50 gallons of solution. Frank's Hot Sauce was applied at 1 gallon per 50 gallons of solution. Each repellent solution was applied at 50 gallons per acre equivalent. Each repellent was applied to one tenth acre of green-wrap tomatoes. The field was planted May 25.

Deer damage was first observed on June 18. The repellents were applied on as needed basis, which in 1996 was approximately every 7 days due to heavy rainfall. Applications were made on June 21, June 26, July 8, July 16, and July 23. The repellents were applied with a hand sprayer.

Each application required approximately 2 hours to complete. Time required to evaluate the demonstration before and after the applications was approximately 3 hours.

Observations - June 21, 1996, before repellent application: Thiram area had 76% of plants with deer damage; Hinder area had 83% of plants with deer damage; Frank's Hot Sauce had 16% of plants with deer damage.

After the application of repellents (6/21/96), deer damage stopped completely until 7/16/96. On July 16 approximately 10% of plants in all three areas shower deer damage. Rainfall occurred shortly after application on July 8. Continued rainfall delayed application until July 16, when damage was observed. The last application was made on July 23. No additional damage was observed in the Thiram or Hinder areas. Damage continued in the Frank's Hot Sauce area until the demonstration was abandoned.

Conclusions- All three repellents were somewhat effective. Thiram and Hinder were more effective than Frank's Hot Sauce.

Most tomato plants that were damaged by deer in the first 6 weeks after planting had delayed fruit maturity and were unproductive for a one time harvest. Repellents are effective if applied before deer damage starts, or as a way to prevent the spread of deer damage to adjacent plants. The use of a spreader-sticker may reduce the total number of repellent applications needed in a growing season.

NORTH CENTRAL HORTICULTURE PROGRAM

BRASSICA VARIETY TRIALS
May - September, 1996

Participants: Greg Burns, North Central Horticulture Agent; Sam Crossley, Potter/McKean Unit CED; Everett Blass and John Blass, commercial potato growers and Earl Brown, Coudersport Area High School Vocational Agriculture Teacher.

Objectives: The objective of this applied research project was to compare varieties of broccoli, cauliflower and spinach to determine which ones are best suited to the growing conditions and market demands of the north central Pennsylvania area. These would then be recommended to commercial, fresh market growers throughout the McKean, Potter, Elk, Cameron, Clearfield and Jefferson counties area.

Procedures: The Blass potato farm in Potter County accepted the offer to become a cooperator and were provided with the seed and transplants involved in the experiment. A local Vocational Agriculture Instructor grew out the broccoli and cauliflower from seed to transplant size. Unfortunately, the spinach seeding did not germinate successfully and was eliminated from the trial. The broccoli and cauliflower were transplanted in 36" rows with 18" between plants. They were planted on June 1 with 1800 lbs. per acre of a 13-9-13 fertilizer applied in the row. Weed control consisted of Roundup being applied to the plot before being tilled and two subsequent cultivations. An insecticide was applied 16 days and 30 days after planting for flea beetle control. Varieties were staggered throughout the plot according to a pre-determined randomized and replicated design. This was done to eliminate experimental biases based on different soil types, compaction, wet or stony areas, etc..There were 30 plants in each variety.

Observations and Conclusions:

Cauliflower:

Amazing: Transplants had very good vigor. Harvest was initiated on August 5. This variety produced 7-10 inch heads. Overall size varied somewhat but all heads were tight and uniform with good color.

White Sails: Transplants showed good vigor. Harvest started on July 24th. These produced large, 8-9 inch, uniform heads.

Icon: Plants did not grow as large as Amazing and White Sails but still produced several 8 inch heads. Harvest was initiated on August 3.

Cashmere: This variety grew at a slower rate than the others. Most produced 7-8 inch heads with good uniformity and color. Harvest was initiated on August 6.

Snow Crown: This variety overmatured very quickly and a significant number of heads would not be marketable due to their poor appearance. Heads were small - only 6-7 inches across. Harvest was initiated on July 24th.

Snow Grace: A significant number of plants did not have enough leaves to wrap the heads completely which would lead to discoloration. This variety produced medium sized heads of 5-7 inches. Harvest was initiated on July 27.

