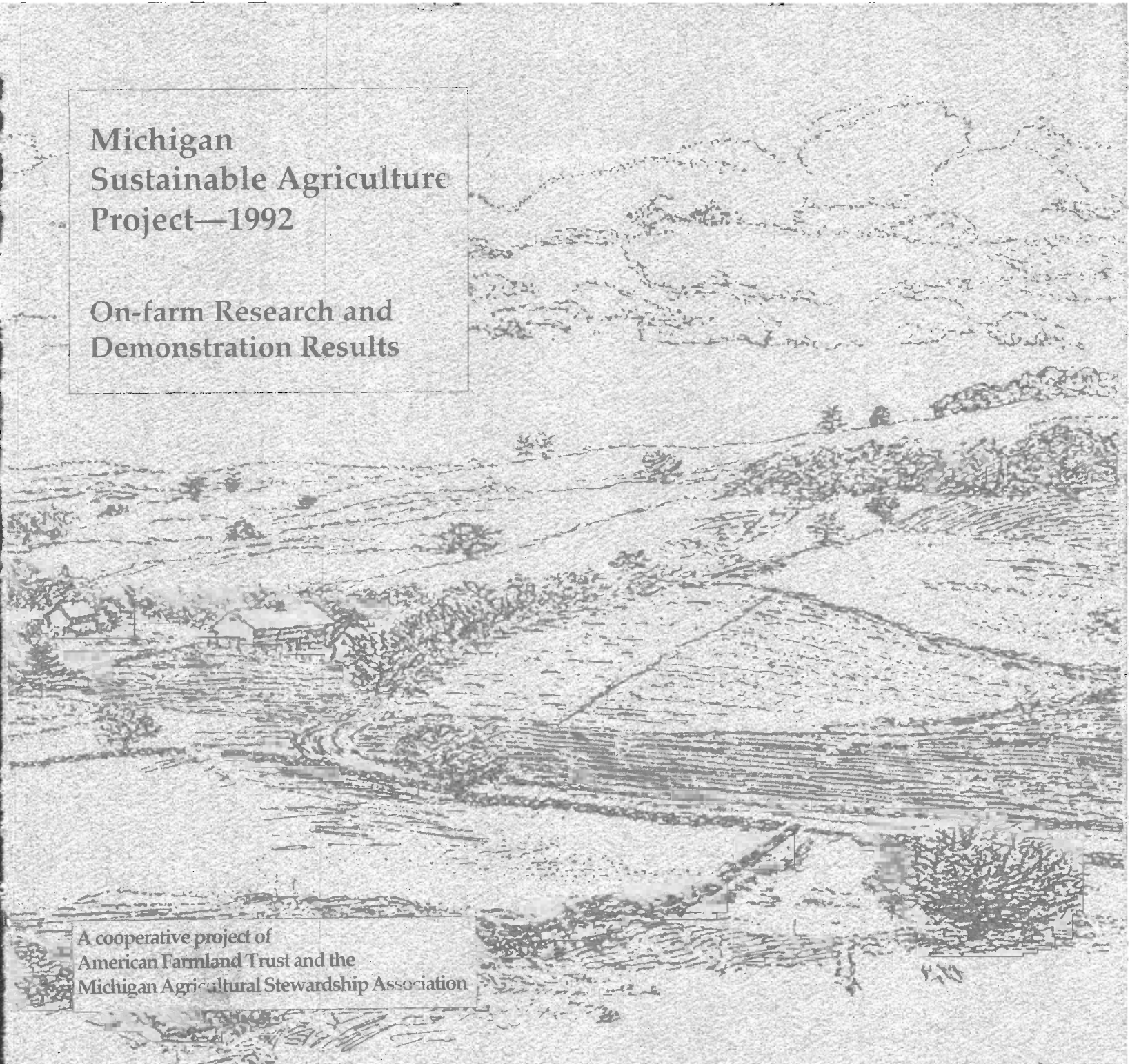
Michigan Sustainable Agriculture Project—1992

On-farm Research and Demonstration Results



A cooperative project of
American Farmland Trust and the
Michigan Agricultural Stewardship Association

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American Farmland Trust
Center for Agriculture in the Environment
P.O. Box 987
DeKalb, IL 60115
815/753-9347 (phone)
815/753-2305 (FAX)

or

American Farmland Trust
National Office
1920 N Street, NW, Suite 400
Washington, D.C. 20036
202/659-5170 (phone)
202/659-8339 (FAX)

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INTRODUCTION

Environmental issues are a major concern for U.S. agricultural producers. All across the country, farmers are taking inventory of their operations in an effort to identify and correct farming practices that have the potential to degrade land and water resources. The desire to farm more responsibly has caused a revolution of sorts in many agricultural communities, with farmers adopting environmentally friendly techniques at an unprecedented rate. This trend toward a renewed environmental responsibility is commonly referred to as sustainable agriculture.

Sustainable agriculture is a term best defined by its component practices. These can be any farming techniques that are practical, profitable and environmentally sound. When used together, sustainable practices form a sustainable farming system, one that is highly integrated, biologically diverse and, above all, flexible.

Farmers who embrace the concept of sustainability believe in stewardship and long-term care of the land. They understand there is a fine line between using the land and abusing it. They are also keenly aware that how they manage the farm today will have a lasting impact on the quality of life for future generations.

In 1991, American Farmland Trust and the Michigan Agricultural Stewardship Association began a cooperative effort to help 15 farmers experiment with and adopt some of the component practices of sustainable agriculture. In its second year, the 1992 Michigan Sustainable Agriculture Project established 25 on-farm research/demonstration sites at locations throughout the state with cooperating producers. These on-farm plots were designed to address farm management problems with an emphasis on reducing impacts to water quality, preventing soil erosion, improving farm profitability and protecting the rural environment.

The information presented in this publication was collected from cooperating producers throughout the year. Its purpose is to give the reader an idea of what sustainable agriculture means when component practices are applied to actual farming operations. Also, it may help producers better understand how the concept can work on many different types of farms.

One final note. Any new practice or farming technique should be applied incrementally. In other words, if something in this publication appears applicable to your farm, don't convert your whole operation overnight. Try it first on a small scale (a couple of acres, or less) before proceeding further. Remember, most of the material in this publication documents what happened on one farm in one given year. Experiment, evaluate and make decisions that are right for your individual operation.

PARTICIPANTS IN THE 1992 SUSTAINABLE AGRICULTURE PROJECT

Antrim County
L.L. "Bud" Coulter
P.O. Box 245
Eastport, MI 49627

Barry County
Tom Guthrie
7301 Milo Rd.
Delton, MI 49046

Paul & Tom Wing
15335 Wing Rd.
Bellevue, MI 49021

Chippewa County
John & Cindy Dutcher
H.C. 55 Box 448
Goetzville, MI 49736

Delta County
Larry Mawby
Box 237
Suttons Bay, MI 49682

Gratiot County
Mark Crumbaugh
5894 S. Crapo Rd.
Ashley, MI 48806

John & Kathy Densmore
5460 Buchanan Rd.
Bellevue, MI 49021

Grand Traverse County
Arnold Elzer
12586 Center Rd.
Traverse City, MI 49684

Ingham County
Bob Fogg
3043 Olds Rd.
Leslie, MI 48847

Phil & Nolan Hall
3298 W. Columbia Rd.
Mason, MI 48854

Ionia County
Wenger Brothers Farm
1380 Marble Rd.
Belding, MI 48809

Isabella County
Bernard Wall
4270 N. Lewis Rd.
Coleman, MI 48618

Jackson County
Rick Benn
8054 Benn Rd.
Parma, MI 49269

Kalamazoo County
Roger French
10004 Stadium Dr.
Kalamazoo, MI 49009

John & Linda Oswalt
15168 S. 37th St.
Vicksburg, MI 49097

Kalkaska County
George Shetler
5436 Tyler Rd.
Kalkaska, MI 49646

Lapeer County
Richard Lauwers
2877 Graham Rd.
Imlay City, MI

Montmorency County
Don Cordes
Hillman, MI 49746

Midland County
Jerry Wirbel
4240 Stark Rd.
Hope, MI 48628

Muskegon County
Gayle McNitt
6890 Moorland Rd.
Ravenna, MI 49451

Oceana County
Greg Mund
6086 120th St.
Rothbury, MI 49452

Shiawassee County
Tom Semans
6627 W. Hibbard
Laingsburg, MI 48848

St. Joseph County
Henry Miller
17613 Fairchild Rd.
Constantine, MI 49042

Dale & Sally Stuby
18558 Centreville-Constantine Rd.
Constantine, MI 49042

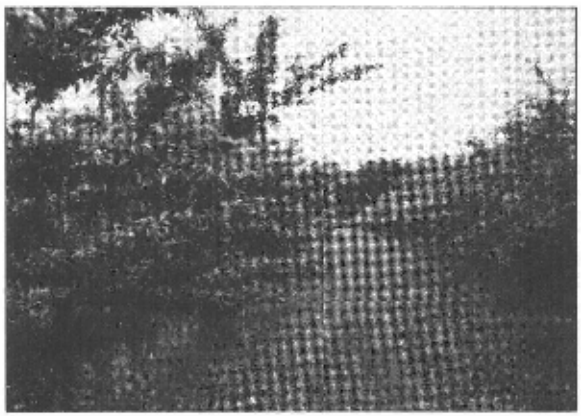
PROJECT RESULTS

LARRY MAWBY
DELTA COUNTY

MATING DISRUPTION OF CODLING MOTH USING PHEROMONES

Larry Mawby is the co-owner and manager of a 300-acre orchard near Garden in Delta County and a vineyard near Suttons Bay in Leelanau County. He grows cherries, apples and grapes for retail and wholesale markets. Larry also produces wine marketed under the L. Mawby label.

Larry is a board member of the Michigan Agricultural Stewardship Association and a member of the Northwest Michigan Organic Growers Association. He is also a board member of the Sleeping Bear Dunes Fresh Fruit Cooperative and serves on the Leelanau County Board of Review.



DEMONSTRATION

A new strategy—mating disruption—is being tested for control of codling moth, a major pest in apple production. Mating disruption is based on the finding that a female codling moth releases a chemical sex attractant that allows the male moth to find her. This chemical attractant is called a pheromone, which, when released, forms a scent trail that gradually diffuses throughout the environment. Placement of enough artificial pheromone into that same environment can prevent male codling moths from locating the female. If the mating of codling moth can be prevented, the risk of damage to fruit by the resulting codling moth larvae is eliminated. A synthetic duplicate of the pheromone encapsulated in a semi-permeable plastic dispenser allows for a long-term controlled release of the pheromone. The dispensers are placed in apple trees during the growing season at the time, height and density prescribed by the producer for effective codling moth control.

In 1991, Dr. James Johnson of Michigan State University began a cooperative project with Larry Mawby using codling moth mating disruption techniques in an eight-acre block of mixed apple varieties. In 1992, another eight-acre block was added to test a different type of pheromone dispenser. Effectiveness of the control methods was determined by monitoring with codling moth pheromone traps and evaluating damage to fruit. Codling moth pheromone traps were placed outside the apple blocks to show that codling moths existed in the study area, and inside the blocks to show that if a male moth can not locate the pheromone trap, then it would also be unable to find a real female moth in the block. Evaluations of codling moth damage to fruit at harvest were made in 1991 and 1992. Data on damage from other apple pests were also taken.

1991

Block A
Crop: Apple, mixed variety
Dispenser: Shin-Etsu, white(200 mg)
Rate: 400 dispensers per acre, at 2m on June 12

Plot: Eight acres treated, maintenance sprays of Lorsban and oil May 13, Nova, Dodine, and Streptomycin on May 27, Sulfur and Dodine on June 11, and Vendex on July 17. Pheromone trap counts were made on a weekly basis. A sample of 25 fruit per tree was taken at harvest on Oct. 4 from a total of 28 trees and examined for insect damage as indicated in the table below.

	CM trap catch (seasonal total)	CM damaged fruit	Leafroller damaged fruit	Plum Curculio damage	Tarnished Plant Bug/ Stink Bugs damage
Mating Disruption	0	5.3%	-	-	-
Outside	11	-	-	-	-

1992

Block A
Crop: Apple, mixed variety
Dispenser: Shin-Etsu, brown(200 mg)
Rate: 400 dispensers per acre, at 2m on June 18

Plot: Eight acres treated, maintenance sprays of Lorsban and Benlate May 18, Dodine and Streptomycin on June 6, Dodine on June 12, and Benlate and Sulfur on June 30. Pheromone trap counts were made on a weekly basis. A sample of 25 fruit per tree was taken at harvest on Oct. 8 from a total of 12 trees (all other trees had fruit drop from late freezes or had been already harvested), and examined for insect damage as indicated in the table below.

