



Southeast MN Regional Research and Demonstration 2004 Summary

The University of Minnesota Extension Service,
Southern Research and Outreach Center,
Minnesota Soybean Research & Promotion Council,
University Center Rochester,
and many local cooperators and agribusinesses joined efforts to conduct field
trials throughout southeast Minnesota.

This report contains the results of these trials.

The majority of these projects are funded through
grant dollars, entry fees, and support from our cooperators.

The University of Minnesota is an equal opportunity educator and employer.

February 1, 2005

Forward

Southeast Regional Agriculture Research and Demonstration 2004 Summary

I want to thank the University of Minnesota Extension and Research Team Members for the yearlong collaborative teamwork this report represents. Faculty from Extension Service, the Southern Research and Outreach Center and the Campus have worked to ensure these field research trials are directly applied and adapted to the local region and address the complex needs of Southern Minnesota production agriculture. We want to thank the regional producers, industry sponsors and state and county partners who have provided land, financial contributions and expertise to make these research trials possible.

Crop Management Tours, such as those conducted in Waseca, Potsdam and Rochester this year, provide hands-on events that bring meaning and an applied perspective to the crop trials. These tours give producers and industry professionals the opportunity to ask questions and have one-on-one time with University of Minnesota researchers and Extension Educators.

An important aspect of this study is the involvement of student interns whose summer academic experience working with educational professionals provides opportunities to accelerate their own professional careers. We are actively discussing future projects and collaboration through campus connections that provide additional experiences with the University of Minnesota Extension Service for students and future leaders of Minnesota.

Extension is committed to providing Minnesotans working in production agriculture with faster and more comprehensive access to the research and resources of the University through specialized educators at our Regional Centers.

This report is exemplary of the University's commitment of providing timely and relevant research results. Again, congratulations to all partners involved!

Together, you and the Extension Service are making a difference in Minnesota.

Respectfully, Dr. LuAnn Hiniker Campus Regional Director

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A. Background Information

The University of Minnesota Extension and Research Team Members

| | |
|-------------------|------------------------------------------------------------|
| Paul Adams | Sr. Research Plot Technician (SROC) |
| Tim Arlt | Area Program Leader, AFE-South |
| Lisa Behnken | Regional Extension Educator, Crops, Rochester |
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| Brad Carlson | County Extension Educator, Rice and Steele Co. |
| Kevin Griffin | Ag Intern, Rochester |
| Jeff Gunsolus | Extension Agronomist, Weed Scientist, St. Paul |
| Dale Hicks | Extension Agronomist, Crops, St. Paul |
| Tom Hoverstad | Scientist (SROC) |
| Gregg Johnson | Research Agronomist, Weed Management (SROC) |
| Debbi Lewis | Ag Intern, Rochester |
| Dan Martens | Technical Advisor, Benton, Morrison and Stearns Co. |
| Seth Naeve | Extension Agronomist, Soybeans, St. Paul |
| Ken Ostlie | Extension Entomologist, St. Paul |
| Paul Peterson | Extension Agronomist, Forages, St. Paul |
| Dave Pfarr | County Extension Educator, Blue Earth and Le Sueur Co. |
| Gyles Randall | Soil Scientist (SROC) |
| George Rehm | Extension Soil Scientist, Soil Fertility, St. Paul |
| Kristal Schaufler | Ag Intern, Rochester |
| Craig Sheaffer | Research Agronomist, Forages, St. Paul |
| Kira Stearns | Ag Intern, Rochester |
| Mary Jane Stearns | Executive Administrative Specialist |
| Jerry Tesmer | Technical Advisor, Fillmore and Winona Co. |
| Ryan Thelemann | Ag Intern, (SROC) |
| Doug Swanson | Scientist, Agronomy and Plant Genetics, St. Paul |
| Tim Wagar | Regional Extension Educator, Crops and Soils, Rochester |
| Angela White | Ag Intern, Rochester |
| Jeff Vetsch | Assistant Scientist (SROC) |

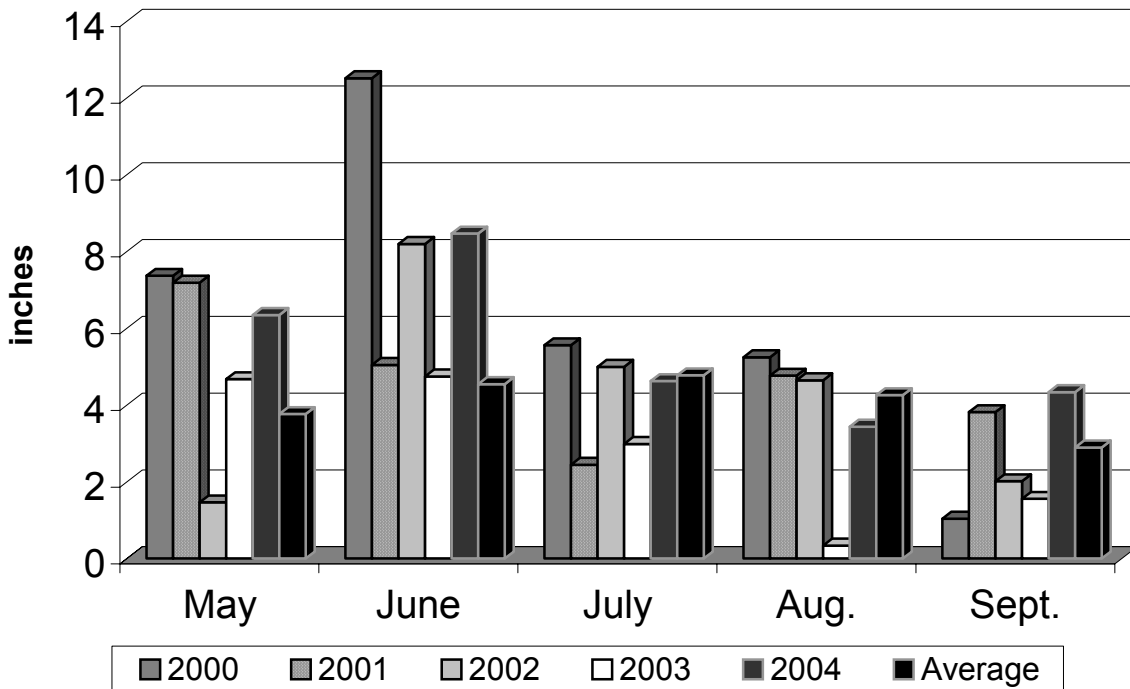
Check These Web Sites:

<http://www.extension.umn.edu>
<http://appliedweeds.coafes.umn.edu>
<http://sroc.coafes.umn.edu/index.html>
<http://www.soybeans.umn.edu/home.htm>
<http://forages.coafes.umn.edu/>
<http://www.mnipm.umn.edu/BugWeb/>
<http://www.roch.edu/>

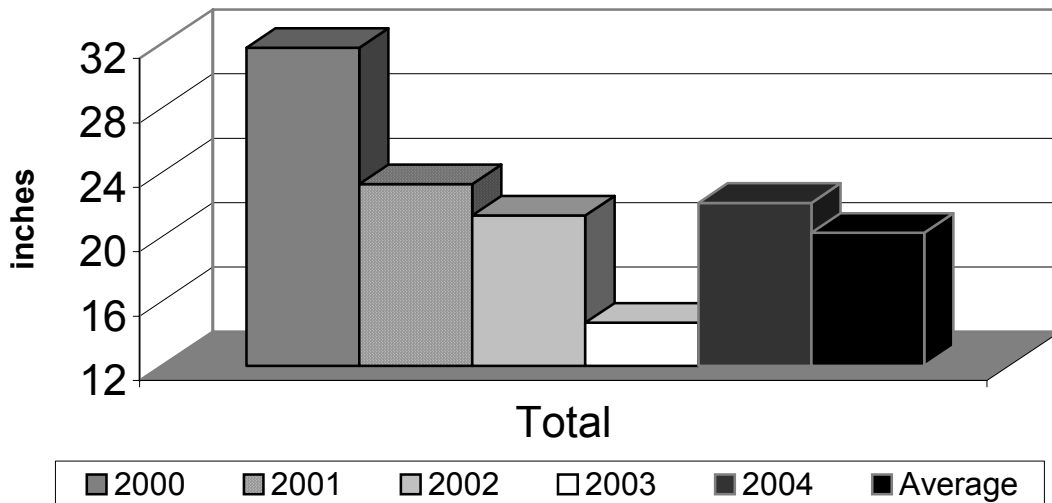
For More Information Call or E-Mail

University of Minnesota Extension Service Regional Center, Rochester at 507-280-2863
Fritz R. Breitenbach, IPM Extension Specialist, 507-280-2870, breit004@umn.edu
Lisa M. Behnken, Regional Extension Educator, 507-280-2867, lbehnken@umn.edu
Mary Jane Stearns, Exec. Administrative Specialist, 507-536-6310. mstearns@umn.edu
Contact Fritz, Lisa, or Mary Jane if interested in receiving the "SE Regional AG Newsletter".

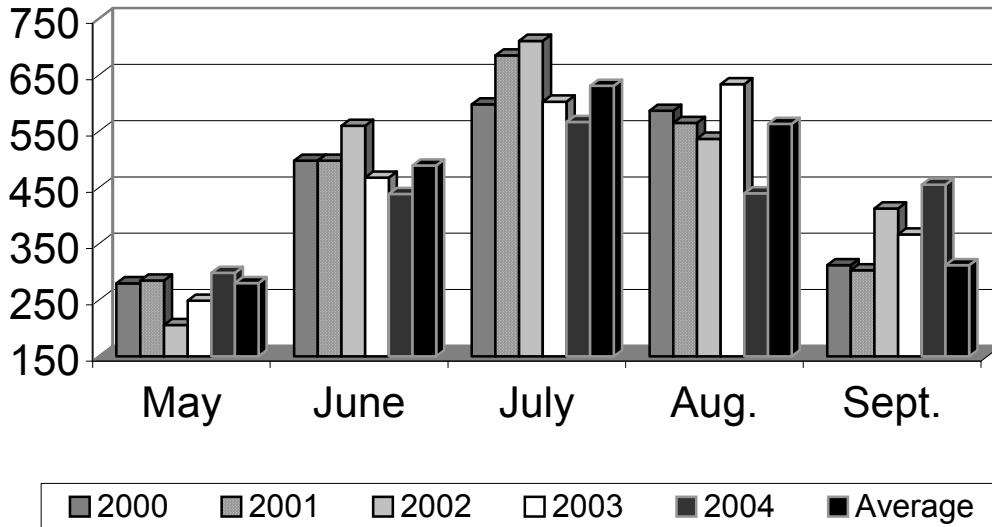
Monthly Rainfall Totals (Rochester, MN)



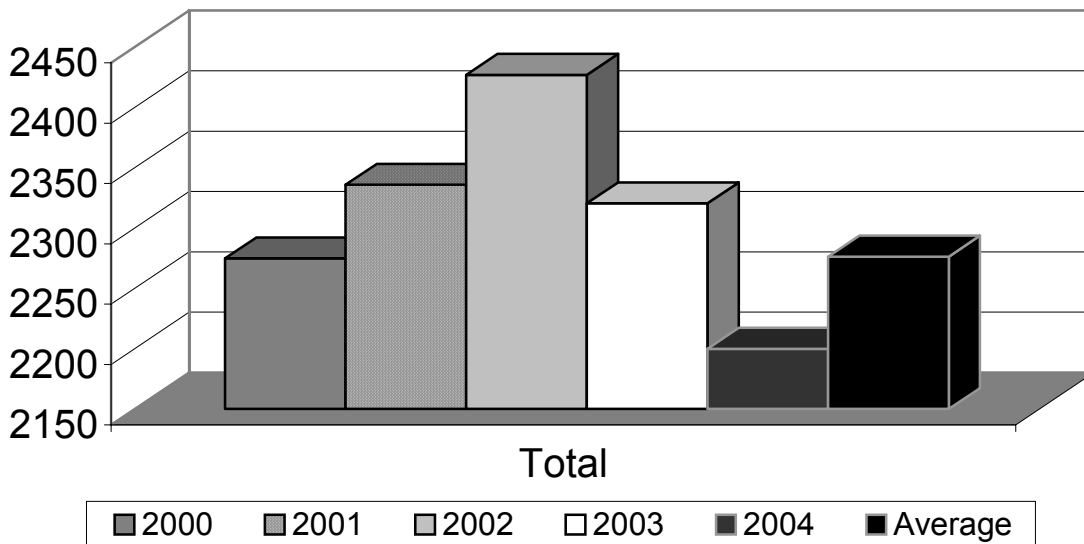
May 1 - Sept. 30 Rainfall Totals (Rochester, MN)



Monthly Growing Degree Day Totals* (Rochester, MN)



May 1 - Sept. 30 GDD Totals* (Rochester, MN)



*Growing degree days (heat units) for corn using a base temperature of 50°F

**UNIVERSITY OF MINNESOTA
EXTENSION SERVICE
FIELD TRIALS — 2004**

Fritz Breitenbach, IPM Specialist
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Tim Wagar, Regional Extension Educator
Jerry Tesmer, Winona/Fillmore Technical Advisor
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Dave Pfarr, Blue Earth/Le Sueur Extension Educator
Angela White, Ag Intern
Debbi Lewis, Ag Intern
Kevin Griffin, Ag Intern
Kira Stearns, Ag Intern
Kristal Schaufler, Ag Intern
Ryan Thelemann, Ag Intern

- Southern Research & Outreach Center
- University Center Rochester

ROCHESTER

VARIETY TRIALS

Corn
 Population Study
 Bt vs. Isoline Hybrid Trial
 Short Season Corn Silage Trial

Soybeans
 Planting Date Study

HERBICIDE TRIALS

Corn
 Weed Management Systems
 Glyphosate Timing
 Roundup® Adjuvant/Deposition Aid
 Product Evaluation
 Weed Control Programs with Define® & Liberty®
 Steadfast® Plus Callisto® Adjuvant Study
 Comparison of One-Pass & Two-Pass Systems
 KIH-485 Control of Woolly Cupgrass

Soybeans
 Weed Management Systems
 Glyphosate Timing
 Evaluation of V-10137 & Select 2-EC® for Woolly Cupgrass Control
 Comparison of Glyphosate Products

PRODUCTION MANAGEMENT

Soybean Aphid Timing Trial
 Potassium/Soybean Aphid Interaction
 N-Study—Second Year Corn After Soybeans or Alfalfa

OWATONNA

Early Maturity Corn Hybrid Trial
 Late Maturity Corn Hybrid Trial
 Waxy Corn Hybrid Trial

KELLOGG

Conservation Tillage Study

KILKENNY

Full Season
 Roundup Ready® Soybeans

MANKATO

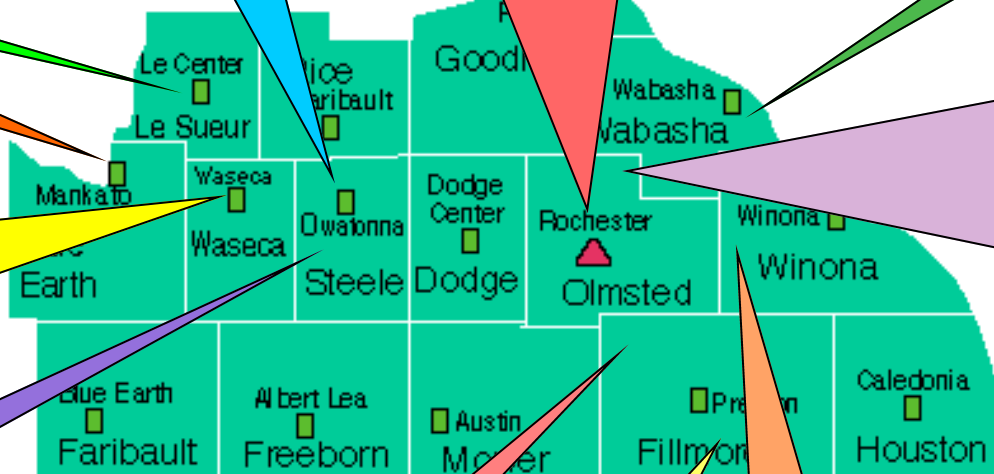
Waxy Corn Hybrid Trial

WASECA

Waxy Corn Hybrid Trial
 Bt vs Isoline Hybrid Trial
 Short Season
 Roundup Ready® Soybeans
 Full Season
 Roundup Ready® Soybeans
 Value-Added Soybeans
 Soybean Aphid Timing Trial

HOPE

Value-Added Soybeans



SPRING VALLEY

Full Season
 Roundup Ready®
 Soybeans

HARMONY

Corn Silage Trial

LEWISTON

Early Maturity Corn Hybrid Trial
 Late Maturity Corn Hybrid Trial
 Bt vs. Isoline Hybrid Trial

POTSDAM

VARIETY TRIALS

Corn
 Waxy Corn Hybrid Trial
 Bt vs. Isoline Hybrid Trial
 Corn Silage Trial

Soybeans
 Value-Added
 Short Season
 Roundup Ready®
 Full Season
 Roundup Ready®

Alfalfa
 Potato Leafhopper
 Resistant vs. Susceptible

HERBICIDE TRIALS

Corn
 KIH-485 Control of Wild Proso Millet
 Evaluation of Option® & Equip® Tank Mix Partners
 Glyphosate Performance Under Adverse Weather
 Glyphosate Timing

Soybeans
 Weed Management Systems
 Glyphosate Timing
 Comparison of One-Pass & Two-Pass Systems
 Evaluation of V-10137 & Select 2-EC® Tank Mixes
 With Harmony® For Common Lambsquarters
 & Wild Proso Millet Control

B. Variety Trials

Another Look at Potato Leafhopper Resistance in Alfalfa

2004 Results

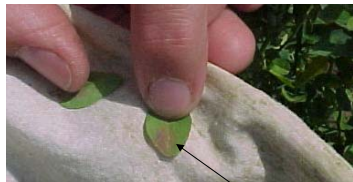
Lisa M. Behnken, Extension Educator, Crops
 Fritz R. Breitenbach, IPM Specialist
 University of Minnesota Extension Service



Potato leafhopper nymph and adult



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Damage

Potato leafhopper (PLH) nymphs and adults feed by piercing and sucking within the plant's phloem tissue. They secrete toxins that disrupt normal nutrient and water flow, resulting in stunted plants.

PLH feeding eventually causes yellowing of leaf tips, known as hopperburn.

Damage results in losses of dry matter yield, protein content and quality.

3

Current Management: Scout, Sweep, and Spray

PLH Economic Threshold Level

| <u>Height (in.)</u> | <u>PLH per sweep</u> |
|---------------------|----------------------|
| 1 | 0.1 |
| 6 | 0.6 |
| 10 | 1.0 |
| 12 | 1.2 |



B-1

4

Glandular-Haired Alfalfa



Potato Leafhopper-resistant germplasm was developed from wild-type plants having erect glandular hairs. This germplasm was released by USDA-ARS, Kansas State, and Purdue in mid-1980's.

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Potato Leafhopper Resistance

- First variety released in 1997
- Early varieties did not perform well:
 - Low expression to PLH (only 15-25%)
 - Yield Drag
 - Susceptible to major alfalfa diseases
 - Poor vigor
 - Not adapted to conditions in Midwest



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Early varieties had only 15-25% PLH expression. This has increased to over 80% with the newest generation (5th) of PLH resistant varieties – breeders seed

(% of Plants with "Trait")

- | | | | |
|-------------------|------|----------------|----|
| • Pioneer P54H91 | > 85 | • DK 121 HG | 35 |
| • DeKalb A37-20HG | > 85 | • Arrest | 34 |
| • Evergreen 2 | > 85 | • Trailblazer | 33 |
| • Evergreen | 79 | • Defense + EV | 32 |
| • Green Leaf | 70 | • Amerig. 302 | 32 |
| • TMF 4355LH | 55 | • CleanSweep | 27 |
| • DK 131 HG | 53 | • PH-5347LH | 20 |
| • ABT 227LH | 48 | • Interceptor | 15 |
| • 6310 | 47 | | |



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Mechanisms of PLH Resistance



1. Entrapment
2. Antibiosis
3. Non-preference for oviposition
4. Tolerance



B-2

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Entrapment

Initial observations thought PLH got “stuck” on the ends of the glandular hairs (fly paper).

Further investigations suggests this is not the case and that entrapment is **NOT** an important mechanism for **resistance**. (many glandular-haired plants do not provide resistance)

Antibiosis

- **Antibiosis** - An association between organisms that is harmful to one of them.
- Hogg and McCaslin, 1992, found survival of nymphs and adults to be lower on glandular haired plants – **antibiosis**.
- Elden and McCaslin, 1994, concluded that **antibiosis is likely due to a chemical in the exudate from the glandular hairs**.
 - Immature leafhoppers were very susceptible to the compound.

Non-preference

- Evidence was found of non-preference in oviposition of PLH females on resistant alfalfa.
- PLH females avoided laying eggs on glandular-haired plants (Lamp and McCaslin, unpublished, University of Maryland)

Tolerance

- The first evidence for tolerance was observed by Lefko, et. al., 1998
 - PLH population required to cause economic damage was **twice** as high on PLH resistance varieties compared to susceptible ones.
- Research with the newest generation (5th) of PLH resistant alfalfa varieties by Sulc, McCormick, Hammond, and Miller, Ohio and Wisconsin recommends:
 - Economic threshold **three times** higher for varieties with 50% or higher (commercial seed) PLH resistance than for susceptible alfalfa

3X Threshold for varieties with 50% or higher PLH resistance (commercial seed)

Susceptible Varieties Economic Threshold Level

- 0.1/sweep @ 1"
- 0.6/sweep @ 6"
- 1.0/sweep @ 10"
- 1.2/sweep @ 12"

Resistant Varieties 3X Threshold

- 0.3/sweep @ 1"
- 1.8/sweep @ 6"
- 3.0/sweep @ 10"
- 3.6/sweep @ 12"

PLH Management with Resistant Varieties

Seeding year:

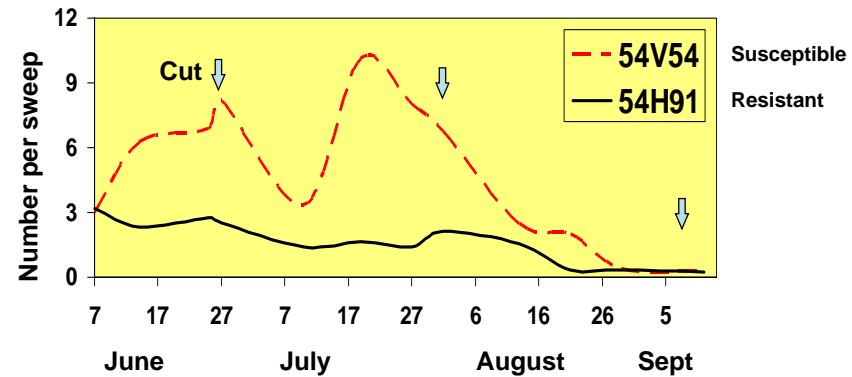
Treat with insecticide before 1st cutting if economic threshold (1X) reached
After 1st cut, use an economic threshold of 3X

Production years:

Use an insecticide when PLH population reaches 3X the economic threshold used for susceptible varieties

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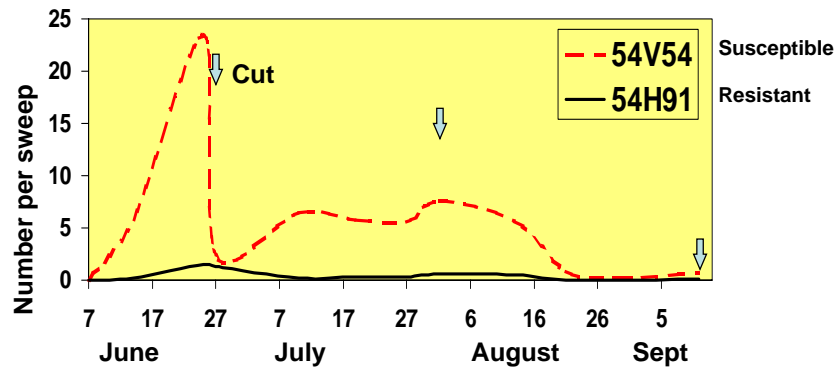
PLH Adult Populations in New Resistant & Susceptible Alfalfa Varieties (2001 Seeding)



The Ohio State University

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PLH Nymph Populations in New Resistant & Susceptible Alfalfa Varieties (2001 Seeding)



The Ohio State University

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Alfalfa Potato Leafhopper Variety X Insecticide Trial

- The objective of this trial was to evaluate the performance of the newest generation of potato leafhopper (PLH) resistant varieties compared to susceptible varieties with and without insecticide.
- **PLH Trial location:** Potsdam, MN, 2003 and 2004
- **Planted:** April 25th, 2003 and June 4, 2004
- **Four Varieties in 2003**
 - Two PLH resistant varieties
 - Pioneer 54H91 & DK A37-20 HG
 - Two susceptible varieties
 - DeKalb A42-15 & Pioneer 54V46
- **Four Varieties in 2004**
 - Three PLH resistant varieties
 - Pioneer 54H91, DeKalb A37-20HG and Evergreen 2
 - One susceptible variety
 - Genoa

B-4

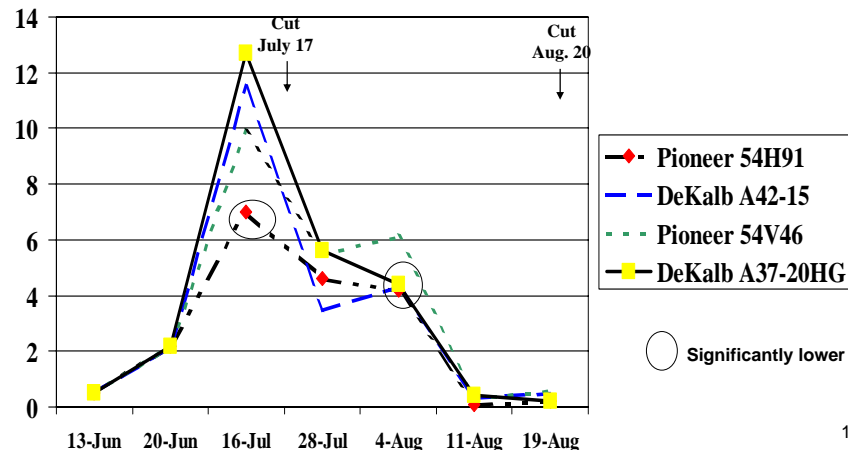
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PLH Adult Population in PLH Resistant and Susceptible Alfalfa Varieties

Potsdam, MN, 2003 (Breitenbach and Behnken)

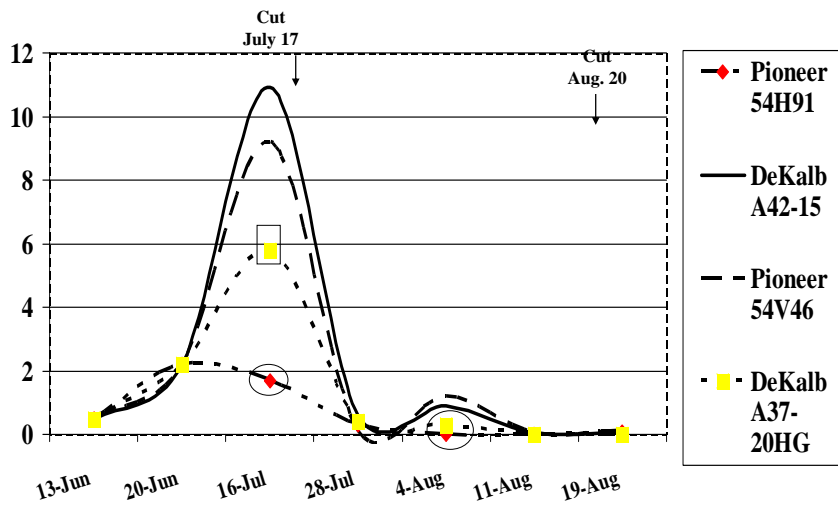
- Plots established on April 25, 2003 at Potsdam, MN (SE Minnesota)
- Susceptible Varieties = Pioneer 54V46 and DeKalb A42-15
- Resistant Varieties = Pioneer 54H91 and DeKalb A37-20HG
- Treatments included a sprayed and unsprayed treatment for all varieties. Warrior insecticide was applied on June 23 and July 30, 2003.
- Average PLH populations were:
 - $1/2$/sweep on 7 inch alfalfa on June 13
 - 2.2/sweep for 10 inch alfalfa on June 20 (2X Threshold)
 - 3.2/sweep for 5.4 inch alfalfa on July 28 (6X Threshold)
- Plots were harvested on July 17 and August 20, 2003
- July 16 count:
 - Pioneer 54H91 had significantly lower adult and nymph PLH numbers
 - DeKalb A37-20HG had significantly lower nymph numbers than susceptible DK A42-15 and Pioneer 54V46.
- August 5:
 - Pioneer 54H91 and DeKalb A37-20HG had significantly lower adult PLH numbers.
 - Both PLH resistant varieties, Pioneer 54H91 and DeKalb A37-20HG, had lower PLH nymphs numbers than the susceptible varieties.

PLH Adult Population in PLH resistant and susceptible alfalfa varieties at Potsdam, MN, 2003 (2003 seeding without Warrior - PLH count/sweep).



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PLH Nymph population in PLH resistant and susceptible alfalfa varieties at Potsdam, MN, 2003 (2003 seeding without Warrior - PLH count/sweep).

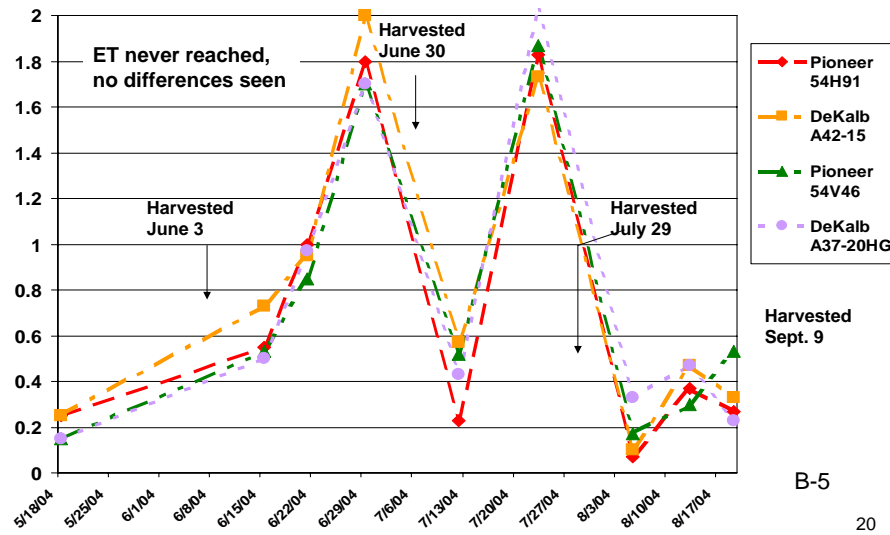


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2004 Potato Leafhopper Number per Sweep

(2003 established alfalfa), Potsdam, MN.

The PLH population never reached economic threshold level in 2004. There were no differences among treatments for PLH adult or nymphs.

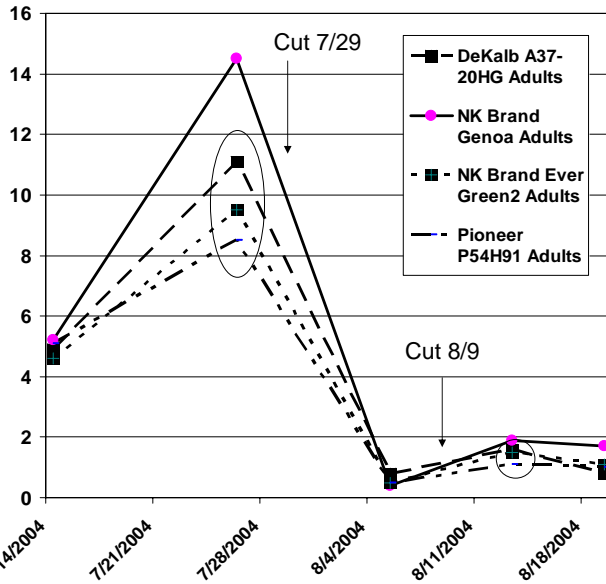


B-5

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PLH/Sweep in Untreated Alfalfa, Adults

Plot established on June 4, 2004, Potsdam, MN



Susceptible = Genoa

Resistant =
DeKalb A37-20HG, NK
Brand Ever Green 2
and Pioneer 54H91

PLH adult numbers

July 14 = No difference

July 26 = DK A37-20HG, EverGreen 2, and P54H91 had significantly lower nymph numbers than Genoa.

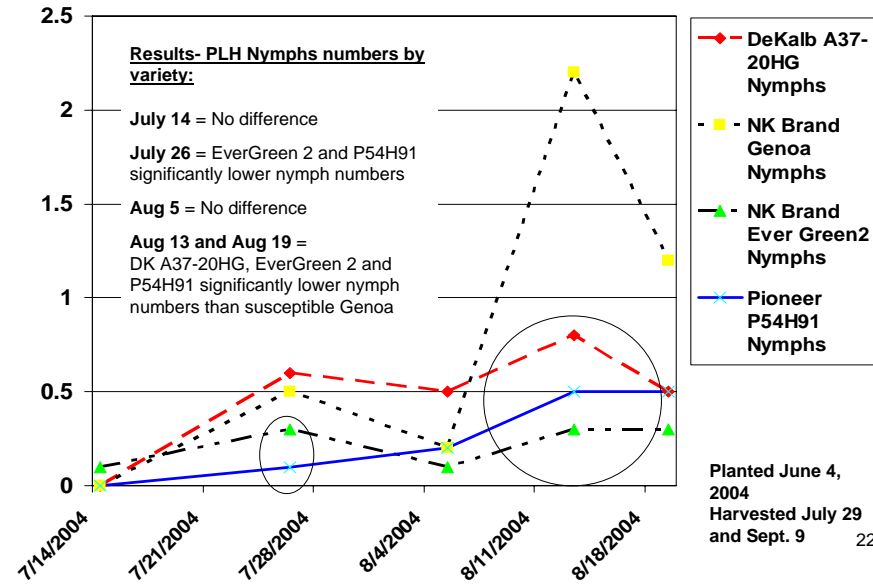
Aug 5 = no difference

Aug 13 = P54H91 had significantly lower PLH adults than Genoa

Aug 19 = DK A37-20HG, EverGreen 2, and P54H91 had significantly lower PLH adults than Genoa

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PLH/Sweep in Untreated Alfalfa, Nymphs (Established 2004, Potsdam, MN)



Results- PLH Nymphs numbers by variety:

July 14 = No difference

July 26 = EverGreen 2 and P54H91 significantly lower nymph numbers

Aug 5 = No difference

Aug 13 and Aug 19 = DK A37-20HG, EverGreen 2 and P54H91 significantly lower nymph numbers than susceptible Genoa

DeKalb A37-20HG Nymphs

NK Brand Genoa Nymphs

NK Brand Ever Green2 Nymphs

Pioneer P54H91 Nymphs

Planted June 4, 2004
Harvested July 29 and Sept. 9

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In the absence of leafhopper pressure...

Yield potential of early released PLH-resistant varieties was lower than standard susceptible varieties.

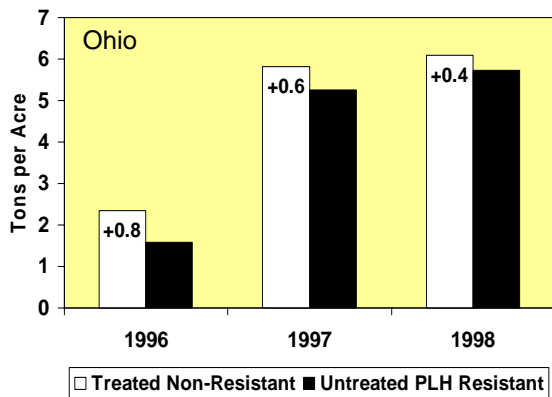
BUT, yield potential has been improved in the newest PLH-resistant varieties.

Ohio and Wisconsin Data

1997 and 1998 Results

| Variety PLH resistance | % resistance | 97-98 Yield DM T/A (no spray) | 97-98 Yield DM T/A (spray) | % Loss |
|----------------------------|--------------|-------------------------------|----------------------------|--------|
| 3 rd generation | 70 | 7.26 | 8.09 | 11% |
| 2 nd generation | 53 | 6.81 | 7.96 | 17% |
| 1 st generation | 25 | 6.52 | 7.86 | 21% |
| susceptible | 0 | 6.24 | 8.11 | 30% |

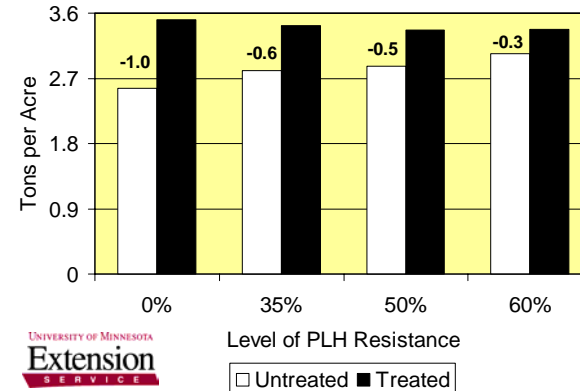
Untreated Resistant (early releases) vs Treated PLH-Susceptible Alfalfa



Under heavy PLH pressure, untreated PLH-resistant alfalfa yielded less than treated non-resistant alfalfa.