White Knight: This was one of the most satisfactory varieties in the trial for fresh market production. It was very early maturing (45 days), heads were large (8-9 inches) and uniform with good color.

In the cauliflower trial rubber bands were used to tie up the leaves on all plants. Some of these broke due to solar desiccation which led to a minor amount of discoloration on some of the heads in all varieties. Additionally, soil compaction was a problem in one area of the plot but the randomized/replicated experimental design eliminated this factor from biasing the results. The Blass family's personal favorites and ones that they would grow again were White Knight (earliness, large size) and White Sails (large size).

Broccoli:

Signal: Harvest was initiated on July 12 with 25 heads cut the first week. This was 10-12 days ahead of all other varieties. Heads averaged 6 inches across, were tight and had a very marketable appearance. Numerous side shoots came on very quickly after the main head was harvested.

Landmark: Heads were very large, approximately 8 inches across, but not as uniform and tight as Signal or Headline. Fewer side shoots were produced. Harvest was initiated on July 29.

Pinnacle: Heads were very uniform and measured 6-8 inches across. This variety produced numerous side shoots. Harvest was initiated on August 5.

Barbados: Heads were uniform but not quite as large as the other varieties averaging 6 inches across. It produced a very good, but not outstanding, set of side shoots.

Headline: Heads were very uniform and tight. Some grew to a very large 8+ inch size but most were approximately 7 inches across. This variety produced fewer side shoots.

Overall, the broccoli varieties did well and presented a very marketable appearance. Each plant produced a main head and 95% of them produced side shoots which were still being harvested into September. The Blass family's personal favorites and ones that they would grow again were Signal (earliness, large size) and Headline (large size).

Utilization of a Hand-Held Flame Weeder in Conjunction with Stale Seedbed Techniques to Reduce Weed Pressure in a Sustainable Vegetable Production System

Participants: Harold Mellott, owner/cooperator, Thomas G. Ford. extension agent, Fulton County.

Objectives: Frequent cultivation of soils in intensive vegetable production systems allows needed soil moisture to be lost through evaporation. Frequent cultivation causes a breakdown in soil structure and brings thousands of additional weed seeds to the soil surface where additional germination could occur. Flame weeding combined with stale seedbed techniques could eliminate the need for cultivation and could preserve valuable soil moisture and structure. This research and/or demonstration project was designed to compare vegetable production systems which utilized mulch, cultivation, flame weeding with a portable propane torch, and no-weed control.

Procedures: Agent tilled and staked out four, 40 rows. Within each row, the agent sowed snap beans at approximately 6.5 oz of seed per 40' row in early June. After crop emergence, the agent established four randomized treatments within each 40' row. Each row contained a control, a flame weeded section, a mulched section, and a cultivated section. Shredded newspaper mulch was applied to the mulched sections after the plants had obtained their first true leaves. Cultivation by hand, rototiller, or a wheel hoe was performed 4 times. Flame weeding was undertaken by the agent 3 times during the production cycle. The beans were hampered by very cool weather which delayed maturity. A complete harvest of all plants in the plot was undertaken on August 14, 1996. Each plot was harvested separately and weighed and recorded separately for each treatment. After the yields were determined individually, the agent added the weights together from each treatment to see if any trends were visible.

Observations and Conclusions: The agent noted that throughout the production cycle that the mulched beans had superior color and had made more growth throughout the plots. The control plots at 6.0 lb/40 ft, flame weeded plots at 6.6 lb/40 ft, and the cultivated plots at 6.9 lb/40 ft. yielded very similarly (see Table 1.). The mulched plots had significantly higher yields 8.5 lb/40 ft. and less visible pod injury (by disease) than the other treatments. Flame weeding proved to give very similar results to cultivation in this trial. The agent had difficulty in targeting the flame without causing plant injury and had to confine flame weeding activities to the early morning hours (when the field debris were covered by a heavy dew). The threat of initiating a field fire is a very real one when combining flame-weeding and mulching.

Flame weeding provided a level of weed control that was very similar to the level achieved by cultivation. The heavy rainfall experienced in 1996 did not allow us to compare soil moisture levels in the blocks. Pod diseases were seen in the control, flame-weeded, and cultivated plots. No incidence of pod injury was seen in the mulched plots.