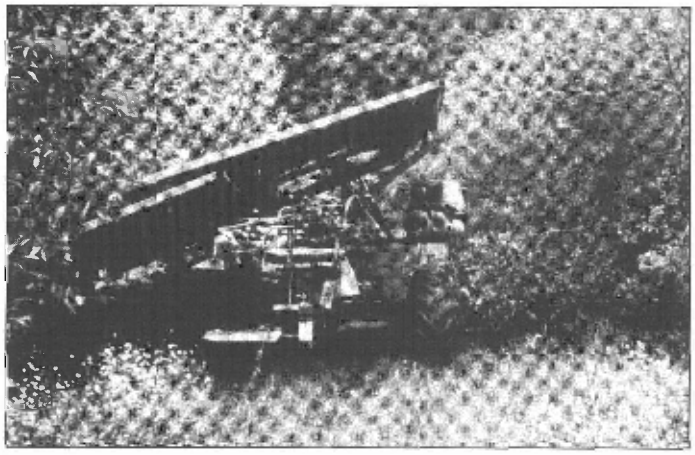
	CM trap catch (seasonal total)	CM damaged fruit	Leafroller damaged fruit	Plum Curculio damage	Tarnished Plant Bug/ Stink Bug damage
Mating Disruption	0	1.0%	-	3.0%	3.0%
Outside	59	-	-	-	-

Block B
Crop: Apple, mixed variety
Dispenser: Shin-Etsu, white(200 mg)
Rate: 400 dispensers per acre, at 2m on June 18

Plot: Eight acres treated, maintenance sprays of Lorsban and oil, and Benlate May 18, Dodine and Streptomycin on June 6, Dodine on June 12, and Benlate and Sulfur on June 30. Pheromone trap counts were made on a weekly basis. A sample of 25 fruit per tree was taken at harvest on Oct. 8 from a total of 24 trees and examined for insect damage as indicated in the table below.

	CM trap catch (seasonal total)	CM damaged fruit	Leafroller damaged fruit	Plum Curculio damage	Tarnished Plant Bug/ Stink Bug damage
Mating Disruption	0	1.0%	-	3.0%	3.0%
Outside	59	-	-	-	-

GREG MUND
OCEANA COUNTY



COMPARISON OF CONVENTIONAL AND "BIOLOGICAL" INSECT CONTROL TREATMENTS IN TART CHERRIES

Greg Mund is an asparagus and fruit grower, as well as the SCS District Conservationist for Muskegon County. He has 30 acres of asparagus and 27 acres of tart cherries, sweet cherries, peaches and plums. He is married and has four children.

Mund is in the second year of a two to three-year alternative program utilizing biological inputs for the production of tart cherries. In 1991, Mund eliminated all insecticide sprays from the fruit treated with these biological products. In 1992, he used the same program and compared it to a conventional pest control program.

PROJECT COMMENTS

"Insect pressure was higher in the biological block. I could have used an insecticide, but was able to do without it. Next year may be a different story.

"This year I started to see the positive influence of the biological fertility program. The fruit and trees were darker in color and there was a better taste to their fruit as well.

"Next year it will all be biological with no fungicides or insecticides unless absolutely necessary as called for by an IPM program.

"I see the biological program as an effective tool for producing crops. The great thing is the reduced impact of and exposure to pesticides. However, there will be a place for some pesticides when things get out of control. It's going to take more time and knowledge to put this system into effect. The future of food production will favor products that reduce harmful inputs to the environment and to the consumer."

PESTICIDE APPLICATIONS ON TART CHERRIES

Conventional Pest Control Program

Date	Type	Application Rate/ac.	$/Unit	Total $
5/8	Copper Sulfate	3#	1.45	4.35
5/16	Captan	4#	2.25	9.00
5/16	Sulphur	10#	.53	5.30
5/22	Sulphur	10#	.53	5.30
5/22	Captan	4#	2.25	9.00
5/22	Bravo	3.6pt	5.50	19.80
6/3	Pro Gibb	2.4oz	1.65	3.96
6/4	Round Up	1.5pt	4.94	7.40
6/6	Sylit	1.5#	8.40	12.60
6/6	Pencap M	1pt	3.50	3.50
6/6	Sulphur	10#	.53	5.30
6/20	Sulphur	10#	.53	5.30
6/20	Captan	4#	2.25	9.00
6/20	Sylit	1.5#	8.40	12.60
6/20	Furdan	3#	3.60	10.80
7/5	Sylit	1.5#	8.40	12.60
7/5	Sulphur	10#	.53	5.30
7/5	Captan	4#	2.25	9.00
7/5	Sevin	2.2#	3.55	7.81
7/9	Ethrel	.5pt	6.19	3.10
7/12	Ethrel	.5pt	6.19	3.10
8/2	Bravo	3pt	5.50	16.50
	TOTAL			**$177.42**

Biological Pest Control Program

Date	Type	Application Rate/ac.	$/Unit	Total $
5/16	Captan	4#	2.25	9.00
5/16	Sulphur	10#	.53	5.30
5/21	H_2O_2	4oz	.086	.34
5/21	Molasses	1qt	1.125	2.25
5/21	Bio Ac	5oz	.69	3.45
5/22	Sulphur	10#	.53	5.30
5/22	Captan	4#	2.25	9.00
5/22	Bravo	3.6pt	5.50	19.80
5/29	Bio Ac	5oz	.69	3.45
5/29	Molasses	1qt	1.125	2.25
5/29	H_2O_2	4oz	.086	.34
6/3	Pro Gibb	2.4oz	1.65	3.96
6/6	Sylit	1.5#	8.40	12.60
6/6	Sulphur	10#	.53	5.30
6/14	Round Up	1.5pt	4.94	7.40
6/18	H_2O_2	3oz	.086	.26
6/18	Sucrose	2#	.82	1.64
6/20	Captan	4#	2.25	9.00
6/20	Sulphur	10#	.53	5.30
6/20	Sylit	1.5#	8.40	12.60
7/4	H_2O_2	2.5oz	.086	.22
7/4	Trans Hume Dark	7oz	.33	2.31
7/4	Sucrose	2#	.82	1.61
7/5	Sylit	1#	8.40	8.40
7/5	Captan	4#	2.25	9.00
7/5	Sulphur	5#	.53	5.30
7/9	Ethrel	.5pt	6.19	3.10
8/3	Bravo	1.5pt	5.50	8.25
	TOTAL			**$156.76**

ARNOLD ELZER
GRAND TRAVERSE COUNTY

COMPARISON OF IPM AND CONVENTIONAL PRACTICES TO REDUCE PESTICIDE APPLICATIONS IN APPLES AND CHERRIES

Arnold and his wife, Betty, own and operate 30 acres of apple and cherry orchards in Grand Traverse County. They also have two acres in vegetable production, and the produce is sold at a local farmers' market. The fruit products are marketed directly to area grocery stores. Arnold is a member of the Michigan Farm Bureau, the Northwest Michigan Horticultural Society and the Grand Traverse Fruit Growers Association.

Arnold became interested in Integrated Pest Management a few years ago and has been learning to put IPM practices to work on his farm since then.

In 1992, a pest scout provided by the Grand Traverse Soil and Water Conservation District was employed to monitor conditions in the orchard. Arnold said a grower must be in the field every day to keep up with changing conditions.

A leaf moisture meter was used in the orchard to record temperature and leaf wetness to help determine the timing and necessity of fungicide applications. Time and temperature must both reach a predetermined threshold before an application is necessary.

When compared to a typical spray schedule, Mr. Elzer eliminated six sprays on his tart cherries in 1992. Figuring material and application costs, a calender schedule costs about $196.50 per acre. Arnold's costs were $78.60 per acre—a $117.90 per-acre savings.

Arnold produced apples with a total spray cost of $213.30 per acre. This compares with a cost of $304 per acre following a spray calender—a $90.70 per-acre savings.

Leaf moisture meters cost between $350 and $1,200 depending on models. Pest scouting fees in the Grand Traverse area are approximately $16 per acre for cherries and $26 per hour for apples. With IPM, scouting fees and meter costs can be recovered on just a few acres. Arnold believes it is very important that growers learn pest scouting themselves. Scouting is of best use when the farm is visited or a regular schedule and weather conditions are factored in.

Yields on the Elzer farm were exceptional in 1992. Tart cherries, which were hurt by cold weather throughout the region, yielded 8,000 pounds per acre. Arnold was very happy with this year's crop.

IPM is becoming a routine management tool on the Elzer farm, and Arnold plans to continue to learn more about the life cycles of pests and how best to control them each season.

PESTICIDES USED IN 1992 TART CHERRY CROP WITH IPM AND SCOUTING

Date	Product & Application Rate	Cost/A
5/14	1 #/A Cyprex	8.00
	5 #/A Sulfur	1.00
6/1	6 oz./A Rubigan	14.00
	5 #/A Sulfur	1.00
6/15	6 oz./A Rubigan	14.00
	1 #/A Cyprex	8.00
	2 #/A Guthion	8.00
7/1	1 #/A Cyprex	8.00
	5 #/A Sulfur	1.00
	Total cost of applications	$63.00
	Labor costs	$15.60
	Total cost	$78.60

Pesticides that would have been used in same tart cherry crop following only the spray calander and not using IPM and scouting

All of the above product costs	78.60
Six additional recommended products	94.50
Labor	23.40
Total cost	$196.50

Pesticide savings per acre by using IPM and scouting in Tart Cherries **$117.90**

PESTICIDES USED IN 1992 APPLE CROP WITH IPM AND SCOUTING

Date	Product & Application Rate	Cost/A
5/13	5 gal./A Dormant Oil	15.00
	2 #/A Manzate	5.00
5/30	8 oz./A Nova	32.00
6/6	5 oz./A Nova	20.00
	1 #/A Cyprex	8.00
	1 #/A Phamadon	10.00
7/5	1 #/A Cyprex	8.00
	3 #/A Imidan	12.00
7/23	3 #/A Captan	8.00
	5 #/A Omite	24.00
8/6	3 #/A Captan	8.00
	3 #/A Omite	12.00
8/12	3 #/A Cyprex	24.00
	Total cost of applications	$186.00
	Labor costs	27.30
	Total cost	$213.30

Pesticides that would have been used in same apple crop following only the spray calander and not using IPM and scouting

All of the above product costs	$213.30
Six additional recommended products	79.50
Labor	11.70
Total	$304.50

Pesticide savings per acre by using IPM and scouting in apples. **$191.20**

L.L. "BUD" COULTER
ANTRIM COUNTY

PLANTING AND PROPAGATION TECHNIQUES FOR CHINESE CHESTNUT TREES

Bud Coulter owns and operates a small farm in Antrim County. Before retirement, he worked as a researcher for a major chemical company.

At one time, the American Chestnut was a predominant forest species throughout much of the eastern United States. Most of the native trees were killed by blight early in this century. Today, only small numbers remain in isolated groves and as single landscape specimens.

Bud's interest in propagating American and Chinese Chestnut trees prompted him to establish a replicated and randomized research plot to examine different practices that can be used to establish seedlings and produce a crop. Chinese Chestnut is blight resistant. It is also an orchard tree and produces larger nuts than does the American Chestnut.

PROJECT DESCRIPTION

Site Size: 1.43 acres

Soil Types: Emmet, Onaway sandy loam

Five different treatments were replicated five times and randomized in a "Latin Square" design. Each of the 25 .06-acre blocks in the square contained five American Chestnut trees planted into a permanent stand 20 feet apart with 25-foot row spacings. All trees were 18 inches tall. The treatments were:

1- Fertilizer, no mulch, trickle irrigation
2- No fertilizer, no mulch, no irrigation
3- Fertilizer, no mulch, no irrigation
4- Fertilizer, mulch, no irrigation
5- No fertilizer, mulch, no irrigation

Plot Diagram

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

All trees were planted into a mixed alfalfa grass stand, with Roundup and Princep applied prior to planting in four foot bands to reduce competition. The alfalfa between the rows was harvested for hay.

Treatments that were mulched received one to two bushels of leaves per tree. Treatments that received fertilizer received one pound 21-0-0 per tree in the spring, and again in the fall.

All trees were grown in 6"x48" plastic tree shelters. Cost of these shelters was approximately $3 per tree.

RESULTS

Because the Chinese Chestnuts do not produce fruit until they are at least four years old, the success rate was measured by the amount of vertical growth in inches. These numbers were also compared to the per-acre costs of establishment for each of the treatments.