Yields of Alfalfa Having Various Levels of PLH Resistance

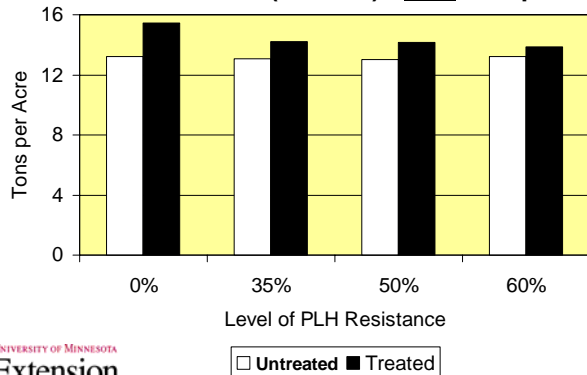
Seeding year (1998) - High PLH pressure



Yield loss from PLH damage declines as PLH resistance increases. (Ohio)

Yields of Alfalfa Having Various Levels of PLH Resistance

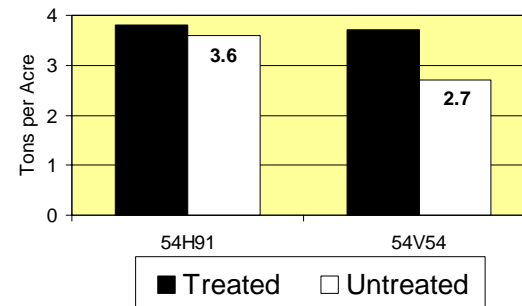
Established stand (1999-00) - Low PLH pressure



No advantage for resistance under low PLH pressure. (Ohio)

New Releases of PLH Resistant vs. Susceptible Alfalfa Varieties

Spring Seeding 2001 - Very high PLH pressure

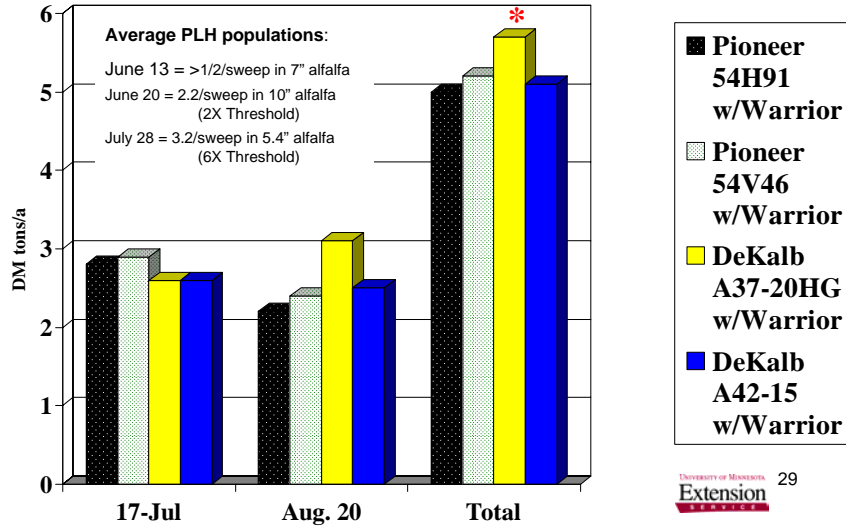


Yield loss to PLH:
Resistant: 0.2 T/A
54H91
Susceptible: 1.0 T/A
54V54

(Ohio)

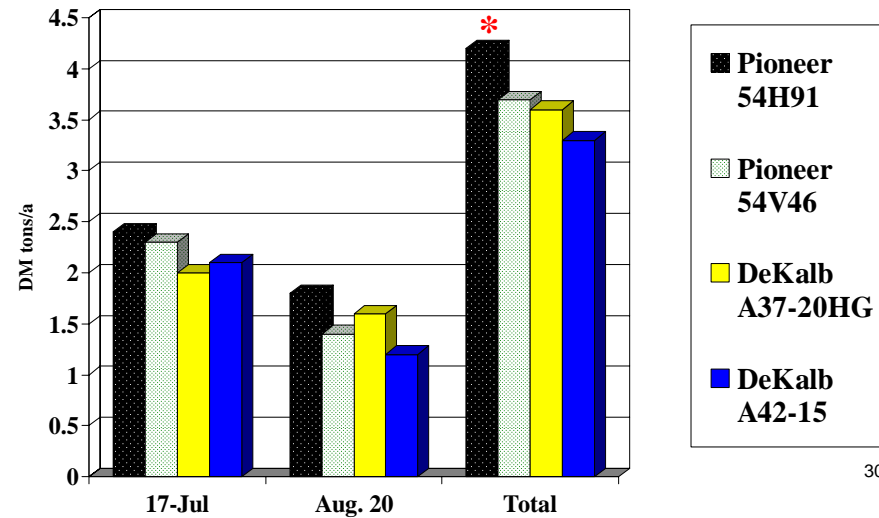
Alfalfa Variety Yield with insecticide to control PLH at Potsdam, MN in 2003.

LSD (P=0.10) = 0.44 tons (* = significant)



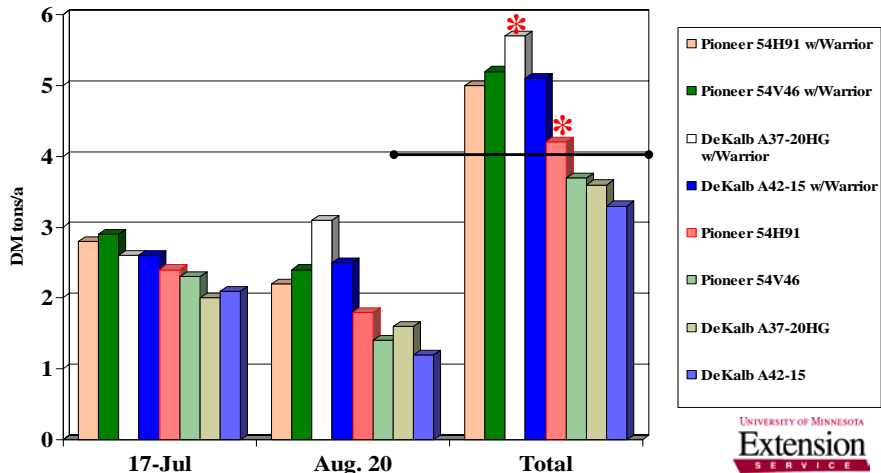
Alfalfa Variety Yield without insecticide to control PLH at Potsdam, MN in 2003.

LSD (P=0.10) = 0.44 tons (* = significant)



Alfalfa Variety Performance with and without insecticide to control PLH at Potsdam, MN, 2003.

Seeding year 2003. LSD = 0.44 tons/a (* = significant in their group)



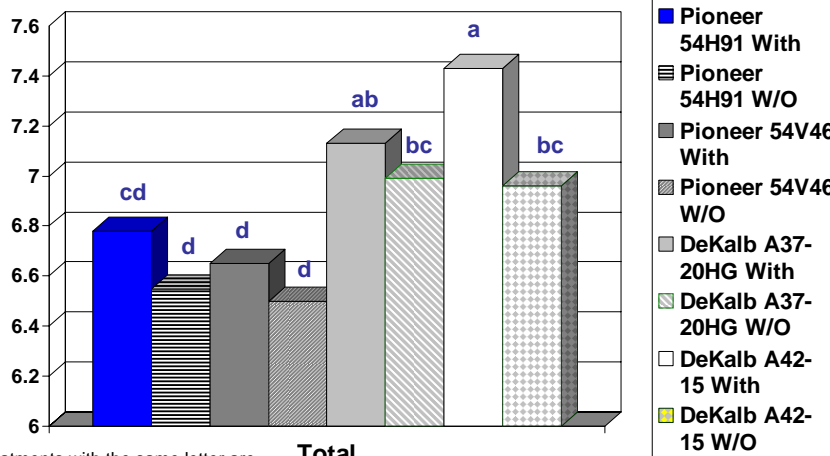
2004 DM Yields – PLH Alfalfa Trial

(2003 Established Alfalfa)

- This plot was not sprayed with insecticide in 2004. The potato leafhopper population never reached the economic threshold level.
- However, note the difference in yields for each variety, sprayed versus unsprayed in 2003 (seeding year). This plot had 2X to 6X economic threshold level of potato leafhopper numbers in 2003. (see slide 33)
- Pioneer 54H91 (unsprayed in 2003) and Pioneer 54V46 (sprayed and unsprayed in 2003) yielded significantly lower than both DeKalb varieties (sprayed and unsprayed in 2003).
- DeKalb A42-15, sprayed versus unsprayed in 2003, yielded significantly more in 2004. Some of this may be explained by Ohio researchers.
 - Ohio researchers found unsprayed resistant varieties lost yield only in the first cutting of the seeding year.
 - However, PLH damage in seeding year may result in reduced vigor of stand for the life of the stand.

2004 DM Yields – PLH Alfalfa Trial

(2003 Established Alfalfa)



Treatments with the same letter are not statistically different.

Total

33

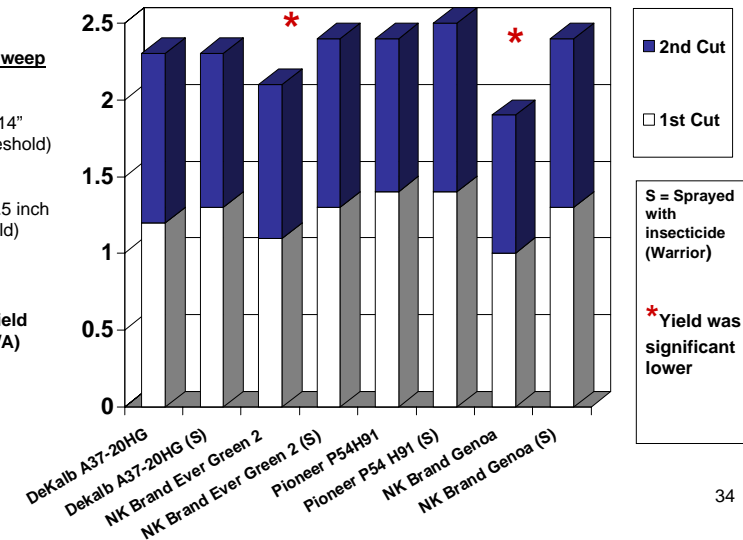
Alfalfa Dry Matter Yield, Treated vs. Untreated (2004 Seeding), Potsdam, MN

PLH Counts/Sweep

July 16 =
5.0 / sweep in 14" alfalfa (3X threshold)

August 13 =
0.8/sweep in 7.5 inch alfalfa (threshold)

Forage Yield (tons DM/A)



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Yield Drag

- In the absence of PLH damage, the newest generation of resistant varieties yield as well as susceptible varieties.
- PLH resistant varieties show a yield advantage over conventional varieties when PLH populations are above the economic threshold.
- With very high populations the newest generation of PLH resistant varieties provide substantial but incomplete protection against PLH – some yield loss still occurs.

Management for varieties with over 50% PLH resistance (commercial seed)

- Seeding year
 - Treat with insecticide before 1st cutting if economic threshold (1X) reached
 - Ohio researchers found unsprayed resistant varieties lost yield only in the first cutting of the seeding year.
 - PLH damage in seeding year may result in reduced vigor of stand for the life of the stand.
 - After 1st cut, use an economic threshold of 3X
- Production years
 - Use an insecticide when PLH population reaches 3X the economic threshold used for susceptible varieties

Take Another Look at PLH Resistant Alfalfa Varieties

- Higher yields (no drag)
- Improved agronomics & disease resistance
- Much greater PLH resistance (>85%, breeders seed)
 - PLH resistant varieties reduce PLH populations, especially nymphs.
- Consider PLH Resistant Varieties:
 - Potato leafhoppers a pest most years
 - Seed with a companion crop
 - Don't use insecticides
 - Don't scout your field

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Sources:

Mark McCaslin and Dave Whalen,
Forage Genetics
Mike Peterson, W-L Research,
Madison, Wisconsin
R. Mark Sulc, Hal Willson, and John S. McCormack,
Ohio State University
Ronald H. Hammond,
Ohio Agric. Res. & Devel. Center
David Miller,
Pioneer Hi-Bred International
Paul Peterson, Craig Sheaffer, and Bill Hutchison
University of Minnesota
Fritz R. Breitenbach and Lisa M. Behnken,
University of Minnesota Extension Service



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2004 Minnesota Hybrid Corn Silage Performance Trials

C.C. Sheaffer, P.R. Peterson, D.R. Swanson, T.R. Hoverstad, J.L. Halgerson, M.D. Bickell, L.M. Behnken, F.R. Breitenbach, D.L. Holen, V.W. Crary, and D.C. Martens; University of Minnesota Agricultural Experiment Station and Extension Service.

The Minnesota Hybrid Corn Silage Evaluation Program evaluates the silage potential of corn hybrids in Minnesota. The goal of the program is to provide unbiased forage yield and quality information for educational and marketing programs.

The program is financed in part by entry fees from private seed companies that chose to enter hybrids for testing; they are listed in this publication. Results presented are from corn silage performance trials in regions of extensive corn silage use: southeastern, central, and west-central Minnesota. The locations are in primary dairy regions of Minnesota.

TEST SITES

Silage hybrids entered in the southeast or central region trials were tested at two sites within each region. Hybrids entered in the west-central region were tested at one site. Sites within regions were as follows:

| | |
|----------------------------|------------------------------------------------------------------|
| Southeast Dairy Region: | Harmony, MN (Fillmore County) Potsdam, MN (Olmsted County) |
| Central Dairy Region: | Paynesville, MN (Stearns County) Melrose, MN (Stearns County) |
| West-central Dairy Region: | Ottertail, MN (Otter Tail County) |

TEST PROCEDURE (Southeast and Central)

Design: Small plots were established at Harmony, Potsdam, Paynesville and Melrose in randomized complete block designs with 4 replications. Hybrids were planted at a 33,000 seed per acre with 30-inch row spacing. The Southeast MN sites were planted May 4. Central MN sites were planted May 10. Plant nutrients as manure or inorganic fertilizer were applied to maximize plant yield. Cultivation and herbicides were used to control weeds.

Harvesting: Plots were harvested and whole-plant herbage sampled for yield and forage quality at each site. Harvest was targeted for when average whole-plant moisture across entries at the site averaged 65%. In 2004, harvest dates at Harmony, Potsdam, Paynesville and Melrose were September 23, September 21, September 27 and September 30, respectively.

TEST PROCEDURE (West-central)

Design: Large plots were established April 28 near Ottertail, MN under center pivot irrigation in a randomized complete block design with 3 replications. Hybrids were planted at a 34,000 seeds per acre with 30-inch row spacing. Inorganic fertilizer was applied preplant and via irrigation to maximize plant yield. Cultivation and herbicides were used to control weeds.

Harvesting: Plots were harvested and whole-plant herbage sampled for yield and forage quality on October 2.

RESULTS PROVIDED

Tables 1 - 5 summarize hybrid yield and forage quality results from Harmony, Potsdam, Paynesville, Melrose, and Ottertail, respectively. Relative maturity (RM), moisture content, whole-plant dry matter (DM) yield, and silage yield are listed, and hybrids are ranked in descending order of milk yield per acre (Milk Yield, /Acre).

Whole-plant forage quality traits listed include crude protein (CP), neutral detergent fiber (NDF), 48-hour *in vitro* digestibility (IVD), 48-hour neutral detergent fiber digestibility (NDFD), and starch concentrations. With the exception of NDFD, all forage quality traits are expressed as a percent of dry matter. NDFD is expressed as a percent of NDF.

Milk production potentials per ton (lb milk/Ton forage) and per acre (lb milk/acre forage) of forage were calculated using the MILK2000 spreadsheet developed by the University of Wisconsin. MILK2000 approximates animal performance based on a standard cow weight and milk production level (1350 lb body weight and 90 lb/day at 3.8% fat). Values based on field calculations for hybrid moisture and DM yield; laboratory values for CP, NDF, NDFD, starch and ash concentration; and book values for NDFCP (1.3%) and ether extract (3.2%) concentration were used for spreadsheet calculations. For MILK2000 predictions, we assumed that kernel processing occurred.

HOW TO USE RESULTS

NDF is a negative indicator of forage intake potential; higher NDF concentration generally implies lower animal performance potential. IVD provides an estimate of forage dry matter digestibility, and NDFD estimates digestibility of the fiber fraction. Starch concentration is positively associated with digestibility because it is assumed to be 100% digestible. Relatively higher IVD, NDFD and/or starch concentrations generally imply greater animal performance potential. Milk per acre represents the combined effects of yield and quality.

Corn hybrids differed in yield, forage quality, and milk production potential at all sites. Means and least significant difference (LSD) values at the 10% probability level are shown for each parameter at each site. Where the difference between two selected hybrids for a particular trait and site is greater than the LSD value, there is a 90% probability that there is a real difference between the two hybrids for that parameter (i.e. moisture, yield, quality concentration, or milk production), (University of Minnesota Extension Service, Regional Center, Rochester, MN).

PARTICIPATING COMPANIES

Name and address of companies participating in the 2004 hybrid corn silage performance trials are listed below:

Ag Venture, P.O. Box 29, Kentland, IN 47951

Crow's Hybrid Corn Co., 612 E Dunlop St, PO Box 157, Kentland, IN 47951

Dairyland Seed Company, Inc., P.O. Box 958, West Bend, WI 53095

Dow AgroSciences- Mycogen Seeds, 9330 Zionsville Rd; Indianapolis, IN 46268

Dyna Gro Seed Company, 221 W Lake Lansing Rd Suite 102, East Lansing, MI 48823

Garst Seed Company, 2369 330th St, Slater, IA 50244

Golden Seed Company, Inc., - Golden Harvest, 27525 135th Ave N, Cordova, IL 61242

Hyland Seeds, 2 Hyland Dr, Box 130, Blenheim, Ontario, Canada N0P 1A0;

Monsanto Seed Group, DeKalb Genetics, 3100 Sycamore Road, Dekalb, IL 60115

Mycogen Seeds, 9330 Zionsville Rd, Indianapolis, IN 46268

Pioneer Hi-Bred, Int'l., 7000 NW 62nd Ave, Johnston, IA 50131

Producers Hybrids, P.O. Box C, Battle Creek, NE 68715

Renk Seed Company, 6800 Wilburn Rd, Sun Prairie, WI 53590

Trelay Seeds, 11623 State Road 80N, Livingston, WI 53554

Table 1. Relative maturity (RM), whole-plant moisture (moist), silage yield and quality traits for corn hybrids planted at Harmony, MN (Fillmore County) in 2004.

| Brand/ Hybrid | RM | moist | -- Yield ¹ -- | | ----- Quality (conc.) ² ----- | | | | | -- Milk Yield ² -- | |
|---------------------------|--------|-------------|--------------------------|-------------|------------------------------------------|-----------|-----------|-----------|-----------|-------------------------------|---------------|
| | | | DM | silage | CP | NDF | IVD | NDFD | Starch | /Ton | /Acre |
| | rating | % | - ton/ acre - | | ----- % ----- | | | | | lb/ ton | lb/ acre |
| DeKalb DKC 57-84 | 107 | 65.0 | 10.3 | 29.3 | 7.6 | 38 | 81 | 49 | 40 | 3,510 | 36,200 |
| Pioneer 34N42 | 108 | 66.1 | 10.2 | 30.1 | 7.9 | 41 | 80 | 50 | 33 | 3,420 | 34,800 |
| Dairyland Stealth 1611 | 108 | 67.8 | 10.0 | 31.1 | 8.2 | 40 | 80 | 50 | 35 | 3,430 | 34,400 |
| Pioneer 33J57 | 114 | 69.6 | 10.4 | 34.0 | 8.0 | 42 | 79 | 49 | 31 | 3,290 | 34,100 |
| Garst 8590IT | 100 | 67.7 | 9.4 | 29.2 | 7.3 | 41 | 80 | 50 | 33 | 3,410 | 32,100 |
| High Cycle 7698RRYGCB | 107 | 64.4 | 9.5 | 26.6 | 7.8 | 41 | 79 | 49 | 35 | 3,350 | 31,700 |
| High Cycle 7601YGCB | 103 | 64.7 | 9.1 | 25.9 | 7.2 | 39 | 80 | 49 | 35 | 3,460 | 31,600 |
| Garst 8579RR | 101 | 67.4 | 9.3 | 28.4 | 7.2 | 43 | 79 | 51 | 31 | 3,340 | 30,900 |
| Ag Venture 6501CB | 103 | 68.1 | 9.7 | 30.3 | 7.8 | 44 | 77 | 48 | 30 | 3,180 | 30,800 |
| Crows 438B | 108 | 68.5 | 9.2 | 29.2 | 8.2 | 43 | 79 | 50 | 32 | 3,330 | 30,600 |
| Golden Harvest H-8673Bt | 108 | 65.0 | 9.2 | 26.2 | 8.0 | 42 | 79 | 49 | 32 | 3,330 | 30,600 |
| Ag Venture X4413CB | 105 | 68.0 | 9.4 | 29.7 | 7.3 | 43 | 78 | 49 | 31 | 3,270 | 30,600 |
| Golden Harvest H-9006Bt | 112 | 68.1 | 9.4 | 29.5 | 7.4 | 43 | 77 | 47 | 31 | 3,190 | 30,000 |
| Producers Hybrids SS110 | 116 | 68.7 | 9.7 | 30.9 | 8.1 | 46 | 76 | 49 | 28 | 3,080 | 29,800 |
| High Cycle 7748YGCB | 109 | 70.0 | 9.7 | 32.0 | 7.6 | 45 | 76 | 47 | 29 | 3,070 | 29,900 |
| DeKalb DKC 61-45 | 111 | 71.3 | 9.2 | 32.0 | 7.9 | 44 | 78 | 50 | 29 | 3,210 | 29,500 |
| Dairyland Stealth 1507BT | 106 | 66.6 | 8.9 | 26.7 | 7.9 | 42 | 78 | 49 | 32 | 3,320 | 29,500 |
| Renk RK870YGCB | 112 | 68.1 | 9.0 | 28.1 | 8.0 | 42 | 78 | 49 | 33 | 3,270 | 29,400 |
| Renk RK775 | 104 | 65.5 | 8.8 | 25.6 | 8.2 | 42 | 79 | 49 | 33 | 3,300 | 29,100 |
| Pioneer 35Y67 | 106 | 67.6 | 9.2 | 28.3 | 7.5 | 44 | 77 | 49 | 30 | 3,170 | 29,100 |
| Renk RK789YGCB | 111 | 66.2 | 9.1 | 27.1 | 7.7 | 43 | 77 | 48 | 31 | 3,180 | 29,000 |
| Pioneer 34M93 | 108 | 67.6 | 9.0 | 27.8 | 8.1 | 46 | 77 | 51 | 28 | 3,210 | 29,000 |
| Trelay 7012 | 105 | 63.3 | 8.3 | 22.8 | 7.5 | 41 | 79 | 49 | 34 | 3,310 | 27,600 |
| DeKalb DKC 54-51 | 104 | 67.9 | 8.3 | 25.8 | 7.8 | 42 | 79 | 48 | 33 | 3,260 | 27,100 |
| Producers Hybrids SS104RR | 104 | 69.6 | 8.6 | 28.2 | 7.7 | 46 | 77 | 50 | 27 | 3,090 | 26,600 |
| Mycogen F697 | 112 | 72.4 | 7.9 | 28.6 | 8.5 | 45 | 79 | 53 | 28 | 3,230 | 25,400 |
| Mean | | 67.5 | 9.3 | 28.6 | 7.8 | 43 | 78 | 49 | 32 | 3,280 | 30,400 |
| LSD (0.10) | | 2.4 | 1.0 | 2.1 | 0.6 | 3 | ns | 2 | 3 | ns | 4,700 |

¹ DM yield is whole-plant corn yield at 100% dry matter; Silage yield is whole-plant corn yield at harvest moisture.

² Quality concentration description expressed as a % of DM, except NDFD which is expressed as a % of NDF. Refer to RESULTS PROVIDED text for additional information.

³ Milk production was estimated using spreadsheet MILK2000 developed at the University of Wisconsin. Refer to RESULTS PROVIDED for additional information.

Table 2. Relative maturity (RM), whole-plant moisture (moist), silage yield and quality traits for corn hybrids planted at Potsdam, MN (Olmsted County) in 2004.

| Brand/ Hybrid | RM rating | moist % | -- Yield ¹ -- | | ----- Quality (conc.) ² ----- | | | | | -- Milk Yield ² -- | |
|---------------------------|--------------|-------------|--------------------------|-------------|------------------------------------------|-----------|-----------|-----------|-----------|-------------------------------|-------------------|
| | | | DM - ton/ acre - | silage | CP | NDF | IVD | NDFD | Starch | /Ton lb/ ton | /Acre lb/ acre |
| Pioneer 35Y67 | 106 | 68.4 | 12.2 | 38.7 | 7.5 | 42 | 79 | 50 | 32 | 3,410 | 41,700 |
| Garst 8579RR | 101 | 67.6 | 11.9 | 36.7 | 7.5 | 40 | 80 | 51 | 33 | 3,490 | 41,600 |
| Ag Venture X4413CB | 105 | 67.1 | 12.8 | 38.7 | 7.6 | 45 | 77 | 49 | 27 | 3,240 | 41,400 |
| DeKalb DKC 57-84 | 107 | 66.5 | 12.0 | 35.9 | 8.1 | 40 | 79 | 48 | 32 | 3,380 | 40,500 |
| Pioneer 33J57 | 114 | 72.6 | 12.6 | 45.9 | 8.0 | 45 | 77 | 49 | 28 | 3,180 | 40,100 |
| Golden Harvest H-9006Bt | 112 | 69.9 | 12.1 | 39.9 | 8.0 | 43 | 77 | 47 | 33 | 3,190 | 38,400 |
| Pioneer 34N42 | 108 | 68.2 | 11.3 | 35.5 | 7.9 | 42 | 79 | 50 | 33 | 3,360 | 37,900 |
| Golden Harvest H-8673Bt | 108 | 67.9 | 11.3 | 35.2 | 8.2 | 45 | 78 | 51 | 28 | 3,250 | 36,700 |
| Crows 438B | 108 | 69.9 | 11.4 | 37.6 | 8.4 | 45 | 77 | 49 | 30 | 3,180 | 36,300 |
| Dairyland Stealth 1611 | 108 | 69.1 | 11.2 | 36.4 | 7.7 | 44 | 77 | 47 | 32 | 3,150 | 35,400 |
| Mycogen F697 | 112 | 74.4 | 10.3 | 40.0 | 8.2 | 44 | 79 | 53 | 29 | 3,350 | 34,300 |
| Producers Hybrids SS110 | 116 | 69.9 | 11.5 | 38.2 | 8.1 | 48 | 74 | 47 | 26 | 2,940 | 33,900 |
| Renk RK870YGCB | 112 | 69.6 | 11.3 | 37.0 | 7.6 | 47 | 75 | 47 | 28 | 3,000 | 33,800 |
| High Cycle 7698RRYGCB | 107 | 69.9 | 11.2 | 37.1 | 8.0 | 47 | 76 | 49 | 27 | 3,030 | 33,900 |
| Pioneer 34M93 | 108 | 69.5 | 11.0 | 36.0 | 8.1 | 48 | 76 | 49 | 26 | 3,030 | 33,300 |
| Producers Hybrids SS104RR | 104 | 70.5 | 10.8 | 36.4 | 7.8 | 46 | 76 | 48 | 28 | 3,080 | 33,200 |
| DeKalb DKC 61-45 | 111 | 72.1 | 10.9 | 39.1 | 8.1 | 47 | 76 | 48 | 28 | 3,030 | 33,100 |
| Trelay 7012 | 105 | 67.5 | 10.4 | 31.9 | 7.5 | 44 | 77 | 48 | 32 | 3,190 | 33,100 |
| Garst 8590IT | 100 | 70.5 | 10.5 | 35.5 | 7.3 | 46 | 76 | 47 | 30 | 3,120 | 32,600 |
| Renk RK775 | 104 | 67.5 | 10.6 | 32.5 | 7.8 | 47 | 75 | 47 | 30 | 3,010 | 32,000 |
| Dairyland Stealth 1507BT | 106 | 70.5 | 10.7 | 36.2 | 8.1 | 48 | 75 | 47 | 28 | 2,970 | 31,800 |
| High Cycle 7601YGCB | 103 | 70.2 | 9.7 | 32.4 | 7.9 | 43 | 78 | 50 | 31 | 3,250 | 31,400 |
| Renk RK789YGCB | 111 | 69.3 | 10.2 | 33.2 | 7.4 | 46 | 75 | 45 | 29 | 3,040 | 31,000 |
| High Cycle 7748YGCB | 109 | 72.5 | 10.8 | 39.3 | 7.6 | 49 | 74 | 46 | 26 | 2,860 | 30,900 |
| DeKalb DKC 54-51 | 104 | 69.5 | 9.8 | 32.2 | 7.5 | 44 | 77 | 46 | 31 | 3,140 | 30,900 |
| Ag Venture 6501CB | 103 | 70.3 | 9.9 | 33.6 | 7.8 | 46 | 76 | 48 | 29 | 3,050 | 30,300 |
| Mean | | 69.7 | 11.1 | 36.6 | 7.8 | 45 | 77 | 48 | 29 | 3,150 | 35,000 |
| LSD (0.10) | | 2.0 | 1.2 | 2.6 | 0.5 | 3 | 2 | 1 | 3 | 200 | 5,300 |

¹ **DM** yield is whole-plant corn yield at 100% dry matter; **Silage** yield is whole-plant corn yield at harvest moisture.

² Quality concentration description expressed as a % of DM, except NDFD which is expressed as a % of NDF. Refer to RESULTS PROVIDED text for additional information.

³ Milk production was estimated using spreadsheet MILK2000 developed at the University of Wisconsin. Refer to RESULTS PROVIDED for additional information.

2004 Minnesota Hybrid Corn Performance Trials

Tom Hoverstad, Dale Hicks, George Nelson, and Steve Quiring
(University of Minnesota Agricultural Experiment Station)

Results of the Minnesota Corn Hybrid Evaluation Program are presented in this bulletin. The program was conducted by the University of Minnesota Agricultural Experiment Station to provide unbiased information for use by corn growers when they choose hybrids to buy and grow. The program was financed in part by entry fees from private seed companies that chose to enter their hybrids for testing.

TEST LOCATIONS

Test zones, locations and maturities are as follows:

Southern Zone: Lamberton, Waseca, and Plainview

Early Maturity Trial - 103 Relative Maturity (RM) and earlier hybrids

Late Maturity Trial - 104 RM and later hybrids

Central Zone: Morris and Rosemount

Early Maturity Trial - 95 RM and earlier hybrids

Late Maturity Trial - 96 RM and later hybrids

Northern Zone: Staples and Rothsay

TESTING PROCEDURE

Entries: Each seed corn company could enter up to six hybrids per zone. Entries in each trial were based on the Relative Maturity (RM) provided by the company. The University of Minnesota Corn Testing Committee could also choose and enter hybrids in each test. For this reason, there may be more than six hybrids for a company in a test.

PRESENTATION OF DATA

Yields are given for individual locations along with yields and harvest moisture contents averaged across locations for 2004. Reported yields are adjusted to 15.5% grain moisture. Hybrids are ranked within maturity group by moisture content averaged across locations for 2004.

LEAST SIGNIFICANT DIFFERENCE

The LSD (Least Significant Difference) figures at the bottom of the yield columns in the tables are statistical measures of variability in the trials. These values may be used to determine whether the difference between any two hybrids is likely to be a real difference or just natural variation.

If the yield difference between two hybrids is equal to or greater than the LSD, then one can be confident that the two hybrids probably differ in yield potential. We show LSD values with a 0.2 alpha level which means that when two hybrids differ in yield by the LSD value or more, one can be 80% confident that the two hybrids differ in yield potential. The higher yielding one is the better hybrid from the yield standpoint. If the yield difference between two hybrids is less than the LSD, the two hybrids probably do not differ significantly in yield potential, (University of Minnesota Extension Service, Regional Center, Rochester, MN).

Participating Companies

Names and mailing addresses of companies participating in the 2004 trials:

Access Seed: 980 Fox Ridge Road, Dike, IA 50624

Ag Source Seeds, Inc.: 1800 L. Ave, Nevada IA, 50201

Albert Lea Seed House (Viking Hybrids): Box 127, 1414 W. Main, Albert Lea, MN 56007

Anderson Seeds: Rt. 3 Box 94, St. Peter, MN 56082

Brown Seed Farms Inc.: PO Box 7, Bay City, WI 54723

Crows Hybrid Corn Co.: Box 306, Milford, IL 60953

Dahlman Seed Co.: 73504-200th St., Dassel, MN 55325

Dairyland Seed Co., Inc. (Stealth): Box 958, West Bend, WI 53095

DynaGro: 221 W Lake Lansing Rd 102 East, East Lansing, MI 48823

Epley Bros. Hybrids, Inc.: PO Box 310, Shell Rock, IA 50670

Farm Advantage: 1275 Hwy 69, Belmond IA 50421

Garst Seed Co & Agripro Seeds: 2369 330th St., Box 500, Slater, IA

Gold Country Seed Inc.: 16506 Hwy 15 North, PO Box 0604, Hutchinson, MN 55350-0604

Golden Harvest / Golden Seeds Co.: 27525 135th Ave N, Cordova IL 61242

Hyland Seeds: 2 Hyland Drive, Blenheim, Ontario, Canada NOP 1A0

Jung Farms Inc.: 341 So. High St., Randolph, WI 53956

Kaltenberg Seeds: PO Box 278, Waunakee, WI 53597

Kruger Seed Co.: 33938 160th St., Dike, IA 50624

L.G. Seeds Inc.: 22827 Shissler Road, Elwood IL 61529

Mallard Seed Co., Inc.: Plainview, MN 55964

Monsanto Co. (DeKalb): 3100 Sycamore Rd., DeKalb, IL 60115

Mycogen Seeds: 9330 Zionsville Road, Indianapolis, IN 46268

Nutech/Thompson Seeds: 6131 North Fork Rd., Ames, IA 50010

Pfister Hybrid Corn Co.: 187 N Fayette St., El Paso, IL 61738

Pioneer Hi-Bred Int'l., Inc.: 99 Navaho Ave., Suite 101A, Mankato, MN 56001

RAGT Semences: Rue Emile Single - Site de Bourran, FR 12033 Rodez cedex 9

Renk Seed Co.: 6800 Wilburn Rd., Sun Prairie, WI 53590

Sand Seed Service: Box 648, 4765 Hwy 143, Marcus, IA 51035

Seeds 2000: Box 200, Breckenridge, MN 56520

Top Farm Hybrids: PO Box 850 Cokato, MN 55321

Trelay, Inc. (High Cycle by Trelay): 11623 Hwy 80, Livingston, WI 53554

Trisler Seed Farms, Inc.: 3274 E 800 North Rd, Fairmount, IL 61841

Wensman Seed Co.: Box 190, Wadena, MN 56482

Table 1. Individual Trial Information - 2004

| Location | Cooperators | Previous Crop | Planting Date | Harvest Dates |
|-----------|----------------------------------|---------------|---------------|---------------|
| Lamberton | Steve Quiring | Soybean | 27-Apr | 16-Oct |
| Waseca | Tom Hoverstad | Soybean | 28-Apr | 28-Oct |
| Plainview | Fritz Brietenbach Bruce Ihrke | Soybean | 4-May | 4-5 Nov |

Table 2. Early Maturity Hybrids, Southern Locations, 2004

| Source/Brand | Hybrid | Relative Maturity | ----- Yield, Bushels/acre at: ----- | | | Average Across ----- Locations ----- | |
|------------------------------------|---------------|-------------------|-------------------------------------|------------|------------|--------------------------------------|-------------|
| | | | Lamberton | Plainview | Waseca | Bu/Acre | % Moisture |
| 97 and earlier RM hybrids | | | | | | | |
| Kruger | 9392RR | 92 | 188 | 234 | 173 | 198 | 18.9 |
| Anderson | 94YR | 94 | 179 | 214 | 167 | 187 | 19.0 |
| Access | A-5293YGCB | 93 | 160 | 213 | 155 | 176 | 19.1 |
| NuTech | EX 592 RRYGCB | 91 | 175 | 207 | 172 | 184 | 19.2 |
| Crows | 1703 B | 95 | 197 | 233 | 197 | 209 | 19.2 |
| NuTech | 5592 YGCB | 91 | 181 | 202 | 164 | 182 | 19.4 |
| NuTech | 3595 RR | 93 | 189 | 233 | 202 | 208 | 19.5 |
| NuTech | 6595 YGRW | 96 | 178 | 231 | 184 | 198 | 19.5 |
| Renk | RK488YGCB | 96 | 192 | 232 | 196 | 207 | 19.6 |
| Kruger | 9496 YGCB | 94 | 176 | 240 | 200 | 205 | 19.7 |
| Epley | E1150YGCB | 95 | 210 | 243 | 178 | 210 | 19.7 |
| Dahlman | D48-01 | 96 | 183 | 228 | 183 | 198 | 19.7 |
| Access | A-1597RR | 97 | 179 | 237 | 215 | 211 | 19.7 |
| NuTech | 4595+ YGCB | 93 | 190 | 229 | 195 | 205 | 19.7 |
| Golden Harvest | H-7007Bt | 96 | 201 | 229 | 202 | 211 | 19.7 |
| Dekalb | DKC47-10 | 97 | 187 | 228 | 193 | 203 | 19.7 |
| Gold Country | 94-01CB | 94 | 214 | 222 | 200 | 212 | 19.8 |
| Dahlman | R48-15 | 95 | 178 | 231 | 204 | 204 | 19.8 |
| Anderson | 797Y | 96 | 185 | 239 | 203 | 209 | 19.9 |
| Kaltenberg | K4688Bt | 96 | 207 | 245 | 199 | 217 | 19.9 |
| Dahlman | D47-47 | 94 | 196 | 228 | 201 | 208 | 20.0 |
| NuTech | 4393 YGCB | 93 | 208 | 207 | 183 | 199 | 20.0 |
| Kruger | 5594YGCB | 96 | 196 | 208 | 201 | 202 | 20.0 |
| Viking | Bt 7293 | 96 | 197 | 231 | 192 | 207 | 20.1 |
| Garst | 8880YG1 | 95 | 204 | 236 | 184 | 208 | 20.2 |
| Dahlman | D48-15 | 95 | 196 | 227 | 183 | 202 | 20.5 |
| Pioneer | 37A91 | 97 | 221 | 241 | 190 | 217 | 21.4 |
| 97 and earlier RM Averages: | | | 191 | 228 | 190 | 203 | 19.7 |