Flame weeding can be a viable means of weed control in vegetable production systems. Better flame targeting and increased safety are the principal concerns of the investigator and are the leading limitations in using flame weeding on small farms.

Table 1.

Yield Comparison in lb for Snapbeans Produced Under Different Treatments

	I	II	III	IV	Total
Flame Weeding	2.1	1.7	.9	1.9	6.6
Cultivation	1.1	2.3	1.6	1.9	6.9
Newspaper	2.3	2.4	2.5	1.3	8.5
Control	2.0	1.1	1.2	1.8	6.0

Phosphorus Application To Wheat On Red Shale Soil

Participants: John Rowehl, York County Extension Agent; Robert Huntsberger , cooperator; Dr. Doug Beegle, Penn State Soil Fertility Specialist

Objectives: Comparisons made of yield and phosphorus soil test levels on the cooperating farm in the course of a prior trial of "Asset"suggested that optimum soil test levels on the soil type in the area might be higher than the general optimum level established for the state. The soil test levels for P on this farm generally run just below the minimum optimum level of 60 lbs/ac. The normal fertilization routine has been to apply 500 lbs of 3-10-10. Our goal is to see what fertilization levels will cause a yield response.

Procedures: In the summer of 1996, sets of fields were soil tested collectively to determine phosphorus levels. Each field probably should have been sampled individually. In the fall at planting, fertilizer was applied at 0X, 1X and 2X of the normal rate. In all, three sets of fields totaling nearly 30 acres were included in the test. Measurement of the grain yield will be done at harvest.

Observations and Conclusions: None to date.

Prepared by John Rowehl, Extension Agent, York County, PA
1-14-97

Compost Container Media Trial at Wojton's Nursery

Participants: Wojton Nursery; Dave Suchanic, Multi-county Ornamental Horticulture Agent at Montgomery County Cooperative Extension; Sally Pick, Recycling Education Director, Recycling Education Program of Montgomery County Cooperative Extension; Angela Rezeli, Summer Intern/Assistant; Master Composter volunteers of Montgomery County; George Leidig of Autrusa Compost Consulting; Earthgro; Select Soils; & Earthmate.

Objectives: This trial was developed to test the viability of including compost as a component in field nursery potting media. Composting is a practical method of recycling organic materials, and in order to make this practice economically feasible, a market for the higher quality finished product must be established.

Procedures:
The trial was started in June of 1996 and will last through spring/early summer of 1997. 1,440 plants were planted in 9 different potting media, and each of the media had different types of compost in it. The trial is, in essence, composed of 4 separate trials, one per plant type: azalea, coreopsis, juniper, and sand cherry. These plants are perennials that grow in 1-2 gallon pots in hoophouses in the field.

Within each plant trial, 4 replications were established. Each replication had 10 plants per block of a single media type, with 9 blocks total to cover all of the 9 media types (90 plants per replication). For example, a replication of azalea has a block of 10 azaleas planted in the control mix, a block of 10 in a media from Select Soils, a block with media from Earthgro, a block of a media made with Earthmate compost, etc.

The control media consists of 1 part soil/sand/peat moss blend, 1 part aged Pro-Base, and 1 part hardwood bark. Earthgro and Select Soils' media came pre-blended. Earthmate and the CMC composts were blended into a potting media on site using a mix recommended in the book, *Recycling and Resource Conservation,* by the Pennsylvania Nurseryman's Association, Inc.: 2 parts commercial compost, 1 part peat moss, 2 parts pine fines, and 2 parts coarse sand. The CMCA media has 25% CMC compost and 75% sphagnum peat moss, and CMCB media is a blend of half CMC compost and half peat moss.

The trial began with sampling the composts alone and the potting media blends (including those blended on site) for physical media characteristics, including bulk density, water-holding capacity, and total porosity. Samples were also taken from the composts alone and all media blends for chemical analysis such as pH, salts, and other macro and micronutrients.

A few weeks after a full day of planting the plants for the trial in June of 1996, a random subsample of 5 plants per block were measured for height and width to provide a baseline for future growth monitoring. In November of 1996, a second end-of-the-growing-season measurement was taken on a randomly chosen subsample of 3

plants per block. pH and salts were tested a second time in mid August using accurate hand-held testers.