Treatment	Tree growth average(inches)	Establishment costs per acre
1- Fertilizer, no mulch & irrigation	56.9	$97.83
2- No fertilizer, no mulch & no irrigation	52.1	$34.85
3- Fertilizer, no mulch & no irrigation	54.7	$70.31
4- Fertilizer, mulch & no irrigation	58.7	$85.61
5- No fertilizer, mulch & no irrigation	56.4	$50.15

Soil temperatures were also taken in the root zones of both mulched and unmulched trees. Temperatures were generally five to six degrees cooler under the mulch in the spring, but remained warmer in the fall when most root growth occurs. Overall, the trees exhibited very good growth in their first year.

BERNARD WALL
ISABELLA COUNTY

INTENSIVE ROTATIONAL GRAZING IN A COW/CALF OPERATION

Bernard Wall and his wife, Delores, farm 40 acres near Coleman and run a small cow/calf operation. Bernard is secretary of the mid-Michigan Chapter of the Organic Growers of Michigan. He and his wife are both 4-H leaders in Midland County.

Bernard generally sells all his calves in the fall as club calves or to farmers who will raise them for breeding stock. In past years, calves were weaned between five and one half and six months and have been averaging 500 to 525 pounds at weaning. 1992 calves were weaned at the same age and averaged 580 pounds.

"We turned a total of 15 head (cow/calf pairs and yearling heifers) out on the test plot on May 18," Bernard said. "It was a 15-acre field of Birdsfoot trefoil and Timothy grass divided into five, three-acre paddocks."

While grazing, Bernard's Simmental cows were given no supplemental grain beyond calving, and the calves were not allowed to creep feed this year. Some years the calves receive grain so they are in good condition at sale time.

"We turned the sire in on June 2, and upon pregnancy checking in the fall, we found the cows had settled early," Bernard said. "We feel this was because of high quality nutritious feed and a good natural healthy environment, giving us a uniform lot of calves in the fall of 1993."

After a first cutting, the hay fields did not regenerate well in '92 due to the cool, dry weather. Since the hay yields would have been minimal, Bernard fenced off the fields and allowed the cows to harvest his second cutting for him. "This saved me a big expense and actually provided a better quality forage," he said.

Paddocks were grazed three times during the growing season. The hay fields were grazed once, and a small rye planting served as late fall feed for the calves. "These plots gave me ample grazing until Sept. 1, at which time I weaned

the calves and turned the cows on other parts of my farm and a parcel of woods that I have access to," he said. "I did not clip these paddocks. We saw no need, as they were grazed quite close with no waste."

Bernard said he really enjoyed pasturing his cows last summer. The weight gain achieved by his calves was above average for the Wall farm. Investment in wire and posts were minimal. Two spools of polywire and about 100 posts were purchased for less than $100. No watering equipment was purchased, with the cows and calves returning to the barnyard for fresh water.

Paddocks yielded an estimated 3.5 tons of hay per acre. Hay fields harvested conventionally yielded only about one-third of the pastured paddocks. This calculation was based on the number of animals pastured and the average daily feed intake of animals on pasture. Actual yield of hay fields included the feed grazed by the animals in place of a second cutting.

Calves were weaned about 60 pounds heavier than in previous years. Wall's calves averaged 85 cents per pound, resulting in about a $51 per-calf increase over typical weaning weights.

"The cattle appeared healthy and content throughout the grazing season, and at the start of winter required less upkeep to maintain a good stable condition throughout the winter," Bernard said.

"Being concerned about our herd's health and productivity, my veterinarian informed me that there was no need for preventative medicine as rotational grazing and non-stressful conditions were the best prevention for them. We did not experience any pink-eye, and weeping was at a very minimum.

"Our goal is to lengthen our grazing season. The cost of maintaining the brood cows during the fall and winter is our biggest expense. We feel we lengthened our season six to eight weeks this year, but we would like more. This was a year of learning, and we feel it was so economically feasible that we would never go back to the old way of pasturing. The only mistake I feel I made was not turning the herd out earlier in the spring!"

JOHN & LINDA OSWALT
KALAMAZOO COUNTY

INTENSIVE ROTATIONAL GRAZING WITH SHEEP

Keeping a close watch on pasture conditions and the amount of forage available, John and Linda Oswalt rotated a large herd of ewes and lambs in and out of an 18-acre paddock near their farmstead. Detailed records were kept throughout the 1992 growing season on animal numbers and the days they grazed in order to estimate the amount of forage harvested.

The Oswalts estimate that the sheep harvested almost 88 tons of feed from the 18-acre pasture during 95 days of grazing from April to the end of October. This equals a per-acre forage yield of 4.88 tons. Based on a conservative feed value of $80 per ton, the pasture produced a gross income of $390.40 per acre. If maintenance and labor costs are subtracted from this amount, net income per acre totalled $347.84.

When the net income derived from 18 acres of rotational pasture ($6,261.12) is compared with John's estimated net return from 18 acres of field corn ($1,359.00), the rotational pasture produced four and one-half times more income for the Oswalts in 1992!

Grazing Periods and estimates of the amount of forage harvested by grazing sheep from 18 acres

April 23 - May 12	
810 lambs & ewes grazed 12 days =	17.60 tons feed
June 14 - June 30	
810 lambs & ewes grazed 16 days =	25.28 tons feed
July 13 - July 30	
120 lambs grazed 17 days =	2.71 tons feed
July 30 - Aug. 10	
664 lambs & ewes grazed 10 days =	15.73 tons feed
Aug. 30 - Sept. 14	
340 lambs & ewes grazed 15 days=	12.74 tons feed
Sept. 14 - Sept. 22	
250 lambs & ewes grazed 7 days =	4.99 tons feed
Oct. 1 - Oct. 12	
90 lambs & ewes grazed 12 days =	3.08 tons feed
Oct. 24 - Oct. 30	
330 lambs & ewes grazed 6 days =	5.64 tons feed
Total estimated tons feed harvested by animals during 95 days of grazing=	**87.77 tons feed**
Estimated average yield per acre =	**4.88 tons feed**

Annual cost per acre for pasture maintenance

100 units of Nitrogen	$ 20.00
Fencing	11.00
1 mowing (for weed control)	6.00
Labor (moving fence and animals)	5.56
Total annual cost/acre	**$ 42.56**

Annual income per acre from pasture

Gross income with an average yield of 4.88 tons per acre of forage

at $70/ton = $341.60
at $80/ton = $390.40
at $90/ton = $439.20

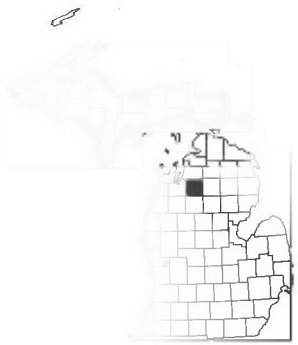
minus annual maintenance costs of $42.56/acre

at $70/ton = $299.04
at $80/ton = $347.84
at $90/ton = $396.64

Comparison of forage and corn production

Gross income per acre for #2 corn (125 bu./ac. x $2.00/bu.)	$250.00
Per acre production cost for #2 corn (inputs and labor)	-$174.50
Net income per acre	**$ 75.50**
Net return on 18 acres of pasture at $80/ton =	**$6,261.12**
Net return on 18 acres of #2 corn at $2.00/bu. =	**$1,359.00**

GEORGE SHETLER
KALKASKA COUNTY



INTENSIVE ROTATIONAL GRAZING IN A DAIRY OPERATION

George Shetler, along with his wife, Sally, and five children, runs a 40-cow dairy operation on approximately 275 acres outside Kalkaska. The farm is split between hay and corn, and all crops are fed on the farm.

George is chairman of the Kalkaska County Soil and Water Conservation District and treasurer of the local school board.

George's Fawn Meadow Farm has been moving toward a more sustainable system of production for the past 10 years. No chemical fertilizer has been applied in that time, and very few herbicides have been used.

PROJECT COMMENTS

1992 was a tough year for Northern Michigan. The Shetler farm saw frost every month. Early summer had little rain, and cold weather resulted in a corn crop that never reached maturity. Pastures grew very slowly, and as a result, pasture ground that had been grazed six times in 1991 was only covered five times in 1992.

The supplemental energy and protein that the herd received in the barn at milking time was pared back to reduce costs. 1992 production reflects these cutbacks. But income over feed costs, when adjusted to a 1991 parity, continued to out-perform 1990's pre-grazing levels. Shetler's milking herd has the genetic potential to produce in excess of 20,000 pounds per year, but the cost of maintaining high production levels has not proven to be profitable in this case.

The Shetler farm is in the process of reducing corn acreage in favor of a more profitable mixed pasture. An experimental six-acre field was planted to Matua grass and clover this year. As of early November, the Matua looked very good, with about 16 inches of growth. This will provide pasture of high quality that is durable and will last later into the season. Matua seed cost was $ 1.95 per pound and was seeded at a rate of 26 pounds per acre. Alsike and Red clovers were included in the seeding at a rate of six pounds per acre resulting in seed costs of $54.54 per acre.

George said that 1992 was a year without summer in Northern Michigan. Although 1992 did not produce the excellent results of the 1991 grazing season, Shetler plans to continue pasturing in 1993.

Electricity Consumption KWH

	1990	1991	1992
MAY	5,540	5,220	4,760
JUNE	5,160	4,510	4,900
JULY	5,210	4,630	4,130
AUGUST	5,340	5,220	4,800
SEPTEMBER	5,360	4,650	4,750
OCTOBER	5,350	5,200	4,900
TOTAL	31,960	29,430	28,240

Milk Production (DHIA Rolling Herd Average)

	1990	1991	1992
MAY			
Milk	18,783	19,035	16,357
Fat%	3.65	3.86	4.00
JUNE			
Milk	19,071	18,414	16,299
Fat%	3.66	3.94	3.80
JULY			
Milk	19,256	17,931	16,348
Fat%	3.66	3.99	3.70
AUGUST			
Milk	19,445	17,710	16,254
Fat%	3.66	4.01	3.80
SEPTEMBER			
Milk	19,725	17,412	15,912
Fat%	3.67	4.02	3.80
OCTOBER			
Milk	19,768	17,262	15,657
Fat%	3.68	4.03	4.00

Supplemental Feed Costs ($/cow/day)*

	1990	1991	1992
Season average	$2.89	$1.93	$1.24

Relative Value of Product ($/cow/day)**

	1990	1991	1992
Season average	$8.72	$8.48	$7.55

Income Over Feed Costs ($/cow/day)

	1990	1991	1992
Season average	$5.83	$6.55	$6.31

* Based on 1991 prices of $ 13.54 milk and 11 cents butterfat differential.

** Based on 1991 feed prices of:

Grain mix	$ 145/ton
Dry hay	50/ton
Corn Silage	25/ton
Haylage	40/ton

JOHN & CINDY DUTCHER
CHIPPEWA COUNTY

USING ANGORA GOATS TO CLEAR BRUSH AND RECLAIM OLD FIELD SITES

John and Cindy Dutcher farm in the Upper Pennisula's Chippewa County. They raise Angora goats and sheep and run a small beef herd. When the farm was purchased in 1981, much of the land had not been cultivated in several years. John and Cindy began to explore possible methods to eliminate Willow and Tag Alder brush that was becoming established in the old pastures. Options consisted of bulldozing with a root rake, killing the brush with brush herbicides or grazing with goats to kill the brush.

In 1991, after comparing expected costs, the Dutchers purchased the necessary fencing supplies to begin intensive grazing in selected paddocks in a pasture that was in decline.

EQUIPMENT

- 4 rolls of 36" electronet
- 1 battery-powered fence charger
- 2-3" ground rods
- Water Pails
- Mineral Salt Blocks

* All equipment was purchased in 1991. This was a one-time cost.

METHODS

Continuing their 1991 project, 21 senior Angora bucks and does (100-150 lbs.) were selected. All animals were wormed, deloused and had their hooves trimmed prior to being turned out into the test area. The goats were transported to the demonstration site in the back of a pick-up. Twenty gallons of water and a mineral salt block were provided in each paddock. Color-coded markers were used as reference points, and each plot was photographed before turning the animals loose.

The field to be cleared was divided into eight paddocks of approximately one-half acre each. Four were designated as controls that would not be grazed. The remaining four were designed as demonstration plots that were to be "goated". The four "goated" plots were divided into four smaller paddocks of approximately .125 acres using electric netting.

RESULTS

Cold, unseasonably dry and wet weather dictated a paddock rotation that began in mid May and ended in mid-September. Each paddock was grazed 117 days during the growing season, with animals remaining in a paddock from two to three days, depending on the cover and palatability of grazing materials.

When first released into a paddock, the goats preferred the young growth from willow and tag alder, goldenrod heads and all new grass and weed shoots. After these were gone, the animals began to push down and girdle the larger brush. This behavior was observed throughout the grazing period, however, activity did slow down significantly near the end of the year, particularly in the last paddock grazed.