Table 2 continued. Early Maturity Hybrids, Southern Locations, 2004

| Source/Brand | Hybrid | Relative Maturity | ----- Yield, Bushels/acre at: ----- | | | Average Across ----- Locations ----- | |
|-------------------------------|---------------|-------------------|-------------------------------------|------------|------------|--------------------------------------|-------------|
| | | | Lamberton | Plainview | Waseca | Bu/Acre | % Moisture |
| 98 to 101 RM Hybrids | | | | | | | |
| Access | A-1500RR | 100 | 193 | 247 | 197 | 212 | 18.9 |
| Dairyland | Stealth-5497 | 98 | 183 | 240 | 202 | 208 | 19.4 |
| Dekalb | DKC50-20 | 100 | 203 | 247 | 216 | 222 | 20.0 |
| NuTech | 4999 YGCB | 98 | 212 | 228 | 218 | 219 | 20.2 |
| High Cycle by Trelay | HC7454YGCB | 98 | 213 | 217 | 220 | 217 | 20.2 |
| Dekalb | DKC50-18 | 100 | 215 | 241 | 192 | 216 | 20.3 |
| Top Farm | 2301 | 100 | 185 | 210 | 211 | 202 | 20.4 |
| Viking | B6573 | 100 | 204 | 230 | 204 | 212 | 20.6 |
| LG Seeds | LG2489Bt | 100 | 214 | 224 | 190 | 209 | 20.6 |
| Anderson | 100YR | 100 | 196 | 218 | 223 | 212 | 20.7 |
| Viking | HL 6592 | 101 | 223 | 221 | 199 | 214 | 20.8 |
| Pioneer | 38H67 | 98 | 181 | 233 | 193 | 203 | 20.9 |
| Renk | RK632YGCB | 99 | 232 | 235 | 205 | 224 | 21.0 |
| LG Seeds | LG2494 | 100 | 184 | 222 | 199 | 202 | 21.1 |
| NuTech | EX 305 RR | 99 | 210 | 256 | 220 | 229 | 21.2 |
| Sands | SOI 9013 | 101 | 197 | 216 | 213 | 209 | 21.3 |
| High Cycle by Trelay | HC5B353 | 100 | 235 | 239 | 222 | 232 | 21.4 |
| Garst | 8787YG1 | 101 | 229 | 245 | 241 | 238 | 21.4 |
| NuTech | 3003 RR | 99 | 212 | 226 | 216 | 218 | 21.6 |
| NuTech | Ex. 200RR | 99 | 190 | 207 | 198 | 199 | 21.9 |
| Pfister | 1688Bt | 99 | 225 | 229 | 209 | 221 | 22.0 |
| High Cycle by Trelay | HC7560YGCB | 100 | 217 | 233 | 207 | 219 | 22.0 |
| Pfister | 2060Bt | 99 | 194 | 223 | 240 | 219 | 22.1 |
| NuTech | 2202 HX | 101 | 237 | 241 | 184 | 221 | 22.1 |
| Trisler | T-2744CB | 101 | 216 | 208 | 232 | 219 | 22.2 |
| NuTech | 4202 YGCB | 101 | 217 | 240 | 211 | 223 | 22.2 |
| Wensman | W 6315BtRR | 101 | 233 | 221 | 236 | 230 | 22.5 |
| Wensman | W 7309RWRR | 101 | 186 | 208 | 195 | 196 | 22.7 |
| NuTech | 5101+ RR/YGCB | 101 | 213 | 211 | 219 | 215 | 22.8 |
| Pfister | 1680Bt | 99 | 202 | 219 | 238 | 220 | 22.9 |
| NuTech | 4303 YGCB | 101 | 236 | 215 | 223 | 225 | 23.3 |
| Trisler | T-2475CB | 100 | 214 | 229 | 207 | 217 | 23.9 |
| 98 to 101 RM Averages: | | | 209 | 228 | 212 | 216 | 21.4 |

| | | | | | | | |
|------------------------------|-------------|-----|-----|-----|-----|-----|------|
| 102 to 103 RM Hybrids | | | | | | | |
| Kruger | 9002 YGCB | 102 | 228 | 259 | 231 | 239 | 19.7 |
| Dekalb | DKC52-47 | 102 | 202 | 244 | 220 | 222 | 20.0 |
| Renk | RK652LLYGCB | 103 | 213 | 244 | 206 | 221 | 20.7 |
| NuTech | 4403 YGCB | 103 | 199 | 243 | 232 | 225 | 21.2 |
| Kaltenberg | K5215Bt | 102 | 225 | 229 | 232 | 229 | 21.2 |

Table 2 continued. Early Maturity Hybrids, Southern Locations, 2004

| Source/Brand | Hybrid | Relative Maturity | ----- Yield, Bushels/acre at: ----- | | | Average Across ----- Locations ----- | |
|-----------------------------------------------------|---------------|-------------------|-------------------------------------|------------|------------|--------------------------------------|-------------|
| | | | Lamberton | Plainview | Waseca | Bu/Acre | % Moisture |
| 102 to 103 RM Hybrids, continued | | | | | | | |
| Sands | SOI 103YGCB | 103 | 200 | 226 | 198 | 208 | 21.2 |
| Access | A-2103RR/YGCB | 103 | 202 | 222 | 211 | 212 | 21.2 |
| Dekalb | DKC52-21 | 102 | 211 | 236 | 230 | 226 | 21.5 |
| Viking | Bt 5370 | 103 | 227 | 221 | 200 | 216 | 21.7 |
| Kruger | 9306 YGCB | 103 | 220 | 234 | 203 | 219 | 21.7 |
| Garst | 8745YG1/RR | 102 | 203 | 236 | 231 | 223 | 21.8 |
| NuTech | 5702 RR/YGCB | 102 | 208 | 239 | 190 | 212 | 21.8 |
| Anderson | 6005 | 102 | 206 | 220 | 179 | 202 | 21.9 |
| Access | A-5504YGCB | 102 | 250 | 221 | 248 | 240 | 22.2 |
| Access | A-8503HX | 103 | 201 | 237 | 211 | 216 | 22.5 |
| Top Farm | 2300 | 103 | 198 | 209 | 192 | 199 | 22.5 |
| Garst | NE634IT | 103 | 242 | 242 | 202 | 229 | 22.6 |
| Kruger | 9203 RR/YGCB | 103 | 210 | 237 | 230 | 226 | 22.6 |
| Renk | RK636RRYGCB | 102 | 208 | 234 | 210 | 217 | 22.8 |
| Trisler | T-2757CB | 103 | 194 | 189 | 228 | 204 | 22.9 |
| Anderson | C102R | 102 | 200 | 209 | 167 | 192 | 23.0 |
| Farm Advantage | 1023 HX | 102 | 196 | 205 | 245 | 215 | 23.0 |
| Epley | E1442 | 102 | 195 | 213 | 230 | 213 | 23.4 |
| High Cycle by Trelay | HC7601YGCB | 103 | 215 | 205 | 188 | 203 | 23.6 |
| Access | A-5503YGCB | 103 | 232 | 204 | 209 | 215 | 23.7 |
| Crows | 2780 B | 103 | 223 | 207 | 206 | 212 | 23.9 |
| Sands | SOI 9033 | 103 | 194 | 211 | 191 | 199 | 23.9 |
| Epley | E1430YGCB | 103 | 220 | 215 | 198 | 211 | 24.8 |
| 102 to 103 RM averages: | | | 211 | 224 | 211 | 215 | 22.3 |
| Southern Locations, Early Maturity Averages: | | | 204 | 226 | 205 | 212 | 21.2 |
| LSD(0.20) | | | 20 | 13 | 25 | 12 | 0.7 |

Table 3. Late Maturity Hybrids, Southern Locations, 2004

| Source/Brand | Hybrid | Relative Maturity | ----- Yield, Bushels/acre at: ----- | | | Average Across ----- Locations ----- | |
|---------------------------------|------------|-------------------|-------------------------------------|-----------|--------|--------------------------------------|------------|
| | | | Lamberton | Plainview | Waseca | Bu/Acre | % Moisture |
| 104 RM and later hybrids | | | | | | | |
| Renk | RK772YGCB | 104 | 215 | 244 | 192 | 217 | 20.2 |
| Access | A-5705YGCB | 105 | 208 | 229 | 202 | 213 | 20.5 |
| Anderson | 4033 | 106 | 183 | 222 | 210 | 205 | 20.6 |
| Access | A-5405YGCB | 105 | 204 | 226 | 234 | 221 | 20.7 |

Table 3 Continued. Late Maturity Hybrids, Southern Locations, 2004

| Source/Brand | Hybrid | Relative Maturity | ----- Yield, Bushels/acre at: ----- | | | Average Across ----- Locations ----- | |
|--------------------------------------------|----------------|-------------------|-------------------------------------|-----------|--------|--------------------------------------|------------|
| | | | Lamberton | Plainview | Waseca | Bu/Acre | % Moisture |
| 104 RM and later hybrids, continued | | | | | | | |
| Dairyland | Stealth-5503 | 105 | 203 | 219 | 226 | 216 | 20.8 |
| Jung | 6580YGCB | 104 | 211 | 252 | 217 | 226 | 20.9 |
| Golden Harvest | H-7990Bt | 104 | 210 | 217 | 202 | 210 | 21.1 |
| NuTech | Ex. 104A YGCB | 104 | 194 | 219 | 189 | 201 | 21.1 |
| NuTech | Ex. 205 YGCB | 104 | 229 | 234 | 249 | 237 | 21.3 |
| Golden Harvest | Ex48338Bt | 106 | 198 | 229 | 179 | 202 | 21.3 |
| Anderson | 106Yr | 106 | 191 | 221 | 202 | 204 | 21.4 |
| Anderson | 105Y | 105 | 216 | 221 | 190 | 209 | 21.5 |
| Gold Country | 1016RRBt | 104 | 177 | 222 | 181 | 193 | 21.6 |
| Access | A-1006RR | 105 | 209 | 206 | 219 | 211 | 21.7 |
| Kruger | 9505 | 105 | 209 | 203 | 228 | 213 | 21.7 |
| High Cycle by Trelay | HC5B739 | 104 | 208 | 234 | 191 | 211 | 21.7 |
| Viking | BR6316 | 104 | 198 | 226 | 215 | 213 | 21.7 |
| Renk | RK700YGCB | 105 | 212 | 213 | 243 | 223 | 21.8 |
| NuTech | 3006 RR | 106 | 207 | 217 | 225 | 217 | 21.8 |
| Anderson | 4320 | 107 | 195 | 222 | 173 | 197 | 21.9 |
| NuTech | 4607 YGCB | 106 | 198 | 231 | 234 | 221 | 22.0 |
| Dekalb | DKC54-51 | 104 | 230 | 217 | 198 | 215 | 22.0 |
| Viking | B 5303 | 104 | 213 | 212 | 207 | 211 | 22.1 |
| Viking | 4520 | 107 | 168 | 201 | 212 | 194 | 22.1 |
| Dairyland | Stealth-5104 | 104 | 197 | 203 | 221 | 207 | 22.2 |
| Jung | 6545YGCB | 105 | 227 | 216 | 205 | 216 | 22.4 |
| Epley | E2410YGCB | 107 | 184 | 217 | 148 | 183 | 22.5 |
| Kruger | 9508 | 108 | 213 | 200 | 194 | 202 | 22.6 |
| Dairyland | Stealth-1606RR | 107 | 193 | 234 | 185 | 204 | 22.6 |
| Dekalb | DKC58-80 | 108 | 240 | 216 | 234 | 230 | 22.6 |
| Garst | 8578IT | 108 | 178 | 230 | 186 | 198 | 23.0 |
| Garst | NE 685IT | 106 | 221 | 213 | 209 | 215 | 23.1 |
| Epley | E2412 | 106 | 204 | 205 | 206 | 205 | 23.2 |
| Pioneer | 34N44 | 110 | 210 | 218 | 217 | 215 | 23.2 |
| Wensman | W 6318Bt | 104 | 217 | 233 | 195 | 215 | 23.2 |
| LG Seeds | LG2533 | 105 | 174 | 228 | 217 | 206 | 23.3 |
| Top Farm | 9305RY | 104 | 188 | 209 | 154 | 184 | 23.3 |
| Kruger | 5110YGCB | 107 | 198 | 185 | 200 | 194 | 23.5 |
| Access | A-2506RR/YGCB | 106 | 217 | 209 | 196 | 207 | 23.7 |
| Pioneer | 35Y67 | 106 | 231 | 240 | 241 | 237 | 23.7 |
| High Cycle by Trelay | HC7698RR/YGCB | 107 | 211 | 209 | 208 | 209 | 23.7 |
| Viking | B5313 | 105 | 228 | 212 | 216 | 219 | 23.7 |
| NuTech | 4407 YGCB | 107 | 209 | 205 | 191 | 202 | 23.9 |
| Access | A-8407HX | 107 | 179 | 191 | 185 | 185 | 24.3 |

Table 3 Continued. Late Maturity Hybrids, Southern Locations, 2004

| Source/Brand | Hybrid | Relative Maturity | ----- Yield, Bushels/acre at: ----- | | | Average Across ----- Locations ----- | |
|----------------------------------------------------|--------------|-------------------|-------------------------------------|------------|------------|--------------------------------------|-------------|
| | | | Lamberton | Plainview | Waseca | Bu/Acre | % Moisture |
| 104 RM and later hybrids, continued | | | | | | | |
| NuTech | Ex. 539 YGCB | 108 | 224 | 196 | 192 | 204 | 24.5 |
| NuTech | EX 308 YGCB | 107 | 219 | 217 | 189 | 208 | 24.5 |
| Wensman | W 5417Bt | 107 | 196 | 228 | 177 | 200 | 24.6 |
| Wensman | W 6422BtRR | 107 | 228 | 207 | 201 | 212 | 24.7 |
| NuTech | 313 | 108 | 236 | 204 | 181 | 207 | 24.7 |
| Wensman | W 5437Bt | 110 | 212 | 195 | 219 | 209 | 24.8 |
| Kruger | 9510 | 108 | 202 | 167 | 198 | 189 | 25.3 |
| NuTech | 110 | 108 | 209 | 172 | 171 | 184 | 25.5 |
| NuTech | 608 | 108 | 200 | 181 | 220 | 200 | 26.2 |
| RAGT | MX337 | 108 | 167 | 200 | 134 | 167 | 26.5 |
| Access | A-1506RR | 106 | 176 | 173 | 192 | 180 | 30.0 |
| Southern Locations, Late Maturity Averages: | | | 205 | 214 | 202 | 207 | 22.9 |
| LSD(0.20) | | | 20 | 17 | 30 | 13 | 0.7 |

Comparison of corn hybrids at Lewiston, Minnesota in 2004.

Breitenbach, Fritz R., Lisa M. Behnken, and Jerrold A. Tesmer.

The objective of these studies was to evaluate grain yield of commonly planted hybrids in southeastern Minnesota. The trials were located at Lewiston, MN. Field histories are reported in Table 1. The trials were planted with a 4-row John Deere 7000 planter equipped with cone units. The seeding rate was 35,000 seeds per acre planted at a depth of 1.75 inches. The plots were four rows wide by 25 feet in length. A randomized complete block design was implemented and replicated four times. The two center rows of each plot were machine harvested with grain weight and moisture recorded. The trials were divided into early (90-97 day) and late maturity (98-108 day).

Table 1. Field history for corn hybrid research site.

| | Lewiston, MN |
|---------------------------------------|--------------------------|
| Planting Date | May 05, 2004 |
| Soil Type | Port Byron silt loam |
| Fertilizer (N-P-K) Spring App. | 150-53-70 |
| Herbicide Pre/Post | Steadfast+Hornet+Clarity |
| Harvest Date | November 13, 2004 |
| Tillage | Conventional |
| Previous Crop | Soybean |

Corn yields were exceptional across SE Minnesota again this year. Yields in this trial ranged from a low of 178 bushels/acre to a high of 230 bushels/acre. Grain moisture varied from a low of 19.3 percent to a high of 26.6 percent. Average yield in the Early Corn Trial was 210 bushels per acre with an average gross return of \$376.24. Average yield in the Late Corn Trial was 205 bushels per acre with an average gross return of \$374.81.

In the Early Maturity Corn Hybrid Performance Trial, NK Brand 32-L9 was numerically the highest yielding hybrid. Six other hybrids in the trial were statistically equal to this hybrid in yield and are **highlighted** in Table 2. Early Corn. Coincidentally, they are ranked 1 to 7 in gross return per acre.

In the Late Maturity Corn Hybrid Performance Trial, Mycogen 2J525 was numerically the highest yielding hybrid. Eight other hybrids in the trial were statistically equal to this hybrid in yield and are **highlighted** in Table 3 - Late Corn. Moisture differences between hybrids in the Late Maturity Corn Trial are such that in some cases slightly lower yielding but drier corn resulted in potentially higher gross returns. Special thanks to: Ted and Wanda Olson, farmer cooperators; and all of the seed companies involved.

FORMULA for calculating gross return:

(Harvested bushels per acre times the dollar bushel revenues per acre of \$1.96) **minus** (((grain moisture minus 15) x bushels per acre) x \$0.03) equals drying cost per acre. In general, grain yield is still the best indicator of hybrid performance. However; grain moisture is important when looking at gross dollar return, (University of Minnesota Extension Service, Regional Center, Rochester, MN).

Table 2. Early Corn - Grain moisture, yield, and gross dollar return per acre at Lewiston, MN 2004 (Breitenbach, Behnken, and Tesmer).

| Entry Name | Description | LEWISTON | | Gross Return Less drying | RANK |
|----------------------------|---------------------------------------------|-------------|--------------|-----------------------------|----------|
| | | % Moisture | bu/A | | |
| Brownseed 3000 YGCB | 90 Day | 19.3 | 209.8 | \$384.14 | 2 |
| Brownseed 4250 YGCB | | 20.4 | 198.5 | \$356.90 | 16 |
| Croplan Genetics 354 BT | 95 Day YieldGard Corn Borer | 21.4 | 195.1 | \$344.94 | 22 |
| Crows - Channel 6939 RB | 93 Day | 20.1 | 182.4 | \$329.60 | 25 |
| Crows 1703 B | 95 Day | 20.2 | 206.6 | \$372.71 | 5 |
| DeKalb 42-95 | 92 Day YieldGard Roundup Ready 2 | 20.7 | 207.1 | \$370.50 | 7 |
| DeKalb 47-10 | 97 Day YieldGard Corn Borer Roundup Ready 2 | 20.7 | 205.4 | \$367.46 | 8 |
| Dyna Gro 53P30 | 93 Day YieldGard Corn Borer Roundup Ready | 20.8 | 204.1 | \$364.52 | 10 |
| Dyna Gro 53F09 | 95 Day YieldGard Corn Borer | 20.6 | 207.5 | \$371.84 | 6 |
| Garst 8922 | 90 Day YieldGard Corn Borer | 20.2 | 202.8 | \$365.85 | 9 |
| Garst 8880 | 96 Day YieldGard Corn Borer | 20.6 | 211.8 | \$379.55 | 4 |
| Gold Country Seed 96-04 CB | 93 Day YieldGard Corn Borer | 20.6 | 194.6 | \$348.72 | 21 |
| Gold Country Seed 94-01 CB | 94 Day YieldGard Corn Borer | 20.9 | 199.3 | \$355.35 | 18 |
| Golden Harvest H-6775 Bt | 93 Day | 21.5 | 192.3 | \$339.41 | 23 |
| Golden Harvest H-7007 Bt | 96 Day | 21.0 | 201.3 | \$358.31 | 14 |
| Mycogen 2T336 | 92 Day YieldGard Corn Borer Roundup Ready | 20.3 | 186.8 | \$336.43 | 24 |
| Mycogen 2R426 | 96 Day YieldGard Corn Borer | 20.8 | 197.9 | \$353.45 | 20 |
| NK Brand N32-L9 | 93 Day YieldGard, Liberty Link | 20.2 | 220.4 | \$397.60 | 1 |
| NK Brand N36-R6 | 97 Day YieldGard, Liberty Link | 21.4 | 200.8 | \$355.01 | 19 |
| Pioneer 38W22 | 92 Day Herculex I Liberty Link | 20.8 | 198.1 | \$353.81 | 17 |
| Pioneer 37A91 | 97 Day | 21.5 | 215.4 | \$380.18 | 3 |
| Producers Hybrids 5154 Bt | 91 Day | 20.4 | 200.1 | \$359.78 | 13 |
| Producers Hybrids 5612 Bt | 96 Day | 20.6 | 199.5 | \$357.50 | 15 |
| AGVENTURE 4880 CB | 95 Day YieldGard | 21.0 | 203.6 | \$362.41 | 12 |
| Trelay High Cycle 7454 Bt | | 20.5 | 202.7 | \$363.85 | 11 |
| LSD (0.10) | | 0.8 | 14.5 | | |

Table 3. Late Corn - Grain moisture, yield, and gross dollar return per acre at Lewiston, MN 2004 (Breitenbach, Behnken, and Tesmer).

| Entry Name | Description | LEWISTON | | Gross Return Less drying | RANK |
|-----------------------------------|----------------------------------------------|-------------|--------------|-----------------------------|-----------|
| | | % Moisture | bu/A | | |
| AGVENTURE 6230 CB | 101 Day YieldGard Corn Borer | 22.0 | 211.4 | \$369.95 | 11 |
| AGVENTURE 6501 CB | 103 Day YieldGard Corn Borer | 23.4 | 201.8 | \$344.67 | 16 |
| Brownseed 5636 | 102 Day | 21.1 | 212.0 | \$376.72 | 9 |
| Brownseed 6220 | 105 Day | 23.6 | 192.8 | \$328.15 | 21 |
| Croplan Genetics 364 BT | 98 Day YieldGard Corn Borer | 20.1 | 209.8 | \$379.11 | 8 |
| Crows 2105 B | 100 Day | 21.3 | 194.6 | \$344.64 | 17 |
| Crows 2780 B | 103 Day | 22.5 | 178.2 | \$309.18 | 24 |
| DeKalb DKC50-20 | 100 Day YieldGard Corn Borer Roundup Ready 2 | 22.0 | 201.1 | \$351.93 | 15 |
| DeKalb DKC54-51 | 105 Day YieldGard Corn Borer | 22.5 | 193.1 | \$335.03 | 20 |
| Dyna Gro 55F16 | 101 Day YieldGard Corn Borer | 20.3 | 211.0 | \$380.01 | 6 |
| Dyna Gro 55F53 | 102 YieldGard Corn Borer | 21.4 | 203.3 | \$359.43 | 13 |
| Garst 8535 | 108 Day YieldGard Corn Borer IT | 22.4 | 220.2 | \$382.71 | 4 |
| Gold Country Seed 103-02 CB | 103 Day YieldGard Corn Borer | 23.4 | 183.6 | \$313.59 | 22 |
| Golden Harvest H-7370 | 99 Day | 20.7 | 206.8 | \$369.97 | 10 |
| Golden Harvest H-7990 Bt | 103 Day YieldGard Corn Borer | 22.7 | 198.2 | \$342.69 | 18 |
| Mycogen 2J525 | 101 Day | 20.2 | 229.8 | \$414.56 | 1 |
| Mycogen 2R570 | 104 Day Herculex I Liberty Link | 22.2 | 208.7 | \$363.97 | 12 |
| NK Brand N45-A6 | 101 Bt 11, Liberty Link | 21.5 | 216.3 | \$381.77 | 5 |
| NK Brand N60-B6 | 106 Day YieldGard, Liberty Link | 22.5 | 218.8 | \$379.62 | 7 |
| Pioneer 38H67 | 98 Day | 21.4 | 224.4 | \$396.74 | 2 |
| Pioneer 35Y67 | 106 Day Herculex I Liberty Link | 26.6 | 193.8 | \$312.41 | 23 |
| Producers Hybrids 6246 Bt | 102 Day YieldGard Corn Borer | 22.6 | 207.5 | \$359.39 | 14 |
| Trelay High Cycle 5B353 Bt | YieldGard Corn Borer | 21.5 | 219.2 | \$386.89 | 3 |
| Trelay High Cycle 7601 Bt | 103 Day YieldGard Corn Borer | 22.7 | 195.2 | \$337.50 | 19 |
| LSD (0.10) | | 1.6 | 19.8 | | |

Comparison of Bt corn hybrids and their isoline hybrids at Lewiston, Potsdam, Rochester, and Waseca, Minnesota in 2004.

Breitenbach, Fritz R., Lisa M. Behnken, Thomas R. Hoverstad, and Jerrold A. Tesmer.

The objective of this study was to evaluate and compare the grain yield of commonly planted Bt hybrids to their isoline hybrids in southeastern Minnesota. The trials were located at Lewiston, Potsdam, Rochester, and Waseca, Minnesota. Field histories are reported in Table 1. All sites were planted with a 4-row John Deere 7000 planter equipped with cone units. The seeding rate was 35,000 seeds per acre planted at a depth of 1.75 inches. Plots were four rows wide by 25 feet in length. A randomized complete block design was implemented with four replications at each site.

Table 1. Field histories for research sites.

| | Potsdam, MN | Lewiston, MN |
|-----------------------------------------|----------------------|--------------------------|
| Planting Date | May 05, 2004 | May 05, 2004 |
| Soil Type | Port Byron silt loam | Port Byron silt loam |
| Fertilizer (N-P-K-) Spring App. | 160-0-120 | 150-53-70 |
| Herbicide Pre/Post | Lumax | Steadfast+Hornet+Clarity |
| Harvest Date | November 11, 2004 | November 13, 2004 |
| Tillage | Conventional | Conventional |
| Previous Crop | Soybean | Soybean |
| | | |
| | Rochester, MN | Waseca, MN |
| Planting Date | April 27, 2004 | April 24, 2004 |
| Soil Type | Lawler loam | Port Byron silt loam |
| Fertilizer (N-P-K-S) Spring App. | 162-23-120-23 | 140-0-0-0 |
| Herbicide Pre/Post | Lumax | Lumax |
| Harvest Date | November 12, 2004 | October 22, 2004 |
| Tillage | Conventional | Conventional |
| Previous Crop | Soybean | Soybean |

Table 2. Grain yield and moisture content at Lewiston, Potsdam, Rochester, and Waseca, MN in 2004 (Breitenbach, Behnken, Hoverstad and Tesmer).

| Entry Name | Description | POTSDAM | | LEWISTON | | ROCHESTER | | WASECA | | AVERAGE | AVERAGE |
|-------------------|-------------------------------------|------------|-------|------------|-------|------------|-------|------------|-------|------------|---------|
| | | % Moisture | bu/A | % Moisture | bu/A | % Moisture | bu/A | % Moisture | bu/A | % Moisture | bu/A |
| DeKalb 46-26 | 96 Day | 23.4 | 213.4 | 20.6 | 208.4 | 21.9 | 214.8 | 20.23 | 210.2 | 21.5 | 211.7 |
| DeKalb 47-10 | 97 Day YieldGard CB, Roundup Ready | 26.6 | 193.2 | 21.1 | 215.1 | 22.0 | 198.8 | 19.95 | 202.1 | 22.4 | 202.3 |
| DeKalb 51-43 | 101 Day | 24.6 | 214.2 | 21.5 | 209.7 | 23.0 | 236.7 | 21.83 | 211.1 | 22.7 | 217.9 |
| DeKalb 50-20 | 100 Day YieldGard CB, Roundup Ready | 23.7 | 217.7 | 22.0 | 212.1 | 23.1 | 225.2 | 21.45 | 209.4 | 22.6 | 216.1 |
| NK Brand N45-T5 | 101 Day Liberty Link | 25.8 | 210.1 | 21.6 | 200.7 | 22.4 | 218.8 | 20.85 | 196.0 | 22.7 | 206.4 |
| NK Brand N45-A6 | 101 Day Bt 11, Liberty Link | 25.0 | 206.4 | 21.1 | 216.2 | 21.9 | 232.2 | 20.63 | 212.2 | 22.2 | 216.8 |
| NK Brand N48-L4 | 103 Day | 24.3 | 202.6 | 23.9 | 199.6 | 24.3 | 218.1 | 23.35 | 200.2 | 23.9 | 205.1 |
| NK Brand NX5253 | 103 Day, Bt 11, Liberty Link | 24.3 | 213.2 | 25.2 | 192.7 | 24.2 | 219.4 | 23.58 | 195.9 | 24.3 | 205.3 |
| Pioneer P36N70 | 101 Day | 24.4 | 211.3 | 21.2 | 212.5 | 22.2 | 210.4 | 22.55 | 193.8 | 22.6 | 207.0 |
| Pioneer P36N71 | 102 Day YieldGard CB | 24.4 | 218.3 | 21.5 | 199.4 | 21.8 | 201.8 | 23.67 | 194.6 | 22.8 | 203.5 |
| Pioneer P36B08 | 103 Day | 23.9 | 217.8 | 22.9 | 204.8 | 22.9 | 214.2 | 23.33 | 199.6 | 23.3 | 209.1 |
| Pioneer P36B09 | 104 Day YieldGard CB | 24.7 | 217.9 | 23.0 | 206.3 | 23.2 | 206.5 | 24.73 | 191.0 | 23.9 | 205.4 |
| LSD (0.10) | | 2.2 | 22 | 0.9 | 10.8 | 0.6 | 15.2 | 2.2 | 12.7 | 0.8 | 8 |

Statistically, there were minimal differences among the six pairs of Bt hybrids and their non-Bt isolines. On average across locations, the non-Bt isolines yielded 209.5 bushels per acre compared to 208.2 bushels per acre for the Bt hybrids.

Comparison across locations shows a statistical advantage for DeKalb 46-26 (non Bt) which out yielded it's Bt isolate DeKalb 47-10 at the Rochester location, and in the four location average, **highlighted**. In addition, NK Brand N45-T5 (a non Bt) yielded statistically lower than NK Brand N45-A6, it's Bt isolate, at Lewiston and Waseca, and in the four location average, **highlighted**.

At the Lewiston site Pioneer P36N70 (a non Bt) statistically out yielded its Bt isolate Pioneer P36N71. This one location advantage did not translate to an across location difference.

Special thanks to: Bruce and Susan Irhke (Potsdam) and Ted and Wanda Olson (Lewiston), farmer cooperators; and the companies of Monsanto, Pioneer, and Syngenta for supplying seed, (University of Minnesota Extension Service, Regional Center, Rochester, and Southern Research and Outreach Center, Waseca, MN and Southern Research and Outreach Center, Waseca).

Comparison of waxy corn hybrids at Potsdam, Mankato and Waseca, Minnesota in 2004.

Breitenbach, Fritz R., Lisa M. Behnken, and Thomas R. Hoverstad

The objective of these studies was to evaluate grain yield of waxy corn in southeastern Minnesota. The trials were located at Potsdam, Mankato, and Waseca, MN. Field histories are reported in Table 1. The trials were planted with a 4-row John Deere 7000 planter equipped with cone units. The seeding rate was 35,000 seeds per acre planted at a depth of 1.75 inches. The plots were four rows wide by 25 feet in length. A randomized complete block design was implemented and replicated four times. The two center rows of each plot were machine harvested with grain weight and moisture recorded at all sites, and test weight recorded at the Mankato site.

2004 was a challenging growing season especially for longer season varieties. Pioneer 36B06 stood out among the group, significantly out yielding all varieties across locations except for Gold Country 103-3 WX, Table 2. Of notable concern, however, are the lack of shorter maturity hybrids in the trial and the high moisture content of the harvested grain. As expected, shorter maturity hybrids had significantly lower grain moisture at harvest. Growers will need to weigh the benefits of yield and moisture before selecting hybrids for their farm.

The majority of waxy corn is sent to wet millers for processing into high value starches for both food and industrial uses. Typically, waxy corn hybrids yield 95-97 percent of conventional hybrids; however, test weights are usually higher. Contracted price premiums of between 10-35 cents per bushel are typical. (University of Minnesota Extension Regional Center, Rochester, MN)

Table 1. Field history for waxy corn hybrid research sites.

| | Potsdam | Mankato | Waseca |
|---------------------------------------|----------------------|--------------------------|--------------------|
| Planting Date | May 5, 2004 | May 3, 2004 | April 24, 2004 |
| Soil Type | Port Byron Silt Loam | Nicollet Marna Clay Loam | Nicollet Clay Loam |
| Fertilizer (N-P-K) Spring App. | 160-0-120 | 186-20-0 | 140-0-0 |
| Herbicide Pre/Post | Lumax | Dual/Callisto + Atrazine | Lumax |
| Harvest Date | November 12, 2004 | NA | October 22, 2004 |
| Tillage | Conventional | Conventional | Conventional |
| Previous Crop | Soybean | Soybean | Soybean |
| | | | |

Table 2. Waxy corn grain yield, moisture content and test weight at Potsdam, Mankato, and Waseca, Minnesota in 2004 (Breitenbach, Behnken, and Hoverstad).

| Entry Name | Description | POTSDAM | | MANKATO | | | WASECA | | AVERAGE | AVERAGE |
|------------------------------------|-------------------|-------------|--------------|-------------|-------------|--------------|-------------|--------------|-------------|--------------|
| | | % Moisture | bu/A | % Moisture | Test Weight | bu/A | % Moisture | bu/A | % Moisture | bu/A |
| AgriGold AG315WX | 103 Day | 25.7 | 179.6 | 28.4 | 51.9 | 178.0 | 25.7 | 168.9 | 26.6 | 175.5 |
| AgriGold AG385WX | 105 Day | 26.6 | 194.1 | 27.9 | 52.7 | 172.1 | 28.1 | 176.2 | 27.5 | 180.8 |
| AgriGold AG391WX | 106 Day | 26.2 | 173.2 | 29.9 | 51.6 | 176.9 | 27.0 | 192.5 | 27.7 | 180.9 |
| AgriGold AG333WX | 105 Day | 26.2 | 184.4 | 26.2 | 50.7 | 162.0 | 27.2 | 175.4 | 26.5 | 173.9 |
| Brownseed 5130 WX | 102 Day | 26.3 | 183.9 | 26.5 | 52.3 | 164.5 | 26.4 | 172.7 | 26.4 | 173.7 |
| Brownseed 6220WX | 104 Day | 28.0 | 177.5 | 28.0 | 51.9 | 174.0 | 26.5 | 171.9 | 27.5 | 174.5 |
| Brownseed 5090WX | 101 Day | 25.5 | 187.9 | 24.1 | 52.8 | 162.7 | 23.2 | 176.7 | 24.3 | 175.8 |
| Brownseed 6723WX | 109 Day | 24.3 | 187.8 | 27.9 | 51.0 | 181.5 | 28.6 | 178.6 | 26.9 | 182.6 |
| Gold Country Seed 98-C4 WX | 98 Day | 23.3 | 196.2 | 25.1 | 54.4 | 159.3 | 22.4 | 184.0 | 23.6 | 179.8 |
| Gold Country Seed 102 WX | 101 Day | 23.1 | 177.0 | 26.8 | 51.5 | 170.7 | 25.4 | 168.0 | 25.1 | 171.9 |
| Gold Country Seed 103-03 WX | 103 Day | 25.8 | 186.7 | 27.1 | 53.4 | 178.4 | 26.0 | 186.5 | 26.3 | 183.9 |
| Pioneer 36B06 | 105 Day | 25.2 | 192.0 | 25.7 | 53.8 | 199.0 | 24.3 | 185.3 | 25.1 | 192.1 |
| Pioneer 34H98 | 108 Day | 27.3 | 188.2 | 26.0 | 53.3 | 174.9 | 25.9 | 182.3 | 26.4 | 181.8 |
| Pioneer 34G07 | 110 Day | 25.1 | 172.5 | 27.2 | 53.0 | 184.6 | 27.6 | 176.9 | 26.6 | 178.0 |
| Pioneer 34N41 | 111 Day | 27.4 | 170.4 | * | * | * | * | * | * | * |
| Jung 2495WX | 95 Day | 24.4 | 170.7 | 22.3 | 54.2 | 161.8 | 21.4 | 173.9 | 22.7 | 168.8 |
| Jung 2546 WX | 102 Day | 27.4 | 159.9 | 26.9 | 52.7 | 161.5 | 25.0 | 171.9 | 26.4 | 164.4 |
| | LSD (0.10) | 3.0 | 21.0 | 1.4 | 1.0 | 11.8 | 1.4 | 13.6 | 1.1 | 9.2 |

Impact of planting date on grain yield and protein and oil concentration in soybean at Rochester, MN in 2004.

Behnken, Lisa M., and Fritz R. Breitenbach.

The objective of this trial was to evaluate grain yield and quality differences in soybeans in relation to planting date. The research site was a Lawler loam containing 3.1 % organic matter with a pH of 5.9 and soil test P and K levels of 45 and 139 ppm, respectively. The previous crop was forage sorghum. The field was chisel plowed in the fall and leveled with a disk in the spring. Spring lime and fertilizer were applied at the rate of 3 ton/a Ag-Lime and 120 lb/a of 0-0-60, which was incorporated with a field cultivator prior to planting. The trial was planted with a 4-row John Deere 7000 planter equipped with cone units. The seeding rate was 150,000 seeds per acre planted at a depth of 1.0 inches. The plots were 4 rows wide by 25 feet in length. The center two rows of each plot were selected for harvest with a plot combine. The herbicide program consisted of two applications of Roundup WeatherMax. Three soybean varieties were selected based on maturity and previous experience in plot trials. Soybeans were planted on four planting dates approximately 2 weeks apart. Soybean varieties, maturities, and planting dates are listed in the tables below.

The June 1 planting date negatively affected yield of the DeKalb 15-51 soybeans when compared to the May 6 and May 17 planting dates. The June 1 planting date also negatively affected yield of the Pioneer 92M80 soybeans when compared to the other three planting dates. The April 27 planting date of ProfiSeed 4215 soybeans yielded lower than the May 6 planting date. (Table 1)

The highest average yield across soybean varieties was achieved on the May 6 planting date with an average yield of 48.1 bushels per acre. The lowest average yield across soybean varieties was achieved on the June 1 planting date with an average yield of 43.8 bushels per acre, Table 2. Pioneer 92M80 performed better than the other two varieties with the April 27 planting date. With the May 6 planting date, Pioneer 92M80 and ProfiSeed 4215 yielded higher than DeKalb 15-51. There was no difference among the varieties with the May 17 planting date. With the June 1 planting date, ProfiSeed 4215 yielded better than the other two varieties, Table 2. (University of Minnesota Extension Service, Regional Center, Rochester, MN).