During the 1996 growing season, the plants did not have to be watered much because of the heavy and consistent rainfall. In late July of 1996, all plants were fertilized. Herbicide was applied to all plants but the coreopsis in mid July; the coreopsis had minimal weed growth at the time. Weeds were also pulled out by hand as the trial was monitored through the growing season.

The same media chemical analysis performed at the beginning of the trial will be taken in the last sampling in late spring/early summer of 1997. To sample the media for this analysis, 36 composite samples will be taken combining subsamples from each replication. For example, subsamples of media will be taken from a total of 4 blocks, i.e. from one block in each of the 4 replications of azaleas planted in the control mix. These subsamples will be combined into a composite sample for all azaleas grown in the control media.

In 1997, soil physical properties will be tested on a subsample of coreopsis, which will have to be harvested to obtain the necessary amount of media. A subsample of coreopsis will also be weighed to most accurately compare their herbaceous growth. A subsample of all plants will be measured for height and width in late spring/early summer of 1997 as a final measurement of the trial.

Observations: The monitoring and collecting of data for this trial has not yet concluded. Once the final data are collected in late spring/early summer of 1997, the data will be analyzed for statistical differences. Observations were taken from nursery professionals at a summer 1996 seminar, and they will be included in the final report. A clear trend from the seminar survey and from observations by all monitoring the trial is that all compost media are outperforming the control mix that has no compost in it.

Regarding costs, the nursery already blends its own media, so using a compost that must be blended does not add additional labor costs. The participants in the trial will try to compare the costs of using a new media to the economic benefits of possible improved growth. The grower's and buyers' willingness to support the environmentally sound practice of composting also factors into the assessment. Some buyers might consider a media from recycled materials as a value-added product worth spending more on.

New Zealand Calf and Heifer Raising Systems Applied to Northeast PA Dairy Farms

Participants: Tioga county dairy farms and J. Craig Williams, extension agent.

Rationale: Calf and heifer raising can be an expensive operation for many PA dairy farms. Many dairy farmers do not like calf feeding due to the high labor required per calf. New Zealand dairy farmers have raised calves outside and on pasture for many years. Can this technique be used on our farms? Our plans are to have four dairy farmers raise groups of calves with a New Zealand type nipple feeder and outside with rotational pasture and calf grain.

Procedures: Presently we had two of the four farms start in the summer of 1996 but both had several delays. The farmers are collecting fence, nipples and laying out the pens for the project. Two of the farms bought their calf feeders or nipples last year. They built their feeders using 5 gallon buckets or 15 gallon white acid cleaner barrels. None of the farmers had their calves outside on grass. The calves did not use the feeder the whole time they were on milk so it was not possible to get an accurate measurement of growth. In the summer of 1997 we are planning to have the calves on grass and on the feeder at the same time.

New Zealand type calf nipple feeders will be used on four farms in 1997 to feed calves in group settings. Each group will have 5-8 calves. Each group will be fed milk with a New Zealand feeder, have the standard calf grain starter available, and access to quality pasture and hay. Each calf will be measured monthly for height and weight gains and recorded on the PSU calf growth chart. Farmer attitude will also be recorded as for positive and negative ideas about this feeding system. All costs will be recorded and evaluated to PA industry standards.

Expectations: Calf raising does not have to be a high labor/calf operation. Pasture can be utilized effectively in a younger age group of dairy heifers. N.Z. calf nipple feeders can be used on PA dairy herds that are not seasonal. Housing calves outside with access to grain, high quality water and pasture can result in excellent average daily gains and be profitable. Lowering the cost and labor of calf raising may result in a positive attitude and a more profitable calf raising operation.

Evaluating Three Low Cost Seeding Methods to Improve Pasture Productivity

Participants: Don Chamberlain Farm, Don Norman Farm, and J. Craig Williams, Tioga County Extension Agent.