Younger brush and less vigorous brush such as Willow was successfully killed in the 1991 season. The larger Alders that had been damaged in 1991 re-leafed this year and were subjected to intensive grazing and defoliation for a consecutive year. This brush is not expected to survive.

As was evident in 1991, clover and grasses that had not been present beneath the brush began to flourish as the pastures opened up. Control paddocks where brush continues to grow unchecked does not exhibit this flush of pasture regrowth. The Dutchers believe that the brush control will be sufficient to allow sheep and cattle to follow the goats, possibly next season.

The 1991 and 1992 seasons revealed that the Angora goats could not only put pressure on the Willows and Alders but could thrive on these plants as feed. Samples of the foliage from Alders were analyzed this year to determine the feed value of this plant. The result of this analysis is listed below.

Analysis of Tag Alder foliage

	% New growth	% Old growth
Moisture	78.3	61.8
Crude Protein	22.5	17.19
(dry matter basis)		
Acid Detergent Fiber	61.4	44.1

High protein and fiber percentages explain the utilization of both bark and leaves of the Alders by the goats.

No differences were noted in fleece weight or overall health between the goats grazed on the brushland and animals of similar size and age grazed on conventional pastures. Mohair prices continued to be somewhat depressed at about $4.65 per pound. The goats continued to produce at expected levels of 6.5 pounds per animal.

COMMENTS

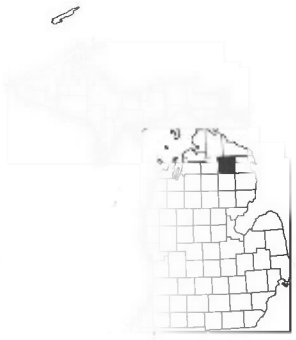
"The goats had to be trained to the electric netting," Cindy said. "They all tried it out, and two became tangled, so it is important to observe them carefully until they are trained. By the end of the first day, they all left the fence alone.

"Local sources indicate that conventional brushland conversion costs run approximatley $75 to $150 per acre. We estimate our costs to be between $50 to $100 per acre. This does not include any return from the sale of goats or mohair.

"We feel that we could reduce our per-acre costs and get better conversion from the animals if we increase the number and size of the animals, and graze each paddock on a shorter schedule with more animal pressure.

"In the spring, we will re-evaluate re-growth in the paddocks to see how effective the goats were at actually killing the larger brush. Some of the better established brushy plants may require more than one season of grazing and browsing before they are killed."

DON CORDES
MONTMORENCY COUNTY



MANURE COMPOSTING ON A COMMERCIAL FARM

Don Cordes and his wife Katherine operate a 50-cow dairy in Montmorency County. In addition to the dairy herd, Don farms more than 300 acres, 250 of which are used for corn, alfalfa and oat production. All crops are fed to the dairy herd.

The Cordes farm has used no chemical fertilizers or pesticides for several years. Don is now trying to incorporate new systems into the operation that will make better use of on-farm resources.

One of these systems is manure composting. Manure that used to be scraped and hauled on a daily basis is now windrowed on a small field adjacent to the barns. These windrows are turned periodically (usually every few days) in an attempt to heat the manure to the high temperatures required for good compost. A special compost turner was purchased for this purpose and has been used for the past several years.

Dairy manure, when properly composted, yields a light crumbly product that looks very much like top soil. The composted manure can be spread on cropland to increase soil tilth and organic content while providing plant nutrients in a stable form.

Don has applied a product that is used as a "starter" to the compost windrows and feels that he has had good luck using these products. Although "starters" are not a required input for making good compost, Don says that heating throughout the windrow is more uniform and occurs more quickly when they are used.

To add organic matter and air space to help dry out manure in the windrows, Don adds straw bedding to the free-stall barn. This is accomplished by spreading straw directly to the barn floor. The alleys are scraped and the straw mixed in the manure. In the future, shredded newsprint may be used instead of straw.

Notes on System

The Cordes 50-cow herd produces about 4,100 pounds of manure per day.

The cost of handling manure in a conventional system is $40.64 per day, or $19.82 per ton. The cost of handling manure in the compost system is $48.67 per day, or $23.74 per ton. Although the cost of handling composted manure is slightly greater, Cordes feels that this cost difference is offset by the reduced amounts they spend on purchased fertilizer inputs.

Dollar values attributed to the manure in the table reflect only the nutrient value of the N, P and K, and places no value on organic matter or biological benefits from the composted manure. Don Cordes feels that the quality of the crops produced on the farm has increased since going to the compost system. Cordes places a great deal of value on the sugar content of the feed produced on this farm. He feels this is reflected in higher production per cow and improved herd health.

COMPARISON OF COMPOSTED AND FRESH MANURE

Manure Quality

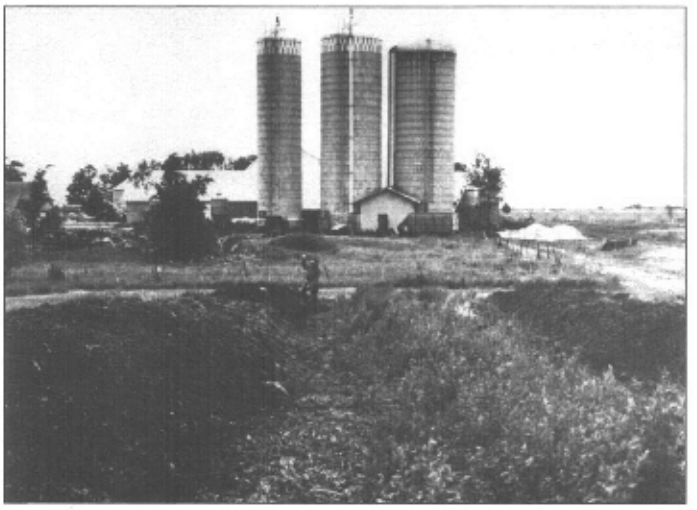
	% Dry Matter		#/ton	
	compost	fresh	compost	fresh
Total N	2.46	2.00	18.3	8.5
Ammon N	.96	.80	7.1	3.4
Organic N	1.50	1.20	11.2	5.1
Phos (P)	.77	.41	5.7	1.7
P_2O_5	1.70	.91	12.7	3.8
Potassium (K)	1.38	1.28	10.3	5.4
K_2O	2.30	2.13	17.1	9.1

Moisture of fresh manure is 78.8%
Moisture of composted manure is 62.8%

On a nutrient basis, the dollar value of the fresh and composted manure can be compared.

Value of Product (100% dry matter)

	Fresh		Composted	
	#/ton	$/ton	#/ton	$/ton
Nitrogen	40.0	8.80	49.20	10.82
P_2O_5	18.2	3.28	34.00	6.12
K_2O	42.6	5.11	46.00	5.52
Total Value		$17.19		$22.64



DALE AND SALLY STUBY
ST. JOSEPH COUNTY

SOIL INSECTICIDE REDUCTION IN SEED CORN

Dale and Sally Stuby farm 770 acres in St. Joseph County. Most of the land is planted to seed corn with the remainder in cash corn, soybeans and wheat. They have a 500-head farrow-to-finish hog operation, and their daughters manage 55 ewes as part of a 4-H project. They use a minimum tillage system.

The Stubys are members of the Michigan Farm Bureau, the St. Joseph County 4-H and FFA. Dale is a county director of the Michigan Pork Producers.

PROJECT COMMENTS

"The root ratings on all plots ended up to be even despite the varying insecticide treatments," said Dale. "This plot was interesting because if you look at the results, it looks like there wasn't a significant difference between the yield results. In fact, the full rate of counter actually ended up yielding less than the 0 rate. In 1992, we went to three-quarter insecticide rates on all our acres based on our 1991 results. We now feel like this is a fairly safe thing to do in seed corn.

"This year's results confirmed our findings," he said. "We have always tried to be good stewards and are concerned about conservation issues. We try to take care of the land. We are also concerned about agriculture's impact on the environment. This county has a documented problem with groundwater contamination. High nitrates have been showing up in wells since the late 1970s. Also, wind erosion is a severe problem in this area. Because of the sandy soils, St. Joseph County is the most susceptible to wind erosion in the state. On average, these soils can lose 4.5 tons per acre per year to wind erosion. A recent study showed that during a single storm event, some fields can lose up to 50 tons per acre! That's unbelievable.

"One of the things we do to prevent this and protect the soil is to use a small grain cover crop that is sowed in either the fall or spring. Because of the weather, this was some of the last seed corn in the area to be planted. Stewart's Wilt was a problem in seed corn in St. Joseph County this year but not in this field. We did have some problems with rust, however. Fungicides were overall ineffective in controlling rust this year. Most fields throughout the state have reported low test weights and high moisture content. Because of early frosts, most of the corn never fully matured, and that affected quality of the final product. In the future, we would like to consider doing some work with our nitrogen rates. It was a weird year!"

SITE INFORMATION

- Normal Rotation: continuous corn
- Previous Crop: seed corn
- Yield Goal for 1992: 40 bu./A female seed
- 1991 Yield: 112 bu./A
- Site Size: Six acres total. Each replication was approximately one acre.
- Soil Types: Spinks Loamy Sand
- Soil Test: pH - 5.8 OM% - 1.3 P - 204 #/A K - 116#/A CEC - 2.6
- Note: Three different rates of soil insecticide were randomized and replicated six times in 400 foot length strips. Border strips were also maintained. Field irrigated through a center pivot system.

MANAGEMENT & INPUTS

Date	Treatment 1	Treatment 2	Treatment 3
Spring '92	Moldboard plow and sow oat cover crop		
5/19	No-till plant seed corn: Pioneer In-bred. Population: 26,100 with 5 gal./A 10-10-10, 3 gal./A liquid starter fertilizer and		
	No soil insecticide	6 #/A Counter	8 #/A Counter
5/21	Broadcast spray pre-emerge herbicides: 1 pt./A Round-up, 1 qt./A AAtrex, 1 qt./A Lasso-Microtech with 20 gal. water		
5/25	Broadcast sprayed 28 #/A 28% N		
6/16	Broadcast sprayed post-emerge herbicides: 1 pt./A AAtrex 4L, and .75 pt./A Buctril		
6/19	Applied 120 #/A Anhydrous Ammonia (98 #/A actual N)		
6/27	Cultivate		
6/29	Band spray post-emerge herbicide: 1 pt./A Prowl		
7/31	Samples pulled for root ratings (average)		
	2.13	2.13	2.1
8/18	Samples pulled for nematode testing		
10/19	Harvest (ear pick) 35.77 bu./A 15.5% moisture	40.08 bu./A 15.5% moisture	33.83 bu./A 15.5% moisture

ECONOMIC RESULTS

Input/acre	Treatment 1	Treatment 2	Treatment 3
Seed	* Provided by seed company.		
Pesticide	22.80	31.92	34.96
Fertilizer	37.47	37.47	37.47
Machinery & labor	69.40	69.40	69.40
Total expenses	$129.67	$138.78	$141.83
Gross income	$90.86	$101.80	$85.92
- Expenses	129.77	138.78	141.83
Net return	[$38.91]	[$36.98]	[$55.91]

HENRY MILLER
ST. JOSEPH COUNTY

SOIL INSECTICIDE REDUCTION IN SEED CORN

Henry Miller has been farming since 1975. Seed corn is his primary crop on 810 acres using a rotation that produces four years of corn and one year of soybeans. Henry also grows navy beans, green beans, edible soybeans and field corn. A soil insecticide is applied to control corn rootworm. Wheat provides a winter cover crop for all the corn ground and is worked down in the spring with a field cultivator.

PROJECT COMMENTS

"Seed corn yields were down 25 to 30-percent due to cool weather and Stewart's Wilt," Henry said. "Wilt was worse where insecticides were not used, possibly due to the poorer control of the flea beetle which serves as a carrier for Stewart's Wilt."

"In a normal year, Stewart's Wilt may not have been a problem, but with cooler weather, the plants were more susceptible."

SITE INFORMATION

- Normal Rotation: 3-4 Corn/1 soybean
- Previous Crop: Seed Corn, wheat cover crop
- Yield Goal for 1992: 50.5 bu./A
- 1991 Yield: 57.91 bu./A
- Site Size: 45 acres total.
- Soil Types: Oshtema, Spinks
- Soil Test: pH - 6.8 OM% - 1.5 P - 75#/A K - 148#/A CEC - 3.8
- Note: Four treatments were replicated six times. Each replication was approximately 1.6 acres.