Table 1. Soybean yield, grain moisture, oil and protein at Rochester, MN., 2004 (Behnken and Breitenbach).

| Name | Treatment | | % Moisture | Yield Bu/a | Percent | |
|--------------------|-----------|---------------|------------|---------------|---------|---------|
| | Maturity | Planting Date | | | Oil | Protein |
| DeKalb 15-51 | 1.5 | April 27 | 12.1 | 41.3 | 18.6 | 33.8 |
| DeKalb 15-51 | 1.5 | May 6 | 12.2 | 44.0 | 18.4 | 34.0 |
| DeKalb 15-51 | 1.5 | May 17 | 12.3 | 43.9 | 18.2 | 34.6 |
| DeKalb 15-51 | 1.5 | June 1 | 12.5 | 38.9 | 18.1 | 35.8 |
| ProfiSeed 4215 | 2.1 | April 27 | 12.5 | 45.7 | NA | NA |
| ProfiSeed 4215 | 2.1 | May 6 | 12.6 | 50.6 | 18.5 | 34.0 |
| ProfiSeed 4215 | 2.1 | May 17 | 12.6 | 47.4 | 18.8 | 34.1 |
| ProfiSeed 4215 | 2.1 | June 1 | 12.7 | 47.2 | 18.5 | 34.6 |
| Pioneer 92M80 | 2.8 | April 27 | 12.7 | 49.7 | 18.0 | 36.4 |
| Pioneer 92M80 | 2.8 | May 6 | 12.8 | 49.7 | 18.4 | 36.1 |
| Pioneer 92M80 | 2.8 | May 17 | 12.9 | 48.8 | 18.3 | 36 |
| Pioneer 92M80 | 2.8 | June 1 | 13.2 | 42.9 | 18.1 | 36.2 |
| LSD (P=.10) | | | 0.2 | 3.8 | | |

Table 2. Soybean yield by variety and planting date at Rochester, MN, 2004 (Behnken and Breitenbach).

| Variety | Planting date | | | |
|--------------------------|---------------|-------------|-------------|-------------|
| | April 27 | May 6 | May 17 | June 1 |
| | (bu/A) | | | |
| DeKalb 15-51 | 41.3 | 44.0 | 43.9 | 38.9 |
| ProfiSeed 4215 | 45.7 | 50.6 | 47.2 | 49.7 |
| Pioneer 92M80 | 49.7 | 49.7 | 48.8 | 42.9 |
| 3 Variety Average | 45.6 | 48.1 | 46.6 | 43.8 |
| LSD (P=.10) | 3.4 | 4.2 | 5.5 | 3.4 |

Value-Added Soybean Trial at Hope, Potsdam, and Waseca, MN in 2004.

Breitenbach, Fritz. R. , Lisa M. Behnken and Seth L. Naeve

Interest and demand for soybeans grown for human consumption and other specific purposes has been increasing every year. Specialty or value-added soybeans are used in many different markets and can be grown conventionally, organically, or produced and designated as “chemical-free.” Table 1. lists key traits that some varieties are grown for.

Producers can realize added income from producing these varieties. However, soybean producers growing for special use markets need to have their production under contract. If done correctly, producers can realize a premium for their efforts. Contracts for these crops vary, but many are fixed basis contracts based off of the July or December futures prices. SE Minnesota has several market outlets for some of these varieties. Buyers may also base contracts on delivery from the field or “clean seed” basis. This adds to the complexity of evaluating prices because as a producer, you don’t know your clean seed yield until after the soybeans are cleaned. Producers need to evaluate potential contracts carefully and make sure that the contract will work for their marketing plan. Contracts change from year to year, as do varieties and amounts needed. Producers need to check with local dealers/agents to find a contract that will work for their operation. While some producers grow special use beans without a contract, there is always a risk that you won’t be able to sell these at a premium.

Obtaining agronomic information about the adaptability of these “value-added” soybeans to southern Minnesota conditions has been difficult. The objective of this trial is to evaluate the agronomic characteristics of soybean varieties grown in southeastern Minnesota for special use markets. Trials were conducted in Hope, Potsdam and Waseca in 2004. The Waseca location was planted on May 28, the Hope site was planted on May 19, and the Potsdam location was planted on May 17. All locations were planted at a 1-inch depth at a population of 160,000 seeds per acre. The Hope and Potsdam site were planted in 30-inch rows, and the Waseca site was planted in 10 in rows. The trials were planted in a randomized complete block design with four replications. Plots were 10 feet wide by 25 feet and trimmed back to uniform harvest lengths prior to combining. Soybeans were grown with conventional tillage practices. Weed control at the Waseca site was Treflan + Pursuit applied pre-plant incorporated, and followed by a postemergence treatment of Assure II and Basagran. Weed control at the Potsdam site was a postemergence tank mix of Dual II + Raptor + FirstRate with a sequential post application of Select. Weed control at the Hope site was Gangster soil applied followed by a postemergence application of Select. The center rows of each plot were harvested to determine yield. Soybean oil and protein were measured for the Hope location. Soybean yields for Hope, Potsdam and Waseca are reported individually and averaged across locations in Table 2. Results from 2003 are presented in Tables 3 and 4, (University of Minnesota Extension Service, Regional Center, Rochester, and Southern Research and Outreach Center, Waseca).

Table 1. Characteristics of selected special use soybean varieties.

| |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Variety: IA 2011 Maturity Rating: 2.2 Variety Highlights: Large seeded, high protein, yellow hilum soybean for use in various food products (soymilk), lacks the lipoxgenase 2 enzyme, has less beany flavor</p> |
| <p>Variety: IA 2016 Maturity Rating: 2.2 Variety Highlights: Yellow hilum, high protein, large seeded soybean variety for use in various food products (tofu)</p> |
| <p>Variety: IA 2053 Maturity Rating: 2.3 Variety Highlights: Large seeded, high protein, yellow hilum soybean for use in various food products (tofu)</p> |
| <p>Variety: Kin Maturity Rating: 1.9 Variety Highlights: Yellow hilum soybean variety for use in various food products</p> |
| <p>Variety: Lariat Maturity Rating: 1.6 Variety Highlights: Yellow hilum soybean variety for use in various food products</p> |
| <p>Variety: Vinton 81 Maturity Rating: 2.1-2.2 Variety Highlights: Yellow hilum, high protein, large seeded soybean variety for use in various food products</p> |

Table 2. Soybean yield and protein and oil concentration of value-added varieties at Waseca, Potsdam, and Hope, MN in 2004 (Breitenbach, Behnken, and Naeve).

| Entry Name | Description | YIELD (bu/ac) | | | | % Oil * | % Protein * |
|-----------------------------|---------------------|---------------|---------|------|----------------|---------|-------------|
| | | Waseca | Potsdam | Hope | 3 Location Ave | | |
| Monsanto DKB 22-52 RR | 2.2 STATEWIDE CHECK | 56.4 | 45.6 | 35.6 | 45.9 | 18.4 | 35.7 |
| Brownseed B099 | 1 | 51.1 | 43.7 | 37.9 | 44.2 | 18.9 | 34.6 |
| Gold Country Seed 314 FG | 1.4 | 48.8 | 40.1 | 38.6 | 42.5 | 16.2 | 40.6 |
| Gold Country Seed 6024 FG | 2.4 | 49.3 | 48.2 | 42.4 | 46.6 | 17.7 | 38.6 |
| Vinton 81 | 2.1-2.2 | 40.7 | 33.4 | 35.9 | 36.7 | 17.0 | 39.1 |
| IA 1007 | | 41.0 | 38.2 | 37.4 | 38.9 | 17.3 | 37.1 |
| IA 1010 | | 39.6 | 44.1 | 41.8 | 41.8 | 16.8 | 37.0 |
| IA 1011 | | 43.3 | 38.6 | 36.1 | 39.3 | 17.3 | 37.0 |
| IA 1013 | | 38.8 | 40.5 | 35.5 | 38.3 | 17.8 | 39.6 |
| IA 2011 | 2.2 | 44.0 | 43.6 | 38.2 | 41.9 | 18.0 | 38.0 |
| IA 2012 | | 40.7 | 38 | 39.7 | 39.5 | 16.6 | 38.4 |
| IA 2016 | 2.2 | 48.8 | 35.1 | 38.8 | 40.9 | 16.8 | 39.8 |
| IA 2025 | | 40.9 | 33.9 | 34.8 | 36.5 | 17.5 | 39.9 |
| IA 2042 LF | | 49.5 | 42.4 | 38.3 | 43.4 | 17.4 | 38.2 |
| IA 2053 | | 49.7 | 42.9 | 40.4 | 44.3 | 16.7 | 39.4 |
| IA 2067 | | 46.0 | 42.1 | 37.1 | 41.7 | 16.8 | 40.7 |
| Kin | 1.9 | 50.2 | 37.8 | 39.1 | 42.4 | 17.5 | 37.1 |
| Lariat | 1.6 | 55.5 | 37.1 | 43 | 45.2 | 18.5 | 37.3 |
| NK Brand S20-F8 | | 58.1 | 50.6 | 40 | 49.6 | NA | NA |
| NK Brand S18-N5 | | 57.0 | 51.2 | 47.9 | 52.0 | 18.3 | 36.5 |
| NorthLand Organic Royal Pro | 1.6 | 49.0 | 35.5 | 36.3 | 40.3 | 17.1 | 38.8 |
| NorthLand Organic Soya Pro | | 43.3 | 36.4 | 34.6 | 38.1 | 17.1 | 38.5 |
| NorthLand Organic Sure Pro | | 47.7 | 43.5 | 43.5 | 44.9 | NA | NA |
| Pioneer 92M10 | | 56.3 | 46.6 | 41.6 | 48.2 | 18.1 | 36.8 |
| PROFISEED 4215 RR | | 58.4 | 46.8 | 36.2 | 47.1 | 18.2 | 35.4 |
| PROFISEED 4192 RR | | 55.0 | 48.8 | 43.8 | 49.2 | 19.0 | 34.6 |
| Stine 1906-0 | | 50.2 | 42.1 | 38.9 | 43.7 | 17.7 | 37.3 |
| Stine 2686-6 | | 54.9 | 49.9 | 51.3 | 52.0 | 18.4 | 36.4 |

Table 2 Continued. Soybean yield and protein and oil concentration of value-added varieties at Waseca, Potsdam, and Hope, MN in 2004.

| Entry Name | Description | YIELD (bu/ac) | | | 3 Location Ave | % Oil * | % Protein * |
|-------------------|-------------|---------------|------------|------------|----------------|---------|-------------|
| | | Waseca | Potsdam | Hope | | | |
| EXP - 12 | | 52.1 | 45.4 | 41.3 | 46.3 | 17.8 | 37.8 |
| EXP - 14 | | 47.2 | 43.3 | 36.6 | 42.4 | 16.6 | 39.8 |
| EXP - 22 | | 53.4 | 42.6 | 43.1 | 46.4 | 18.1 | 37.8 |
| Viking O-2022 | 2 | 51.0 | 41.9 | 41.5 | 44.8 | 18.0 | 36.0 |
| LSD (0.10) | | 5.2 | 6.1 | 5.1 | | | |

*Oil and protein results from field trial at Hope.

Table 3. Special use soybean yield and protein and oil concentrations at Clarks Grove, Owatonna, Potsdam and Waseca in 2003 (Arlt, Breitenbach, Behnken and Hoverstad).

| Variety | Company | Yield (bu/ac) | | | | | % Protein | % Oil |
|-----------|-------------------------|---------------|----------|---------|--------|------------|-----------|-------|
| | | Clarks Grove | Owatonna | Potsdam | Waseca | 4-Site Ave | | |
| SoyaPro | Northland Organic Foods | 30.6 | 21.2 | 25.1 | 31.2 | 27.0 | 35.8 | 17.8 |
| Royal Pro | Northland Organic Foods | 40.5 | 29.9 | 25.2 | 31.1 | 31.6 | 35.6 | 18.4 |
| SurePro | Northland Organic Foods | 40.1 | 25.8 | 30.7 | 35.8 | 33.1 | 37.3 | 17.9 |
| HP 204 | Generic | 35.0 | 28.1 | 26.7 | 32.3 | 30.5 | 35.6 | 18.1 |
| Vinton 81 | Generic | 33.9 | 20.3 | 24.4 | 27.6 | 26.5 | 37.4 | 16.4 |
| IA 1007 | SunRich | 38.5 | 24.9 | 28.9 | 37.5 | 32.5 | 35.5 | 17.7 |
| IA 2011 | Sun Rich | 40.5 | 22.2 | 33.7 | 39.6 | 34.0 | 33.4 | 19.4 |
| IA 2012 | SunRich | 42.3 | 29.7 | 36.8 | 44.1 | 38.2 | 35.0 | 18.3 |
| IA 2016 | SunRich | 33.3 | 19.9 | 28.3 | 27.5 | 27.2 | 36.6 | 17.5 |
| IA 2017 | Alliance Company of MN | 36.0 | 21.4 | 30.1 | 36.7 | 31.0 | 37.1 | 18.5 |
| IA 2020 | Alliance Company of MN | 29.7 | 16.8 | 31.0 | 36.7 | 28.5 | 36.9 | 18.2 |
| IA 2025 | SunRich | 41.7 | 36.8 | 35.3 | 40.4 | 38.5 | 33.3 | 19.4 |
| IA 2043 | SunRich | 37.9 | 21.9 | 32.9 | 40.5 | 33.3 | 35.5 | 17.8 |
| IA 2053 | SunRich | 43.0 | 28.9 | 33.3 | 41.6 | 36.7 | 36.5 | 17.5 |
| IA 1010 | SunRich | 40.9 | 30.7 | 34.2 | 42.7 | 37.1 | 35.0 | 17.9 |
| IA 1011 | SunRich | 41.5 | 26.2 | 33.2 | 40.5 | 35.3 | 34.7 | 17.7 |
| KIN | SunRich | 42.5 | 33.2 | 35.3 | 36.5 | 36.9 | 34.5 | 18.6 |
| LARIAT | SunRich | 40.5 | 28.4 | 35.2 | 46.8 | 37.7 | 36.2 | 19.9 |

Table 3 Continued. Special use soybean yield and protein and oil concentrations at Clarks Grove, Owatonna, Potsdam and Waseca in 2003.

| Variety | Company | Yield (bu/ac) | | | | | % Protein | % Oil |
|--------------------|----------------|---------------|----------|---------|--------|------------|-----------|-------|
| | | Clarks Grove | Owatonna | Potsdam | Waseca | 4-Site Ave | | |
| E-24 | SunRich | 33.1 | 24.2 | 32.9 | 38.7 | 32.2 | 35.2 | 17.9 |
| 92M10 | Pioneer | 47.2 | 26.2 | 34.0 | 47.8 | 38.8 | 33.5 | 19.2 |
| 91M10 | Pioneer | 38.1 | 30.6 | 33.8 | 47.6 | 37.5 | 35.3 | 19.1 |
| S20-F8 | Northrup King | 44.1 | 36.8 | 34.4 | 45.6 | 40.2 | 33.7 | 18.9 |
| 2686-6 | Stine | 45.2 | 32.4 | 33.6 | 44.2 | 38.8 | 34.7 | 19.4 |
| 1906-0 | Stine | 42.7 | 31.2 | 34.5 | 50.7 | 39.8 | 34.9 | 19.3 |
| H-1184 | Golden Harvest | 46.4 | 35.1 | 37.1 | 48.7 | 41.8 | 35.1 | 18.8 |
| H-1547 | Golden Harvest | 39.2 | 27.2 | 28.7 | 33.8 | 32.2 | 35.7 | 18.0 |
| 4213 | Thompson | 41.4 | 29.5 | 32.9 | 39.8 | 35.9 | 35.2 | 19.2 |
| 4223 | Thompson | 39.9 | 32.2 | 33.3 | 38.8 | 36.1 | 35.8 | 18.1 |
| 4233 | Thompson | 41.3 | 28.8 | 34.2 | 40.3 | 36.1 | 33.0 | 20.5 |
| LSD (P=.10) | | 5.1 | 8.2 | 2.5 | 7.2 | | | |

Table 4. Special use soybean variety rankings for yield, protein and oil content. Yield is the four-trial average; protein and oil are an average of three locations in 2003 (Arlt, Breitenbach, Behnken, and Hoverstad)

| Soybean Variety | Rank | | |
|-----------------|-------|---------|-----|
| | Yield | Protein | Oil |
| SoyaPro | 28 | 8 | 23 |
| Royal Pro | 23 | 11 | 14 |
| SurePro | 19 | 2 | 20 |
| HP 204 | 25 | 11 | 17 |
| Vinton 81 | 29 | 1 | 29 |
| IA 1007 | 20 | 13 | 25 |
| IA 2011 | 17 | 27 | 3 |
| IA 2012 | 7 | 19 | 15 |
| IA 2016 | 27 | 5 | 27 |
| IA 2017 | 24 | 3 | 13 |
| IA 2020 | 26 | 4 | 16 |
| IA 2025 | 6 | 28 | 3 |

Table 4 Continued. Special use soybean variety rankings for yield, protein and oil content. Yield is the four-trial average; protein and oil are an average of three locations in 2003.

| Soybean Variety | ----- Rank ----- | | |
|-----------------|------------------|---------|-----|
| | Yield | Protein | Oil |
| IA 2043 | 18 | 13 | 23 |
| IA 2053 | 12 | 6 | 27 |
| IA 1010 | 10 | 19 | 20 |
| IA 1011 | 16 | 22 | 25 |
| KIN | 11 | 24 | 12 |
| LARIAT | 8 | 17 | 2 |
| E-24 | 21 | 16 | 20 |
| 92M10 | 4 | 26 | 7 |
| 91M10 | 9 | 15 | 9 |
| S20-F8 | 2 | 25 | 10 |
| 2686-6 | 4 | 22 | 3 |
| 1906-0 | 3 | 21 | 6 |
| H-1184 | 1 | 18 | 11 |
| H-1547 | 21 | 10 | 19 |
| 4213 | 15 | 16 | 7 |
| 4223 | 13 | 8 | 17 |
| 4233 | 13 | 29 | 1 |

Some regional buyers of Organic and Special Use Soybeans:

Northland Organic Foods
 462 Holly Ave
 St. Paul MN 55102
 651-221-0855
soybean@northlandorganic.com
 Caroline or Lane or Kevin Lewis

SunRich, Inc.
 3824 SW 93rd St
 Hope MN 56046
 507-451-4724
info@sunrich.com
 Laverne Klecker

Cashton Farm Supply
 199 Front Street
 Cashton, WI 54619
 608-654-5123
 Ernie Peterson

NOTE: Always check with the Regional Companies to determine what varieties they are purchasing and what contracts they have available, before planting!

Short Season Roundup Ready Soybean Varieties
Simulating Soybeans Grown After Cannery Peas at Potsdam and Waseca in 2004.

Breitenbach, Fritz R., Lisa M. Behnken, and Seth L. Naeve.

Currently more than 80,000 acres of peas are planted in southern MN, of which approximately 40,000 acres are double cropped with short season soybean. Minimal variety testing information is available to growers. Two trials were initiated in southern Minnesota in 2004, one located in Waseca and the other in Potsdam. Field histories are presented in Table 1. Table 2 provides information regarding yield potential, oil, and protein levels of short season Roundup Ready soybean varieties. **Bolded and shaded** varieties are not statistically different from the highest average yielding variety NK Brand S08-R4, (University of Minnesota Extension Service, Regional Center, Rochester, and Southern Research and Outreach Center, Waseca, MN).

Table 1. 2004 Field Histories for Short Season Roundup Ready Soybean Variety Trials

| | Potsdam | Waseca |
|---------------|----------------------|----------------------------------------|
| Soil Type | Port Byron Silt Loam | Webster Clay Loam |
| Herbicide | Glyphosate | Treflan + Pursuit/Assure II + Basagran |
| Planting Date | June 23, 2004 | June 22, 2004 |
| Tillage | Conventional | Conventional |
| Previous Crop | Corn | Corn |

Table 2. Grain yield, moisture content, and oil and protein content of short season Roundup Ready soybean varieties simulating soybeans grown after cannery peas at Potsdam and Waseca, MN in 2004 (Breitenbach, Behnken, and Naeve).

| Entry Name | Description | POTSDAM | | WASECA | | AVERAGE bu/A | POTSDAM | |
|----------------------------------|--------------------------------|-------------|-------------|-------------|-------------|-----------------|-------------|-------------|
| | | % Moisture | bu/A | % Moisture | bu/A | | % Oil | % Protein |
| Asgrow AG0801 RR | 0.8 STATEWIDE CHECK | 17.2 | 33.5 | 17.2 | 52.2 | 42.9 | 17.6 | 36.7 |
| DeKalb DKB0752 | 0.7 | 16.9 | 34.7 | 16.7 | 47.6 | 41.1 | 17.3 | 36.9 |
| Gold Country Seed 3512 RR | 1.1 | 18.3 | 26.7 | 19.3 | 42.6 | 34.7 | 16.7 | 37.4 |
| Gold Country Seed 2509 RR | 0.9 | 18.1 | 33.6 | 19.8 | 55.5 | 44.5 | 17.6 | 37.0 |
| Gold Country Seed 6016 RR | 1.4 | 19.2 | 21.8 | 20.0 | 45.5 | 33.7 | 16.6 | 37.1 |
| Latham E1230R | 1.2 | 18.5 | 27.2 | 18.3 | 48.1 | 37.7 | 16.8 | 37.5 |
| Latham E1330R | 1.3 | 18.8 | 27.5 | 18.5 | 50.3 | 38.9 | 16.7 | 36.8 |
| Latham 148RR | 1.4 | 17.8 | 33.2 | 17.5 | 46.3 | 39.8 | 17.3 | 37.2 |
| NK Brand S08-R4 | 0.8 | 16.8 | 38.9 | 16.9 | 52.0 | 45.5 | 17.2 | 35.9 |
| NK Brand S10-T1 | 1.0 | 18.3 | 40.1 | 19.5 | 49.2 | 44.7 | 17.9 | 35.6 |
| Pioneer 91B33 | 1.3 | 17.9 | 32.8 | 18.3 | 45.1 | 38.9 | 18.2 | 36.5 |
| ProfiSeed 13J6 RR | 1.3 | 17.6 | 28.1 | 19.8 | 45.2 | 36.6 | 17.4 | 38.1 |
| ProfiSeed 4153 RR | 1.5 | 19.1 | 27.3 | 20.0 | 48.3 | 37.8 | 16.5 | 38.8 |
| Stine S-0990-4 | 1.0 | 17.4 | 34.0 | 19.0 | 51.2 | 42.6 | 17.0 | 38.5 |
| Stine S-1007-4 | 1.0 | 16.7 | 30.0 | 19.1 | 46.2 | 38.1 | 17.4 | 37.3 |
| Stine S-0943-4 | 0.9 | 16.9 | 33.1 | 18.8 | 54.0 | 43.5 | 17.2 | 36.7 |
| | LSD (0.10) | 1.0 | 5.4 | 1.6 | 7.8 | 4.7 | | |

Roundup Ready Soybean Variety Trials at four locations in Southern Minnesota, 2004.

Breitenbach, Fritz R., Lisa M. Behnken, and Seth L. Naeve.

The 2004 and 2003 Roundup Ready Soybean Variety Trials are presented in this report. The variety trials were initiated to evaluate yields from Roundup Ready Soybeans that are sold commercially to farmers in SE Minnesota. The test was financed in part by a 25-dollar entry fee per variety paid by seed companies who choose to enter their Roundup Ready Soybean varieties for testing and performance. Additional funding was provided from the Minnesota Soybean Research and Promotion Council. Locations for the tests were selected in southeastern Minnesota. Field histories and planting date are provided in Table 1. Results for 2004 are in Table 2 and results for 2003 are in Table 3. Varieties not statistically different than the highest yielding variety, (Latham 497 & ProfiSeed 4192 in the 2004 trial and DeKalb 22-51 in the 2003 trial) are **bolded and highlighted** in Table 2 and Table 3. The ten top performers in 2003 are noted in the description section in Table 2. Six of the top ten are in the top 25 percent in yield in the 2004 trial. Oil and protein results are included in the 2004 table. Special thanks to our farmer cooperators Scott Reiland and family, Fillmore/Mower and Tom Thelemann and family, LeSueur/Rice. (University of Minnesota Extension Service, Rochester, and Southern Research and Outreach Center, Waseca, MN).

Table 1. 2004 Roundup Ready Soybean Variety Trial Field Histories.

| Location | Planting date | Herbicides | Tillage | Previous crop | Soil type | Row spacing |
|-----------------|----------------------|--------------------------------------|----------------|----------------------|------------------|--------------------|
| Fillmore/Mower | May 18, 2004 | Glyphosate | Conventional | Corn | Silt Loam | 30" |
| Le Surer/Rice | May 19, 2004 | Glyphosate | Conventional | Corn | Clay Loam | 30" |
| Olmsted/Wabasha | May 17, 2004 | Dual + Raptor + Glyphosate/Select | Conventional | Corn | Silt Loam | 30" |
| Waseca | May 28, 2004 | Glyphosate | Conventional | Corn | Clay Loam | 7.5" |

Table 2. 2004 Roundup Ready Soybean Variety Trial Results for LeSueur/Rice, Olmsted/Wabasha, Fillmore/Mower, and Waseca (Breitenbach, Behnken, and Naeve).

| Entry Name | Description | LeSueur/Rice Counties | Olmsted/Wabasha Counties | Fillmore/Mower Counties | Waseca County | AVERAGE 4 LOCATIONS | % Oil | % Protein |
|--------------------------------------|--------------------------------------|----------------------------------|-------------------------------------|------------------------------------|--------------------------|--------------------------------|--------------|------------------|
| Latham 497RR | 2.2 Top Performer in 2003 | 53.6 | 54.3 | 50.0 | 56.9 | 53.7 | 17.9 | 35.1 |
| ProfiSeed 4192 RR | 1.9 | 53.0 | 51.8 | 47.4 | 62.8 | 53.7 | 19.0 | 33.9 |
| Gold Country Seed 6221 RR | 2.1 Top Performer in 2003 | 52.3 | 51.8 | 50.2 | 52.0 | 51.6 | 17.9 | 34.7 |
| Gold Country Seed 1319 RR | 1.9 | 47.3 | 51.7 | 48.4 | 57.1 | 51.1 | 17.0 | 37.7 |
| DynaGro DG3218 | 2.1 | 48.3 | 52.6 | 50.1 | 51.9 | 50.7 | 17.4 | 37.3 |

| Table 2 Continued. 2004 Roundup Ready Soybean Variety Trial Results for LeSueur/Rice, Olmsted/Wabasha, Fillmore/Mower, and Waseca | | | | | | | | |
|------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|----------------------------------|-------------------------------------|------------------------------------|--------------------------|--------------------------------|--------------|------------------|
| Entry Name | Description | LeSueur/Rice Counties | Olmsted/Wabasha Counties | Fillmore/Mower Counties | Waseca County | AVERAGE 4 LOCATIONS | % Oil | % Protein |
| Producers Hybrids 210 RR | 2.2 Top Performer 2003 | 49.2 | 50.4 | 50.6 | 52.4 | 50.7 | 18.3 | 34.9 |
| Latham E1936R | 1.9 | 51.0 | 52.9 | 48.4 | 49.9 | 50.5 | 18.0 | 35.8 |
| Asgrow AG1903 | 1.9 | 49.0 | 48.5 | 49.1 | 55.6 | 50.5 | 17.6 | 35.5 |
| Gold Country Seed 2424 RR | 2.4 | 51.6 | 54.8 | 49.8 | 43.8 | 50.0 | 17.5 | 37.4 |
| Producers Hybrids PX 320 RR | 2 | 54.0 | 51.0 | 45.9 | 48.7 | 49.9 | 18.6 | 35.4 |
| ProfiSeed 4215 RR | 2.0 Top Performer 2003 & 2002 | 48.5 | 51.8 | 48.2 | 50.2 | 49.7 | 18.3 | 34.6 |
| Prairie Brand PB-2141 RR | 2.1 Top Performer in 2003 & 2002 | 49.7 | 50.1 | 48.0 | 50.4 | 49.6 | 18.0 | 35.1 |
| Latham L2136R | 2.1 Top Performer in 2003 (Last year EX468) | 50.5 | 50.5 | 44.4 | 52.5 | 49.5 | 17.8 | 36.4 |
| Trelay High Cycle 2223 RR | 2.2 | 52.8 | 48.4 | 49.6 | 46.9 | 49.4 | 18.5 | 34.4 |
| Stine S-2103-4 | 2.1 | 45.8 | 47.4 | 50.2 | 53.8 | 49.3 | 18.2 | 35.0 |
| DynaGro DG3200 | 2 | 47.5 | 48.4 | 45.4 | 55.3 | 49.2 | 17.4 | 36.2 |
| NK Brand S19-R5 | 1.9 | 51.9 | 48.0 | 45.3 | 50.7 | 49.0 | 17.8 | 36.0 |
| Atlas 5B190RR | 1.9 | 50.4 | 54.0 | 46.6 | 43.8 | 48.7 | 17.5 | 37.3 |
| DeKalb DKB15-51 | 1.5 | 42.5 | 44.4 | 47.9 | 59.8 | 48.6 | 17.8 | 35.6 |
| Gold Country Seed 2519 RR | 1.9 | 45.8 | 47.3 | 47.7 | 53.6 | 48.6 | 17.9 | 35.8 |
| Prairie Brand PB-1914 RR | 1.9 | 50.1 | 46.4 | 45.6 | 52.2 | 48.6 | 17.4 | 36.3 |
| NK Brand S17-P9 | 1.7 | 48.4 | 49.5 | 45.5 | 50.9 | 48.6 | 17.4 | 35.1 |
| Asgrow AG2107 | 2.1 SCN | 48.1 | 48.5 | 46.8 | 50.4 | 48.4 | 18.5 | 35.9 |
| Golden Harvest H-2448 RR | 2.4 | 47.5 | 50.9 | 50.9 | 43.9 | 48.3 | 17.7 | 37.0 |
| ProfiSeed 22J1 RR | 2.1 | 47.4 | 46.7 | 48.2 | 50.6 | 48.2 | 17.7 | 36.5 |
| Prairie Brand PB-1954 RR | 1.9 | 47.6 | 52.1 | 47.7 | 45.3 | 48.2 | 18.1 | 36.0 |
| Trelay High Cycle 2194 RR | 1.9 | 50.3 | 48.6 | 47.1 | 46.3 | 48.1 | 17.0 | 37.3 |

Table 2 Continued. 2004 Roundup Ready Soybean Variety Trial Results for LeSueur/Rice, Olmsted/Wabasha, Fillmore/Mower, and Waseca

| Entry Name | Description | LeSueur/Rice Counties | Olmsted/Wabasha Counties | Fillmore/Mower Counties | Waseca County | AVERAGE 4 LOCATIONS | % Oil | % Protein |
|--------------------------------|-------------------------------------------------|--------------------------|-----------------------------|----------------------------|------------------|------------------------|-------|-----------|
| Pioneer 92B38 | 2.3 | 50.9 | 48.6 | 46.3 | 45.1 | 47.7 | 17.5 | 37.2 |
| Garst 2018 RR | 2 | 46.5 | 49.3 | 46.8 | 48.0 | 47.7 | 17.8 | 36.2 |
| Garst 2012 RR/N | 2.0 SCN | 46.7 | 49.2 | 42.1 | 52.5 | 47.6 | 17.9 | 38.1 |
| Trelay High Cycle 2222 RR | 2.2 | 44.8 | 50.5 | 44.1 | 50.6 | 47.5 | 17.7 | 36.4 |
| Stine S-2116-4 | 2.1 | 48.9 | 46.2 | 44.3 | 50.5 | 47.5 | 17.4 | 36.1 |
| Crows 2015 R | 2 | 48.5 | 51.2 | 48.6 | 41.6 | 47.5 | 18.6 | 35.1 |
| Golden Harvest H-2124 RR | 2.1 | 45.6 | 53.6 | 46.8 | 42.8 | 47.2 | 17.3 | 37.4 |
| Golden Harvest H-1961 RR | 1.9 Top Performer in 2003 & 2002 | 48.2 | 46.5 | 44.3 | 49.0 | 47.0 | 17.5 | 36.0 |
| Croplan Genetics RT2092 | 2 | 44.4 | 43.7 | 46.6 | 53.3 | 47.0 | 17.6 | 36.1 |
| Garst 2332 RR | 2.3 | 45.3 | 52.0 | 45.0 | 44.5 | 46.7 | 17.3 | 37.9 |
| Atlas 2N202RR | 2 | 48.5 | 46.4 | 49.0 | 42.5 | 46.6 | 18.5 | 35.5 |
| Crows 1830 R | 1.8 | 51.1 | 47.6 | 45.5 | 42.2 | 46.6 | 18.3 | 36.3 |
| Crows 2130 R | 2.1 | 43.9 | 46.2 | 42.8 | 51.5 | 46.1 | 17.5 | 36.4 |
| DynaGro DG3190 | 1.9 Top Performer in 2003 | 46.6 | 46.2 | 43.7 | 47.6 | 46.0 | 17.8 | 35.8 |
| Asgrow AG2403 | 2.4 | 52.2 | 44.3 | 48.2 | 39.3 | 46.0 | 18.2 | 35.7 |
| Stine S-1918-4 | 1.9 Top Performer 2003 | 46.3 | 46.8 | 42.7 | 47.0 | 45.7 | 17.7 | 36.1 |
| Producers Hybrids PX 322 RR | 2.2 | 46.5 | 43.8 | 42.3 | 49.8 | 45.6 | 17.6 | 36.4 |
| Prairie Brand PB-2243 RR | 2.2 | 45.2 | 46.8 | 42.8 | 47.4 | 45.5 | 17.1 | 37.7 |
| Dekalb DKB 22-52 | 2.2 STATEWIDE CHECK Top Performer in 2003 | 43.4 | 41.5 | 45.3 | 51.9 | 45.5 | 17.9 | 35.9 |
| Latham 367RR | 1.9 | 47.8 | 47.7 | 40.3 | 45.7 | 45.4 | 17.7 | 35.6 |
| DynaGro DG31C15 | 1.5 | 43.8 | 42.1 | 42.6 | 52.4 | 45.2 | 17.7 | 36.3 |
| Pioneer 92M00 | 2 | 45.6 | 45.4 | 46.1 | 42.4 | 44.9 | 17.8 | 36.5 |
| Crows 1530 R | 1.5 | 50.6 | 42.4 | 43.8 | 42.6 | 44.9 | 17.5 | 37.6 |

Table 2 Continued. 2004 Roundup Ready Soybean Variety Trial Results for LeSueur/Rice, Olmsted/Wabasha, Fillmore/Mower, and Waseca

| Entry Name | Description | LeSueur/Rice Counties | Olmsted/Wabasha Counties | Fillmore/Mower Counties | Waseca County | AVERAGE 4 LOCATIONS | % Oil | % Protein |
|------------------------------|-------------|--------------------------|-----------------------------|----------------------------|------------------|------------------------|-------|-----------|
| Trelay High Cycle 2175 RR | 1.7 | 46.1 | 41.1 | 40.7 | 50.6 | 44.6 | 17.7 | 36.3 |
| NK Brand S14-A7 | 1.4 | 46.0 | 43.1 | 43.1 | 45.8 | 44.5 | 17.9 | 36.0 |
| Pioneer 92M30 | 2.3 | 47.5 | 47.1 | 43.6 | 36.2 | 43.6 | 17.9 | 36.3 |
| Stine S-1586-4 | 1.6 | 44.4 | 41.8 | 41.8 | 43.8 | 42.9 | 17.9 | 35.9 |
| NK Brand S21-H3 | 2.1 | 43.9 | 46.2 | 39.8 | 36.9 | 41.7 | 17.4 | 37.4 |
| Croplan Genetics RT1535 | 1.5 | 43.9 | 43.1 | 40.3 | 39.4 | 41.7 | 17.9 | 35.8 |
| LSD (0.10) | | 5.7 | 4.3 | 4.8 | 9.8 | 3.2 | | |

Table 3. 2003 Roundup Ready Soybean Variety Trial Results for Houston, Potsdam, Sargeant and Waseca (Breitenbach, Behnken, and Naeve).

| Variety | Maturity Group | Houston Yield | Potsdam Yield | Sargeant Yield | Waseca Yield | Ave. Yield |
|-----------------------------------|----------------|---------------|------------------|----------------|--------------|-------------|
| Asgrow 2107 | 2.1 | 31.9 | 48.4 | 37.2 | 34.2 | 37.9 |
| Golden Harvest 2124 RR | 2.1 | 32.4 | 43.4 | 38.0 | 33.7 | 36.9 |
| DeKalb 15-51 | 1.5 | 34.3 | 44.3 | 35.6 | 34.8 | 37.3 |
| DeKalb 22-51 | 2.2 | 35.3 | 49.7 | 39.7 | 37.9 | 40.6 |
| Dynagro 3190 | 1.9 | 37.1 | 47.4 | 36.3 | 34.6 | 38.9 |
| Gold Country 7414 RR | 1.4 | 32.2 | 43.8 | 34.0 | 29.7 | 34.9 |
| Gold Country 1319 RR | 1.9 | 35.0 | 41.6 | 33.3 | 31.4 | 35.3 |
| Gold Country 6221 RR | 2.1 | 35.3 | 48.2 | 41.3 | 36.2 | 40.2 |
| Golden Harvest H- 1961 | 1.9 | 37.1 | 49.4 | 35.8 | 36.2 | 39.6 |
| Latham 367 RR | 1.9 | 35.3 | 47.9 | 34.8 | 33.9 | 38.0 |
| Latham 468 RR | 2.1 | 35.9 | 50.1 | 34.7 | 35.6 | 39.1 |
| Latham 497 RR | 2.2 | 35.3 | 47.3 | 40.3 | 35.3 | 39.5 |
| NK Brand X317R | 1.7 | 32.6 | 45.6 | 36.5 | 34.6 | 37.3 |
| NK Brand S19-V2 | 1.9 | 33.4 | 47.9 | 33.7 | 31.5 | 36.6 |
| NK Brand S21-D2 | 2.1 | 28.7 | 38.8 | 33.5 | 28.7 | 32.4 |

| Table 3 Continued. 2003 Roundup Ready Soybean Variety Trial Results for Houston, Potsdam, Sargent and Waseca | | | | | | |
|---------------------------------------------------------------------------------------------------------------------|-----------------------|----------------------|----------------------|-----------------------|---------------------|-------------------|
| Variety | Maturity Group | Houston Yield | Potsdam Yield | Sargeant Yield | Waseca Yield | Ave. Yield |
| Pioneer 92B38 | 2.3 | 33.2 | 44.6 | 35.5 | 35.0 | 37.1 |
| Pioneer 92B13 | 2.1 | 34.7 | 47.0 | 33.7 | 29.9 | 36.3 |
| Pioneer 92M00 | 2 | 30.0 | 41.3 | 36.1 | 28.1 | 33.8 |
| Producers 171 RR | 1.7 | 28.6 | 40.3 | 32.1 | 28.1 | 32.3 |
| Producers 210 RR | 2.1 | 35.5 | 45.7 | 39.2 | 35.7 | 39.0 |
| Profiseed 4192 | 1.9 | 32.9 | 45.2 | 37.0 | 36.6 | 37.9 |
| ProfiSeed 4215 | 2.1 | 36.1 | 49.8 | 39.5 | 36.5 | 40.5 |
| ProfiSeed 4214 | 2.1 | 36.1 | 48.7 | 37.3 | 39.0 | 40.3 |
| Prairie Brand 2141 | 2.1 | 34.1 | 48.0 | 43.6 | 36.2 | 40.5 |
| Renk RS 212 | 2.1 | 29.1 | 44.6 | 34.3 | 30.8 | 34.7 |
| Pioneer 91B03 | 1.0 | 31.1 | 35.9 | 29.8 | 31.2 | 32.0 |
| Stine 1586-4 RR | 1.5 | 34.2 | 47.1 | 34.1 | 34.3 | 37.4 |
| Stine 1962-4 RR | 1.6 | 29.6 | 40.3 | 32.8 | 28.1 | 32.7 |
| Stine 1918-4 RR | 1.9 | 35.6 | 47.9 | 36.4 | 35.3 | 38.8 |
| Thompson T- 7192RR | 1.9 | 33.0 | 42.6 | 34.1 | 32.7 | 35.6 |
| Thompson T-7214RR | 2.1 | 36.8 | 48.3 | 39.2 | 32.7 | 39.3 |
| Thompson T-7205RR | 2 | 33.8 | 44.7 | 37.9 | 35.8 | 38.0 |
| Trelay High Cycle 2182 RR | 1.8 | 26.9 | 38.4 | 31.3 | 27.9 | 31.1 |
| Trelay High Cycle 2210 RR | 2 | 34.2 | 43.7 | 31.9 | 33.3 | 35.8 |
| Trelay High Cycle 2212 RR | 2.1 | 35.9 | 46.6 | 38.4 | 33.0 | 38.5 |
| Ziller BT213 RR | 2.1 | 31.9 | 46.0 | 37.2 | 32.9 | 37.0 |
| | LSD (0.10) | 2.5 | 3.1 | 4.8 | 3.7 | 1.8 |

Soybean No-Till Variety Trials

Carlson, Brad, Extension Educator, Rice & Steele Counties; Jerry Tesmer, Technical Advisor, Winona & Fillmore Counties; Fritz Breitenbach, Area IPM Specialist, Rochester.