Objectives: This project looked at three low cost pasture seeding methods for increasing pasture productivity and related their success on a cost/acre basis: frost seeding, hoof seeding and limited tillage seeding. All three methods can be easily applied to area farms. We wanted to demonstrate the pro's and con's of each seeding method, what the costs/acre are and their effectiveness in increasing pasture productivity. Many farmers ask about seeding their hillside pastures to improve the yield but are not sure about conventional tillage and seeding methods.

Procedures: The Chamberlain and Norman farms had three demo areas consisting of 1/4 acre plots. These plots were within their grazing pasture system. Each area has not had Puna chicory or improved varieties of white clover applied in the past. The pastures consisted primarily of bluegrass and native white clover with some orchardgrass.

Area #1 was frost seeded on March 26, 1996 as a traditional broadcast frost seeding method. Three one-quarter acre plots were seeded to look at different combinations. One was seeded with white clover at 1.25 lb./1/4 acre (5 lb./acre). Another was seeded with chicory at 1 lb./1/4 acre (4 lb./acre). The third plot was seeded with a mix of both at .75 lb. each/1/4 acre for a total of 1.5 lb. (3 lb./acre).

Area #2 was broadcast seeded on April 25, 1996 after frost had left the ground and then the dairy cattle grazed the area. This area evaluated hoof action after broadcast seeding as a seeding method. A one-quarter acre plot was seeded with white clover at 1.25 lb./1/4 acre (5 lb./acre). Another plot was seeded with chicory at 1 lb./14/acre (4 lb./acre). A third plot was seeded with a mix of both at .75 lb. each/1/4 acre for a total of 1.5 lb. (3 lb./acre).

Area #3 consisted of a single quarter-acre plot which was lightly disked and then broadcast seeded on April 25, 1996. The disking opened vertical slits and the early spring timing allowed for plenty of moisture for germination. This area was seeded at 1 lb. white clover per 1/4 acre.

The Southern Cross white clover cost $4.60/lb. and the Good Hunt Forage Feast chicory cost $11.95/lb. Each seeding was done with hand run Seedway seeder. The seeder can be purchased for $30.00

Observation: Each farm hosted a pasture walk where farmers looked at the seeding results. On the Chamberlain farm the clover and chicory could be seen 2 1/2 months after it was sown. These fields had some areas that did not have much grass growing from feeding round bales the winter before. Chicory could be seen in both the March and April seeding areas on June 3. On July 1 the chicory was 7-9 inches tall in the round bale areas where there was no grass pressure. In the areas of the pasture where grass pressure was heavy the chicory was only 1-2 inches tall. The clover established in both areas but identification was

difficult between the natural clover and the new clover in the first year. The new improved clover should produce more feed in the second year. The chicory established quite well in both areas but grew faster in the round bale areas. Also these fields had a slower grazing rotation of 15-25 days that provided enough rest time for the new seedlings to get started.

All fields were grazed in a normal rotation and mowed when needed. By August and September the chicory was still 3-4 inches tall but had roots that were 2 inches in diameter.

On one of the fields that cattle had access to frequently, the chicory could not get established and never grew over 1-2 inches. Come August and September, it was difficult to locate many chicory plants. Some plants were growing in rejected grass clumps. Thus chicory and other new seedings should be given a rest period to help them get established. It is very hard to frost or hoof seed into a continuously grazed pasture.

In the limited tillage fields, a disk made one pass and lightly disturbed the surface. The disks were turned vertically to make open slits and not roll a lot of soil. The limited tillage fields did not have more seedling growth than the frost seeded areas that were seeded a month earlier. This could be since the disk was just opening slits that the seeding had the same grass pressure as regular broadcasting.

Summary: As we look back on this project, the fields will be followed into the 1997 grazing season. The growth and establishment success of these broadcast seedings seem to depend on the grazing pressure and the grass pressure as much as any other factor. Fields with open spaces had clover and chicory establish easily but too frequent grazing could damage these stands. We did not see a big difference in the timing of frost seeding and an early spring hoof seeding. By the July pasture walk both plots had about the same amount of clover and chicory growing.

Now as these fields emerge from the winter of 1996/97, we are going to watch for winter kill and frost heaving. Chicory has a deep tap root that may make it more prone to frost heaving damage. We will know by the end of May, 1997, how well these plants survived.