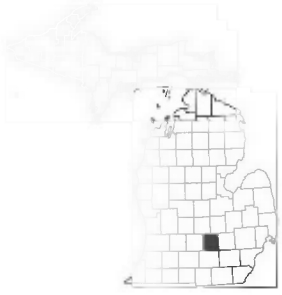
MANAGEMENT &INPUTS

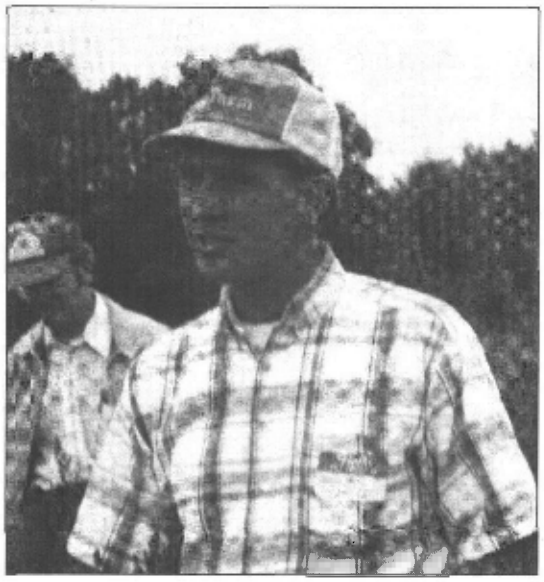
Date	0 rate w/rescue	0 rate (Check)	3/4 rate	Full rate
Fall '91	Chisel and spread wheat cover (1.5 bu./A wheat)			
5/14	Field cultivate/kill cover crop			
5/18	Plant corn: Pioneer In-bred, Population 23,100 with 175 #/A 12-15-4 starter fertilizer (21 #/A actual N) and			
	No soil insecticide	No soil insecticide	6 #/A Counter	8 #/A Counter
5/19	Spray herbicides: 1.2 qt./A Bicep			
6/2	Rotary Hoe			
6/25	Spot spray: 1 pt./A Buctril and .5 qt./A Atrazine			
7/1	Rescue spray: 2 pt./A Lorsban			
7/10	Cultivate and sidedress: 28 gal./A 28% N (84 #/A actual N)			
7/11	Spray herbicides: 1 pt./A Prowl			
7/31	Samples pulled for root ratings (average)			
	2.0	2.2	2.3	2.2
Aug	Detassle			
10/14	Harvest (ear pick) 29.85 bu./A 15.5% moisture	29.94 bu./A 15.5% moisture	33.46 bu./A 15.5% moisture	34.29 bu./A 15.5% moisture

ECONOMIC RESULTS

Input/acre	0 w/Res.	0	3/4	Full
Seed	* Provided by seed company.			
Pesticide	30.03	18.59	28.31	31.55
Fertilizer	24.07	24.07	24.07	24.07
Machinery & labor	61.00	57.20	57.20	57.20
Total expenses	$115.10	$99.86	$109.88	$112.82
Gross income	$75.82	$73.51	$84.99	$87.10
- Expenses	115.10	99.86	109.86	112.82
Net return	[$39.28]	[$26.35]	[$24.89]	[$25.72]

BOB FOGG
INGHAM COUNTY





ROTARY HOE TECHNIQUES FOR WEED CONTROL IN ORGANIC SOYBEANS

Bob and Joann Fogg farm 335 acres in Ingham County. The operation incorporates a 25-cow dairy herd with an organic cash crop system The Foggs grow 50 to 60 acres of corn, soybeans and alfalfa. Small grains and legumes are also grown, and manure is incorporated in rotation with a cover crop.

PROJECT COMMENTS

"During the busiest time of the cropping season on an organic farm, many operations need to be performed at the same time," Bob said. "Rotary hoeing and cultivation are my primary methods of weed control. In this plot, I examined whether it would be possible to make two passes with a rotary hoe, back to back on the same day, instead of making two passes over the usual five to seven-day interval.

"This was not a normal growing season, but there were no noticeable differences between the two treatments. Weed control in both treatments was quite good despite adverse growing conditions. The overall yields were low due to lower seasonal temperatures, not competition with weeds."

SITE INFORMATION

- Normal Rotation: corn, soybeans, small grain
- Previous Crop: corn
- Yield Goal for 1992: 35 bu./A
- 1991 Yield: 100 bu./A
- Site Size: Six acres
- Soil Types: Owasso-Marlette sandy loam, Hillsdale-Ricklles sandy loam
- Soil Test: pH - 6.0 OM% - 2.0 P - 28 #/A K - 64 #/A CEC - 6.3
- Note: Two treatments were replicated six times and randomized throughout the plot.

MANAGEMENT & INPUTS

Date	Treatment 1	Treatment 2
June 1	Moldboard plow	
June 5	Disk field	
June 12	Roller harrow field	
June 13	Plant soybeans in 38" rows, Beeson 80, 60 #/A	
June 20	Rotary hoe	Rotary hoe twice with second pass in opposite direction
June 27	Rotary hoe	
July 5	Cultivate	
July 15	Cultivate	
Dec 29	Harvest (Average of all replications) 23.25 bu./A	25.3 bu./A

ECONOMIC RESULTS

Input/acre	Treatment 1	Treatment 2
Seed	$11.50	$11.50
Pesticide	0.00	0.00
Fertilizer	0.00	0.00
Machinery & labor	68.00	68.00
Total expenses	$79.50	$79.50
Gross income	$139.50	$151.80
- Expenses	79.50	79.50
Net return	$60.00	$72.30

TOM GUTHRIE
BARRY COUNTY

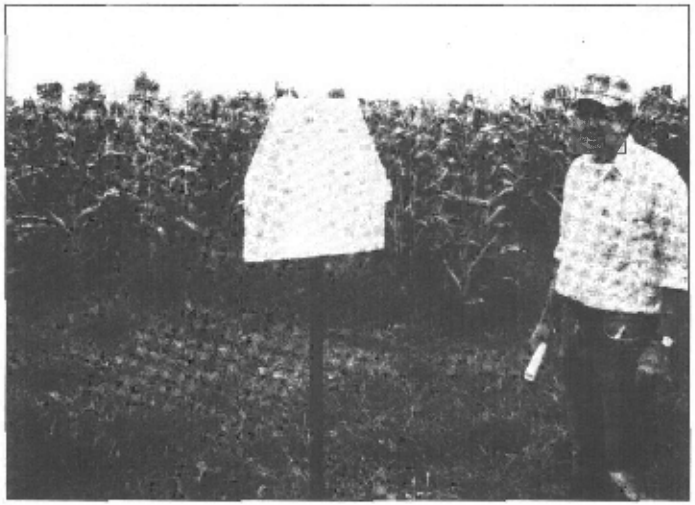
ALTERNATIVE WEED CONTROL IN CORN

Tom Guthrie farms 1,225 acres of cash grain in Delton. He also does custom no-till planting and harvesting in a four-county area. Tom is secretary of the Michigan Agricultural Stewardship Association, a district representative of the Michigan Farm Bureau and has served as a member of the USDA-LISA North Central Region Review Committee.

PROJECT COMMENTS

"This plot was severely affected by the weather," Tom said. "The red wheat I planted this spring as a cover crop was a variety more susceptible to summer diseases. But because of the very cool weather, it never died. Also, the overall weed control in this plot was very poor due to dry, cool weather after application. In all, the weather caused a frustrating year. I think the wheat cover crop had the potential to control weeds, but it just never got to that stage. Some of the wheat never even germinated until very late in the year. My plan was to have it get up early in the season and then die. Early on (in May and June), because of the cold, dry conditions, there really wasn't any difference between the broadcast and banded herbicides. But at that time, there really wasn't any weed competition, or corn growth either. This was one of those years when herbicides just didn't work.

"I would definitely like to go to more herbicide banding. The cost of application makes it worth it. It also makes cultivating a more viable weed control option. Banding should be one-third the cost of broadcast herbicide applications. All around, a very poor year to try this project."



SITE INFORMATION

- Normal Rotation: corn-soybeans-wheat
- Previous Crop: wheat
- Yield Goal for 1992: 100 bu./A
- 1991 Yield: 42 bu./A
- Site Size: 15 acres
- Soil Types: Kalamazoo loam, Oshtemo loam
- Soil Test: pH - 6.3 OM% - N/A P - 80 #/A K - 288 #/A CEC - 7.2

MANAGEMENT & INPUTS

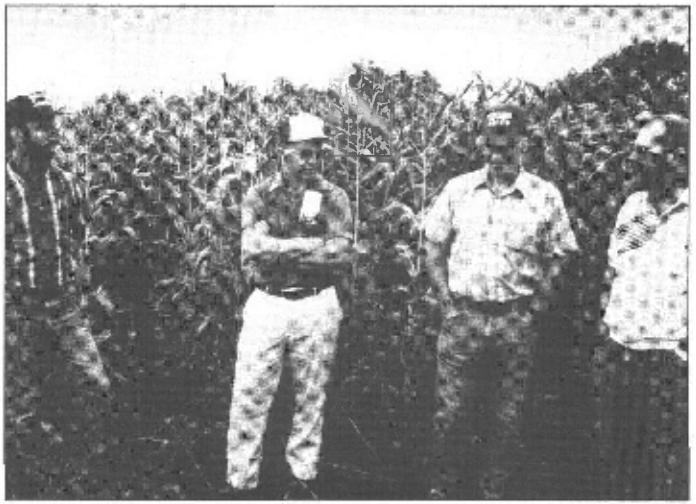
Date	Treatment 1	Treatment 2	Treatment 3
4/1	Broadcast 225 #/A Urea (100 #/A actual N)		
5/7	Applied pre-plant herbicides: 1 pt./A Roundup w/ surfactant		
5/12	Disked wheat stubble		Planted 2 bu./A wheat cover crop
	Planted corn into wheat stubble		Planted corn into newly seeded wheat
	Payco PX711 Pop: 23,600, with 7.5 gal./A 6-18-18 liquid starter fertilizer		
	Banded herbicides behind planter .16 qt./A Atrazine 4L, .33 qt./A Bladex 4L & .33 qt./A Lasso	Broadcast herbicides .5 qt./A Atrazine 4L, 1 qt./A Bladex 4L & 1 qt./A Lasso	No additional herbicides
5/20	Rescue spray: .5 pt./A 2,4-D w/ 1 qt./A crop oil concentrate		
7/23	Rescue spray: .5 pt./A 2,4-D w/ 1 qt./A crop oil concentrate		
12/28	Harvest 66.2 bu./A 15.5% Moisture	74.4 bu./A 15.5% Moisture	68.2 bu./A 15.5% Moisture

ECONOMIC RESULTS

Input/acre	Treatment 1	Treatment 2	Treatment 3
Seed	$18.80	$18.80	$25.80
Pesticide	19.52	10.94	4.95
Fertilizer	39.08	39.08	39.08
Machinery & labor	53.03	53.03	53.03
Total expenses	$130.43	$121.85	$122.86
Gross income	$132.40	$148.80	$136.40
- Expenses	130.43	121.85	122.86
Net return	$1.97	$26.96	$13.54

PAUL & TOM WING
BARRY COUNTY

ALTERNATIVE WEED CONTROL IN CORN



Paul Wing farms about 400 acres of corn for silage, alfalfa and soybeans with his son, Tom. He also has a dairy herd and raises some beef cattle. Paul uses a mix of no-till and conventional till on his land. Paul is married and has five children. He is a member of Farm Bureau and is vice-chairman of the Eaton County Soil Conservation District.

PROJECT COMMENTS

"This was an unusual year," Paul said. "As a dairy farmer, rotary hoeing and cultivating can be very difficult because that is when we are making hay. The weed control in plot number 1 was pretty bad, but this year it didn't look any worse than some of the fields in my area that received a full herbicide rate. Treatment 2 had some weeds in the rows and number 3 had good weed control.

"Banding herbicides and cultivating, with some fine-tuning, looks like it may work for us. The rotary hoe could also play a role if we can get the timing down. The rotary hoe needs to be used before planting to make a difference."

SITE INFORMATION

- Normal Rotation: 2corn-4hay
- Previous Crop: corn
- Yield Goal for 1992: 125
- 1991 Yield: 129
- Site Size: 10.25 acres
- Soil Types: Kalamazoo loam, Oshtemo
- Soil Test: pH - 6.9 OM% - N/A P - 78 #/A K - 184 #/A CEC - 6.0
- Note: Three treatments were replicated and randomized four times in this plot.