Introduction

Minnesota is on the fringe of the area in which no-till farming is successful. The use of no-till planting of soybeans has waxed and waned over the years in Minnesota, and seems to fluctuate with the presence of production challenges and technologies to mitigate them. Recently, several seed companies have been promoting the use of specific varieties for use in highly reduced or no-tillage systems. These recommendations are based on a cumulative effect of several plant characteristics which may make a specific variety more successful under these conditions.

No “Residue Proven” varieties were available in the maturity range typically planted in this area. It was noted however, that high emergence scores were usually associated with “Residue Proven” varieties available in other maturities. For this trial, we specifically looked at varieties with good emergence scores and varieties with lower emergence scores. These usually fell into the above average and average range as assigned by the company (varieties with poor scores were unavailable).

Methods

Plots were established at two sites: North of Nerstrand in Rice County, and North of Lewiston in Winona County. All varieties selected had Roundup Ready technology. Plots were drilled using a six foot Great Plains No-till drill. Plots were 12 feet wide by 25 feet long. A seeding rate of 175,000 seeds/A was used. A secondary tillage treatment was performed prior to planting on half of the plot area. At the Nerstrand site, the tillage was two passes with a field cultivator, and at Lewiston, the tillage was two passes with a Great Plains Turbo-Till. Each variety was replicated four times in each tillage treatment at each site.

Results and Discussion

No statistical differences were detected among tillage systems and varieties at the Nerstrand location. Statistical differences were detected among tillage systems and varieties at the Lewiston location. Pioneer 29M32, NK Brand NK S13-J9, Monsanto DeKalb 22-52, and Stine 1918-4 all had higher yields in the no-till system than in the tilled system. The above listed varieties all had above average and higher emergence scores with the exception of Pioneer 29M32 (average emergence score). It seems likely that emergence was not a good filter for performance in no-till systems this year, possibly because the year started out warm, and dry. This trial will be repeated again in 2005 if funding is available.

Table. Performance of soybean varieties in two tillage systems at Nerstrand and Lewiston, MN in 2004 (Carlson, Tesmer, and Breitenbach).

| Brand | Variety | Emergence ¹ | White mold ¹ | Phytophthora root rot ¹ | Nerstrand tilled | Nerstrand no-till | Lewiston tilled | Lewiston no-till |
|-------------------------------|---------|------------------------|-------------------------|------------------------------------|------------------------------------|-------------------|-----------------|------------------|
| | | | | | -----Soybean Yield ----- (bu/A) | | | |
| Pioneer | 29M32 | 5 | 3 | 3 | 39 | 38 | 34 | 40 |
| Pioneer | 92B13 | 9 | 5 | 5 | 34 | 38 | 34 | 36 |
| Northrup King | S19-V2 | 1 | NR | 4 | 42 | 40 | 29 | 32 |
| Northrup King | S13-J9 | 3 | NR | 3 | 31 | 35 | 25 | 31 |
| DeKalb | 22-52 | 3 | 3 | 8 | 35 | 39 | 33 | 38 |
| Asgrow | 2107 | 2 | 6 | 5 | 42 | 39 | 33 | 35 |
| Prairie Brand | 2141 | 8.5 | 6.5 | 6 | 43 | 38 | 40 | 38 |
| Stine | 1918-4 | 9 | 8 | 8 | 38 | 43 | 31 | 36 |
| Location X treatment averages | | | | | 39 | 38 | 33 | 36 |
| LSD (P=0.10) | | | | | 6 | 6 | 4 | 4 |

1. Pioneer varieties rated on scale of 1 – 9 with 9 being best; Northrup King varieties rated on scale of 1 – 9 with 1 being best; Monsanto Asgrow varieties rated on a scale of 1 – 9 with 1 being best; Prairie Brand varieties rated on a scale of 1 – 9 with 9 being best; and Stine varieties rated on scale of 0 – 9 with 9 being best.

Major funding for this project was provided by the Karst Campaign, an educational program intended to promote the use of best management practices (BMPs) for the purpose of improving water quality in Southeast Minnesota. This specific research/demonstration project is part of an effort to assist farmers with making specific management decisions which contribute to success when using BMPs.

C. Herbicide Evaluations

Comparison of glyphosate programs in field corn at Rochester, MN in 2004.

Behnken, Lisa M., Fritz R. Breitenbach, Kristal L. Schaufler and Debra L. Lewis.

The objective of this trial was to compare glyphosate programs in field corn in southeastern Minnesota. The research site was a Lawler loam series containing 2.9% organic matter with a pH of 6.0 and soil test P and K levels of 74 ppm and 268 ppm, respectively. The previous crop was soybean. The area was fertilized in the spring with 122 lb/A nitrogen, 23 lb/A phosphorus, 120 lb/A potash, 23 lb/A sulfur and 3 tons/A of lime. The area was topdressed with 40 lb/A of nitrogen on June 15. The field was disked and field cultivated once prior to planting. The corn hybrids, DeKalb DKC 47-10 was planted and used for all treatments except the Lightning treatment where Garst NE-839 IT, was planted. Both hybrids were planted on April 29, 2004 at a depth of 1.5 inches in 30-inch rows at 32,000 seeds/A. A randomized complete block design with four replications was used. Preemergence (PRE) and postemergence (POST I, POST II and POST III) treatments were applied with a tractor-mounted sprayer, delivering 20 gpa at 32 psi using Turbo Tee 11002 nozzles. Evaluations of the plots were taken on May 18, June 2, June 7, June 15, and October 20, 2004. Application dates, environmental conditions, and crop and weed stages are listed below.

| Date | April 29 | June 3 | June 8 | June 21 |
|-----------------------------------|----------|----------|----------|------------|
| Treatment | PRE | POST I | POST II | POST III |
| Temperature (F) | | | | |
| air | 59 | 69 | 79 | 69 |
| Relative humidity (%) | 57 | 47 | 68 | 65 |
| Wind (mph) | 8 | 8 | 13 | 7 |
| Soil moisture | adequate | adequate | adequate | adequate |
| Corn | | | | |
| stage | seeded | 4 collar | 5 collar | 7 collar |
| height (inches) | -- | 7.8 | 10 | 21.9 |
| Giant ragweed | | | | |
| weed density | -- | heavy | heavy | heavy |
| height (inch) | -- | 5.6 | 14.4 | 2 regrowth |
| Common lambsquarters | | | | |
| weed density | -- | light | light | light |
| height (inch) | -- | 4.7 | 1.7 | 8 regrowth |
| Common waterhemp | | | | |
| weed density | -- | moderate | moderate | moderate |
| height (inch) | -- | 0.5 | 1.0 | 2 regrowth |
| Giant foxtail | | | | |
| weed density | -- | moderate | moderate | moderate |
| height (inch) | -- | 4.6 | 3.6 | 3 regrowth |
| Rainfall after application (inch) | | | | |
| week 1 | 0.01 | 4.27 | 5.65 | 0.63 |
| week 2 | 1.44 | 3.24 | 1.92 | 0.16 |
| week 3 | 1.02 | 0.11 | 0.57 | 2.82 |

Outlook applied at 21 oz/A gave some early season control of giant ragweed, 50%, compared to no control when applied at 12 oz/A, (May 18 rating). Glyphosate applied POST I without a tank mix partner (atrazine, Clarity, or Distinct), resulted in significantly lower late season giant ragweed control, (October 20 rating) and resulted in lower grain yields. Sequential glyphosate applications (POST I and POST III) provided superior weed control and grain yield when compared to single pass applications of glyphosate. Reduced PRE applications of Outlook followed by a POST I application of Roundup Original + Distinct resulted in significantly lower giant ragweed control than when applied at POST II, 85 percent compared to 94 percent, respectively. Grain yield, however, was significantly higher for the POST I sequential

application than the POST II sequential application, 226 bushels (POST I) compared to 204 bushels (POST II), suggesting that early weed competition from giant ragweed was a factor.

Common waterhemp control was significantly better when Outlook, was followed by a POST II application of Roundup Original + Distinct compared to the POST I application of the same herbicides, 93% compared to 85%, respectively. Outlook / Distinct + atrazine applied PRE / POST I, Outlook / Roundup Original + Distinct applied PRE / POST II, and Lightning + Marksman applied at POST I provided significantly better common waterhemp control than the single-pass applications at POST I of Roundup WeatherMax, Roundup Original + Clarity, and Roundup Original + Distinct. Giant foxtail control decreased to 66% by the end of the season for Lightning + Marksman treatment compared to all other treatments that maintained control at or above 93%. The sequential application of Roundup WeatherMax applied at POST I and POST III resulted in weed control similar to the Outlook / Roundup Original + Distinct treatment applied at POST II, (University of Minnesota Extension Service, Regional Center, Rochester, MN).

Table. Performance of glyphosate programs for weed control in corn on May 18, June 15, and October 20 at Rochester, MN in 2004 (Behnken, Breitenbach, Schaufler, and Lewis).

| Treatment | Rate | Giant ragweed control | | | Common lambsquarters control | | | Common waterhemp control | | | Giant foxtail control | | | Corn yield (bu/A) |
|-----------------------------------------------------|-------------------------------------------|-----------------------|------|-------|------------------------------|------|-------|--------------------------|------|-------|-----------------------|------|-------|-------------------|
| | | 5/18 | 6/15 | 10/20 | 5/18 | 6/15 | 10/20 | 5/18 | 6/15 | 10/20 | 5/18 | 6/15 | 10/20 | |
| | (rate/A) | (%) | | | (%) | | | (%) | | | (%) | | | |
| PRE / POST I | | | | | | | | | | | | | | |
| Outlook / Roundup WeatherMax + AMS | 12 oz / 22 oz + 3 lbs | 0 | 96 | 77 | 94 | 100 | 97 | 100 | 100 | 85 | 98 | 100 | 95 | 202 |
| Outlook / Roundup Original + Distinct + NIS + AMS | 12 oz / 24 oz + 3 oz + 0.25% v/v + 3 lbs | 0 | 98 | 85 | 96 | 100 | 99 | 100 | 100 | 85 | 97 | 100 | 95 | 226 |
| Outlook / Distinct + atrazine + NIS + AMS | 21 oz / 4 oz + 1 pt + 0.25 % v/v + 3 lbs | 50 | 98 | 96 | 96 | 100 | 99 | 100 | 100 | 91 | 98 | 100 | 94 | 231 |
| PRE / POST II | | | | | | | | | | | | | | |
| Outlook / Roundup Original + Distinct + NIS + AMS | 12 oz / 24 oz + 3 oz + 0.25 % v/v + 3 lbs | 0 | 97 | 94 | 97 | 100 | 99 | 100 | 100 | 93 | 97 | 100 | 98 | 204 |
| POST I | | | | | | | | | | | | | | |
| Roundup WeatherMax + AMS | 22 oz + 3 lbs | 0 | 96 | 71 | 0 | 99 | 96 | 0 | 96 | 73 | 0 | 99 | 93 | 178 |
| Roundup Original + Clarity + NIS + AMS | 24 oz + 8 oz + 0.25 % v/v + 3 lbs | 0 | 96 | 86 | 0 | 100 | 99 | 0 | 95 | 83 | 0 | 100 | 94 | 208 |
| Roundup Original + Distinct + NIS + AMS | 24 oz + 3 oz + 0.25 % v/v + 3 lbs | 0 | 98 | 88 | 0 | 99 | 99 | 0 | 98 | 80 | 0 | 100 | 94 | 217 |
| Lightning + Marksman + NIS + AMS | 1.28 oz + 2 pts + 0.25 % v/v + 3 lbs | 0 | 97 | 93 | 0 | 100 | 98 | 0 | 97 | 93 | 0 | 84 | 66 | 198 ¹ |
| POST I / POST III | | | | | | | | | | | | | | |
| Roundup WeatherMax + AMS / Roundup WeatherMax + AMS | 22 oz + 3 lbs / 22 oz + 3 lbs | 0 | 98 | 91 | 0 | 100 | 99 | 0 | 97 | 89 | 0 | 99 | 99 | 223 |
| Untreated | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| LSD (0.10) | | 3 | 2 | 5 | 2 | 1 | 3 | 0 | 3 | 7 | 1 | 3 | 5 | 18 |

1. Hybrid used for this treatment was Garst NE-839 IT, the hybrid DeKalb DKC 47-10 was used for all other treatments. AMS = spray grade ammonium sulfate, Helena, NIS = AGRI-DEX nonionic surfactant, Helena.

Comparison of Liberty programs in field corn at Rochester, MN in 2004.

Behnken, Lisa, M. Fritz, R. Breitenbach, Kristal L. Schaufler, and Angela L. White.

The objective of this trial was to compare the performance of Liberty programs for weed control in field corn in southeastern Minnesota. The research site was a Lawler loam series containing 2.9% organic matter with a pH of 6.0 and soil test P and K levels of 74 ppm and 268 ppm, respectively. The previous crop was soybean. The area was fertilized in the spring with 122 lb/A nitrogen, 23 lb/A phosphorus, 120 lb/A potash, 23 lb/A sulfur, and 3 T/A of lime. The area was topdressed with 40 lbs/A of nitrogen on June 15. The field was disked and field cultivated once prior to planting. The corn hybrid, NK N45-A6, was planted on April 29, 2004 at a depth of 1.5 inches in 30-inch rows at 32,000 seeds/A. A randomized complete block design with four replications was used. Preemergence (PRE) and postemergence (POST I and II) treatments were applied with a tractor-mounted sprayer, delivering 20 gpa at 32 psi using Turbo Tee 11002 nozzles. Evaluations of the plots were taken on May 18, June 2, June 15, and October 20. Application dates, environmental conditions, and crop and weed stages are listed below.

| Date | April 29 | June 2 | June 7 |
|-----------------------------------|----------|----------|----------|
| Treatment | PRE | POST I | POST II |
| Temperature (F) | | | |
| air | 61 | 70 | 91 |
| Relative humidity (%) | 57 | 46 | 43 |
| Wind (mph) | 7 | 10 | 29 |
| Soil moisture | -- | -- | -- |
| Corn | | | |
| stage | seeded | 3 collar | 4 collar |
| height (inches) | -- | 4.7 | 11.0 |
| Giant ragweed | | | |
| weed density | -- | heavy | heavy |
| height (inch) | -- | 4.1 | 10.0 |
| Common lambsquarters | | | |
| weed density | -- | light | light |
| height (inch) | -- | 1.4 | 2.1 |
| Common waterhemp | | | |
| weed density | -- | moderate | moderate |
| height (inch) | -- | 0.5 | 1.25 |
| Giant foxtail | | | |
| weed density | -- | moderate | moderate |
| height (inch) | -- | 2.2 | 3.6 |
| Rainfall after application (inch) | | | |
| week 1 | 0.01 | 4.27 | 5.65 |
| week 2 | 1.44 | 3.24 | 1.85 |
| week 3 | 1.02 | 0.11 | 0.63 |

A preemergence application of Lumax provided significantly better giant ragweed, common lambsquarters, and common waterhemp control than preemergence applications of Define (June 2 rating). Two treatments resulted in significantly lower giant ragweed and common waterhemp control than all other treatments, Define / Equip and Liberty + Callisto (October 20 rating). Late season giant foxtail control was also significantly lower with the Liberty + Callisto treatment compared to all other treatments (October 20 rating). Grain yield from these three treatments, however, were not adversely affected when compared to treatments with better weed control.

Grain yield appears to be affected by early season giant ragweed control. POST I and POST II applications provided better than 89 percent giant ragweed control. POST I applications all yielded over 200 bushels whereas the POST II applications were in the 180's and 190's, with the exception of Lumax followed by Liberty where the Lumax provide better than 90 percent giant ragweed control, (University of Minnesota Extension Service, Regional Center, Rochester, MN).

Table. Performance of Liberty programs in corn on June 2, June 15, and October 20 at Rochester, MN in 2004 (Behnken, Breitenbach, Schaufler, and White).

| Treatment | Rate | Giant ragweed control | | | Common lambsquarters control | | | Common waterhemp control | | | Giant foxtail control | | | Injury | Corn yield | |
|--------------------------------------------|-------------------------------------------|-----------------------|----------|----------|------------------------------|----------|------------|--------------------------|----------|----------|-----------------------|----------|----------|--------------|------------|-----------|
| | | 6/2 | 6/15 | 10/20 | 6/2 | 6/15 | 10/20 | 6/2 | 6/15 | 10/20 | 6/2 | 6/15 | 10/20 | | | |
| | (lb/A) | 6/2 6/15 10/20 (%) | | | 6/2 6/15 10/20 (%) | | | 6/2 6/15 10/20 (%) | | | 6/2 6/15 -10/20 (%) | | | 6/7 6/15 (%) | (bu/A) | |
| Preemergence / Postemergence I | | | | | | | | | | | | | | | | |
| Define / Equip + MSO + 28% UAN | 12 oz / 1.5 oz + 1.5 pts + 1.5 qts | 0 | 89 | 88 | 43 | 100 | 99 | 89 | 99 | 88 | 97 | 100 | 99 | 5 | 1 | 201 |
| Preemergence / Postemergence II | | | | | | | | | | | | | | | | |
| Define / Liberty + atrazine + AMS | 12 oz / 32 oz + 1 pt + 3 lbs | 0 | 97 | 95 | 37 | 100 | 99 | 91 | 99 | 97 | 95 | 100 | 99 | 0 | 3 | 183 |
| Define / Option + Distinct + MSO + 28% UAN | 12 oz / 1.5 oz + 4 oz + 1.5 pts + 1.5 qts | 0 | 92 | 98 | 41 | 100 | 99 | 89 | 100 | 97 | 95 | 100 | 99 | 2 | 6 | 190 |
| Define / Buctril + atrazine + Callisto | 21.7 oz / 2 pts + 1 oz | 0 | 98 | 97 | 58 | 100 | 100 | 92 | 100 | 97 | 97 | 96 | 97 | 2 | 6 | 195 |
| Lumax / Liberty + AMS | 2 qts / 32 oz + 3 lbs | 94 | 100 | 99 | 99 | 100 | 100 | 99 | 100 | 99 | 98 | 100 | 100 | 0 | 0 | 210 |
| Postemergence I | | | | | | | | | | | | | | | | |
| Liberty + Callisto + AMS | 32 oz + 1.5 oz + 3 lbs | 0 | 97 | 84 | 0 | 100 | 99 | 0 | 99 | 85 | 0 | 97 | 81 | 6 | 0 | 202 |
| Liberty + Lumax + AMS | 32 oz + 3 pts + 3 lbs | 0 | 100 | 99 | 0 | 100 | 99 | 0 | 100 | 99 | 0 | 98 | 94 | 4 | 0 | 200 |
| Untreated | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 18 |
| LSD (0.05) | | 3 | 2 | 4 | 9 | 1 | 0.4 | 6 | 2 | 5 | 3 | 4 | 6 | 3 | 5 | 19 |

MSO = methylated sunflower oil; Loveland; 28% UAN = an aqueous solution of urea and ammonium nitrate, Helena; AMS = spray grade ammonium sulfate, Helena.

Performance of Steadfast plus Callisto tank mixed with different additives for weed control in field corn at Potsdam, MN in 2004.

Breitenbach, Fritz R., Lisa M. Behnken, Kevin R. Griffin, and Kristal L. Schaufler.

The objective of this trial was to evaluate the performance of Steadfast plus Callisto tank mixed with different additives for weed control in field corn in southeastern Minnesota. The research site was a Port Byron silt loam containing 3.2% organic matter, soil pH of 6.7, and soil test P and K levels of 66 ppm and 376 ppm, respectively. The previous crop was soybean. The area was fertilized in the spring with 160 lbs/A of nitrogen and 120 lb/A of potash. The field was disked and field cultivated once prior to planting. The corn hybrid, Pioneer 37R70 RR, was planted on May 11, 2004 at a depth of 1.5 inches in 30-inch rows at 32,000 seeds/A. A randomized complete block design with four replications was used. Preemergence (PRE) and postemergence (POST) treatments were applied with a tractor-mounted sprayer, delivering 20 gpa at 32 psi using Turbo Tee 11002 nozzles. Evaluations of the plots were taken on May 27, June 25, July 9, and October 29, 2004. Application dates, environmental conditions, and crop and weed stages are listed below. Giant ragweed distribution was variable at Potsdam, and dramatically affected yields.

| Date | May 12 | June 15 |
|-----------------------------------|----------|----------|
| Treatment | PRE | POST |
| Temperature (F) | | |
| air | 73 | 74 |
| Relative humidity (%) | 73 | 49 |
| Wind (mph) | 24 | 10 |
| Soil moisture | adequate | adequate |
| Corn | | |
| stage | seeded | V3 |
| height (inches) | -- | 12.6 |
| Wild proso millet | | |
| weed density | -- | moderate |
| height (inch) | -- | 1.9 |
| Common lambsquarters | | |
| weed density | -- | moderate |
| height (inch) | -- | 0.9 |
| Velvetleaf | | |
| weed density | -- | light |
| height (inch) | -- | 1.2 |
| Giant ragweed | | |
| weed density | -- | moderate |
| height (inch) | -- | 8.7 |
| Rainfall after application (inch) | | |
| week 1 | 1.47 | 1.92 |
| week 2 | 2.98 | 0.57 |
| week 3 | 1.31 | 1.68 |

All treatments provided excellent control of common lambsquarters and velvetleaf with no statistical differences between treatments. Giant ragweed control with Steadfast + Callisto + atrazine + AMS was similar when the additives Prime Oil, Superb HC, and Destiny, were used. Increasing the rate of Callisto from 1.5 oz/A to 3 oz/A did not improve giant ragweed control. Option + Callisto + Destiny + AMS and Steadfast + Lumax + NIS + AMS gave significantly lower control of giant ragweed than the other treatments (July 9 rating). Wild proso millet control was slightly better when Steadfast + Callisto + atrazine + AMS was applied with Destiny or Prime Oil compared to Superb HC, 92%, 92% and 88%, respectively, (University of Minnesota Extension Service, Regional Center, Rochester, MN).

Table. Performance of Steadfast and Callisto tank mixed with different additives for weed control in corn on May 27, June 25, July 9, and October 29 at Potsdam, MN in 2004 (Breitenbach, Behnken, Griffin, and Schaufler).

| Treatment | Rate | Wild proso millet control | | | Common lambsquarters control | | Velvetleaf control | | Giant ragweed control | | | Corn yield (bu/A) |
|-------------------------------------------------------------------------------------|-------------------------------------------------|---------------------------|------|-----|------------------------------|-----|--------------------|-----|-----------------------|-----|-------|----------------------|
| | | 5/27 | 6/25 | 7/9 | 6/25 | 7/9 | 6/25 | 7/9 | 6/25 | 7/9 | 10/29 | |
| | (rate/A) | (%) | | | (%) | | (%) | | (%) | | | |
| Preemergence / Postemergence | | | | | | | | | | | | |
| Cinch / Steadfast + Callisto + atrazine + Prime Oil ¹ + AMS ² | 1 pt / 0.75 oz + 2 oz + 10 oz + 1 % v/v + 2 lbs | 89 | 97 | 86 | 100 | 99 | 100 | 99 | 88 | 87 | 94 | 216 |
| Postemergence | | | | | | | | | | | | |
| Steadfast + Callisto + atrazine + Prime Oil ¹ + AMS ² | 0.75 oz + 3 oz + 12 oz + 1 % v/v + 2 lbs | 0 | 81 | 92 | 100 | 99 | 100 | 99 | 85 | 80 | 87 | 173 |
| Steadfast + Callisto + atrazine + Superb HC ³ + AMS ² | 0.75 oz + 1.5 oz + 12 oz + 0.5 % v/v + 2 lbs | 0 | 85 | 88 | 100 | 99 | 100 | 99 | 84 | 88 | 93 | 222 |
| Steadfast + Callisto + atrazine + Destiny ⁴ + AMS ² | 0.75 oz + 1.5 oz + 12 oz + 1 % v/v + 2 lbs | 0 | 89 | 92 | 100 | 99 | 100 | 99 | 87 | 90 | 94 | 199 |
| Steadfast + Callisto + atrazine + Prime Oil ¹ + AMS ² | 0.75 oz + 1.5 oz + 12 oz + 1 % v/v + 2 lbs | 0 | 84 | 91 | 100 | 99 | 100 | 99 | 87 | 85 | 93 | 204 |
| Steadfast + Lumax + NIS ⁵ + AMS ² | 0.75 oz + 2 pts + 0.25 % v/v + 2 lbs | 0 | 86 | 95 | 100 | 99 | 100 | 99 | 78 | 58 | 79 | 181 |
| Option + Callisto + Destiny ⁴ + AMS ² | 1.5 oz + 1.5 oz + 1 % v/v + 2 lbs | 0 | 83 | 85 | 99 | 98 | 100 | 99 | 70 | 63 | 85 | 209 |
| Untreated | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 108 |
| LSD = (0.05) | | 1 | 4 | 3 | 1 | 1 | 0 | 0 | 7 | 13 | 7 | 34 |

Prime Oil¹, Agrilience; AMS² = spray grade ammonium sulfate, Helena; Superb HC³, Agrilience; Destiny⁴, Agrilience; and NIS⁵ = AGRI-DEX nonionic surfactant, Helena

Evaluation of the performance of KIH-485 for weed control in field corn at Potsdam, MN in 2004.

Behnken, Lisa M., Fritz R. Breitenbach, Kristal L. Schaufler, and Kira L. Stearns.

The objective of this trial was to evaluate the performance of KIH-485 for weed control in field corn in southeastern Minnesota. The research site was a Port Byron silt loam containing 3.2% organic matter, soil pH of 6.7, and soil test P and K levels of 66 ppm and 376 ppm, respectively. The previous crop was soybean. The area was fertilized in the spring with 160 lb/A of nitrogen and 120 lb/A of potash. The field was disked and field cultivated once prior to planting. The corn hybrid, Pioneer 37R70 RR, was planted on May 11, 2004 at a depth of 1.5 inches in 30-inch rows at 32,000 seeds/A. A randomized complete block design with four replications was used. Preemergence (PRE) and postemergence (POST) treatments were applied with a tractor-mounted sprayer, delivering 20 gpa at 32 psi using Turbo Tee 11002 nozzles. Evaluations of the plots were taken on May 27, June 14, and July 9. Application dates, environmental conditions, and crop and weed stages are listed below. Giant ragweed distribution was variable at Potsdam, and dramatically affected yields.

| Date | May 12 | June 15 |
|-----------------------------------|----------|----------|
| Treatment | PRE | POST |
| Temperature (F) | | |
| air | 73 | 67 |
| Relative humidity (%) | 73 | 67 |
| Wind (mph) | 24 | 7 |
| Soil moisture | adequate | adequate |
| Corn | | |
| stage | seeded | V3 |
| height (inches) | 0 | 12.6 |
| Wild proso millet | | |
| weed density | -- | moderate |
| height (inch) | -- | 1.9 |
| Giant ragweed | | |
| weed density | -- | moderate |
| height (inch) | -- | 8.7 |
| Common lambsquarters | | |
| weed density | -- | moderate |
| height (inch) | -- | 0.9 |
| Velvetleaf | | |
| weed density/ft ² | -- | light |
| height (inch) | -- | 1.2 |
| Rainfall after application (inch) | | |
| week 1 | 1.47 | 1.92 |
| week 2 | 2.98 | 0.57 |
| week 3 | 1.31 | 1.68 |

No crop injury response was observed from any of the treatments in this trial. All rates of KIH-485 and Dual II Magnum tested provided comparable control of wild proso millet. Package mixes of KIH-485 & atrazine provided better control of wild proso millet than Bicep Lite II Magnum package mixes on the July 9 rating. Suppression of giant ragweed was observed with all rates of KIH-485 and with the 2.66 pt/A rate of Dual II Magnum. The KIH-485 & atrazine package mixes also suppressed giant ragweed as did the high rate of Bicep Lite II Magnum.

KIH-485 at the 6 oz/A and 8 oz/A rates, KIH-485 & atrazine, and Bicep Lite II Magnum package mixes provided better common lambsquarters control than the Dual II Magnum treatments and the KIH-485 treatment at 4 oz/A rate on the June 14 rating. All rates of KIH-485 offered suppression of velvetleaf. KIH-485 at the 4 oz/A rate offered significantly lower velvetleaf control than the higher rates of KIH-485 and the high rate of Dual II Magnum. Dual II Magnum at the 1.33 pt/A rate provided significantly lower velvetleaf control than all of the KIH-485 treatments and the Dual II Magnum treatment at the 2.66 pt/A rate (June 16 rating). KIH-485 & atrazine and Bicep Lite II Magnum package mixes provided similar control of velvetleaf to the higher rates of KIH-485 and the high rate of Dual II Magnum, (University of Minnesota Extension Service, Regional Center, Rochester, MN).

Table. Performance of KIH-485 for weed control in corn on May 27, June 14, and July 9 at Potsdam, MN in 2004. (Behnken, Breitenbach, Schaufler, and Stearns).

| Treatment | Rate | Wild proso millet control | | | Giant ragweed control | | Common lambsquarters control | | Velvetleaf control | | Corn yield |
|------------------------------------|------------------|---------------------------|------|-----|-----------------------|-----|------------------------------|-----|--------------------|-----|------------|
| | | 5/27 | 6/14 | 7/9 | 6/14 | 7/9 | 6/14 | 7/9 | 6/14 | 7/9 | |
| | (rate/A) | (%) | | | (%) | | (%) | | (%) | | (bu/A) |
| Preemergence/ Postemergence | | | | | | | | | | | |
| KIH-485 / Clarity | 4 oz / 16 oz | 99 | 92 | 96 | 5 | 98 | 72 | 98 | 46 | 98 | 176 |
| KIH-485 / Clarity | 5 oz / 16 oz | 99 | 89 | 96 | 10 | 98 | 81 | 98 | 49 | 98 | 179 |
| KIH-485 / Clarity | 6 oz / 16 oz | 99 | 88 | 96 | 23 | 99 | 94 | 98 | 65 | 98 | 223 |
| KIH-485 / Clarity | 8 oz / 16 oz | 99 | 94 | 97 | 47 | 99 | 97 | 98 | 65 | 98 | 205 |
| Dual II Magnum / Clarity | 1.33 pts / 16 oz | 93 | 74 | 90 | 0 | 99 | 75 | 98 | 25 | 98 | 208 |
| Dual II Magnum / Clarity | 2.66 pts / 16 oz | 99 | 81 | 93 | 27 | 98 | 75 | 98 | 49 | 98 | 206 |
| KIH-485&atrazine / Clarity | 19 oz / 16 oz | 98 | 83 | 92 | 44 | 99 | 98 | 97 | 59 | 98 | 213 |
| KIH-485&atrazine / Clarity | 30.5 oz / 16 oz | 97 | 91 | 93 | 53 | 98 | 99 | 98 | 63 | 98 | 203 |
| Bicep Lite II Magnum / Clarity | 29 oz / 16 oz | 91 | 70 | 63 | 0 | 99 | 96 | 99 | 55 | 98 | 204 |
| Bicep Lite II Magnum / Clarity | 35.5 oz / 16 oz | 88 | 78 | 74 | 43 | 98 | 96 | 99 | 46 | 98 | 206 |
| Postemergence | | | | | | | | | | | |
| Clarity | 16 oz | 0 | 0 | 6 | 0 | 99 | 0 | 99 | 0 | 99 | 208 |
| Untreated | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 39 |
| LSD = (0.10) | | 4 | 8 | 10 | 11 | 1 | 13 | 1 | 16 | 1 | 26 |

Evaluation of the performance of KIH-485 for weed control in field corn at Rochester, MN in 2004.

Breitenbach, Fritz R., Lisa M. Behnken, Debra L. Lewis, and Angela L. White.

The objective of this trial was to evaluate the performance of KIH-485 for weed control in field corn in southeastern Minnesota. The research site was a Lawler loam series containing 2.7% organic matter with a pH of 6.5 and soil test P and K levels of 74 ppm and 185 ppm, respectively. The area was fertilized in the spring with 122 lb/A of nitrogen, 23 lb/A of phosphorus, 120 lb/A of potash, 23 lb/A of sulfur and 3 T/A of lime. The area was also top dressed with an additional 40lb/A of nitrogen on June 15. The previous crop was soybean. The field was disked and field cultivated once prior to planting. The corn hybrid, DeKalb DKC 47-10, was planted on April 29, 2004 at a depth of 1.5 inches in 30-inch rows at 32,000 seeds/A. A randomized complete block design with four replications was used. Preemergence (PRE) and postemergence (POST) treatments were applied with a tractor-mounted sprayer, delivering 20 gpa at 32 psi using Turbo Tee 11002 nozzles. Evaluations of the plots were taken on May 18, June 2, and July 9. Application dates, environmental conditions, and crop and weed stages are listed below.

| Date | April 29 | June 2 |
|-----------------------------------|----------|----------|
| Treatment | PRE | POST |
| Temperature (F) | | |
| air | 61 | 70 |
| Relative humidity (%) | 51 | 46 |
| Wind (mph) | 12 | 10 |
| Soil moisture | adequate | adequate |
| Corn | | |
| stage | seeded | 3-collar |
| height (inches) | -- | 4.75 |
| Woolly cupgrass | | |
| weed density | -- | moderate |
| height (inch) | -- | 1.3 |
| Giant ragweed | | |
| weed density | -- | heavy |
| height (inch) | -- | 3.0 |
| Common lambsquarters | | |
| weed density | -- | light |
| height (inch) | -- | 0.8 |
| Common waterhemp | | |
| weed density | -- | moderate |
| height (inch) | -- | 0.7 |
| Rainfall after application (inch) | | |
| week 1 | 0.01 | 0.20 |
| week 2 | 1.44 | 5.46 |
| week 3 | 1.02 | 1.92 |

Significantly lower woolly cupgrass control was achieved when using the two Bicep Lite II Magnum premixes than with Dual II Magnum and KIH-485 alone, and the KIH-485 & atrazine premixes. The 8 oz/A rate of KIH-485 provided better control of woolly cupgrass than the 1.33 pt/A rate of Dual II Magnum. KIH-485 provided better giant ragweed suppression than Dual II Magnum (May 18 rating). The June 2 rating for giant ragweed showed minimal suppression with KIH-485 at the 4 oz/A rate and Dual II Magnum at both rates. A progressive rate response

was observed with KIH-485 for giant ragweed control, with a significant improvement in control from the 4 oz/A to 8 oz/A rate. KIH-485 & atrazine, and Bicep Lite II Magnum premixes provided better control of giant ragweed than KIH-485 and Dual II Magnum alone. The low rate of Bicep Lite II Magnum provided less control of giant ragweed than the high rate of the KIH-485 & atrazine premix. KIH-485 (all rates) provided significantly superior common lambsquarters control than Dual II Magnum alone (May 18 and June 2 ratings). Premixes of KIH-485 & atrazine, Bicep Lite II Magnum, and the two high rates of KIH-485 provided the best common lambsquarters control, (University of Minnesota Extension Service, Regional Center, Rochester, MN).