Soil Aeration of Permanent Pasture using the Aerway ™

Personnel: D.W. Hartman, Agricultural Extension Agent, Greg and Deb Farr, farm owners/operators, Ron Phelps, Pocono Resource Conservation Development

Objectives: Pasture damage from grazing when soil is wet can be a problem, especially on farms with heavy, poorly drained soils. Intensive rotational grazing systems concentrate large numbers of animals on small areas for short periods of time. This can amplify the problem of pasture damage due to grazing on wet soil. The Aerway ™ is a machine designed to aerate soil and presumably improve soil conditions for growing crops. Despite numerous testimonial endorsements concerning the effectiveness of the machine, there is very little available data derived under controlled conditions. This study was an attempt to objectively determine the effectiveness of the machine in improving pasture growth with an early summer aeration.

Procedures: A study was conducted during the 1996 grazing season on a management intensive grazing beef cattle farm in Columbia County, Pennsylvania. Eight, one acre paddocks were set up on a section of permanent pasture consisting of mostly perennial ryegrass and white clover, with smaller populations of orchardgrass, tall fescue and red clover. Soil types were of the Berks and Shelmadine series. The Berks soils are well drained and the Shelmadine soils are poorly drained. Four of the paddocks were on well to moderately well drained soil and the other four were on somewhat poorly to poorly drained soil. Due to unusually wet conditions, haylage was not harvested from the field until June 20, 1996. Alternating paddocks were aerated on June 22, 1996 using the Aerway ™ machine. Pasture regrowth was measured with the Seneca Trail RC & D pasture plate to determine herbage dry matter levels. Except for the first measurement, all sets of measurements were taken four weeks after the last harvest (machine harvest in June and grazing harvests in subsequent months). Total regrowth and rate of regrowth were both evaluated. Grazing harvest was accomplished with a herd of thirty-four cow/calf pairs. Grazing was short duration - one day per paddock. Measurements were taken on July 5 & 16, August 16, September 18 and October 28. Weather conditions during the season were generally wet.

Results and Conclusions: Measurements were averaged to provide yield figures in pounds of dry matter per acre for the aerated and non-aerated paddocks for each measurement date. Results were as follows:

date	aerated (dm/a)	non-aerated (dm/a)	significance
7/5	1595 lbs.	1534 lbs.	N.S.
7/16	2144	1967	Sig. @ 0.02
8/16	2305	2331	N.S.
9/18	1811	1785	N.S.
10/28	1328	1180	Sig. @ 0.20

Rate of pasture regrowth was also evaluated. Results were as follows:

date	aerated (dm/a/day)	non-aerated (dm/a/day)	significance
8/16	87.90 lbs.	87.88 lbs.	N.S.
9/18	69.30	67.08	N.S.
10/28	50.27	44.91	Sig. @ 0.20

The most significant difference was seen on the July 16th measurement. This was four weeks after the aeration. Pasture observation at this time also indicated a larger flush of regrowth on aerated paddocks. The effects seemed to quickly dissipate through the summer. The differences seen on the October measurement were not highly significant. It is doubtful that any benefits from aeration would disappear during the summer and reappear later in the year.

The results of this study indicate there is a short term benefit from aeration of permanent pasture using the Aerway ™. Questions remain regarding timing of aeration (eg., spring vs. summer vs. fall) and the effect of long term use of aeration on a particular field.

Using Hairy Vetch To Improve Soil Tilth

Participants: John Rowehl; York County Extension Agent, Daryl Fricke ; cooperator, Earl Rohrer, P.L Rohrer and Bro.; commercial sponsor

Objectives: Much has been written about the ability of hairy vetch to supply nitrogen to crops when used as a cover crop. Observations by the participating agent suggested that it could have potential to greatly improve the soil quality of the red shale soil located in the northern part of the county. Could this result in the soil being in a condition that would be more suitable for no-till planting? If so perhaps the acreage of no-till crops could be increased and the benefits of soil conservation captured.