MANAGEMENT & INPUTS

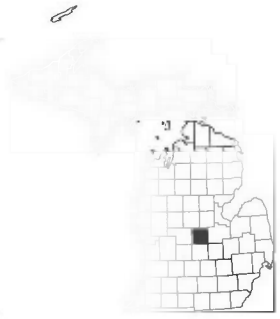
Date	Treatment 1	Treatment 2	Treatment 3
Spring 92	Spread manure		
5/2	Spread potash, 300 #/A 0-0-60		
5/4	Chisel plow and make pass with soil finisher		
5/18	Plant corn: Pioneer 3475 Pop: 22,000 with		
	No herbicides	Banded herbicides .75 #/A Atrazine & .5 qt./A Prowl	Broadcast herbicides 1.5 #/A Atrazine & 1.0 qt./A Prowl
5/27	Rotary hoe		
6/10	Rotary hoe		
6/26	Cultivate		
7/7	Cultivate		
7/9	Inject liquid nitrogen (28%): 112.5 #/A actual N		
12/14	Harvest* 106.3 bu./A 15.5% moisture	110.98 bu./A 15.5% moisture	111.79 bu./A 15.5% moisture

*average of all replications

ECONOMIC RESULTS

Input/acre	Treatment 1	Treatment 2	Treatment 3
Seed	$20.00	$20.00	$20.00
Pesticide	0.00	5.88	11.76
Fertilizer	33.78	33.78	33.78
Machinery & labor	79.60	72.34	63.16
Total expenses	$133.38	$132.00	$128.70
Gross income	$212.60	$221.96	$223.58
- Expenses	133.38	132.00	128.70
Net return	$79.22	$89.96	$94.88

MARK CRUMBAUGH
GRATIOT COUNTY



ALTERNATIVE WEED CONTROL IN DRY BEANS USING COVER CROPS

Mark Crumbaugh and his wife, Dawn, farm 475 acres near Ashley. Mark grows corn, soybeans, dry beans, wheat and alfalfa. He serves as a director for the Gratiot Soil Conservation District. In addition to his own operation, Mark helps with his father's farm, bringing the total acreage to about 1,500.

An advocate of no-till, Mark was interested in the performance of dry beans planted in corn stubble compared to dry beans planted in a rye cover. A rye cover crop seeded in the fall helps prevent wind erosion and should help with weed control the following year. Costs associated with establishing a rye cover are about $9.70 per acre.

PROJECT COMMENTS

The herbicide treatment, a single application of Round-up, was the same for both fields. The beans in the rye cover experienced less competition from weeds and generally looked better.

Fertilizer was a foliar application of Liquid 28%. This was applied at a rate of 10 gallons per acre. Sixty gallons of water were used to deliver the fertilizer which was applied in a gentle rain to reduce the possibility of burning the leaves.

1992 was a disastrous year for dry-bean production in Michigan. Freezes in June and September resulted in a setback early in the season, with the crop never reaching maturity. No crop was harvested in this demonstration.

SITE INFORMATION

- Normal Rotation: corn-soybeans-wheat
- Previous Crop: corn
- Yield Goal for 1992: 100 #/A
- 1991 Yield: 140 bu./A
- Site Size: Four acres
- Soil Types: Lenawee clay loam
- Soil Test: pH - 6.8 OM% - 2% P - 88 #/A K - 314 #/A CEC - 12.4

MANAGEMENT & INPUTS

Date	Treatment 1	Treatment 2
Fall '91	Plant rye cover crop	No cover crop established
6/1	Spray burndown herbicides 1 qt./A Roundup (treatments 1 & 2)	
6/8	No-till drill beans, 70 #/A dry beans	
7/8	Foliar applied 10 gal./A 28% N (30 #/A actual N)	
Sept.	Frost. Crop killed before reaching maturity.	

ECONOMIC RESULTS

Input/acre	Treatment 1	Treatment 2
Seed	$40.60	$40.60
Pesticide	19.98	19.98
Fertilizer	5.85	5.85
Machinery & labor	30.08	20.38
Total expenses	$96.51	$86.81
Gross income	0	0

GAYLE MCNITT
MUSKEGON COUNTY

FOLIAR APPLIED FERTILIZER IN CORN

Gayle McNitt and his wife, Marilyn, farm 500 acres near Ravenna. Marilyn serves as a Director on the Muskegon Soil Conservation District Board.

Gayle hoped to determine the cost effectiveness of an additional foliar application of 10-20-10 when the plants are about 18 inches tall. 1992 turned out to be a tough year for corn in Muskegon County. Three frosts were recorded in June after the corn had emerged.

PROJECT COMMENTS

The two plots received a slightly different application of Liquid 28% early in the season. The plot that received the higher rate appeared to look better. A look at plant root mass confirmed that the plants with the higher N rate were more vigorous.

A tissue analysis was done on plants from each plot about mid-August. No significant difference in the plant tissue was found.

The entire plot was covered with municipal sludge in the fall of 1991. This sludge contributed the following:

Nitrogen	136# per acre
Phosphorus	30# per acre
Potassium	4# per acre
Calcium	594# per acre

The most significant factor affecting yield was the unusually cold summer and the resulting frost damage. The plot with the additional foliar fertilizer application outperformed the other plot by about six bushels per acre. Both plots yielded poorly at 64 bushels for the lower fertilizer rate and 69 bushels for the plot that received the additional fertilizer. The increased yield did not cover the additional cost of the foliar applied product.

SITE INFORMATION

- Normal Rotation: continuous corn
- Previous Crop: corn
- Yield Goal for 1992: 145 bu./A
- 1991 Yield: 96 bu./A
- Site Size: 20 acres
- Soil Types: Nester-Ubly sandy loam, Sims loam
- Soil Test: pH - 7.7 OM% - 2.1 P - 62 #/A K - 78 #/A CEC - 10.6
- Note: This was a side by side comparison contrasting two, 10 acre plots. These fields received sludge applications in 1991.

MANAGEMENT & INPUTS

Date	Treatment 1	Treatment 2
5/1	Tillage pass with Soil Saver	
5/15	Plant corn with no-till planter: Hybrid: Amcorn 7450 Pop: 25,000 with .10 gal./A Micro-nutrients, & 7 gal./A 3-18-18 liquid starter fertilizer	
5/20	Spray herbicides: 1 qt./A Marksman, 1.2 qt./A Bicep, & 1 pt./A Crop Oil, and 8 gal./A 28% N	
7/2	Cultivate and side-dress N	
	8 gal./A 28% N	12 gal./A 28% N
7/15	Apply foliar fertilizer: 2.5 gal./A 10-20-10	
10/28	Harvest 68.82 bu./A 15.5% Moisture	 63.9 bu./A 15.5% Moisture

ECONOMIC RESULTS

Input/acre	Treatment 1	Treatment 2
Seed	$9.38	$9.38
Pesticide	14.50	14.50
Fertilizer	51.81	42.90
Machinery & labor	52.23	48.44
Total expenses	$127.92	$115.22
Gross income	$141.08	$131.00
- Expenses	127.92	115.22
Net return	$13.16	$15.78

PHIL HALL
INGHAM COUNTY

REDUCTION OF STARTER FERTILIZER IN CORN

Phil Hall, and his brother, Nolan, farm approximately 800 acres of mixed crops in Ingham County. They also have a dairy operation that provides manure resources. In 1992, the Halls began their project to see how starter fertilizers perform on ground with high phosphate levels.

PROJECT COMMENTS

"This year there was very little advantage yield-wise for using starter fertilizer," Phil said. "Being as cool and wet as it was, we expected that the difference might be more. From an economic standpoint, the starter did not really pay enough for us to offset our labor costs for handling it."

SITE INFORMATION

- Normal Rotation: 2corn-soybeans-wheat
- Previous Crop: corn
- Yield Goal for 1992: 120 bu./A
- 1991 Yield: 150 bu./A
- Site Size: 36.5 A
- Soil Types: Marlette fine sandy loam, Capac loam, Colwood-Brookston loam
- Soil Test: pH - 6.5-6.9 OM% - 2.3-7.2 P - 187-394 #/A K - 402-644 #/A CEC - 11.11-25.27
- Note: Field was heavily manured with both solid and liquid dairy manure. Two different starter fertilizer rates were replicated six times in alternating strips six rows wide x 1,900 ft. long.

MANAGEMENT & INPUTS

Date	Treatment 1	Treatment 2
3/16	Spread 12 ton/A solid dairy manure. Analysis= 31.2 #/A N, 44.4 #/A P_2O_5, 228 #/A K_2O	
4/29	Spread 1,744 gal./A liquid dairy manure. Analysis= 7 #/A N, 14.5 #/A P_2O_5, 35 #/A K_2O	
5/9	Chisel plow and apply 90 #/A Anhydrous Ammonia, (73.8 #/A actual N)	
5/11	Plant corn: Hybrid: DeKalb 524, Pop: 24,200 with	
	100 #/A 9-44-9 starter fertilizer	No starter used
5/19	Broadcast herbicides: 1 qt./A Dual, 1 qt./A Bladex and 1 qt./A Atrazine 4L	
6/9	Cultivate	
11/11	Harvest 143.9 bu./A 15.5% Moisture	 136.7 bu./A 15.5% Moisture

ECONOMIC RESULTS

Input/acre	Treatment 1	Treatment 2
Seed	$19.62	$19.62
Pesticide	22.54	22.54
Fertilizer	19.46	10.13
Machinery & labor	121.17	118.16
Total expenses	$182.79	$170.45
Gross income	$287.80	$273.40
- Expenses	182.79	170.45
Net return	$105.01	$102.95

TOM SEMANS
SHIAWASSEE COUNTY

REDUCTION OF STARTER FERTILIZER IN CORN

Tom Semans and his wife, Barbara, farm about 1,100 acres near Lainsburg. The farm supports a 100-cow dairy herd in addition to a cash-crop operation. Tom serves as secretary of the Shiawassee County Soil Conservation District. He is also president of the Michigan Milk Producers Association local.

PROJECT COMMENTS

Tom's project this year consisted of an evaluation of starter fertilizer in a no-till corn plot. The yield of the two plots was nearly identical, which resulted in a slightly higher return per acre for the plot that received no starter.

It is Tom's belief that this field would have benefited from chisel plowing to allow the soil to warm up. The season was unusually cold, and the farm's lighter, coarse textured soils yielded better than the heavier soils.

The anhydrous ammonia application in mid-June helped get the slow growing season started. The corn never dried down and had a low test weight at harvest time.

SITE INFORMATION

- Normal Rotation: 3hay-wheat-corn soybeans
- Previous Crop: corn
- Yield Goal for 1992: 145 bu./A
- 1991 Yield: 145 bu./A
- Site Size: 20 acres
- Soil Types: Conover loam
- Soil Test: pH - 6.7 OM% - 3.9% P - 313 #\A K - 670 #\A CEC - 11.17
- Note: This plot compared two treatments in four alternating side-by-side strips.

MANAGEMENT & INPUTS

Date	Starter fertilizer	No starter
Oct'91	Sprayed 2#/A Simazine	
Dec'91	Spread 4500 gal./A liquid dairy manure	
5/14/92	Planted no-till corn: Northrup King 5897 Pop: 26,000 with	
	60 #/A 18-46-0 starter fertilizer	No starter fertilizer
5/14	Sprayed pre-emerge herbicides: 1.5 pt./A 2,4-D & 2.5 #/A Extrazine	
6\15	Side-dress Anhydrous Ammonia (NH_3) (75 #/A actual N)	
12/21	Harvest 95 bu./A 15.5% Moisture	 94.3 bu./A 15.5% Moisture

ECONOMIC RESULTS

Input/acre	Starter	No starter
Seed	$22.75	$22.75
Pesticide	19.08	19.08
Fertilizer	15.71	8.93
Machinery & labor	57.30	57.30
Total expenses	$114.84	$108.06
Gross income	$190.00	$188.60
- Expenses	114.84	108.06
Net return	$75.16	$80.54

WENGER BROTHERS FARM
IONIA COUNTY

NITROGEN RATE AND SOURCE COMPARISONS IN RIDGE-TILL CORN

Tom, Ron and Larry Wenger farm 500 acres in Ionia County. The three brothers, along with their wives and children, have farmed in partnership since 1977. In addition to corn, hay, small grains and soybeans, they also have about 120 sows, feed pigs and finish about 100 head of beef. A brood cow herd is also kept.

PROJECT COMMENTS

The farm began a ridge-till system a few years ago. In addition to building ridges, the brothers were interested in reducing the volume of herbicides used and utilizing the liquid manure from the hog operation in a better fashion.

Part of this demonstration was to reduce the amount of nitrogen applied to the corn crop while maintaining yields. A special manifold was built to apply liquid manure to standing corn. The manifold directs manure between the rows which is then cultivated in. About 6,000 gallons of the manure was side-dressed per acre, and no other N source was applied to this plot.

A second plot received 68 pounds of N as liquid 28% and no manure. A third plot received 130 pounds of N as liquid 28%.