Table. Performance of KIH-485 for weed control in corn on May 18, June 2, and July 9 at Rochester, MN in 2004 (Breitenbach, Behnken, Lewis, and White).

| Treatment | Rate | Woolly cupgrass control | | | Giant ragweed control | | | Common lambsquarters control | | | Common waterhemp control | | | Corn yield (bu/A) |
|-------------------------------------|------------------|-------------------------|-----|-----|-----------------------|-----|-----|------------------------------|-----|-----|--------------------------|-----|-----|----------------------|
| | | 5/18 | 6/2 | 7/9 | 5/18 | 6/2 | 7/9 | 5/18 | 6/2 | 7/9 | 5/18 | 6/2 | 7/9 | |
| | (rate/A) | 5/18 6/2 7/9 (%) | | | 5/18 6/2 7/9 (%) | | | 5/18 6/2 7/9 (%) | | | 5/18 6/2 7/9 (%) | | | |
| Preemergence / Postemergence | | | | | | | | | | | | | | |
| KIH-485 / Clarity | 4 oz / 16 oz | 82 | 91 | 80 | 29 | 3 | 93 | 61 | 83 | 83 | 100 | 100 | 88 | 164 |
| KIH-485 / Clarity | 5 oz / 16 oz | 92 | 97 | 85 | 49 | 23 | 95 | 71 | 88 | 84 | 100 | 100 | 93 | 172 |
| KIH-485 / Clarity | 6 oz / 16 oz | 90 | 93 | 82 | 64 | 44 | 93 | 90 | 96 | 80 | 100 | 100 | 92 | 157 |
| KIH-485 / Clarity | 8 oz / 16 oz | 96 | 99 | 88 | 63 | 60 | 92 | 97 | 99 | 83 | 100 | 100 | 92 | 162 |
| Dual II Magnum / Clarity | 1.33 pts / 16 oz | 81 | 94 | 78 | 5 | 1 | 95 | 0 | 23 | 84 | 100 | 91 | 87 | 164 |
| Dual II Magnum / Clarity | 2.66 pts / 16 oz | 88 | 100 | 87 | 10 | 5 | 95 | 30 | 63 | 85 | 100 | 98 | 85 | 166 |
| KIH-485 & atrazine / Clarity | 19 oz / 16 oz | 91 | 94 | 81 | 85 | 74 | 94 | 100 | 100 | 84 | 100 | 100 | 90 | 178 |
| KIH-485 & atrazine / Clarity | 30.5 oz / 16 oz | 91 | 92 | 80 | 89 | 79 | 95 | 100 | 100 | 85 | 100 | 100 | 87 | 173 |
| Bicep Lite II Magnum / Clarity | 29 oz / 16 oz | 81 | 85 | 46 | 70 | 68 | 95 | 100 | 98 | 84 | 100 | 99 | 84 | 146 |
| Bicep Lite II Magnum / Clarity | 35.5 oz / 16 oz | 84 | 88 | 58 | 88 | 74 | 96 | 100 | 100 | 83 | 100 | 98 | 86 | 167 |
| Postemergence | | | | | | | | | | | | | | |
| Clarity | 16 oz | 0 | 0 | 0 | 0 | 0 | 98 | 0 | 0 | 98 | 0 | 0 | 98 | 41 |
| Untreated | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| LSD (0.10) | | 5 | 5 | 8 | 8 | 7 | 4 | 11 | 11 | 4 | 0 | 3 | 5 | 27 |

Performance of glyphosate products when applied under adverse weather conditions in field corn at Potsdam, MN in 2004.

Breitenbach, Fritz R., Lisa M. Behnken, Kira L. Stearns, and Kevin R. Griffin.

The objective of this trial was to evaluate the performance of glyphosate products when applied under adverse weather conditions for weed control in field corn in southeastern Minnesota. The research site was a Port Byron silt loam containing 3.2% organic matter with a pH of 6.7 and soil test P and K levels of 66 ppm and 376 ppm, respectively. The field was fertilized in the spring with 160 lb/A of nitrogen and 120 lb/A of potash. The previous crop was soybean. The field was disked and field cultivated once prior to planting. The corn hybrid, Pioneer 37R70 RR, was planted on May 11, 2004 at a depth of 1.5 inches in 30-inch rows at 32,000 seeds/A. A randomized complete block design with four replications was used. Postemergence (POST) treatments were applied with a tractor-mounted sprayer, delivering 15 gpa at 32 psi using TurboTee 11002 nozzles. Evaluations of the plots were taken on June 25 and July 9. Application date, environmental conditions, and crop and weed stages are listed below. Giant ragweed distribution was variable at Potsdam, and dramatically affected yields.

| Date | June 14 |
|-----------------------------------|----------|
| Treatment | POST |
| Temperature (F) | |
| Air | 75 |
| Relative humidity (%) | 46 |
| Wind (mph) | 14 |
| Soil moisture | adequate |
| Corn | |
| stage | V3 |
| height (inches) | 12.6 |
| Wild proso millet | |
| weed density | moderate |
| height (inch) | 1.9 |
| Common lambsquarters | |
| weed density | moderate |
| height (inch) | 0.9 |
| Velvetleaf | |
| weed density | light |
| height (inch) | 1.2 |
| Giant ragweed | |
| weed density | moderate |
| height (inch) | 8.7 |
| Rainfall after application (inch) | |
| week 1 | 1.85 |
| week 2 | 0.63 |
| week 3 | 0.38 |

There were some differences in weed control at the June 25 rating among the glyphosate products. However, no differences were observed among the glyphosate products applied alone for wild proso millet or velvetleaf control by the July 9 rating. Common lambsquarters control was lower with Glystar Plus + AMS (78% for the July 9 rating) compared to all other treatments except Glyphomax Plus + AMS, which gave 81%. No differences in common lambsquarters control was observed among the other glyphosate products applied alone by the July 9 rating. However, control was only 84 to 88% with these treatments. Roundup WeatherMax + Callisto + atrazine + AMS provided significantly better control of velvetleaf and common lambsquarters than all other treatments, 100% and 100%, respectively (July 9 rating), (University of Minnesota Extension Service, Regional Center, Rochester, MN).

Table. Performance of glyphosate products for weed control in corn on June 25 and July 9 at Potsdam, MN in 2004 (Breitenbach, Behnken, Stearns, and Griffin).

| Treatment | Rate | Corn injury | Wild proso millet control | | Common lambsquarters control | | Velvetleaf control | | Giant ragweed control | | Corn yield |
|------------------------------------------------|-------------------------------|-------------|---------------------------|----------|------------------------------|----------|--------------------|----------|-----------------------|--------|------------|
| | | | 6/25 | 6/25 7/9 | 6/25 7/9 | 6/25 7/9 | 6/25 7/9 | 6/25 7/9 | | | |
| | (rate/A) | (%) | (%) | (%) | (%) | (%) | (%) | (%) | (%) | (bu/A) | |
| Postemergence | | | | | | | | | | | |
| Roundup WeatherMax + AMS | 16 oz + 3 lbs | 0 | 92 | 95 | 93 | 85 | 98 | 89 | 96 | 93 | 181 |
| Roundup WeatherMax + AMS | 22 oz + 3 lbs | 1 | 92 | 95 | 97 | 88 | 98 | 90 | 96 | 95 | 180 |
| Roundup WeatherMax | 22 oz | 3 | 93 | 95 | 95 | 87 | 97 | 89 | 98 | 93 | 178 |
| Roundup WeatherMax + NIS | 22 oz + 0.125 % v/v | 0 | 93 | 95 | 96 | 87 | 99 | 90 | 95 | 91 | 186 |
| Roundup WeatherMax + AMS | 32 oz + 3 lbs | 3 | 94 | 95 | 96 | 86 | 99 | 88 | 98 | 93 | 187 |
| Roundup Original Max + AMS | 22 oz + 3 lbs | 0 | 94 | 95 | 94 | 86 | 98 | 89 | 97 | 94 | 186 |
| Roundup Original Max + NIS + AMS | 22 oz + 0.125 % v/v + 3 lbs | 2 | 91 | 95 | 96 | 85 | 96 | 89 | 96 | 91 | 194 |
| Touchdown IQ + AMS | 24 oz + 3 lbs | 3 | 94 | 95 | 92 | 84 | 98 | 89 | 94 | 91 | 190 |
| Touchdown IQ + AMS | 32 oz + 3 lbs | 1 | 93 | 95 | 94 | 86 | 98 | 90 | 96 | 91 | 179 |
| ClearOut 41 Plus + AMS | 24 oz + 3 lbs | 1 | 92 | 95 | 95 | 88 | 97 | 89 | 95 | 93 | 202 |
| ClearOut 41 Plus + AMS | 32 oz + 3 lbs | 4 | 94 | 95 | 90 | 85 | 98 | 88 | 96 | 91 | 199 |
| Glyphomax Plus + AMS | 32 oz + 3 lbs | 2 | 93 | 95 | 92 | 81 | 97 | 90 | 98 | 94 | 182 |
| Glystar Plus + AMS | 32 oz + 3 lbs | 1 | 95 | 95 | 91 | 78 | 98 | 90 | 97 | 90 | 176 |
| Roundup WeatherMax + Callisto + atrazine + AMS | 22 oz + 1.5 oz + 9 oz + 3 lbs | 3 | 96 | 95 | 97 | 100 | 99 | 100 | 97 | 91 | 192 |
| Roundup WeatherMax + Distinct+ AMS | 22 oz + 2 oz + 3 lbs | 2 | 96 | 95 | 96 | 89 | 98 | 91 | 98 | 95 | 197 |
| Untreated | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 18 |
| LSD = (0.10) | | 3 | 3 | 0 | 5 | 4 | 1 | 3 | 3 | 4 | 27 |

AMS = spray grade ammonium sulfate, Helena; NIS = AGRI-DEX nonionic surfactant, Helena.

Comparison of the performance of Option and Equip alone and in combination with other herbicides for weed control in field corn at Potsdam, MN in 2004.

Breitenbach, Fritz R., Lisa M. Behnken, Angela L. White and Kristal L. Schaufler.

The objective of this trial was to compare the performance of Option and Equip alone and in combination with other herbicides for weed control in field corn in southeastern Minnesota. The research site was a Port Byron silt loam containing 3.2% organic matter with a pH of 6.7 and soil test P and K levels of 66 ppm and 376 ppm, respectively. The previous crop was soybean. The area was fertilized in the spring with 160 lb/A of nitrogen and 120 lb/A of potash. The field was disked and field cultivated once prior to planting. The corn hybrid, Pioneer 37R70 RR, was planted on May 11, 2004 at a depth of 1.5 inches in 30-inch rows at 32,000 seeds/A. A randomized complete block design with four replications was used. Postemergence (POST) treatments were applied with a tractor-mounted sprayer, delivering 20 gpa at 32 psi using Turbo Tee 11002 nozzles. Evaluations of the plots were taken on June 25, July 9, and October 29, 2004. Application dates, environmental conditions, and crop and weed stages are listed below. Giant ragweed distribution was variable at Potsdam, and dramatically affected yields.

| | |
|-----------------------------------|----------|
| Date | June 15 |
| Treatment | POST |
| Temperature (F) | |
| air | 72 |
| Relative humidity (%) | 53 |
| Wind (mph) | 9 |
| Soil moisture | adequate |
| Corn | |
| stage | V3 |
| height (inches) | 12.6 |
| Wild proso millet | |
| weed density | moderate |
| height (inch) | 1.9 |
| Common lambsquarters | |
| weed density | moderate |
| height (inch) | 0.9 |
| Velvetleaf | |
| weed density | light |
| height (inch) | 1.2 |
| Giant ragweed | |
| weed density | moderate |
| height (inch) | 8.7 |
| Rainfall after application (inch) | |
| week 1 | 1.92 |
| week 2 | 0.57 |
| week 3 | 1.68 |

Option and Equip tank mixed with Distinct provided similar control of wild proso millet to the standard Steadfast + Callisto. Paired comparisons of Option and Equip tank mixed with various broadleaf partners provided similar wild proso millet control.

Option tank mixed with Callisto and Equip tank mixed with Callisto or Northstar provided similar control of common lambsquarters to the standard Steadfast + Callisto. Paired comparisons of

Option and Equip tank mixed with various broadleaf partners provided similar control of common lambsquarters with the exception of Option plus Northstar which provided significantly lower common lambsquarters control than the Equip plus Northstar tank mix.

Option and Equip both alone and with tank mix partners provided significantly better control of giant ragweed than the Steadfast + Callisto standard (October 29 rating). Only Option applied by itself was not significantly different than the Steadfast + Callisto standard, (July 9 rating). Option alone provided significantly lower giant ragweed control than Equip applied by itself. Paired comparisons of Option and Equip tank mixed with various broadleaf partners provided similar control of giant ragweed with the exception of Option plus Callisto which provided significantly lower giant ragweed control than the Equip plus Callisto tank mix, (University of Minnesota Extension Service, Regional Center, Rochester, MN).

Table. Performance of Option and Equip alone and in combination with other herbicides on June 25, July 9, and October 29 at Potsdam, MN in 2004. (Breitenbach, Behnken, White, and Schaufler).

| Treatment | Rate | Corn injury | Wild proso millet control | | Common lambsquarters control | | Velvetleaf control | | Giant ragweed control | | | Corn yield |
|--------------------------------------|-----------------------------------|-------------|---------------------------|-----|------------------------------|-----|--------------------|-----|-----------------------|-----|-------|------------|
| | | | 6/25 | 7/9 | 6/25 | 7/9 | 6/25 | 7/9 | 6/25 | 7/9 | 10/29 | |
| | (rate/A) | (%) | (%) | | (%) | | (%) | | (%) | | | (bu/A) |
| Postemergence | | | | | | | | | | | | |
| Option + MSO + 28% UAN | 1.5 oz + 1.5 pts + 1.5 qts | 3 | 80 | 84 | 80 | 78 | 80 | 97 | 64 | 61 | 65 | 202 |
| Equip + MSO + 28% UAN | 1.5 oz + 1.5 pts + 1.5 qts | 3 | 80 | 82 | 80 | 81 | 80 | 98 | 61 | 76 | 79 | 189 |
| Option + Distinct + MSO + 28% UAN | 1.5 oz + 2 oz + 1.5 pts + 1.5 qts | 5 | 80 | 88 | 80 | 86 | 80 | 98 | 77 | 95 | 95 | 209 |
| Equip + Distinct + MSO + 28% UAN | 1.5 oz + 2 oz + 1.5 pts + 1.5 qts | 1 | 80 | 94 | 85 | 85 | 85 | 98 | 83 | 95 | 96 | 189 |
| Option + Callisto + MSO + 28% UAN | 1.5 oz + 2 oz + 1.5 pts + 1.5 qts | 0 | 80 | 87 | 85 | 96 | 85 | 98 | 68 | 74 | 76 | 166 |
| Equip + Callisto + MSO + 28% UAN | 1.5 oz + 2 oz + 1.5 pts + 1.5 qts | 4 | 80 | 87 | 80 | 94 | 80 | 98 | 73 | 88 | 97 | 200 |
| Option + Northstar + MSO + 28% UAN | 1.5 oz + 2 oz + 1.5 pts + 1.5 qts | 1 | 80 | 84 | 80 | 79 | 80 | 98 | 77 | 95 | 98 | 201 |
| Equip + Northstar + MSO + 28% UAN | 1.5 oz + 3 oz + 1.5 pts + 1.5 qts | 4 | 80 | 85 | 85 | 94 | 85 | 99 | 74 | 98 | 97 | 209 |
| Steadfast + Callisto + COC + 28% UAN | 0.75 oz + 2 oz + 1 qt + 1.5 qts | 0 | 80 | 93 | 80 | 98 | 80 | 98 | 73 | 48 | 51 | 207 |
| Untreated | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 26 |
| LSD = (0.05) | | 5 | 0 | 6 | 7 | 9 | 7 | 2 | 9 | 14 | 8 | 38 |

MSO = methylated sunflower oil, Loveland; 28% UAN = an aqueous solution of urea and ammonium nitrate, Helena; and COC = crop oil concentrate, Helena.

Comparison of single-pass and two-pass sequential management systems for weed control in field corn at Rochester, MN in 2004.

Behnken, Lisa M., Fritz R. Breitenbach, Angela L. White, Kevin R. Griffin.

The objective of this trial was to evaluate and compare the performance of single-pass and two-pass sequential management systems for weed control in field corn in southeastern Minnesota. The research site was a Lawler loam series containing 2.4% organic matter with a pH of 6.1 and soil test P and K levels of 59 ppm and 198 ppm, respectively. The previous crop was soybean. The area was fertilized in the spring with 122 lb/A of nitrogen, 23 lb/A phosphorous, 120 lb/A potash, 23 lb/A of sulfur, and 3 T/A of lime. Forty lb/A of additional nitrogen was side-dressed when the corn was at 5 collar on June 15. The field was disked and field cultivated once prior to planting. The corn hybrid, Golden Harvest 7616RR, was planted on May 6, 2004 at a depth of 1.5 inches in 30-inch rows at 32,000 seeds/A. A randomized complete block design with four replications was used. Preemergence (PRE) and postemergence (POST I and II) treatments were applied with a tractor-mounted sprayer, delivering 20 gpa at 32 psi using Turbo Tee 11002 nozzles. Evaluations of the plots were taken on May 24, June 7, June 14, August 2, and October 21. Application dates, environmental conditions, and crop and weed stages are listed below.

| Date | May 6 | June 8 | June 28 |
|-----------------------------------|----------|----------|------------|
| Treatment | PRE | POST I | POST II |
| Temperature (F) | | | |
| Air | 62 | 78 | 72 |
| Relative humidity (%) | 39 | 71 | 44 |
| Wind (mph) | 15 | 14 | 9 |
| Soil moisture | adequate | adequate | adequate |
| Corn | | | |
| Stage | seeded | 5 collar | 8 collar |
| height (inches) | 0 | 6 | 22.0 |
| Giant ragweed | | | |
| weed density | -- | heavy | heavy |
| height (inch) | -- | 4.4 | 2 Regrowth |
| Common lambsquarters | | | |
| weed density | -- | light | light |
| height (inch) | -- | 1.3 | 2 Regrowth |
| Common waterhemp | | | |
| weed density | -- | moderate | moderate |
| height (inch) | -- | 1.4 | 2 Regrowth |
| Giant foxtail | | | |
| weed density | -- | moderate | moderate |
| height (inch) | -- | 1.4 | 2 Regrowth |
| Rainfall after application (inch) | | | |
| week 1 | 1.44 | 5.65 | 0.16 |
| week 2 | 1.02 | 1.92 | 2.82 |
| week 3 | 2.91 | 0.57 | 0.23 |

Only two preemergence treatments provided greater than 90% season long giant ragweed control; Lumax, and Camix + Princep. All other soil applied treatments provided 71% control, or lower (August 2 rating). Three sequential PRE/POST I treatments provide statistically lower giant ragweed control than the best sequential treatments. They were Define / Option + Distinct, Harness Xtra / Roundup WeatherMax, and Dual II Magnum / Touchdown Total. Package mixes with atrazine or Callisto, Outlook, and Define provided better initial common lambsquarters control than Dual II Magnum. The addition of a sequential postemergence treatment resulted in excellent common lambsquarters control for all treatments. All treatments

provided excellent early season common waterhemp control, however, control diminished in several treatments by late season. Those treatments were: Keystone LA+ Balance Pro, Outlook/ Distinct, Define / Option + Distinct, Harness Xtra / Roundup WeatherMax, and Dual II Magnum / Touchdown Total. Early season control of giant foxtail was excellent with all treatments, but late season control decreased for several treatments with reduced rates of Keystone LA at 1 qt/A, (University of Minnesota Extension Service, Regional Center, Rochester, MN).

Table. Performance of single-pass and two-pass sequential weed management systems in field corn on May 24, June 14, and August 2 at Rochester, MN in 2004 (Behnken, Breitenbach, White, and Griffin).

| Treatment | Rate | Giant ragweed control | | | Common lambsquarters control | | | Common waterhemp control | | Giant foxtail control | | | Corn yield |
|----------------------------------------------------------------|--------------------------------------------------------|-----------------------|------|-----|------------------------------|------|-----|--------------------------|-----|-----------------------|------|-----|------------|
| | | 5/24 | 6/14 | 8/2 | 5/24 | 6/14 | 8/2 | 6/14 | 8/2 | 5/24 | 6/14 | 8/2 | |
| | (rate/A) | 5/24 6/14 8/2 (%) | | | 5/24 6/14 8/2 (%) | | | 6/14 8/2 (%) | | 5/24 6/14 8/2 (%) | | | (bu/A) |
| Preemergence | | | | | | | | | | | | | |
| Lumax | 2.5 qts | 93 | 99 | 98 | 99 | 99 | 99 | 99 | 97 | 99 | 99 | 97 | 149 |
| Keystone LA | 2 qts | 88 | 65 | 60 | 99 | 99 | 99 | 99 | 92 | 99 | 99 | 98 | 32 |
| Keystone LA + Hornet | 2 qts + 3 oz | 90 | 91 | 70 | 99 | 99 | 99 | 99 | 94 | 99 | 99 | 96 | 123 |
| Keystone LA + Balance Pro | 1 qt + 2.25 oz | 91 | 97 | 71 | 99 | 99 | 99 | 99 | 86 | 99 | 99 | 76 | 122 |
| Camix + Princep | 2 qts + 1 qt | 92 | 99 | 91 | 99 | 99 | 99 | 99 | 93 | 99 | 99 | 98 | 144 |
| PRE / POST I | | | | | | | | | | | | | |
| Dual II Magnum / Callisto + atrazine + COC + 28% UAN | 1.33 pts / 3 oz + 1 pt + 1 % v/v + 2.5 % v/v | 0 | 75 | 96 | 76 | 99 | 99 | 99 | 95 | 99 | 99 | 96 | 148 |
| Outlook / Distinct + NIS + 28% UAN | 15 oz / 4 oz + 0.25 % v/v + 2.5 % v/v | 38 | 79 | 94 | 94 | 99 | 99 | 99 | 81 | 99 | 99 | 94 | 147 |
| Keystone LA / Hornet + NIS + 28% UAN | 2 qts / 3 oz + 0.25 % v/v + 2.5 % v/v | 89 | 93 | 95 | 99 | 99 | 98 | 99 | 92 | 99 | 99 | 86 | 170 |
| Cinch / Steadfast + Callisto + atrazine + COC + 28% UAN | 0.66 pts / 0.76 + 3 oz + 1 pt + 1 % v/v + 2.5 % v/v | 0 | 74 | 98 | 71 | 99 | 99 | 99 | 96 | 97 | 99 | 96 | 150 |
| Define / Option + Distinct + MSO + 28% UAN | 15 oz / 1.5 oz + 2 oz + 1 % v/v + 2.5 % v/v | 0 | 76 | 86 | 93 | 99 | 98 | 99 | 82 | 99 | 99 | 92 | 155 |
| Harness Xtra / Roundup WeatherMax + AMS | 0.92 qts / 22 oz + 3 lbs | 75 | 97 | 90 | 99 | 99 | 94 | 99 | 75 | 99 | 99 | 81 | 143 |
| Dual II Magnum / Touchdown Total + AMS | 1 pt / 24 oz + 3 lbs | 0 | 89 | 88 | 70 | 99 | 92 | 99 | 82 | 99 | 99 | 95 | 156 |
| Dual II Magnum / Northstar + atrazine + COC + 28% UAN | 1.33 pts / 4 oz + 1 pt + 1 % v/v + 2.5 % v/v | 0 | 70 | 98 | 71 | 99 | 99 | 99 | 94 | 99 | 99 | 95 | 156 |
| Dual II Magnum / Northstar + Accent + atrazine + COC + 28% UAN | 1.33 pts / 4 oz + 0.33 oz + 1 pt + 1 % v/v + 2.5 % v/v | 0 | 70 | 98 | 73 | 99 | 99 | 99 | 93 | 98 | 99 | 95 | 151 |
| POST I / POST II | | | | | | | | | | | | | |
| Roundup WeatherMax + AMS / Roundup WeatherMax + AMS | 22 oz + 3 lbs / 16 oz + 3 lbs | 0 | 88 | 100 | 0 | 99 | 100 | 99 | 99 | 0 | 99 | 99 | 141 |
| Untreated Check | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| LSD (0.05) | | 6 | 5 | 6 | 6 | 0 | 3 | 0 | 5 | 1 | 0 | 5 | 27 |

COC = crop oil concentrate; 28 % UAN = an aqueous solution of urea and ammonium nitrate, Helena; NIS = AGRI-DEX nonionic surfactant; Helena; MSO = methylated sunflower oil; Loveland; and AMS = spray grade ammonium sulfate, Helena.

Evaluation of spray adjuvants and deposition aids on glyphosate performance in field corn at Rochester, MN in 2004.

Breitenbach, Fritz R., Lisa M. Behnken, Angela L. White, and Kira L. Stearns.

The objective of this trial was to evaluate spray adjuvants and deposition aids on glyphosate performance in field corn in southeastern Minnesota in 2004. The research site was a Lawler loam series containing 2.7% organic matter with a pH of 6.5 and soil test P and K levels of 43 ppm and 185 ppm, respectively. The previous crop was soybean. The area was fertilized in the spring with 122 lb/A of nitrogen, 23 lb/A of phosphorus, 120 lb/A of potash, 23 lb/A of sulfur and 3 T/A of lime. The area was topdressed with 40 lb/A of nitrogen on June 15. The field was disked and field cultivated once prior to planting. The corn hybrid, DeKalb DKC 47-10, was planted on April 29, 2004 at a depth of 1.5 inches in 30-inch rows at 32,000 seeds/A. All of the adjuvants and deposition aids used in this trial are products of West Central, Inc. A randomized complete block design with four replications was used. Postemergence (POST I and II) treatments were applied with a tractor-mounted sprayer, delivering 20 gpa at 32 psi using Turbo Tee 11002 nozzles. Evaluations of the plots were taken on June 7, June 14, June 29 and July 9, 2004. Application dates, environmental conditions, and crop and weed stages are listed below.

| Date | May 25 | June 21 |
|-----------------------------------|----------|------------|
| Treatment | POST I | POST II |
| Temperature (F) | | |
| air | 59 | 69 |
| Relative humidity (%) | 67 | 65 |
| Wind (mph) | 16 | 7 |
| Soil moisture | adequate | adequate |
| Corn | | |
| Stage | 2 collar | 6 collar |
| height (inches) | 2.5 | 18 |
| Giant ragweed | | |
| weed density | heavy | heavy |
| height (inch) | 3 | 3 regrowth |
| Common lambsquarters | | |
| weed density | light | light |
| height (inch) | 3.5 | 8 regrowth |
| Common waterhemp | | |
| weed density | moderate | moderate |
| height (inch) | 0.5 | 2 regrowth |
| Giant foxtail | | |
| weed density | moderate | moderate |
| height (inch) | 0.5 | 3 regrowth |
| Rainfall after application (inch) | | |
| week 1 | 1.05 | 0.63 |
| week 2 | 0.33 | 0.16 |
| week 3 | 5.65 | 2.82 |

No differences were observed among the glyphosate products plus spray adjuvants and/or deposition aids for common waterhemp or giant foxtail control compared to the sequential glyphosate standard applied alone as Buccaneer / Buccaneer, by the July 9 rating. There were some differences observed in the treatments for giant ragweed and common lambsquarters control. The sequential application of Buccaneer applied with One-Ap XL provided significantly better giant ragweed control (92%), than when applied with Cornbelt Gardian, WC038, WC037 or WC036 and the sequential Buccaneer Plus + WC037 and Buccaneer alone treatments (July 9 rating). Buccaneer applied with Cornbelt Premier 90 + Premier AMS provided better giant ragweed control than when applied with Cornbelt Gardian, WC038 or WC037 and the sequential Buccaneer Plus + WC037 and Buccaneer alone treatments (July 9 rating). The sequential application of Buccaneer applied with WC036 provided significantly better common lambsquarters control than when applied with Cornbelt Gardian, One-Ap XL, Cornbelt Dri-Gard, or, Cornbelt Gardian Plus. Option + Priority+ Soy-Stik + Premium AMS and Steadfast+ Priority+ Premium COC + Premium AMS gave significantly lower giant ragweed and giant foxtail control compared to all

other treatments by the July 9 rating. Option + Priority + Soy-Stik + Premium AMS provided significantly lower common waterhemp control than all of the glyphosate treatments. (University of Minnesota Extension Service, Regional Center, Rochester, MN)

Table. Performance of spray adjuvants and deposition aids with glyphosate in field corn on June 7, June 14, June 29 and July 9 at Rochester, MN in 2004 (Breitenbach, Behnken, White and Stearns).

| Treatment | Rate | Giant ragweed control | | | | Common lambsquarters control | | | | Common waterhemp control | | | | Giant foxtail control | | | |
|-----------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|-----------------------|------|------|-----|------------------------------|------|------|-----|--------------------------|------|------|-----|-----------------------|------|------|-----|
| | | 6/7 | 6/14 | 6/29 | 7/9 | 6/7 | 6/14 | 6/29 | 7/9 | 6/7 | 6/14 | 6/29 | 7/9 | 6/7 | 6/14 | 6/29 | 7/9 |
| | (rate/A) | (%) | | | | (%) | | | | (%) | | | | (%) | | | |
| Postemergence I | | | | | | | | | | | | | | | | | |
| Option + Priority + Soy-Stik + Premium AMS | 1.5 oz + 1 oz + 1.5 oz + 2 lbs | 90 | 95 | - | 61 | 96 | 99 | - | 80 | 97 | 97 | - | 75 | 100 | 99 | - | 89 |
| Steadfast + Priority + Premium COC + Premium AMS | 0.75 oz + 1 oz + 1 % v/v + 2 lbs | 86 | 95 | - | 51 | 97 | 99 | - | 85 | 96 | 98 | - | 81 | 100 | 99 | - | 94 |
| Postemergence I / Postemergence II | | | | | | | | | | | | | | | | | |
| Buccaneer / Buccaneer | 32 oz / 16 oz | 95 | 90 | 84 | 85 | 98 | 99 | 93 | 88 | 95 | 97 | 98 | 89 | 100 | 98 | 98 | 99 |
| Buccaneer + Cornbelt Premier 90 + Premium AMS / Buccaneer + Cornbelt Premier 90 + Premium AMS | 32 oz + 0.5 % v/v + 8.5 lbs/100 gal / 16 oz + 0.5 % v/v + 8.5 lbs/100 gal | 96 | 90 | 93 | 90 | 98 | 98 | 95 | 90 | 97 | 97 | 99 | 91 | 100 | 98 | 99 | 98 |
| Buccaneer Plus + Cornbelt Gardian / Buccaneer Plus + Cornbelt Gardian | 32 oz + 2 qts/100 gal / 16 oz + 2 qts/100 gal | 95 | 90 | 84 | 84 | 94 | 98 | 86 | 84 | 93 | 96 | 95 | 87 | 100 | 98 | 99 | 99 |
| Buccaneer + One-Ap XL / Buccaneer + One-Ap XL | 32 oz + 9 lbs/100 gal / 16 oz + 9 lbs/100 gal | 95 | 90 | 95 | 92 | 96 | 98 | 88 | 83 | 94 | 94 | 96 | 89 | 100 | 98 | 99 | 99 |
| Buccaneer + WC038 / Buccaneer + WC038 | 32 oz + 2 qts/100 gal / 16 oz + 2 qts/100 gal | 95 | 90 | 83 | 84 | 97 | 99 | 92 | 89 | 97 | 97 | 97 | 91 | 100 | 98 | 99 | 99 |
| Buccaneer + Cornbelt Dri-Gard / Buccaneer + Cornbelt Dri-Gard | 32 oz + 9 lbs/100 gal / 16 oz + 9 lbs/100 gal | 95 | 90 | 93 | 88 | 96 | 98 | 87 | 83 | 94 | 96 | 97 | 91 | 100 | 98 | 99 | 98 |
| Buccaneer + Cornbelt Gardian Plus / Buccaneer + Cornbelt Gardian Plus | 32 oz + 2.5 gal/100 gal / 16 oz + 2.5 gal/100 gal | 95 | 90 | 90 | 89 | 97 | 97 | 87 | 85 | 96 | 96 | 98 | 92 | 100 | 99 | 99 | 99 |
| Buccaneer + WC037 / Buccaneer + WC037 | 32 oz + 2 qts/100 gal / 16 oz + 2 qts/100 gal | 95 | 90 | 87 | 85 | 98 | 98 | 93 | 90 | 97 | 96 | 98 | 92 | 100 | 98 | 99 | 99 |
| Buccaneer Plus + WC037 / Buccaneer Plus + WC037 | 32 oz + 2 qts/100 gal / 16 oz + 2 qts/100 gal | 95 | 90 | 87 | 84 | 98 | 99 | 96 | 91 | 95 | 96 | 97 | 93 | 100 | 98 | 98 | 99 |
| Buccaneer + WC036 / Buccaneer + WC036 | 32 oz + 2 qts/100 gal / 16 oz + 2 qts/100 gal | 95 | 90 | 90 | 88 | 98 | 99 | 94 | 93 | 96 | 97 | 97 | 93 | 100 | 99 | 99 | 98 |
| LSD (0.10) | | 1 | 0 | 4 | 4 | 2 | 1 | 4 | 6 | 2 | 1 | 3 | 6 | 0 | 1 | 1 | 3 |

Effect of weed emergence and timing of weed removal on corn yield at Rochester, MN in 2004.

Breitenbach, Fritz R., Lisa M. Behnken, Thomas R. Hoverstad and Jeffrey L. Gunsolus.

The objective of this trail was to determine the effect of weed emergence and timing of weed removal on corn yield in southeastern Minnesota. The research site was a Lawler loam series containing 2.7% organic matter with a pH test of 6.5 and soil test P and K levels of 43 ppm and 185 ppm, respectively. The previous crop was soybean. The area was fertilized in the spring with 122 lb/A nitrogen, 23 lb/A phosphorus, 120 lb/A potash, 23 lb/A sulfur and 3 T/A of lime. The area was topdressed with 40 lb/A of nitrogen on June 15. The field was disked and field cultivated once prior to planting. The corn hybrid, DKC 47-10, was planted on April 29, 2004 at a depth of 1.5 inches in 30-inch rows at 32,000 seeds/A. A randomized complete block design with four replications was used. Preemergence (PRE) and postemergence (POST) treatments were applied with a tractor-mounted sprayer, delivering 20 gpa at 32 psi using Turbo Tee 11002 nozzles. Application dates, environmental conditions, and crop and weed stages are listed below.

| Date | April 29 | May 20 | June 2 | June 7 | June 14 | June 18 | June 28 |
|-----------------------------------|----------|----------|----------|----------|----------|----------|------------|
| Treatment | PRE | POST I | POST II | POST III | POST IV | POST V | POST VI |
| Temperature (F) | | | | | | | |
| Air | 61 | 71 | 67 | 91 | 73 | 61 | 72 |
| Relative humidity (%) | 49 | 59 | 49 | 43 | 57 | 59 | 44 |
| Wind (mph) | 13 | 14 | 12 | 29 | 13 | 18 | 9 |
| Corn | | | | | | | |
| stage | -- | V1 | V2 | V4 | V5 | V6 | 6-7 collar |
| height (inches) | -- | 3.0 | 4.0 | 5.4 | 14.0 | 15.0 | 17.0 |
| Giant ragweed | | | | | | | |
| weed density | -- | heavy | heavy | heavy | heavy | heavy | heavy |
| height (inch) | -- | 0.5 | 4.6 | 10.8 | 13.0 | 15.0 | 2-4 |
| | | | | | | | regrowth |
| Common lambsquarters | | | | | | | |
| weed density | -- | light | light | light | light | light | light |
| height (inch) | -- | 0.5 | 1.4 | 3.0 | 4.0 | 5.0 | 2-4 |
| | | | | | | | regrowth |
| Common waterhemp | | | | | | | |
| weed density | -- | moderate | moderate | moderate | moderate | moderate | moderate |
| height (inch) | -- | 0.0 | 1.4 | 0.75 | 2.5 | 3.0 | 2-4 |
| | | | | | | | regrowth |
| Giant foxtail | | | | | | | |
| weed density | -- | moderate | moderate | moderate | moderate | moderate | moderate |
| height (inch) | -- | 0.5 | 1.0 | 4.3 | 5.0 | 5.5 | 2-4 |
| | | | | | | | regrowth |
| Rainfall after application (inch) | | | | | | | |
| week 1 | 0.01 | 2.91 | 0.20 | 5.65 | 1.85 | 0.38 | 0.16 |
| week 2 | 1.44 | 1.30 | 5.46 | 1.85 | 0.63 | 0.26 | 2.82 |
| week 3 | 1.02 | 4.32 | 1.92 | 0.63 | 1.68 | 1.73 | 0.23 |

Different weeds emerge at different times during the growing season. Timing of weed removal is a critical factor in maximizing corn yields. At this location, which has a heavy giant ragweed population, the sequential POST II / POST VI applications of Roundup WeatherMax and Harness followed by Roundup WeatherMax at POST III (5 inch weeds) were the best treatments in this trial, 156 and 150 bu/A, respectively. When weeds were removed too early, treatments 1 and 2, later emerging weeds caused enough competition to substantially reduce

corn yields. When removed too late, treatments 9 and 10, early season competition caused a substantial reduction in corn yield.

In the combined location study, Lamberton, Morris, Rochester, and Waseca, the one-pass Roundup WeatherMax treatments did not maximize yield or returns. The PRE / POST sequential applications of Harness followed by Roundup WeatherMax, gave the best economic returns (average over all locations). The two pass Roundup WeatherMax system resulted in the highest yield, but has more economic risk than PRE / POST III (5 inch weeds), which also resulted in top yields. This data is presented in the report on page C-21, (University of Minnesota Extension Service, Regional Center, Rochester, MN).

Table. Effect of time of weed removal on corn yield at Rochester, MN in 2004 (Breitenbach, Behnken, Hoverstad and Gunsolus).

| Trt number | Treatment | Rate/A | Corn yield (bu/A) |
|------------|-----------------------------------------------------|---------------------------------|-------------------|
| | PRE | | |
| 11 | Harness | 1.25 pt | 3 |
| | PRE / POST I (1"weeds) | | |
| 1 | Harness / Roundup WeatherMax + AMS | 1.25 pt / 22 oz + 2.5 lb | 27 |
| | POST I (1"weeds) | | |
| 2 | Roundup WeatherMax + AMS | 22 oz + 2.5 lb | 33 |
| | PRE / POST II (3"weeds) | | |
| 3 | Harness / Roundup WeatherMax + AMS | 1.25 pt / 22 oz + 2.5 lb | 134 |
| | POST II (3"weeds) | | |
| 4 | Roundup WeatherMax + AMS | 22 oz + 2.5 lb | 128 |
| | PRE / POST III (5"weeds) | | |
| 5 | Harness / Roundup WeatherMax + AMS | 1.25 pt / 22 oz + 2.5 lb | 150 |
| | POST III (5"weeds) | | |
| 6 | Roundup WeatherMax + AMS | 22 oz + 2.5 lb | 130 |
| | PRE / POST IV (7"weeds) | | |
| 7 | Harness / Roundup WeatherMax + AMS | 1.25 pt / 22 oz + 2.5 lb | 128 |
| | POST IV (7"weeds) | | |
| 8 | Roundup WeatherMax + AMS | 22 oz + 2.5 lb | 122 |
| | PRE / POST V (9"weeds) | | |
| 9 | Harness / Roundup WeatherMax + AMS | 1.25 pt / 22 oz + 2.5 lb | 94 |
| | POST V (9"weeds) | | |
| 10 | Roundup Weathermax + AMS | 22 oz + 2.5 lb | 48 |
| | POST II / POST VI (3"weeds / 2-4" regrowth) | | |
| 12 | Roundup WeatherMax + AMS / Roundup WeatherMax + AMS | 22 oz + 2.5 lb / 22 oz + 2.5 lb | 156 |
| | LSD (0.10) | | 18 |

Effect of Time of Weed Removal on Corn Yield

(multiple locations)

One pass or two? What would a PRE do?