Procedures: This project began with a phone call from the cooperator about deep tillage to relieve what he thought might be a compaction problem. The grower had a plan to improve some acreage with some late summer weed control, receive turkey manure, incorporate it and plant a cover crop. A comparison of rye, wheat, oats and hairy vetch was suggested. This was to be done on four parts of a twelve acre field. The agent contacted Earl Rohrer who agreed to supply the hairy vetch seed. The cooperator obtained the other seed. Hairy vetch and oats were seeded on September 27. Corn will be planted in 1997. We intend to measure corn grain yield and possibly do one of the nitrogen tests.

Observations and Conclusions: None to date.

Prepared by John Rowehl, Extension Agent, York County, PA
1-14-97

Subsurface Tillage Comparison

by
Donald C. Fretts
Penn State Cooperative Extension

Participants

Farm Cooperators -	Albert Ferens Fayette County Dunbar, PA	Robert & Lee Hamilton Washington County Claysville, PA
Extension Agent -	Donald C. Fretts Fayette county	
Ag. Business -	Greenline Supply Sonny Herring Uniontown, PA.	Unverferth Mfg. Gary Strader Bedford, PA.

Objectives

Albert Ferens expressed a concern of soil compaction on some of his fields that are managed under a continous no-till system with a corn-soybean rotation. No-till and minimum till are becoming more popular in the area and there is some concern if soil compaction is a problem. In addition there are some farms that produce continous corn silage to support dairy and livestock enterprises.

A plan was developed to work with the two farm cooperators and Unverferth Mfg. to demonstrate the concept of subsurface tillage to reduce hard pan.
The objectives were:
1. Cooperate with Unverferth Mfg, Greenline Supply, Albert Ferens and Bob and Lee Hamilton and establish replications of subsurfaced field plots versus non- subsurfaced field plots.
2. Maintain the plot identity for two or more years.
3. Measure yields from the replicated plots for two or more years and compare the results from the treated and non-treated plots.
4. Publish the results of the tests for the benefit of other farmers who may be concerned about soil compaction.

Procedures

Ferens Farm

The fields used on the Ferens farm are located on the Penn State Fayette Campus. The predominant soils are Westmoreland Channery Silt Loam and Clarksburg-Guernsey Silt Loam. On April 22, 1996, three subsurfaced plots were established using an 4-shank Unverferth Zone-Builder. The plots consisted of approximately 1 - 1 1/2 acres each and were established in corn stubble or soybean residue fields. The depth of the tillage was measured at 16 inches. The existence of some hard pan symptoms was confirmed by using a soil test probe and a spade to dig up the soil profile to visually examine the soil structure. In May, Mr. Ferens planted each field to soybeans or corn with no additional tillage.

The growing season was cool and unusually wet which resulted very little moisture stress on the crops. In addition, the harvest season was unusually wet and corn harvest was delayed until December 11,1996.

As a result of the wet season, time pressures and limited mechanical resources to measure yields, only one corn plot was measured using a truck scale some miles away from the plots.

Hamilton Farm

Procedures for the Hamilton Farm were very similar to the ones used on the Ferens Farm; same date, same depth, same number and size of plots and fields. Differences included the fields were moldboard plowed following the treatments, the fields have been in continous corn silage for more than 20 years, and due to the wetness of the season soils were definitely stressed by machinery traffic during planting, and harvest. This leads to the question of additional compaction because of such traffic. Soils consist of Newark Silt Loams and Dormont Silt Loams.

Due to the inability of measuring yields mechanically, a hand yield check was used to measure silage yields on October 17,1996. Five 1/1000 acre yield samples were extracted from two treated and check plots.

Observations and Conclusions

Ferens Farm

	Acres	Plant Pop./A.	% Moisture	Yield/A
Treated	1.04	24000	23.4	149.26 bu.
Untreated	.829	23750	24.1	116.28 bu.

There was a significant difference, 28%, in favor of the subsurfaced plot.

Hamilton Farm

#1 Treated	5/1000	27500	--	18.9 tons
#1 Untreated	5/1000	25400	--	19.1 tons
#2 Treated	5/1000	28330	--	19.75 tons
#2 Untreated	5/1000	28300	--	20 tons

There was essentially no measurable difference in yield between the treated and untreated plots. However there was a visual difference in height of the corn at tasseling in favor of the treated plots. The concern is that due to mechanical traffic during the season, the hardpan may have been re-established. An attempt to determine this will be made in the spring of 1997.