Herbicide treatment was a band of Bladex and Atrazine over the row. This banding allowed only 25-percent of each acre to be treated with herbicides. All plots received the same herbicide treatment. All the corn was cultivated two times.

"Yields were very low due to cold, wet weather. The corn grew very slowly. There were also some weed problems this year," Tom said.

"Side-dressing manure appears to be a feasible system for utilizing nutrients while maintaining yields for high economic returns."

The liquid manure was analyzed for quality. The results are listed below.

Liquid Manure Analysis

	lbs./1000 gal.	lbs./ton
Total N	41.0	9.9
Ammonia N	29.5	7.1
Phos.(P)	11.8	2.8
P_2O_5	26.0	6.3
Potassium (K)	41.6	10.0
K_20	69.3	16.7

Using this analysis, the manure supplied 177 pounds of N per acre. (According to MSU Extension Bulletin WQ12, Organic Nitrogen is not readily available for plant use.)

Ron Wenger

SITE INFORMATION

- Normal Rotation: continuous corn
- Previous Crop: corn
- Yield Goal for 1992: 135 bu./A
- 1991 Yield: 135 bu./A
- Site Size: 15 acres
- Soil Types: Clay loam
- Soil Test: pH - 6.6 OM% - N/A P - 95 #/A K - 221 #/A CEC - 5.2
- Note: This plot replicated and randomized three fertilizer treatments six times.

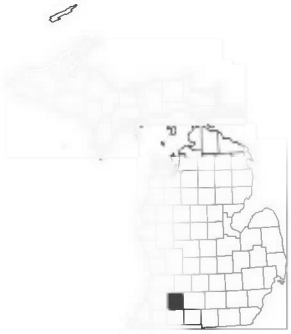
MANAGEMENT & INPUTS

Date	High N Rate	Low N Rate	Manure only
5/18	Plant corn on ridges, band herbicides and apply nitrogen Crows SL-35 Pop: 26,000 with 1 #/A Bladex and 1 #/A Atrazine and		
	130 #/A 28% N	68 #/A 28% N	No nitrogen
6/12	Cultivate		Cultivate and side-dress manure (6000 gal.\A)
7/10	Cultivate		
12/20	Harvest 55 bu./A 15.5% Moisture	40 bu./A 15.5% Moisture	55 bu./A 15.5% Moisture

ECONOMIC RESULTS

Input/acre	High N	Low N	Manure
Seed	$24.05	$24.05	24.05
Pesticide	6.55	6.55	6.55
Fertilizer	7.60	3.98	0.00
Machinery & labor	41.73	41.73	50.33
Total expenses	$79.93	$76.31	$80.93
Gross income	$110.00	$80.00	$102.00
- Expenses	79.93	76.31	80.93
Net return	$30.07	$3.69	$21.07

ROGER FRENCH
KALAMAZOO COUNTY



NITROGEN RATE COMPARISONS IN CORN FOLLOWING SOYBEANS

Roger French, in partnership with his father, runs Dawnera Farms, an 1,100-acre dairy and cash grain operation west of Kalamazoo. Roger is on the board of directors for the Michigan Agricultural Stewardship Association and a member of the Kalamazoo County Farm Bureau. He farms using a biological input program with a modified ridge-till system.

PROJECT COMMENTS

"By the end of April, the ground was saturated, but we didn't receive any more rain until the end of May," Roger said. "This, along with cold conditions, gave a very poor start to this year's plot. Weather caused spotty emergence and poor early growth. Overall, the weather created very stressful conditions for plants throughout the growing season.

"We feel like the plot once again proved that 60 to 90 pounds per acre of N is the optimum application for this farm. The decrease in yield at the 120 pounds per acre rate may show that too much N can have a detrimental effect under a biological management system like ours. Nitrogen management will continue to be a critical factor for us in the future."

SITE INFORMATION

- Normal Rotation: 2 corn/wheat, hay or soybeans
- Previous Crop: soybeans
- Yield Goal for 1992: 100 bu./A
- 1991 Yield: 50 bu./A
- Site Size: 3.67 acres total.
- Soil Types: Spinks loamy sand
- Soil Test: pH - 6.4 OM% - 1.0 P - 257 #/A K - 109 #/A CEC - 3.0
- Note: Four different rates of nitrogen were randomized and replicated four times in 6 row x 445 ft.length strips.

MANAGEMENT & INPUTS

Date	Treatment 1	Treatment 2	Treatment 3	Treatment 4
Fall 91	Light tillage with Aerway tool and fall application of biologicals. 1 gal./A humic acid Bio-Hume, 1 gal./A Bio-Carb (liquid carbon),and 1 gal./A Thiosol (12-0-0-26 sulfur, 1.3 #/A actual N)			
5/13	Plant corn: Hybrid: Pioneer 3527 Pop: 21,000 Sprayed 12" band of liquid fertilizer, biologicals & herbicides 3.5 gal./A 28% N, 4.0 gal./A Bio-C, & .5 gal./A Bio-Carb (10.4#/A actual N) with 20 oz./A Lariat Side-dress 2"x3" 4.5 gal./A 28% N, 4.0 gal./A 8-28-5, .5 gal./A Bio-Mix, 8 oz./A Manganese, 8 oz./A Boron & 8 oz./A Copper (13.5 #/A actual N) Side-dress 3"x5" 15 gal./A Solu-Cal (1-0-0-4 calcium, 1.5 #/A actual N)			
5/23	Rotary Hoe			
5/30	Rotary Hoe			
6/19	Cultivate			
6/26	Cultivate, build ridges and side-dress with 2 gal./A Thio-Sul, 1 gal./A Bio-Phos (12-26-0), 3 gal./A Bio-K (0-0-5), 4 gal./A Bio-C (total actual N = 2.6 #/A) &			
	No additional N (0 #/A N)	10 gal./A 28% N (30 #/A N)	20 gal./A 28% N (60 #/A N)	30 gal./A 28%N (90 #/A N)
11/30	Harvest 77.31 bu./A @ 30 #/A total N	82.77 bu./A @ 60 #/A total N	92.07 bu./A @ 90 #/A total N	88.18 bu./A @ 120 #/A total N

ECONOMIC RESULTS

Input/acre	1	2	3	4
Seed	$18.37	$18.37	$18.37	$18.37
Pesticide	2.54	2.54	2.54	2.54
Fertilizer	44.50	50.00	55.50	61.00
Machinery & labor	60.62	60.62	60.62	60.62
Total expenses	$126.03	$131.53	$137.03	$142.53
Gross income	$154.60	$165.60	$184.20	$176.40
- Expenses	126.03	131.53	137.03	142.53
Net return	$28.57	$34.07	$47.17	$33.87

JOHN & KATHY DENSMORE
GRATIOT COUNTY

POULTRY MANURE AS A NITROGEN SOURCE

John Densmore and his wife, Kathy, farm 825 acres near Ithaca. John serves as a director for the Gratiot County Soil Conservation District. The crop rotation includes soybeans, corn, dry beans and wheat for seed. John cleans and bags seed on the farm for cash sales.

PROJECT COMMENTS

John had access to a supply of poultry manure from a brother who farms nearby. Interested in determining what source of nitrogen would most efficiently supply needed N for corn production, John set up this demonstration to test the possibilities.

Four different combinations were used. Anhydrous ammonia (NH_3) with manure, NH_3 only, no additional applications, and manure only. All plots received 200 pounds of starter at planting. Plots were given identical herbicide treatments and planted no-till.

The farm has good sandy loam soils and can get yields of 150 bushels per acre consistently (weather permitting). This year was cold throughout most of the season and yields reflect this fact.

Highest net return was the field receiving only poultry manure. Although the plots receiving both NH_3 and manure yielded best, production costs offset the better yields.

SITE INFORMATION

- Normal Rotation: corn-soybeans
- Previous Crop: soybeans
- Yield Goal for 1992: 150 bu./A
- 1991 Yield: 40 bu./A
- Site Size: 30 acres
- Soil Test: N/A

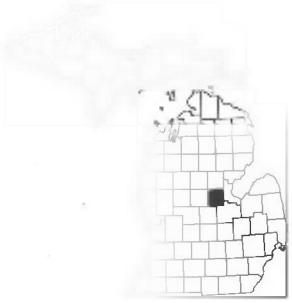
MANAGEMENT & INPUTS

Date	Manure only	NH_3 and manure	NH_3 no manure	No NH_3 no manure
1/15	Spread manure 2,500 gal./A liquid poultry manure			
4/1		Spread manure 2,500 gal./A liquid poultry manure		
5/1	Spot spray burndown herbicides, .5 qt./A Roundup			
5/7	Plant no-till corn: Pioneer 3733 Pop: 26,500 with 200 #/A 15-40-0 starter fertilizer			
5/9	Spray pre-emerge herbicides 1 #/A Princep, 1 #/A Bladex and .5 pt./A 2,4-D			
6/20		Side-dress 120 #/A Anyhydrous Ammonia (NH_3) (98 #/A actual N)		
12/20	Harvest 123.5 bu./A 15.5% moisture	128.5 bu./A 15.5% moisture	114.5 bu./A 15.5% moisture	77 bu./A 15.5% moisture

ECONOMIC RESULTS

Input/acre	1	2	3	4
Seed	$22.52	$22.52	$22.52	$22.52
Pesticide	18.28	18.28	18.28	18.28
Fertilizer	22.50	36.78	36.78	22.50
Machinery & labor	46.97	53.40	44.80	38.37
Total expenses	$110.27	$130.98	$122.38	$101.67
Gross income	$247.00	$257.00	$229.00	$154.00
- Expenses	110.27	130.98	122.38	101.67
Net return	$136.73	$126.02	$106.62	$52.33

JERRY WIRBEL
MIDLAND COUNTY



COMPARISON OF NO-TILL AND CONVENTIONAL SUGAR BEETS

Jerry Wirbel and his wife, Pearl, farm about 1,000 acres consisting of corn, dry beans, sugar beets and wheat near Hope.

1992 was a difficult year for Michigan agriculture. A dry, warm spring left the appearance of a bumper year, but cold weather arrived in early summer and remained throughout the growing season. This year, Jerry experimented with his dry beans, sugar beets and corn crops.

Dry Beans

In 1991, Jerry had good results from his experiment with no-till dry beans and expected a repeat performance in 1992. It did not happen. The beans were drilled in early June. By June 21, they had emerged through the heavy trash covering the field in time to receive a killing frost for two nights. "The residue in the field seemed to insulate the field," Jerry explained. "Heat from the soil couldn't escape to keep the plants from frost damage." The result was a disaster.

The crop was replanted in late June. The late planting date resulted in an immature crop going into early fall. A September freeze killed the beans. The crop was a complete loss. Total costs exceeded $160 per acre, but Jerry is not ready to give up on no-till beans just yet. "It was an unusual year, but I think that in the long run no-till dry beans will yield better, reduce input costs, and conserve soil and water." he said. Jerry is prepared to try again next year.

Corn

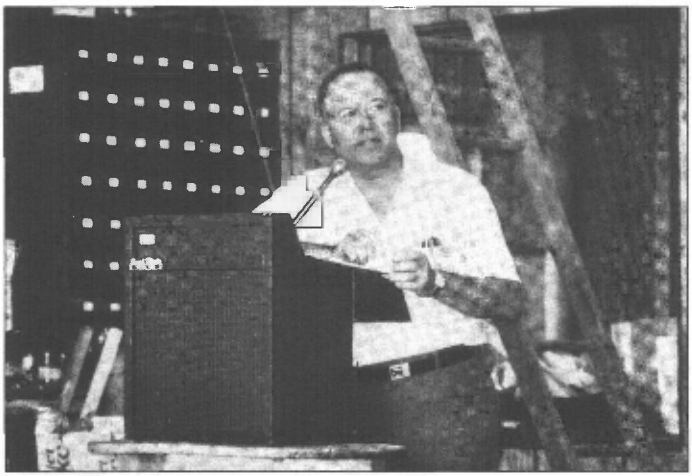
The no-till corn crop at Wirbel Farms averaged 100 bushels per acre, which was about the average yield for the area. The crop received 200 pounds of 0-0-60 in the fall of 1991, 160 pounds per acre anhydrous ammonia and 15 gallons 10-34-0 at planting. The corn ground was field cultivated one time in the fall to incorporate the potash.

Sugar Beets

No-till sugar beets at the Wirbel Farm had good yields this year. Average yield in the area was slightly less than 14 tons per acre while Jerry's beets produced 17 tons per acre overall with some acreage going as high as 21.5 tons.

One five-acre plot on the farm has not been tilled since spring of 1990. This acreage yielded better than average at 18.5 tons per acre. The best yields on the farm were on acreage that had minimal tillage in the fall of 1991. This ground experienced the highest percent seed germination and as a result, was the highest producing at 21.5 tons per acre.