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Weed Emergence Patterns and the Effect of Time of Weed Removal on Corn Yield

- Different weeds emerge at different times during the growing season
- If left uncontrolled, weeds emerging before or with the crop are more competitive than weeds that emerge after crop emergence
- Weed effects on yield will depend upon:
 - Weed species
 - Weed density
 - Environmental conditions
 - Duration of weed/crop competitive period

Question: What effect does time of weed removal have on corn yield?

Weed Emergence Patterns and the Effect of Time of Weed Removal on Corn Yield

- In 2004, research compared 5 glyphosate timings (1", 3", 5", 7" and 9" weed heights), with and without a 1/2-rate of a PRE herbicide on crop yield and economic returns
- Studies were conducted at four locations
- Major Weeds at each location:

Lamberton: yellow foxtail, common lambsquarters, redroot pigweed, wild buckwheat

Morris: green foxtail, common lambsquarters, Powell amaranth, wild mustard

Rochester: giant foxtail, giant ragweed, common waterhemp, common lambsquarters

Waseca: giant foxtail, common ragweed, redroot pigweed common lambsquarters, velvetleaf,

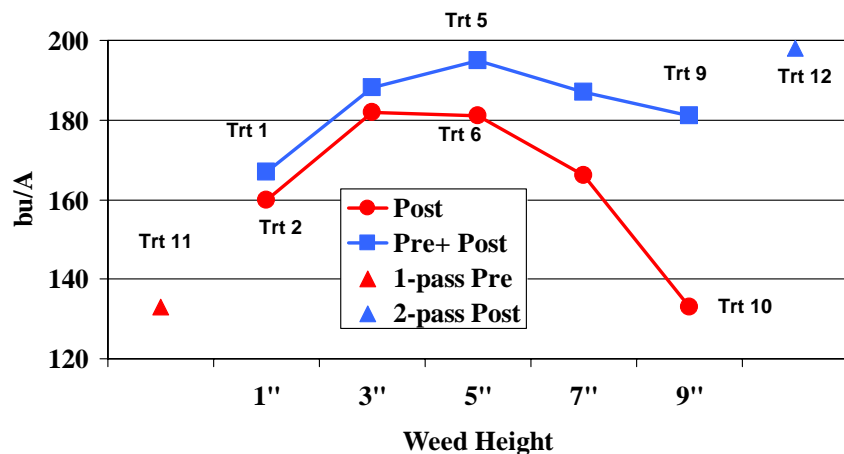
Treatments and Timing of Application

| Trt | Description | Timing |
|-----|--------------------------------------------|---------------------------|
| 1 | Harness/Roundup WeatherMax + AMS | PRE / 1" weeds |
| 2 | Roundup WeatherMax + AMS | 1" weeds |
| 3 | Harness/Roundup WeatherMax + AMS | PRE / 3" weeds |
| 4 | Roundup WeatherMax + AMS | 3" weeds |
| 5 | Harness/Roundup WeatherMax + AMS | PRE / 5" weeds |
| 6 | Roundup WeatherMax + AMS | 5" weeds |
| 7 | Harness/Roundup WeatherMax + AMS | PRE / 7" weeds |
| 8 | Roundup WeatherMax + AMS | 7" weeds |
| 9 | Harness/Roundup WeatherMax + AMS | PRE / 9" weeds |
| 10 | Roundup WeatherMax + AMS | 9" weeds |
| 11 | Harness | PRE |
| 12 | Roundup WeatherMax / Roundup WeatherMax | 3" weeds 2-4" regrowth |

Harness at 1.25 pt/A

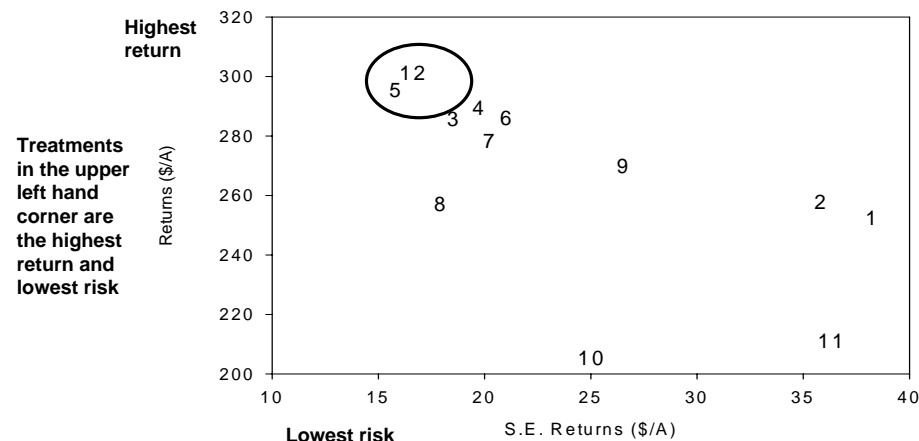
Roundup WeatherMax at 22 oz/A + AMS at 2.5 lb/A

Glyphosate Timing and Corn Yield Across Locations, 2004



Trt 5 – Harness (1.25 pt./A) / Roundup WeatherMax (22 oz/A) + AMS at 5 inch weeds
 Trt 11 – Harness PRE
 Trt 12 – Roundup WeatherMax + AMS / Roundup WeatherMax + AMS at 3"/ 2-4" regrowth

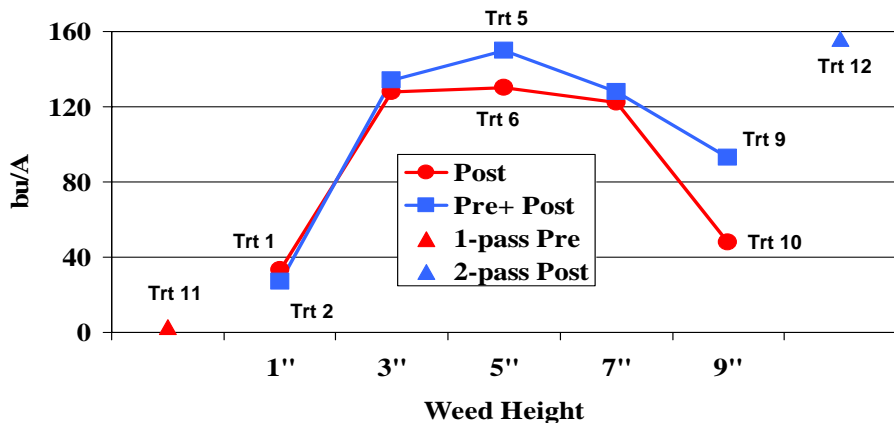
Mean returns vs. standard error of mean returns for corn treatments across locations, 2004



Trt 5 – Harness (1.25 pt./A) / Roundup WeatherMax (22 oz/A) + AMS at 5 inch weeds

Trt 12 – Roundup WeatherMax + AMS / Roundup WeatherMax + AMS at 3"/ 2-4" regrowth

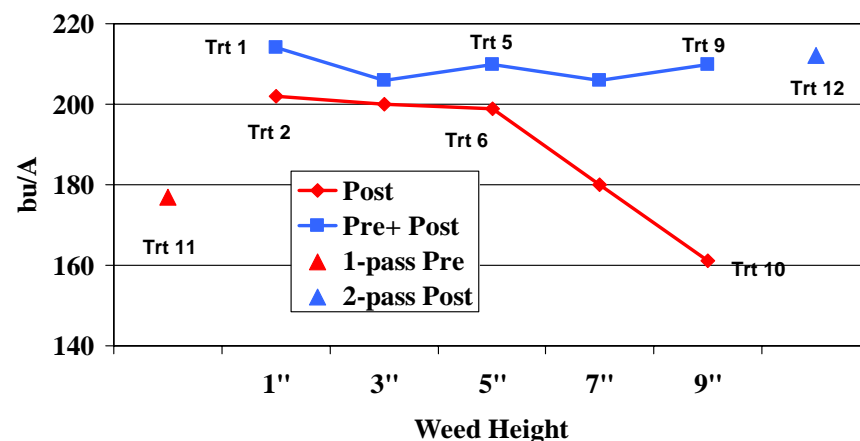
Glyphosate Timing and Corn Yield Rochester, 2004



Trt 5 – Harness (1.25 pt./A) / Roundup WeatherMax (22 oz/A) + AMS at 5 inch weeds
 Trt 11 – Harness PRE
 Trt 12 – Roundup WeatherMax + AMS / Roundup WeatherMax + AMS at 3"/ 2-4" regrowth

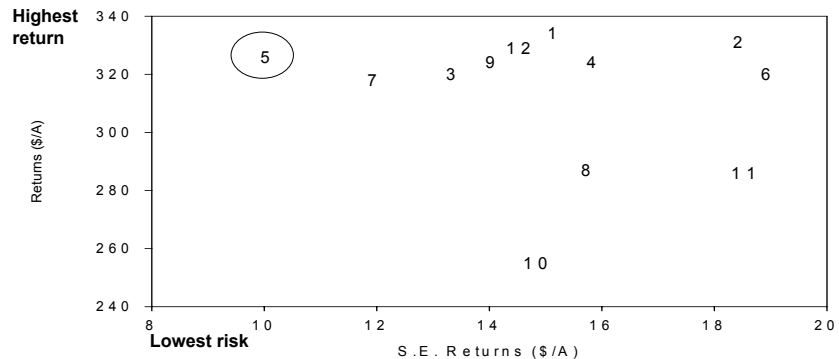
* Heavy giant ragweed competition key factor at this site.

Glyphosate Timing and Corn Yield Across Locations, 2004 – Excluding Rochester



Trt 5 – Harness (1.25 pt./A) / Roundup WeatherMax (22 oz/A) + AMS at 5 inch weeds
 Trt 11 – Harness PRE
 Trt 12 – Roundup WeatherMax + AMS / Roundup WeatherMax + AMS at 3"/ 2-4" regrowth

**Mean returns vs. standard error of mean returns for
corn treatments across locations, 2004
Excluding Rochester**



Trt 5 – Harness (1.25 pt./A) / Roundup WeatherMax (22 oz/A) + AMS at 5 inch weeds

Trt 12 – Roundup WeatherMax + AMS / Roundup WeatherMax + AMS at 3”/ 2-4” regrowth

2004 Summary – All locations

Under Cool & Wet Conditions:

Corn

One-pass glyphosate does not maximize yield or returns.

The longer the duration of competition the greater impact on yield.

PRE/POST sequential applications gave the best economic returns (average over all locations).

Two pass glyphosate system can work (high yield) but has more economic risk than PRE / POST III (5 inch weeds).

Evaluation of weed management systems in field corn at Rochester, MN in 2004.

Breitenbach, Fritz R., Lisa M. Behnken, Thomas R. Hoverstad and Jeffrey L. Gunsolus.

The objective of this trial was to evaluate weed management systems for weed control in field corn in southeastern Minnesota. The research site was a Lawler loam series containing 2.4% organic matter with a pH of 6.1 and soil test P and K levels of 59 ppm and 198 ppm, respectively. The previous crop was soybean. The area was fertilized in the spring with 122 lb/A nitrogen, 23 lb/A phosphorus, 120 lb/A of potash, 23 lb/A sulfur, and 3 tons/A of lime. The area was topdressed with 40 lbs/A of nitrogen as urea on June 15. The field was disked and field cultivated once prior to planting. The corn hybrids, Pioneer 38H66 LL and Pioneer 39H66 RR, were planted on May 6, 2004, at a depth of 1.5 inches in 30-inch rows at 32,000 seeds/A. A randomized complete block design with four replications was used. Preemergence (PRE) and postemergence (POST I and II) treatments were applied with a tractor-mounted sprayer, delivering 20 gpa at 32 psi using Turbo Tee 11002 nozzles. Evaluations of the plots were taken on May 24, June 7, June 15, and October 21, 2004. Application dates, environmental conditions, and crop and weed stages are listed below. (University of Minnesota Extension Service, Regional Center, Rochester, MN)

| Date | May 6 | June 7 | June 28 |
|--------------------------------------|----------|----------|------------|
| Treatment | PRE | POST I | POST II |
| Temperature (F) | | | |
| air | 70 | 94 | 70 |
| Relative humidity (%) | 33 | 41 | 44 |
| Wind (mph) | 16 | 28 | 9 |
| Soil moisture | adequate | adequate | adequate |
| Corn | | | |
| stage | -- | 4 collar | 7 collar |
| height (inches) | -- | 6 | 17 |
| Giant ragweed | | | |
| weed density | -- | heavy | heavy |
| height (inch) | -- | 5 | 2 regrowth |
| Common lambsquarters | | | |
| weed density | -- | light | light |
| height (inch) | -- | 1.5 | 2 regrowth |
| Giant foxtail | | | |
| weed density | -- | moderate | moderate |
| height (inch) | -- | 2.2 | 2 regrowth |
| Common waterhemp | | | |
| weed density | -- | moderate | moderate |
| height (inch) | -- | 1.5 | 2 regrowth |
| Rainfall after application (inch) | | | |
| week 1 | 1.44 | 5.65 | 0.16 |
| week 2 | 1.02 | 1.85 | 2.82 |
| week 3 | 2.91 | 0.63 | 0.23 |

Table. Performance of weed management systems in corn on May 24, June 15, and October 21 at Rochester, MN in 2004 (Breitenbach, Behnken, Hoverstad, and Gunsolus).

| Treatment | Rate | Giant ragweed control | | | Common lambsquarters control | | | Giant foxtail control | | | Common waterhemp control | | | Corn yield (% of weed free) |
|------------------------------------------------------|----------------------------------------------------------|-----------------------|------|-------|------------------------------|------|-------|-----------------------|------|-------|--------------------------|------|-------|--------------------------------|
| | | 5/24 | 6/15 | 10/21 | 5/24 | 6/15 | 10/21 | 5/24 | 6/15 | 10/21 | 6/7 | 6/15 | 10/21 | |
| | (rate/A) | (%) | | | (%) | | | (%) | | | (%) | | | |
| PRE | | | | | | | | | | | | | | |
| Hybrid = Pioneer 38H66 LL | | | | | | | | | | | | | | |
| Keystone LA + Hornet | 2.2 qts + 4 oz | 95 | 88 | 77 | 100 | 100 | 99 | 100 | 100 | 98 | 99 | 100 | 95 | 83 |
| Lumax | 6 pts | 96 | 99 | 94 | 100 | 100 | 98 | 100 | 100 | 97 | 99 | 100 | 96 | 94 |
| PRE / POST I | | | | | | | | | | | | | | |
| Hybrid = Pioneer 38H66 LL | | | | | | | | | | | | | | |
| Surpass/ Hornet + Callisto + atrazine + COC + AMS | 2.75 pts / 3 oz + 0.75 oz + 0.28 lbs + 1 % v/v + 2.5 lbs | 50 | 91 | 98 | 100 | 100 | 97 | 100 | 100 | 92 | 99 | 100 | 95 | 94 |
| Keystone LA / Hornet + Clarity + NIS + AMS | 2.2 qts / 3 oz + 4 oz + 0.25 % v/v + 2.5 lbs | 76 | 76 | 95 | 100 | 100 | 98 | 100 | 100 | 92 | 99 | 100 | 91 | 106 |
| Outlook/Distinct + atrazine + NIS + AMS | 21 oz / 4 oz + 0.5 lbs + 0.25 % v/v + 2.5 lbs | 40 | 87 | 96 | 100 | 100 | 98 | 100 | 100 | 91 | 99 | 100 | 95 | 88 |
| Define / Liberty + atrazine + AMS | 12 oz / 32 oz + 0.5 lbs + 3 lbs | 0 | 99 | 98 | 58 | 100 | 98 | 100 | 100 | 90 | 99 | 100 | 99 | 85 |
| Define / Option + Distinct + MSO+28% N | 12 oz / 1.5 oz + 4 oz + 1.5 pts + 1.5 qts | 0 | 74 | 96 | 70 | 100 | 97 | 100 | 100 | 91 | 99 | 100 | 99 | 86 |
| Define SC / Option + Callisto + MSO + 28%N | 12 oz / 1.5 oz + 1.5 oz + 1.5 pts + 1.5 qts | 0 | 53 | 80 | 68 | 63 | 98 | 99 | 100 | 94 | 99 | 100 | 98 | 83 |
| Cinch / Accent Gold+ Callisto + atrazine + COC + AMS | 0.75 pts / 3.5 oz + 1 oz + 0.5 lbs + 1 % v/v + 2 lbs | 0 | 89 | 99 | 45 | 100 | 99 | 100 | 100 | 96 | 99 | 100 | 99 | 102 |
| Cinch / Steadfast + Callisto + atrazine +COC +AMS | 0.75 pts / 0.75 oz + 2 oz + 0.5 lbs + 1% v/v + 2 lbs | 0 | 91 | 93 | 45 | 100 | 99 | 100 | 100 | 94 | 94 | 100 | 98 | 92 |
| Dual II Magnum / Callisto + Liberty+ atrazine + AMS | 1 pt / 3 oz + 16 oz + 0.55 lbs + 2 lbs | 25 | 100 | 99 | 50 | 100 | 99 | 100 | 100 | 93 | 99 | 100 | 95 | 89 |
| Dual II Magnum / Callisto + atrazine + COC + 28%N | 2 pts / 3 oz + 0.55 lbs + 1 % v/v + 2.5 % v/v | 0 | 93 | 99 | 68 | 100 | 99 | 100 | 100 | 93 | 99 | 100 | 94 | 98 |
| Outlook / Aim + atrazine + Clarity + NIS | 21 oz / 0.5 oz + 0.55 lbs + 3 oz + 0.25 % v/v | 40 | 75 | 85 | 100 | 100 | 99 | 100 | 100 | 84 | 99 | 100 | 93 | 89 |
| POST I | | | | | | | | | | | | | | |
| Hybrid = Pioneer 38H66 LL | | | | | | | | | | | | | | |
| Steadfast + Callisto + COC + AMS | 0.75 oz + 2 oz + 1 % v/v + 2 lbs | 0 | 64 | 67 | 0 | 50 | 99 | 0 | 100 | 95 | 0 | 75 | 98 | 59 |
| Accent Gold+ Clarity + atrazine + COC + AMS | 3.5 oz + 4 oz + 0.5 lbs + 1 % v/v + 2 lbs | 0 | 83 | 99 | 0 | 100 | 99 | 0 | 100 | 84 | 0 | 100 | 96 | 93 |
| Steadfast + Lumax + NIS + AMS | 0.75 oz + 1.5 pts + 0.25 % v/v + 2 lbs | 0 | 79 | 68 | 0 | 100 | 99 | 0 | 100 | 98 | 0 | 100 | 99 | 55 |
| Weed free | | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Hybrid = Pioneer 38H66 LL | | | | | | | | | | | | | | |
| Weedy | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| PRE / POST I | | | | | | | | | | | | | | |
| Hybrid = Pioneer 39H66 RR | | | | | | | | | | | | | | |
| Harness / Roundup WeatherMax + AMS | 1.25 pts / 22 oz + 2.5 lbs | 20 | 99 | 91 | 89 | 100 | 92 | 100 | 100 | 83 | 99 | 100 | 90 | 92 |
| Dual II Magnum / Touchdown Total + AMS | 1 pt / 24 oz + 2.5 lbs | 0 | 100 | 90 | 48 | 100 | 92 | 98 | 100 | 84 | 99 | 100 | 89 | 103 |
| Keystone LA / GF 1279 + AMS | 1.1 qts / 24 oz + 2.5 lbs | 45 | 100 | 89 | 100 | 100 | 89 | 100 | 100 | 85 | 99 | 100 | 89 | 108 |
| Outlook / Distinct + Roundup WeatherMax + NIS + AMS | 12 oz / 3 oz + 11 oz + 0.25 % v/v + 2.5 lbs | 0 | 91 | 93 | 55 | 100 | 92 | 100 | 100 | 89 | 97 | 100 | 91 | 94 |
| Cinch / Roundup WeatherMax + rimsulfuron + AMS | 0.75 pts / 22 oz + 1 oz + 2.5 lbs | 0 | 100 | 95 | 33 | 100 | 91 | 98 | 100 | 87 | 99 | 100 | 95 | 101 |
| POST I / POST II | | | | | | | | | | | | | | |
| Corn hybrid = Pioneer 39H66 RR | | | | | | | | | | | | | | |
| Roundup WeatherMax + AMS / Roundup WeatherMax + AMS | 22 oz + 2.5 lbs / 22 oz + 2.5 lbs | 0 | 100 | 99 | 0 | 98 | 99 | 0 | 100 | 99 | 0 | 90 | 99 | 95 |
| Weed Free | | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Corn hybrid = Pioneer 39H66 RR | | | | | | | | | | | | | | |
| LSD (0.10) | | 13 | 5 | 4 | 11 | 6 | 3 | 2 | 0 | 4 | 3 | 8 | 4 | 14 |

COC = crop oil concentrate; AMS = spray grade ammonium sulfate, Helena; NIS = AGRI-DEX nonionic surfactant, Helena; MSO = methylated sunflower oil; Loveland; and 28% N = an aqueous solution of urea and ammonium nitrate, Helena.

2004 Corn Herbicide Evaluation (Rochester, Lamberton, and Waseca)

Hoverstad, Thomas R., Fritz R. Breitenbach, Jodie K. Getting, and Jeff L. Gunsolus

| Herbicide | Rate (product / A) | Giant foxtail | Yellow foxtail | Common ragweed | Common lambsquarters. | Common cocklebur | Tall and common waterhemp | Redroot pigweed | Velvet- leaf | H2O | Yield | Cost | Returns | |
|-------------------------------------------------------------------|------------------------------------------------------|--------------------------------------------------|-------------------|-------------------|--------------------------|---------------------|------------------------------|--------------------|-----------------|-------|-------|----------------|---------|-----|
| | | 5 | 1 | 2 | 4 | 1 | 2 | 1 | 1 | 6 | 6 | 6 | | |
| | | Number of locations | | | | | | | | | | | | |
| | | ----- | | | | (% control) | | | | ----- | | ----(\$/A)---- | | |
| <u>Preemergence Corn hybrid = Pioneer 38H68</u> | | | | | | | | | | | | | | |
| 1 | Keystone LA + Hornet WDG | 2.2 qt + 4oz | 96 | 75 | 94 | 99 | 74 | 97 | 100 | 99 | 23.2 | 180 | 40.94 | 245 |
| 2 | Lumax | 6 pt | 88 | 73 | 97 | 99 | 92 | 97 | 100 | 99 | 24.0 | 186 | 41.06 | 251 |
| <u>Preemergence/POST II (V4 corn) Corn hybrid = Pioneer 38H68</u> | | | | | | | | | | | | | | |
| 3 | Surpass / Hornet + Callisto + atrazine + COC + AMS | 2.75 pt / 3 oz + 0.75 oz + 0.28 lb + 1% + 2.5 lb | 97 | 86 | 97 | 99 | 99 | 97 | 100 | 99 | 24.2 | 187 | 50.68 | 242 |
| 4 | Keystone LA / Hornet + Clarity + NIS + AMS | 2.2 qt / 3 oz + 4 oz + 0.25% + 2.5 lb | 95 | 79 | 99 | 99 | 99 | 95 | 100 | 99 | 23.6 | 193 | 46.80 | 258 |
| 5 | Outlook / Distinct + atrazine + NIS + AMS | 21 oz / 4 oz + 0.5 lb + 0.25% + 2.5 lb | 96 | 89 | 99 | 99 | 96 | 97 | 99 | 99 | 23.9 | 185 | 47.02 | 245 |
| 6 | Define/ Liberty + atrazine + AMS | 12 oz / 32 oz + 0.5 lb + 3 lb | 97 | 93 | 98 | 98 | 93 | 99 | 100 | 99 | 25.2 | 173 | 43.02 | 224 |
| 7 | Define/ Option + Distinct + MSO + 28% | 12 oz / 1.5 oz + 4 oz + 1.5 pt + 3 pt | 96 | 83 | 99 | 99 | 96 | 99 | 100 | 99 | 24.3 | 171 | 53.84 | 213 |
| 8 | Define SC/ Option + Callisto + MSO + 28% | 12 oz / 1.5 oz + 1.5 oz + 1.5 pt + 3 pt | 97 | 80 | 84 | 99 | 94 | 98 | 98 | 99 | 24.5 | 169 | 46.92 | 216 |
| 9 | Cinch/ AccentGold + Callisto + atrazine + COC + AMS | 0.75 pt / 3.5 oz + 1 oz + 0.5 lb + 1% + 2 lb | 94 | 87 | 98 | 99 | 99 | 99 | 100 | 99 | 24.4 | 182 | 53.80 | 229 |
| 10 | Cinch/ Steadfast + Callisto + atrazine + COC + AMS | 0.75 pt / 0.75 oz + 2 oz + 0.5 lb + 1% + 2 lb | 94 | 92 | 95 | 99 | 95 | 99 | 99 | 99 | 24.2 | 183 | 47.60 | 239 |
| 11 | Dual II Magnum/ Callisto + Liberty + atrazine + 28%N | 1 pt / 3 oz + 16 oz + 0.55 lb + 2 lb | 98 | 94 | 99 | 99 | 99 | 97 | 100 | 99 | 24.0 | 188 | 46.08 | 249 |
| 12 | Dual II Magnum/ Callisto + atrazine + COC + 28%N | 2 pt / 3 oz + 0.55 lb + 1% + 2.5% | 95 | 90 | 99 | 99 | 99 | 97 | 100 | 99 | 24.6 | 193 | 54.16 | 245 |
| 13 | Outlook/ Aim + atrazine + Clarity + NIS | 21 oz / 0.5 oz + 0.55 lb + 3 oz + 0.25% | 93 | 83 | 99 | 99 | 98 | 96 | 99 | 99 | 24.3 | 183 | 41.21 | 245 |

Table continued. 2004 Corn Herbicide Evaluation (Rochester, Lamberton, and Waseca)

| Herbicide | Rate (product / A) | Giant foxtail | Yellow foxtail | Common ragweed | Common lambsquarters. | Common cocklebur | Tall and common waterhemp | Redroot pigweed | Velvet- leaf | H2O | Yield | Cost | Returns | |
|----------------------------------------------------------------------------------|------------------------------------------------------------|--------------------------------------------|-------------------|-------------------|--------------------------|---------------------|------------------------------|--------------------|-----------------|------|-------|--------|---------|-------------|
| | | Number of locations | | | | | | | | | 6 | 6 | 6 | |
| | | 5 | 1 | 2 | 4 | 1 | 2 | 1 | 1 | 6 | 6 | 6 | 6 | |
| | | ----- (% control) ----- | | | | | | | | | (%) | (bu/A) | ---- | (\$/A)----- |
| <u>POST II (V4 corn) Corn hybrid = Pioneer 38H68</u> | | | | | | | | | | | | | | |
| 14 | Steadfast + Callisto + COC + AMS | 0.75 oz + 2 oz + 1% + 2 lb | 90 | 75 | 64 | 99 | 95 | 99 | 100 | 99 | 24.6 | 154 | 30.63 | 209 |
| 15 | Accent Gold WDG + Clarity + atrazine + COC + AMS | 3.5 oz + 4 oz + 0.5 oz + 1% + 2 lb | 82 | 70 | 98 | 98 | 99 | 98 | 90 | 99 | 24.4 | 176 | 36.91 | 239 |
| 16 | Steadfast + Lumax + NIS + AMS | 0.75 oz + 1.5 pt + 0.25% + 2 lb | 90 | 74 | 73 | 99 | 95 | 99 | 100 | 99 | 24.5 | 151 | 31.22 | 204 |
| <u>Checks Corn hybrid = Pioneer 38H68</u> | | | | | | | | | | | | | | |
| 17 | Weedy Check | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 23.9 | 58 | 0.00 | 95 | |
| 18 | Weed-Free Check | | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 24.1 | 192 | 0.00 | 301 | |
| <u>Preemergence/POST II (V4 corn) Corn hybrid = Pioneer 38H66</u> | | | | | | | | | | | | | | |
| 19 | Harness/ Roundup WeatherMax + AMS | 1.25 pt / 22 oz + 2.5 lb | 95 | 89 | 98 | 96 | 93 | 93 | 96 | 99 | 22.1 | 200 | 43.39 | 280 |
| 20 | Dual II Magnum/ Touchdown Total + AMS | 1 pt / 24 oz + 2.5 lb | 96 | 94 | 96 | 97 | 94 | 94 | 99 | 99 | 23.0 | 204 | 44.74 | 280 |
| 21 | Keystone LA / GF 1279 + AMS | 2.2 pt / 24 oz + 2.5 lb | 95 | 90 | 97 | 96 | 95 | 92 | 99 | 99 | 22.5 | 207 | - | |
| 22 | Outlook/ Distinct + Roundup WeatherMax + NIS + AMS | 12 oz / 3 oz + 11 oz + 0.25% + 2.5 lb | 97 | 92 | 99 | 97 | 99 | 95 | 100 | 99 | 22.5 | 201 | 48.09 | 276 |
| 23 | Cinch / RoundupWeatherMax + rimsulfuron + AMS | 0.75 pt / 22 oz + 1 oz + 2.5 lb | 97 | 92 | 99 | 97 | 99 | 97 | 100 | 99 | 22.8 | 199 | - | |
| <u>POST I (V3 corn) / POST III (4-inch Regrowth) Corn hybrid = Pioneer 38H66</u> | | | | | | | | | | | | | | |
| 24 | Roundup WeatherMax + AMS/ Roundup WeatherMax + AMS | 22 oz + 2.5 lb/22 oz + 2.5 lb | 99 | 97 | 99 | 99 | 99 | 99 | 99 | 99 | 22.9 | 207 | 41.98 | 289 |
| 25 | Roundup WeatherMax + Aim + AMS/Roundup WeatherMax + AMS | 22 oz + 0.5 oz + 2.5 lb/ 22 oz + 2.5 lb | 99 | 97 | 99 | 92 | 99 | 99 | 99 | 99 | 22.6 | 202 | 44.62 | 279 |
| <u>Checks Corn hybrid = Pioneer 38H66</u> | | | | | | | | | | | | | | |
| 26 | Hand-Weeded | - | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 22.6 | 207 | 0.00 | 332 |
| LSD (0.10) | | | 2 | 4 | 5 | 1 | 6 | 2 | 2 | 1 | 1.3 | 13 | | 23 |
| Corn Price = \$1.83 (Waseca Co. 2004 Loan Rate) | | | | | | | | | | | | | C-28 | |

2004 Corn Herbicide Evaluation (Rochester)

| Herbicide | Rate (product/A) | Giant foxtail | Common lambsquarters | Giant ragweed | Common waterhemp | H2O (%) | Yield (bu/A) | Cost ----- (\$/A) ----- | Returns | |
|---------------------------------------------------------------------|-------------------------------------------------------|-----------------------------------------------------|-------------------------|------------------|---------------------|------------|-----------------|----------------------------|---------|-----|
| | | ----- (% control) ----- | | | | | | | | |
| <u>Preemergence Corn hybrid = Pioneer 38H68</u> | | | | | | | | | | |
| 1 | Keystone LA + Hornet WDG | 2.2 qt + 4oz | 98 | 99 | 77 | 95 | 22.4 | 145 | 40.94 | 194 |
| 2 | Lumax | 6 pt | 97 | 98 | 94 | 96 | 23.5 | 166 | 41.06 | 221 |
| <u>Preemergence / POST II (V4 corn) Corn hybrid = Pioneer 38H68</u> | | | | | | | | | | |
| 3 | Surpass / Hornet + Callisto + atrazine + COC + AMS | 2.75 pt / 3 oz + 0.75 oz + 0.28 lb + 1% + 2.5 lb | 92 | 97 | 98 | 95 | 24.8 | 167 | 50.68 | 207 |
| 4 | Keystone LA / Hornet + Clarity + NIS + AMS | 2.2 qt / 3 oz + 4 oz + 0.25% + 2.5 lb | 92 | 98 | 95 | 91 | 23.4 | 188 | 46.80 | 250 |
| 5 | Outlook / Distinct + atrazine + NIS + AMS | 21 oz / 4 oz + 0.5 lb + 0.25% + 2.5 lb | 91 | 98 | 96 | 95 | 25.4 | 158 | 47.02 | 193 |
| 6 | Define / Liberty + atrazine + AMS | 12 oz / 32 oz + 0.5 lb + 3 lb | 90 | 98 | 98 | 99 | 25.6 | 152 | 43.02 | 188 |
| 7 | Define / Option + Distinct + MSO + 28% | 12 oz / 1.5 oz + 4 oz + 1.5 pt + 3 pt | 91 | 97 | 96 | 99 | 28.0 | 153 | 53.84 | 169 |
| 8 | Define SC / Option + Callisto + MSO + 28% | 12 oz / 1.5 oz + 1.5 oz + 1.5 pt + 3 pt | 94 | 98 | 80 | 98 | 27.7 | 149 | 46.92 | 171 |
| 9 | Cinch / AccentGold + Callisto + atrazine + COC + AMS | 0.75 pt / 3.5 oz + 1 oz + 0.5 lb + 1% + 2 lb | 96 | 99 | 99 | 99 | 26.3 | 181 | 53.80 | 219 |
| 10 | Cinch / Steadfast + Callisto + atrazine + COC + AMS | 0.75 pt / 0.75 oz + 2 oz + 0.5 lb + 1% + 2 lb | 94 | 99 | 93 | 98 | 26.3 | 163 | 47.60 | 197 |
| 11 | Dual II Magnum / Callisto + Liberty + atrazine + 28%N | 1 pt / 3 oz + 16 oz + 0.55 lb + 2 lb | 93 | 99 | 99 | 95 | 25.9 | 156 | 46.08 | 190 |
| 12 | Dual II Magnum / Callisto + atrazine + COC + 28%N | 2 pt / 3 oz + 0.55 lb + 1% + 2.5% | 93 | 99 | 99 | 94 | 25.8 | 173 | 54.16 | 209 |
| 13 | Outlook / Aim + atrazine + Clarity + NIS | 21 oz / 0.5 oz + 0.55 lb + 3 oz + 0.25% | 84 | 99 | 85 | 93 | 25.6 | 157 | 41.21 | 198 |

Table Continued. 2004 Corn Herbicide Evaluation (Rochester)

| Herbicide | Rate (product/A) | Giant | Common | Giant | Common | H2O (%) | Yield (bu/A) | Cost ----- (\$/A) ----- | Returns |
|----------------------------------------------------------------------------------|--------------------------------------------|---------|---------------|---------|-----------|------------|-----------------|----------------------------|---------|
| | | foxtail | lambsquarters | ragweed | waterhemp | | | | |
| <u>POST II (V4 corn) Corn hybrid = Pioneer 38H68</u> | | | | | | | | | |
| 14 Steadfast + Callisto + COC + AMS | 0.75 oz + 2 oz + 1% + 2 lb | 95 | 99 | 67 | 98 | 27.9 | 104 | 30.63 | 121 |
| 15 Accent Gold WDG + Clarity + atrazine + COC + AMS | 3.5 oz + 4 oz + 0.5 oz + 1% + 2 lb | 84 | 99 | 99 | 96 | 26.5 | 164 | 36.91 | 209 |
| 16 Steadfast + Lumax + NIS + AMS | 0.75 oz + 1.5 pt + 0.25% + 2 lb | 98 | 99 | 68 | 99 | 28.5 | 97 | 31.22 | 109 |
| <u>Checks Corn hybrid = Pioneer 38H68</u> | | | | | | | | | |
| 17 Weedy Check | | 0 | 0 | 0 | 0 | 25.8 | 5 | 0.00 | 7 |
| 18 Weed-Free Check | | 100 | 100 | 100 | 100 | 25.1 | 178 | 0.00 | 273 |
| <u>Preemergence / POST II (V4 corn) Corn hybrid = Pioneer 38H66</u> | | | | | | | | | |
| 19 Harness/ Roundup WeatherMax+AMS | 1.25 pt / 22 oz + 2.5 lb | 83 | 92 | 91 | 90 | 23.2 | 205 | 43.39 | 283 |
| 20 Dual II Magnum/ Touchdown Total+AMS | 1 pt / 24 oz + 2.5 lb | 84 | 92 | 90 | 89 | 22.7 | 229 | 44.74 | 322 |
| 21 Keystone LA / GF 1279 + AMS | 2.2 pt / 24 oz + 2.5 lb | 85 | 89 | 89 | 89 | 22.3 | 241 | - | - |
| 22 Outlook/ Distinct + RoundupWeatherMax + NIS + AMS | 12 oz / 3 oz + 11 oz + 0.25% + 2.5 lb | 89 | 92 | 93 | 91 | 22.1 | 208 | 48.09 | 290 |
| 23 Cinch / RoundupWeatherMax + rimsulfuron + AMS | 0.75 pt / 22 oz + 1 oz + 2.5 lb | 87 | 91 | 95 | 95 | 23.7 | 224 | - | - |
| <u>POST I (V3 corn) / POST III (4-inch Regrowth) Corn hybrid = Pioneer 38H66</u> | | | | | | | | | |
| 24 Roundup WeatherMax+AMS/ Roundup WeatherMax+AMS | 22 oz + 2.5 lb/22 oz + 2.5 lb | 99 | 99 | 99 | 99 | 23.1 | 210 | 41.98 | 291 |
| 25 Roundup WeatherMax + Aim + AMS/ Roundup WeatherMax + AMS | 22 oz + 0.5 oz + 2.5 lb/ 22 oz + 2.5 lb | - | - | - | - | - | - | - | - |
| <u>Checks Corn hybrid = Pioneer 38H66</u> | | | | | | | | | |
| 26 Hand-Weeded | - | 100 | 100 | 100 | 100 | 23.0 | 224 | 0.00 | 358 |
| LSD (0.10) | | 4 | 3 | 4 | 4 | 1.4 | 24 | | 38 |

Corn Price = \$1.83
(Waseca Co. 2004 Loan Rate)