Jerry stated that a light pass with a field cultivator after sugar beets may be the best way to prepare for the following year's corn crop. Conditions when harvesting beets are often wet, and there is a need to scratch out the wheel and harvester tracks before planting corn.



SITE INFORMATION

- Normal Rotation: sugar beets, corn, dry beans
- Previous Crop: dry beans
- Yield Goal for 1992:
- 1991 Yield:
- Site Size: 30 acres.
- Soil Types: Lenawee silty clay loam
- Soil Test: pH - 7.85 OM% - 4.2 P - 82 #/A K - 276 #/A CEC - 26.98

MANAGEMENT & INPUTS

Date	Conventional till sugar beets	No-till sugar beets
Nov 91	Applied 200 #/A potash	
	Plowed and cultivated	No cultivation
5/6	Plant beets into tilled field Variety: Mono-high E4	Plant beets into bean stubble Pop:7/8 #/A beet seed
	with 20 gal./A 28% N (56 #/A actual N) & 15 gal./A 10-34-0 (18 #/A actual N and 60 #/A P) & 1.5 qt./A Pyramin and 1.5 qt./A Antor banded over the row.	
6/5	Post apply herbicides and cultivate 1 pt./A Betamix and .2 pt./A H273	
6/30	Cultivate	
7/15	Cultivate	
10/10	Harvest 14 tons/A	17 tons/A

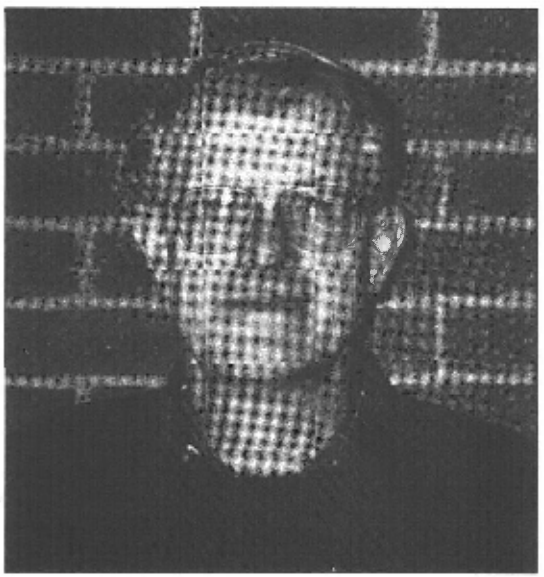
ECONOMIC RESULTS

Input/acre	Conventional	No-till
Seed	$19.00	$19.00
Pesticide	26.97	26.97
Fertilizer	49.24	49.24
Machinery & labor	99.04	81.63
Total expenses	$194.25	$176.84
Gross income	$532.00	$646.00
- Expenses	194.25	176.84
Net return	$337.75	$469.16

RICHARD LAUWERS
LAPEER COUNTY

COMPARISON OF RIDGE-TILL AND NO-TILL CORN

Dick Lauwers farms nearly 2,500 acres with his sons, Mark and Mike. The cash crop operation grows sugar beets, wheat, corn and soybeans using no-till and ridge-till systems. Dick is a member of the St. Clair County Farm Bureau and an ASCS board member.



PROJECT COMMENTS

This year, the weather did not cooperate. When planting in the ridge-till system, the coulters left the seed bed clumpy. This would not have been a problem if there had been adequate rain to break up the clumps. There was no rain early in the growing season, and therefore germination was poor.

In addition to the lack of moisture, the entire field froze on June 22 and suffered hail damage on July 26. The result was a poor performance in both the no-till and the ridge-till plots.

Throughout the season, the no-till field consistently looked better. This was probably due to better seed germination and the higher nitrogen rate. The combination of the two resulted in better early season growth and was evident in yield comparisons.

Dick did not feel that the demonstration accurately reflected the two systems or their strengths and weaknesses but maintained records on input costs and return per acre for future reference.

SITE INFORMATION

- Normal Rotation:corn,soybeans,sugar beets,wheat
- Previous Crop: soybeans
- Yield Goal for 1992: 125 bu./A
- 1991 Yield: 30 bu./A
- Site Size: 40 acres
- Soil Types: Blount
- Soil Test: pH - 6.2 OM% - 2 P - 76#/A K - 212#/A CEC - 11

MANAGEMENT & INPUTS

Date	No-till system	Ridge-till system
5/1	Spray burndown herbicides 1 pt./A Roundup with surfactant and .5 pt./A 2,4-D	
5/11	Plant no-till corn, Stine 1060 Pop: 27,000 with 200 #/A 9-23-30 starter fertilizer & 48 gal./A 28% N (144 #/A actual N)	Plant ridge-till corn, Stine 1060 Pop: 27,000 with 200 #/A 9-23-30 starter fertilizer, 10 gal./A 28% N (30 # actual N) & .86 #/A Pardner & 1.2 pt./A Marksman banded over the row
5/11	Broadcast sprayed pre-emerge herbicides, 3.5 pt./A Marksman & 3 #/A Pardner	
5/13		Cultivate
7/2		Cultivate and side-dress 25 gal./A 28% N (75 #/A actual N)
12/28	Harvest 47 bu./A 15.5% moisture	40 bu./A 15.5% moisture

ECONOMIC RESULTS

Input/acre	No-till	Ridge-till
Seed	$23.63	$23.63
Pesticide	22.79	13.76
Fertilizer	52.00	43.85
Machinery & labor	42.27	47.55
Total expenses	$140.69	$128.79
Gross income	$94.00	$80.00
- Expenses	140.69	128.79
Net return	[$46.69]	[$48.79]

RICK BENN
JACKSON COUNTY

NITROGEN REDUCTION IN MINIMUM-TILL CORN RECEIVING LIQUID DAIRY MANURE APPLICATIONS

Rick and his wife, Sally, run a 100-cow dairy and farm 1,000 acres of row crops, small grains and hay. They have four children. Rick is vice president of the Jackson County Farm Bureau, president of the Jackson County Dairy Promotion Association and serves on the Sandstone Township Board of Supervisors.

PROJECT COMMENTS

In 1992, Rick compared three different rates of anhydrous ammonia in a field that received 6,000 gallons per acre of liquid dairy manure prior to planting.

"I learned that I probably shouldn't have planted corn in 1992," Rick said. "I was surprised, though, that the yield on the treatment that got 70 pounds per acre N wasn't higher. There really wasn't that much difference between the 30 pounds per acre and the 110 pounds per acre rates. I also should have left a check strip with no N. There were no noticeable differences in height or color between any of the rates."

SITE INFORMATION

- Normal Rotation: 3hay, 2corn, wheat
- Previous Crop: corn
- Yield Goal for 1992: 100 bu./A
- 1991 Yield: 130 bu./A
- Site Size: Three acres
- Soil Types: Brady, Sandy loam
- Soil Test: pH - 6.4 OM% - N/A P - 97#/A K - 200#/A CEC - N/A
- Note: Three nitrogen rates were compared in a side-by-side demonstration.

MANAGEMENT & INPUTS

Date	Low N rate	Medium N rate	High N rate
Fall 1991	Spread liquid dairy manure 6,000 gal./A, Analysis = 16# N/ 1000 gallons		
5/13	Disk field		
5/14	Plant corn: Pioneer 3475 Pop: 24,200, and band herbicides .33 pt./A Prowl and 1.3 pt./A Atrazine 4L w/ 8#/A Difonate soil insecticide		
6/24	Cultivate and side-dress Anhydrous Ammonia (NH_3)		
	30 #/A actual N	70 #/A actual N	110#/A actual N
1/27/93	Harvest 115 bu./A 15.5% moisture	96 bu./A 15.5% moisture	127 bu./A 15.5% moisture

ECONOMIC RESULTS

Input/acre	Low N	Medium N	High N
Seed	$ 19.50	$ 19.50	$ 19.50
Pesticide	19.27	19.27	19.27
Fertilizer	4.50	10.50	16.50
Machinery & labor	51.51	51.51	51.51
Total expenses	$94.78	$100.78	$106.78
Gross income	$230.00	$192.00	$254.00
- Expenses	95.78	100.78	106.78
Net return	$135.22	$91.22	$147.22

American Farmland Trust
Sustainable Agriculture Program

"Land," said Aldo Leopold, *"is not merely soil; it is a fountain of energy flowing through a circuit of soils, plants and animals."*

Unfortunately, many of the farming practices commonly used by agricultural producers over the last few decades have severely altered this biological "circuit." Soil erosion and sedimentation, the widespread contamination of ground and surface waters and the loss of wildlife habitat ...all are serious problems that, in part, stem from man's agricultural activities.

Sustainable agriculture is an alternative approach to crop and livestock production that encourages the use of practices that do not degrade land or water resources. Sustainable farming methods make better use of biological assets and reduce overall reliance on purchased agricultural inputs.

On-farm research and demonstration projects conducted in recent years throughout the U.S. have proven that sustainable farming systems work and are as productive and profitable as conventional systems.

American Farmland Trust is a private, nonprofit membership organization founded in 1980 to protect our nation's farmland. AFT works to stop the loss of productive farmland and to promote farming practices that lead to a healthy environment.

The **Sustainable Agriculture Program** works with agricultural producers to promote alternative farming systems that are practical, profitable and environmentally sound. To accomplish this, staff work in three program areas:

- Assistance to grassroots organizations: AFT assists in the establishment of farmer-directed groups that play a fundamental role in promoting sustainable agriculture.

- Advocacy: AFT promotes the development of public policy and programs that support alternative farming systems at the local, state and federal levels.

- On-farm demonstration and research projects: AFT makes financial and technical assistance available for farmers to experiment with alternative production techniques.

In addition, the Sustainable Agriculture Program provides educational opportunities for farmers. Workshops, field days, conferences and publications are all part of this effort.

The Sustainable Agriculture Program has formed partnerships with farmer groups like the Illinois Sustainable Agriculture Society, the Indiana Sustainable Agriculture Association, the Michigan Agricultural Stewardship Association, and the Pennsylvania Association for Sustainable Agriculture. Successful on-farm demonstration projects in these states have also been established. New sustainable agriculture projects are now being developed throughout the nation.

In 1991, AFT received the President's Environment and Conservation Challenge Award for its work in sustainable agriculture.

As we advance into the future, so must we increase our efforts to become better stewards of the land. American Farmland Trust is committed to this philosophy. The Sustainable Agriculture Program will continue its efforts to promote alternative farming systems so the resource base that supports us all can remain productive for many generations to come.

MICHIGAN AGRICULTURAL STEWARDSHIP ASSOCIATION

The Michigan Agricultural Stewardship Association is a statewide, nonprofit educational organization committed to the development and use of sustainable farming systems.

Formed in 1991 by a group of innovative farmers and agricultural professionals, MASA works to:

- Increase awareness and educate the public on sustainable agriculture issues;
- Promote research that will determine the sustainability of alternative farming systems;
- Aid in the development of sustainable agricultural techniques for use on Michigan farms and assist in their adoption by Michigan farmers; and
- Encourage cooperation between producers, agribusiness, researchers and government agencies for the development of sustainable farming systems.

Soil conservation, water quality and wildlife issues are also concerns of MASA members.

MASA believes that Michigan producers need access to practical, readily usable information on sustainable farming systems.

The organization holds field days, workshops and farmer meetings throughout the year to educate its members about ways to reduce some of their negative ecological impacts associated with agricultural production and to farm more profitably.

The organization participates in the establishment of on-farm demonstration and research plots, designed by farmers and agricultural professionals to compare conventional and alternative production methods.

Members of MASA receive newsletters and special mailings on sustainable agriculture issues and events.

MASA MEMBERSHIP APPLICATION

Name _____

Address _____

_____

Phone _____

Individual or Family membership ..... $25 _____
Three year Charter membership ..... $150 _____
Institution or Business membership ..... $100 _____

Please make check payable to MASA and return to:
MASA
7301 Milo Road
Delton, Mich. 49046

Michigan Agricultural Stewardship Association
7301 Milo Road
Delton, Mich. 49046

The Michigan Agricultural Stewardship Association is a statewide, nonprofit educational organization committed to the development and use of sustainable farming systems.

American Farmland Trust
Center for Agriculture in the Environment
P.O. Box 987
DeKalb, Ill. 60115
(815)753-9347 (phone)
(815)753-2305 (FAX)

American Farmland Trust is a private, nonprofit membership organization founded in 1980 to protect our nation's farmland. AFT works to stop the loss of productive farmland and promote farming practices that lead to a healthy environment. Annual membership is $20.

American Farmland Trust
P.O. Box 987
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