2004 Corn Herbicide Evaluation (Lamberton)

| Herbicide | Rate (product/A) | Yellow foxtail | Common lambsquarters | Redroot pigweed | H2O (%) | Yield (bu/A) | Cost ---- | Returns (\$/A) ---- |
|-------------------------------------------------------------------|--------------------------------------------------|-------------------|-------------------------|--------------------|------------|-----------------|--------------|------------------------|
| <u>Preemergence Corn hybrid = Pioneer 38H68</u> | | | | | | | | |
| 1 Keystone LA + Hornet WDG | 2.2 qt + 4oz | 75 | 99 | 100 | 20.9 | 189 | 40.94 | 272 |
| 2 Lumax | 6 pt | 73 | 100 | 100 | 21.2 | 196 | 41.06 | 282 |
| <u>Preemergence/POST II (V4 corn) Corn hybrid = Pioneer 38H68</u> | | | | | | | | |
| 3 Surpass / Hornet + Callisto + atrazine + COC + AMS | 2.75 pt / 3 oz + 0.75 oz + 0.28 lb + 1% + 2.5 lb | 86 | 100 | 100 | 21.7 | 193 | 50.68 | 264 |
| 4 Keystone LA / Hornet + Clarity + NIS + AMS | 2.2 qt / 3 oz + 4 oz + 0.25% + 2.5 lb | 79 | 100 | 100 | 20.4 | 183 | 46.80 | 259 |
| 5 Outlook / Distinct + atrazine + NIS + AMS | 21 oz / 4 oz + 0.5 lb + 0.25% + 2.5 lb | 89 | 100 | 99 | 20.3 | 195 | 47.02 | 279 |
| 6 Define/ Liberty+atrazine+AMS | 12 oz / 32 oz + 0.5 lb + 3 lb | 93 | 100 | 100 | 21.4 | 198 | 43.02 | 282 |
| 7 Define/ Option+Distinct+MSO+28% | 12 oz / 1.5 oz + 4 oz + 1.5 pt + 3 pt | 83 | 100 | 100 | 21.0 | 197 | 53.84 | 272 |
| 8 Define SC/ Option+Callisto+MSO+28% | 12 oz / 1.5 oz + 1.5 oz + 1.5 pt + 3 pt | 80 | 100 | 98 | 22.2 | 192 | 46.92 | 264 |
| 9 Cinch/ AccentGold+Callisto+atrazine+COC+AMS | 0.75 pt / 3.5 oz + 1 oz + 0.5 lb + 1% + 2 lb | 87 | 100 | 100 | 21.0 | 184 | 53.80 | 251 |
| 10 Cinch/ Steadfast+Callisto+atrazine+COC+AMS | 0.75 pt / 0.75 oz + 2 oz + 0.5 lb + 1% + 2 lb | 92 | 100 | 99 | 21.5 | 202 | 47.60 | 283 |
| 11 Dual II Magnum/ Callisto+Liberty+atrazine+28%N | 1 pt / 3 oz + 16 oz + 0.55 lb + 2 lb | 94 | 100 | 100 | 20.9 | 190 | 46.08 | 269 |
| 12 Dual II Magnum/ Callisto+atrazine+COC+28%N | 2 pt / 3 oz + 0.55 lb + 1% + 2.5% | 90 | 100 | 100 | 21.4 | 189 | 54.16 | 256 |
| 13 Outlook/ Aim+atrazine+Clarity+NIS | 21 oz / 0.5 oz + 0.55 lb + 3 oz + 0.25% | 83 | 100 | 99 | 21.8 | 189 | 41.21 | 268 |
| <u>POST II (V4 corn) Corn hybrid = Pioneer 38H68</u> | | | | | | | | |
| 14 Steadfast+Callisto+COC+AMS | 0.75 oz + 2 oz + 1% + 2 lb | 75 | 100 | 100 | 20.4 | 184 | 30.63 | 276 |
| 15 Accent Gold WDG+Clarity+atrazine+COC+AMS | 3.5 oz + 4 oz + 0.5 oz + 1% + 2 lb | 70 | 96 | 90 | 20.9 | 180 | 36.91 | 261 |
| 16 Steadfast+Lumax+NIS+AMS | 0.75 oz + 1.5 pt + 0.25% + 2 lb | 74 | 100 | 100 | 20.9 | 195 | 31.22 | 292 |
| <u>Checks Corn hybrid = Pioneer 38H68</u> | | | | | | | | |
| 17 Weedy Check | | 0 | 0 | 0 | 20.9 | 89 | 0.00 | 148 |
| 18 Weed-Free Check | | 100 | 100 | 100 | 21.1 | 197 | 0.00 | 326 |

Table Continued. 2004 Corn Herbicide Evaluation (Lamberton)

| Herbicide | Rate (product/A) | Yellow | Common | Redroot | H2O (%) | Yield (bu/A) | Cost | Returns |
|----------------------------------------------------------------------------------|----------------------------------------|------------------|------------------------------|------------------|------------|-----------------|-------|---------|
| | | foxtail ----- | lambsquarters (% control) | pigweed ----- | | | | |
| <u>Preemergence/POST II (V4 corn) Corn hybrid = Pioneer 38H66</u> | | | | | | | | |
| 19 Harness/ Roundup WeatherMax+AMS | 1.25 pt / 22 oz + 2.5 lb | 89 | 96 | 96 | 19.1 | 197 | 43.39 | 293 |
| 20 Dual II Magnum/ Touchdown Total+AMS | 1 pt / 24 oz + 2.5 lb | 94 | 100 | 99 | 19.1 | 207 | 44.74 | 308 |
| 21 Keystone LA / GF 1279 + AMS | 2.2 pt / 24 oz + 2.5 lb | 90 | 99 | 99 | 19.1 | 198 | - | |
| 22 Outlook/ Distinct + RoundupWeatherMax + NIS + AMS | 12 oz / 3 oz + 11 oz + 0.25% + 2.5 lb | 92 | 98 | 100 | 18.0 | 192 | 48.09 | 285 |
| 23 Cinch / RoundupWeatherMax + rimsulfuron + AMS | 0.75 pt / 22 oz + 1 oz + 2.5 lb | 92 | 100 | 100 | 18.7 | 195 | - | |
| <u>POST I (V3 corn) / POST III (4-inch Regrowth) Corn hybrid = Pioneer 38H66</u> | | | | | | | | |
| 24 Roundup WeatherMax+AMS/ Roundup WeatherMax+AMS | 22 oz + 2.5 lb/22 oz + 2.5 lb | 97 | 100 | 99 | 18.9 | 205 | 41.98 | 308 |
| 25 Roundup WeatherMax + Aim + AMS/ Roundup WeatherMax + AMS | 22 oz + 0.5 oz + 2.5 lb/22 oz + 2.5 lb | 97 | 100 | 99 | 19.3 | 201 | 44.62 | 297 |
| <u>Checks Corn hybrid = Pioneer 38H66</u> | | | | | | | | |
| 26 Hand-Weeded | - | 100 | 100 | 100 | 18.9 | 200 | 0.00 | 343 |
| LSD (0.10) | | 4 | 1 | 2 | 1.4 | 12 | | 24 |

Corn Price = \$1.83
(Waseca Co. 2004 Loan Rate)

2004 Corn Herbicide Evaluation (Waseca)

Tall Waterhemp Site

| Herbicide | Rate (product/A) | Giant foxtail --- | Tall waterhemp --- | H2O (%) | Yield (bu/A) | Cost ----- | Returns ----- |
|-------------------------------------------------------------------|----------------------------------------------------|--------------------------------------------------|--------------------------|------------|-----------------|---------------|------------------|
| | | (% control) | (%) | | | (\$/A) | |
| <u>Preemergence Corn hybrid = Pioneer 38H68</u> | | | | | | | |
| 1 | Keystone LA + Hornet WDG | 2.2 qt + 4oz | 93 | 99 | 22.7 | 202 | 40.94 283.23 |
| 2 | Lumax | 6 pt | 73 | 99 | 22.5 | 186 | 41.06 258.68 |
| <u>Preemergence/POST II (V4 corn) Corn hybrid = Pioneer 38H68</u> | | | | | | | |
| 3 | Surpass / Hornet + Callisto + atrazine + COC + AMS | 2.75 pt / 3 oz + 0.75 oz + 0.28 lb + 1% + 2.5 lb | 98 | 99 | 22.7 | 199 | 50.68 268.57 |
| 4 | Keystone LA / Hornet + Clarity + NIS + AMS | 2.2 qt / 3 oz + 4 oz + 0.25% + 2.5 lb | 96 | 99 | 22.6 | 184 | 46.80 248.99 |
| 5 | Outlook / Distinct + atrazine + NIS + AMS | 21 oz / 4 oz + 0.5 lb + 0.25% + 2.5 lb | 97 | 99 | 22.3 | 193 | 47.02 264.8 |
| 6 | Define/ Liberty+atrazine+AMS | 12 oz / 32 oz + 0.5 lb + 3 lb | 99 | 99 | 23.0 | 190 | 43.02 260.9 |
| 7 | Define/ Option+Distinct+MSO+28% | 12 oz / 1.5 oz + 4 oz + 1.5 pt + 3 pt | 96 | 99 | 22.3 | 183 | 53.84 241.57 |
| 8 | Define SC/ Option+Callisto+MSO+28% | 12 oz / 1.5 oz + 1.5 oz + 1.5 pt + 3 pt | 97 | 98 | 21.9 | 187 | 46.92 256.94 |
| 9 | Cinch/ AccentGold+Callisto+atrazine+COC+AMS | 0.75 pt / 3.5 oz + 1 oz + 0.5 lb + 1% + 2 lb | 84 | 99 | 22.5 | 185 | 53.80 243.98 |
| 10 | Cinch/ Steadfast+Callisto+atrazine+COC+AMS | 0.75 pt / 0.75 oz + 2 oz + 0.5 lb + 1% + 2 lb | 84 | 99 | 22.1 | 177 | 47.60 238.56 |
| 11 | Dual II Magnum/ Callisto+Liberty+atrazine+28%N | 1 pt / 3 oz + 16 oz + 0.55 lb + 2 lb | 99 | 99 | 22.2 | 200 | 46.08 277.41 |
| 12 | Dual II Magnum/ Callisto+atrazine+COC+28%N | 2 pt / 3 oz + 0.55 lb + 1% + 2.5% | 93 | 99 | 23.2 | 204 | 54.16 270.84 |
| 13 | Outlook/ Aim+atrazine+Clarity+NIS | 21 oz / 0.5 oz + 0.55 lb + 3 oz + 0.25% | 95 | 99 | 22.8 | 180 | 41.21 247.54 |
| <u>POST II (V4 corn) Corn hybrid = Pioneer 38H68</u> | | | | | | | |
| 14 | Steadfast+Callisto+COC+AMS | 0.75 oz + 2 oz + 1% + 2 lb | 63 | 99 | 21.7 | 156 | 30.63 224.87 |
| 15 | Accent Gold WDG+Clarity+atrazine+COC+AMS | 3.5 oz + 4 oz + 0.5 oz + 1% + 2 lb | 56 | 99 | 21.6 | 180 | 36.91 257.7 |
| 16 | Steadfast+Lumax+NIS+AMS | 0.75 oz + 1.5 pt + 0.25% + 2 lb | 59 | 99 | 21.0 | 141 | 31.22 201.7 |
| <u>Checks Corn hybrid = Pioneer 38H68</u> | | | | | | | |
| 17 | Weedy Check | | 0 | 0 | 17.9 | 140 | 0.00 243.53 |
| 18 | Weed-Free Check | | 100 | 100 | 22.5 | 206 | 0.00 332.43 |

Table continued. 2004 Corn Herbicide Evaluation (Waseca) Tall Waterhemp Site

| Herbicide | Rate (product/A) | Giant foxtail (% control) | Tall waterhemp (%) | H2O (%) | Yield (bu/A) | Cost (\$/A) | Returns (\$/A) | |
|----------------------------------------------------------------------------------|-------------------------------------------------------------|----------------------------------------|--------------------------|------------|-----------------|----------------|-------------------|--------|
| <u>Preemergence/POST II (V4 corn) Corn hybrid = Pioneer 38H66</u> | | | | | | | | |
| 19 | Harness/ Roundup WeatherMax+AMS | 1.25 pt / 22 oz + 2.5 lb | 99 | 96 | 18.4 | 190 | 43.39 | 284.87 |
| 20 | Dual II Magnum/ Touchdown Total+AMS | 1 pt / 24 oz + 2.5 lb | 99 | 99 | 22.3 | 191 | 44.74 | 263.75 |
| 21 | Keystone LA / GF 1279 + AMS | 2.2 pt / 24 oz + 2.5 lb | 97 | 96 | 22.0 | 184 | - | |
| 22 | Outlook/ Distinct + RoundupWeatherMax + NIS + AMS | 12 oz / 3 oz + 11 oz + 0.25% + 2.5 lb | 99 | 99 | 21.8 | 212 | 48.09 | 296.58 |
| 23 | Cinch / RoundupWeatherMax + rimsulfuron + AMS | 0.75 pt / 22 oz + 1 oz + 2.5 lb | 99 | 99 | 22.0 | 191 | - | |
| <u>POST I (V3 corn) / POST III (4-inch Regrowth) Corn hybrid = Pioneer 38H66</u> | | | | | | | | |
| 24 | Roundup WeatherMax+AMS/ Roundup WeatherMax+AMS | 22 oz + 2.5 lb/22 oz + 2.5 lb | 99 | 99 | 21.3 | 202 | 41.98 | 290.75 |
| 25 | Roundup WeatherMax + Aim + AMS/ Roundup WeatherMax + AMS | 22 oz + 0.5 oz + 2.5 lb/22 oz + 2.5 lb | 99 | 99 | 21.3 | 190 | 44.62 | 267.75 |
| <u>Checks Corn hybrid = Pioneer 38H66</u> | | | | | | | | |
| 26 | Hand-Weeded | - | 100 | 100 | 21.8 | 197 | 0.00 | 320.13 |
| | | LSD (0.10) | 9 | 2 | 2.7 | 17 | | 31 |

Corn Price = \$1. 83
(Waseca Co. 2004 Loan Rate)

2004 Corn Herbicide Evaluation (Waseca)

Common Cocklebur Site

| Herbicide | Rate (product/A) | Giant | Common | Common | Common | H2O (%) | Yield (bu/A) | Cost ---- (\$/A) ---- | Returns ---- | |
|-------------------------------------------------------------------|----------------------------------------------------|-----------------------------------------------------|-----------|---------|---------------|------------|-----------------|--------------------------|-----------------|-----|
| | | foxtail | cocklebur | ragweed | lambsquarters | | | | | |
| <u>Preemergence Corn hybrid = Pioneer 38H68</u> | | | | | | | | | | |
| 1 | Keystone LA + Hornet WDG | 2.2 qt + 4oz | 98 | 74 | 90 | 99 | 26.4 | 179 | 40.94 | 228 |
| 2 | Lumax | 6 pt | 98 | 92 | 96 | 99 | 26.6 | 182 | 41.06 | 231 |
| <u>Preemergence/POST II (V4 corn) Corn hybrid = Pioneer 38H68</u> | | | | | | | | | | |
| 3 | Surpass / Hornet + Callisto + atrazine + COC + AMS | 2.75 pt / 3 oz + 0.75 oz + 0.28 lb + 1% + 2.5 lb | 99 | 99 | 96 | 99 | 26.8 | 181 | 50.68 | 220 |
| 4 | Keystone LA / Hornet + Clarity + NIS + AMS | 2.2 qt / 3 oz + 4 oz + 0.25% + 2.5 lb | 97 | 99 | 99 | 99 | 26.8 | 186 | 46.80 | 230 |
| 5 | Outlook / Distinct + atrazine + NIS + AMS | 21 oz / 4 oz + 0.5 lb + 0.25% + 2.5 lb | 99 | 96 | 99 | 99 | 26.5 | 188 | 47.02 | 236 |
| 6 | Define/ Liberty+atrazine+AMS | 12 oz / 32 oz + 0.5 lb + 3 lb | 98 | 93 | 99 | 99 | 28.3 | 185 | 43.02 | 224 |
| 7 | Define/ Option+Distinct+MSO+28% | 12 oz / 1.5 oz + 4 oz + 1.5 pt + 3 pt | 99 | 96 | 99 | 99 | 27.3 | 159 | 53.84 | 181 |
| 8 | Define SC/ Option+Callisto+MSO+28% | 12 oz / 1.5 oz + 1.5 oz + 1.5 pt + 3 pt | 99 | 94 | 74 | 99 | 27.5 | 178 | 46.92 | 215 |
| 9 | Cinch/ AccentGold+Callisto+atrazine+COC+AMS | 0.75 pt / 3.5 oz + 1 oz + 0.5 lb + 1% + 2 lb | 99 | 99 | 99 | 99 | 27.1 | 180 | 53.80 | 212 |
| 10 | Cinch/ Steadfast+Callisto+atrazine+COC+AMS | 0.75 pt / 0.75 oz + 2 oz + 0.5 lb + 1% + 2 lb | 99 | 95 | 99 | 99 | 27.6 | 185 | 47.60 | 224 |
| 11 | Dual II Magnum/ Callisto+Liberty+atrazine+28%N | 1 pt / 3 oz + 16 oz + 0.55 lb + 2 lb | 99 | 99 | 99 | 99 | 26.7 | 190 | 46.08 | 238 |
| 12 | Dual II Magnum/ Callisto+atrazine+COC+28%N | 2 pt / 3 oz + 0.55 lb + 1% + 2.5% | 99 | 99 | 99 | 99 | 28.0 | 186 | 54.16 | 217 |
| 13 | Outlook/ Aim+atrazine+Clarity+NIS | 21 oz / 0.5 oz + 0.55 lb + 3 oz + 0.25% | 99 | 98 | 99 | 99 | 26.9 | 184 | 41.21 | 233 |

Table continued. 2004 Corn Herbicide Evaluation (Waseca) Common Cocklebur Site

| Herbicide | Rate (product/A) | Giant | Common | Common | Common | H2O (%) | Yield (bu/A) | Cost ---- | Returns (\$/A) ---- | |
|----------------------------------------------------------------------------------|-------------------------------------------------------------|--------------------------------------------|-----------|---------|---------------|------------|-----------------|--------------|------------------------|-----|
| | | foxtail | cocklebur | ragweed | lambsquarters | | | | | |
| <u>POST II (V4 corn) Corn hybrid = Pioneer 38H68</u> | | | | | | | | | | |
| 14 | Steadfast+Callisto+COC+AMS | 0.75 oz + 2 oz + 1% + 2 lb | 97 | 95 | 78 | 99 | 27.4 | 180 | 30.63 | 234 |
| 15 | Accent Gold WDG+Clarity+atrazine+COC+AMS | 3.5 oz + 4 oz + 0.5 oz + 1% + 2 lb | 86 | 99 | 98 | 99 | 26.6 | 175 | 36.91 | 225 |
| 16 | Steadfast+Lumax+NIS+AMS | 0.75 oz + 1.5 pt + 0.25% + 2 lb | 98 | 95 | 84 | 99 | 26.8 | 179 | 31.22 | 235 |
| <u>Checks Corn hybrid = Pioneer 38H68</u> | | | | | | | | | | |
| 17 | Weedy Check | | 0 | 0 | 0 | 0 | 26.4 | 27 | 0.00 | 40 |
| 18 | Weed-Free Check | | 100 | 100 | 100 | 100 | 26.7 | 190 | 0.00 | 284 |
| <u>Preemergence/POST II (V4 corn) Corn hybrid = Pioneer 38H66</u> | | | | | | | | | | |
| 19 | Harness/ Roundup WeatherMax+AMS | 1.25 pt / 22 oz + 2.5 lb | 97 | 93 | 97 | 99 | 25.0 | 199 | 43.39 | 263 |
| 20 | Dual II Magnum/ Touchdown Total+AMS | 1 pt / 24 oz + 2.5 lb | 99 | 94 | 93 | 98 | 25.2 | 197 | 44.74 | 257 |
| 21 | Keystone LA / GF 1279 + AMS | 2.2 pt / 24 oz + 2.5 lb | 94 | 95 | 94 | 96 | 25.0 | 203 | - | |
| 22 | Outlook/ Distinct + RoundupWeatherMax + NIS + AMS | 12 oz / 3 oz + 11 oz + 0.25% + 2.5 lb | 97 | 99 | 99 | 99 | 25.1 | 191 | 48.09 | 246 |
| 23 | Cinch / RoundupWeatherMax + rimsulfuron + AMS | 0.75 pt / 22 oz + 1 oz + 2.5 lb | 99 | 99 | 99 | 99 | 25.1 | 187 | - | |
| <u>POST I (V3 corn) / POST III (4-inch Regrowth) Corn hybrid = Pioneer 38H66</u> | | | | | | | | | | |
| 24 | Roundup WeatherMax+AMS/ Roundup WeatherMax+AMS | 22 oz + 2.5 lb/22 oz + 2.5 lb | 98 | 99 | 99 | 99 | 25.0 | 209 | 41.98 | 279 |
| 25 | Roundup WeatherMax + Aim + AMS/ Roundup WeatherMax + AMS | 22 oz + 0.5 oz + 2.5 lb/ 22 oz + 2.5 lb | 99 | 99 | 99 | 77 | 24.5 | 207 | 44.62 | 278 |
| <u>Checks Corn hybrid = Pioneer 38H66</u> | | | | | | | | | | |
| 26 | Hand-Weeded | - | 100 | 100 | 100 | 100 | 24.8 | 194 | 0.00 | 300 |
| LSD (0.10) | | | 3 | 6 | 7 | 11 | 1.1 | 16 | | 27 |

Corn Price = \$1. 83
(Waseca Co. 2004 Loan Rate)

2004 Corn Herbicide Evaluation (Waseca)

Giant Ragweed Site

| Herbicide | Rate (product/A) | Giant foxtail ----- (% control) ----- | Giant ragweed ----- (% control) ----- | H2O (%) | Yield (bu/A) | Cost ----- (\$/A) ----- | Returns |
|-------------------------------------------------------------------|-----------------------------------------------------|---------------------------------------------|---------------------------------------------|------------|-----------------|----------------------------|---------|
| <u>Preemergence Corn hybrid = Pioneer 38H68</u> | | | | | | | |
| 1 Keystone LA + Hornet WDG | 2.2 qt + 4oz | 95 | 70 | 21.3 | 175 | 40.94 | 247 |
| 2 Lumax | 6 pt | 85 | 85 | 23.3 | 199 | 41.06 | 276 |
| <u>Preemergence/POST II (V4 corn) Corn hybrid = Pioneer 38H68</u> | | | | | | | |
| 3 Surpass / Hornet + Callisto + atrazine + COC + AMS | 2.75 pt / 3 oz + 0.75 oz + 0.28 lb + 1% + 2.5 lb | 98 | 99 | 22.5 | 203 | 50.68 | 276 |
| 4 Keystone LA / Hornet + Clarity + NIS + AMS | 2.2 qt / 3 oz + 4 oz + 0.25% + 2.5 lb | 96 | 97 | 22.6 | 217 | 46.80 | 301 |
| 5 Outlook / Distinct + atrazine + NIS + AMS | 21 oz / 4 oz + 0.5 lb + 0.25% + 2.5 lb | 97 | 97 | 23.0 | 193 | 47.02 | 263 |
| 6 Define/ Liberty+atrazine+AMS | 12 oz / 32 oz + 0.5 lb + 3 lb | 99 | 60 | 27.2 | 112 | 43.02 | 128 |
| 7 Define/ Option+Distinct+MSO+28% | 12 oz / 1.5 oz + 4 oz + 1.5 pt + 3 pt | 98 | 94 | 21.1 | 143 | 53.84 | 182 |
| 8 Define SC/ Option+Callisto+MSO+28% | 12 oz / 1.5 oz + 1.5 oz + 1.5 pt + 3 pt | 99 | 29 | 22.9 | 105 | 46.92 | 124 |
| 9 Cinch/ AccentGold+Callisto+atrazine+COC+AMS | 0.75 pt / 3.5 oz + 1 oz + 0.5 lb + 1% + 2 lb | 96 | 94 | 24.3 | 179 | 53.80 | 226 |
| 10 Cinch/ Steadfast+Callisto+atrazine+COC+AMS | 0.75 pt / 0.75 oz + 2 oz + 0.5 lb + 1% + 2 lb | 97 | 96 | 21.7 | 189 | 47.60 | 261 |
| 11 Dual II Magnum/ Callisto+Liberty+atrazine+28%N | 1 pt / 3 oz + 16 oz + 0.55 lb + 2 lb | 99 | 96 | 23.0 | 194 | 46.08 | 267 |
| 12 Dual II Magnum/ Callisto+atrazine+COC+28%N | 2 pt / 3 oz + 0.55 lb + 1% + 2.5% | 93 | 94 | 22.9 | 203 | 54.16 | 271 |
| 13 Outlook/ Aim+atrazine+Clarity+NIS | 21 oz / 0.5 oz + 0.55 lb + 3 oz + 0.25% | 93 | 87 | 23.2 | 188 | 41.21 | 259 |

Table continued. 2004 Corn Herbicide Evaluation (Waseca) Giant Ragweed Site

| Herbicide | Rate (product/A) | Giant foxtail ----- (% control) ----- | Giant ragweed ----- (% control) ----- | H2O (%) | Yield (bu/A) | Cost ----- (\$/A) ----- | Returns |
|----------------------------------------------------------------------------------|----------------------------------------|---------------------------------------------|---------------------------------------------|------------|-----------------|----------------------------|---------|
| <u>POST II (V4 corn) Corn hybrid = Pioneer 38H68</u> | | | | | | | |
| 14 Steadfast+Callisto+COC+AMS | 0.75 oz + 2 oz + 1% + 2 lb | 99 | 44 | 23.5 | 120 | 30.63 | 159 |
| 15 Accent Gold WDG+Clarity+atrazine+COC+AMS | 3.5 oz + 4 oz + 0.5 oz + 1% + 2 lb | 95 | 79 | 26.1 | 161 | 36.91 | 209 |
| 16 Steadfast+Lumax+NIS+AMS | 0.75 oz + 1.5 pt + 0.25% + 2 lb | 98 | 36 | 24.0 | 104 | 31.22 | 132 |
| <u>Checks Corn hybrid = Pioneer 38H68</u> | | | | | | | |
| 17 Weedy Check | | 0 | 0 | 26.5 | 3 | 0.00 | 5 |
| 18 Weed-Free Check | | 100 | 100 | 23.3 | 192 | 0.00 | 306 |
| <u>Preemergence/POST II (V4 corn) Corn hybrid = Pioneer 38H66</u> | | | | | | | |
| 19 Harness/ Roundup WeatherMax+AMS | 1.25 pt / 22 oz + 2.5 lb | 99 | 91 | 23.4 | 183 | 43.39 | 247 |
| 20 Dual II Magnum/ Touchdown Total+AMS | 1 pt / 24 oz + 2.5 lb | 99 | 87 | 24.7 | 173 | 44.74 | 223 |
| 21 Keystone LA / GF 1279 + AMS | 2.2 pt / 24 oz + 2.5 lb | 99 | 90 | 23.2 | 186 | - | |
| 22 Outlook/ Distinct + RoundupWeatherMax + NIS + AMS | 12 oz / 3 oz + 11 oz + 0.25% + 2.5 lb | 99 | 95 | 24.0 | 184 | 48.09 | 241 |
| ²³ Cinch / RoundupWeatherMax + rimsulfuron + AMS | 0.75 pt / 22 oz + 1 oz + 2.5 lb | 99 | 87 | 24.0 | 186 | - | |
| <u>POST I (V3 corn) / POST III (4-inch Regrowth) Corn hybrid = Pioneer 38H66</u> | | | | | | | |
| 24 Roundup WeatherMax+AMS/ Roundup WeatherMax+AMS | 22 oz + 2.5 lb/22 oz + 2.5 lb | 99 | 96 | 24.4 | 214 | 41.98 | 291 |
| 25 Roundup WeatherMax + Aim + AMS/ Roundup WeatherMax + AMS | 22 oz + 0.5 oz + 2.5 lb/22 oz + 2.5 lb | 99 | 99 | 23.4 | 204 | 44.62 | 279 |
| <u>Checks Corn hybrid = Pioneer 38H66</u> | | | | | | | |
| 26 Hand-Weeded | - | 100 | 100 | 23.9 | 213 | 0.00 | 335 |
| | LSD (0.10) | 4 | 18 | 2.3 | 39 | | 69 |

Corn Price = \$1. 83
(Waseca Co. 2004 Loan Rate)

2004 Corn Herbicide Evaluation (Waseca)

Common Ragweed Site

| Herbicide | Rate (product/A) | Giant | Common | Common | Velvetleaf | H2O | Yield | Cost | Returns | |
|-------------------------------------------------------------------|----------------------------------------------------|-----------------------------------------------------|---------|---------------|------------|-----|--------|-------|---------|-------|
| | | foxtail | ragweed | lambquarters. | (%) | (%) | (bu/A) | ----- | (\$/A) | ----- |
| <u>Preemergence Corn hybrid = Pioneer 38H68</u> | | | | | | | | | | |
| 1 | Keystone LA + Hornet WDG | 2.2 qt + 4oz | 97 | 99 | 99 | 99 | 25.7 | 188 | 40.94 | 245 |
| 2 | Lumax | 6 pt | 87 | 99 | 99 | 99 | 26.7 | 185 | 41.06 | 235 |
| <u>Preemergence/POST II (V4 corn) Corn hybrid = Pioneer 38H68</u> | | | | | | | | | | |
| 3 | Surpass / Hornet + Callisto + atrazine + COC + AMS | 2.75 pt / 3 oz + 0.75 oz + 0.28 lb + 1% + 2.5 lb | 99 | 99 | 99 | 99 | 27.0 | 181 | 50.68 | 219 |
| 4 | Keystone LA / Hornet + Clarity + NIS + AMS | 2.2 qt / 3 oz + 4 oz + 0.25% + 2.5 lb | 95 | 99 | 99 | 99 | 25.8 | 201 | 46.80 | 258 |
| 5 | Outlook / Distinct + atrazine + NIS + AMS | 21 oz / 4 oz + 0.5 lb + 0.25% + 2.5 lb | 98 | 99 | 99 | 99 | 25.8 | 184 | 47.02 | 234 |
| 6 | Define/ Liberty+atrazine+AMS | 12 oz / 32 oz + 0.5 lb + 3 lb | 98 | 97 | 97 | 99 | 25.5 | 200 | 43.02 | 262 |
| 7 | Define/ Option+Distinct+MSO+28% | 12 oz / 1.5 oz + 4 oz + 1.5 pt + 3 pt | 98 | 99 | 99 | 99 | 26.0 | 189 | 53.84 | 233 |
| 8 | Define SC/ Option+Callisto+MSO+28% | 12 oz / 1.5 oz + 1.5 oz + 1.5 pt + 3 pt | 96 | 95 | 99 | 99 | 24.8 | 202 | 46.92 | 266 |
| 9 | Cinch/ AccentGold+Callisto+atrazine+COC+AMS | 0.75 pt / 3.5 oz + 1 oz + 0.5 lb + 1% + 2 lb | 96 | 97 | 99 | 99 | 25.3 | 180 | 53.80 | 222 |
| 10 | Cinch/ Steadfast+Callisto+atrazine+COC+AMS | 0.75 pt / 0.75 oz + 2 oz + 0.5 lb + 1% + 2 lb | 97 | 91 | 99 | 99 | 25.9 | 181 | 47.60 | 227 |
| 11 | Dual II Magnum/ Callisto+Liberty+atrazine+28%N | 1 pt / 3 oz + 16 oz + 0.55 lb + 2 lb | 97 | 99 | 99 | 99 | 25.2 | 196 | 46.08 | 254 |
| 12 | Dual II Magnum/ Callisto+atrazine+COC+28%N | 2 pt / 3 oz + 0.55 lb + 1% + 2.5% | 96 | 99 | 99 | 99 | 26.3 | 199 | 54.16 | 246 |
| 13 | Outlook/ Aim+atrazine+Clarity+NIS | 21 oz / 0.5 oz + 0.55 lb + 3 oz + 0.25% | 93 | 99 | 99 | 99 | 25.6 | 200 | 41.21 | 264 |

Table continued. 2004 Corn Herbicide Evaluation (Waseca) Common Ragweed Site

| Herbicide | Rate (product/A) | Giant | Common | Common | Velvetleaf | H2O | Yield | Cost | Returns |
|----------------------------------------------------------------------------------|--------------------------------------------|---------|-------------|----------------|------------|------|--------|--------|---------|
| | | foxtail | ragweed | lambsquarters. | | | (bu/A) | (\$/A) | |
| | | ----- | (% control) | ----- | | (%) | | ----- | ----- |
| <u>POST II (V4 corn) Corn hybrid = Pioneer 38H68</u> | | | | | | | | | |
| 14 Steadfast+Callisto+COC+AMS | 0.75 oz + 2 oz + 1% + 2 lb | 94 | 50 | 99 | 99 | 26.4 | 181 | 30.63 | 241 |
| 15 Accent Gold WDG+Clarity+atrazine+COC+AMS | 3.5 oz + 4 oz + 0.5 oz + 1% + 2 lb | 88 | 99 | 99 | 99 | 24.7 | 198 | 36.91 | 270 |
| 16 Steadfast+Lumax+NIS+AMS | 0.75 oz + 1.5 pt + 0.25% + 2 lb | 97 | 63 | 99 | 99 | 26.0 | 191 | 31.22 | 257 |
| <u>Checks Corn hybrid = Pioneer 38H68</u> | | | | | | | | | |
| 17 Weedy Check | | 0 | 0 | 0 | 0 | 26.2 | 85 | 0.00 | 129 |
| 18 Weed-Free Check | | 100 | 100 | 100 | 100 | 26.0 | 189 | 0.00 | 286 |
| <u>Preemergence/POST II (V4 corn) Corn hybrid = Pioneer 38H66</u> | | | | | | | | | |
| 19 Harness/ Roundup WeatherMax+AMS | 1.25 pt / 22 oz + 2.5 lb | 99 | 99 | 99 | 99 | 23.7 | 223 | 43.39 | 308 |
| 20 Dual II Magnum/ Touchdown Total+AMS | 1 pt / 24 oz + 2.5 lb | 99 | 99 | 99 | 99 | 24.1 | 225 | 44.74 | 308 |
| 21 Keystone LA / GF 1279 + AMS | 2.2 pt / 24 oz + 2.5 lb | 99 | 99 | 99 | 99 | 23.8 | 228 | - | |
| 22 Outlook/ Distinct + RoundupWeatherMax + NIS + AMS | 12 oz / 3 oz + 11 oz + 0.25% + 2.5 lb | 99 | 99 | 99 | 99 | 24.3 | 221 | 48.09 | 297 |
| 23 Cinch / RoundupWeatherMax + rimsulfuron + AMS | 0.75 pt / 22 oz + 1 oz + 2.5 lb | 99 | 99 | 99 | 99 | 23.2 | 211 | - | |
| <u>POST I (V3 corn) / POST III (4-inch Regrowth) Corn hybrid = Pioneer 38H66</u> | | | | | | | | | |
| 24 Roundup WeatherMax+AMS/Roundup WeatherMax+AMS | 22 oz + 2.5 lb/22 oz + 2.5 lb | 99 | 99 | 99 | 99 | 24.6 | 202 | 41.98 | 272 |
| 25 Roundup WeatherMax + Aim + AMS/ Roundup WeatherMax + AMS | 22 oz + 0.5 oz + 2.5 lb/ 22 oz + 2.5 lb | 99 | 99 | 99 | 99 | 24.6 | 206 | 44.62 | 274 |
| <u>Checks Corn hybrid = Pioneer 38H66</u> | | | | | | | | | |
| 26 Hand-Weeded | - | 100 | 100 | 100 | 100 | 23.4 | 211 | 0.00 | 335 |
| LSD (0.10) | | 4 | 7 | 1 | 1 | 1.1 | 24 | | 40 |

Corn Price = \$1. 83
(Waseca Co. 2004 Loan Rate)

Evaluation of Prowl H₂O programs and glyphosate products for weed control in soybean at Rochester, MN in 2004.

Breitenbach, Fritz R., Lisa M. Behnken, Kevin R. Griffin, and Kristal L. Schaufler.

The objective of this trial was to evaluate Prowl H₂O programs and compare glyphosate products for weed control in soybean in southeastern Minnesota. The research site was a Lawler loam series containing 2.5% organic matter with a pH of 6.1 and soil test P and K levels of 42 ppm and 135 ppm, respectively. The area was fertilized with 3 T/A of lime in the spring. The previous crop was corn. The field was disked and field cultivated once prior to planting. The soybean variety, Golden Harvest 1961, was planted on May 26, 2004 at a depth of 1.5 inches in 30-inch rows at 150,000 seeds/A. A randomized complete block design with four replications was used. Preplant incorporated (PPI), preemergence (PRE), and postemergence (POST) treatments were applied with a tractor-mounted sprayer, delivering 20 gpa at 32 psi using Turbo Tee 11002 nozzles. Evaluations of the plots were taken on June 29, July 12, and July 19. Application dates and environmental conditions as well as crop and weed stages are listed below.

| Date | May 26 | May 26 | June 28 |
|-----------------------------------|----------|----------|----------|
| Treatment | PPI | PRE | POST |
| Temperature (F) | | | |
| air | 56 | 58 | 71 |
| Relative humidity (%) | 64 | 62 | 45 |
| Wind (mph) | 13 | 13 | 13 |
| Soil moisture | adequate | adequate | adequate |
| Soybean | | | |
| stage | seeded | seeded | V2 |
| height (inches) | 0 | 0 | 6.8 |
| Giant ragweed | | | |
| weed density/ft ² | -- | -- | 4 |
| height (inch) | -- | -- | 5 |
| Common lambsquarters | | | |
| weed density/ft ² | -- | -- | 6 |
| height (inch) | -- | -- | 1 |
| Common waterhemp | | | |
| weed density/ft ² | -- | -- | 12 |
| height (inch) | -- | -- | 2.5 |
| Giant foxtail | | | |
| weed density/ft ² | -- | -- | 25 |
| height (inch) | -- | -- | 5 |
| Rainfall after application (inch) | | | |
| week 1 | 1.31 | 1.31 | 0.16 |
| week 2 | 0.20 | 0.20 | 2.82 |
| week 3 | 5.46 | 5.46 | 0.23 |

Soil applied Pursuit Plus provided significantly better giant ragweed and common lambsquarters control than soil applied Prowl H₂O + Outlook and Prowl H₂O by itself. Soil applied Prowl H₂O + Outlook provided significantly better common waterhemp and giant foxtail control than soil applied Pursuit Plus and Prowl H₂O by itself. Soil applied Prowl H₂O + Outlook provided significantly better giant ragweed and common lambsquarters control than soil applied Prowl H₂O by itself (Table 1.).

Two-pass programs (soil applied followed by post) generally provided similar weed control to the glyphosate standard. Exceptions to this were the Prowl H₂O / Raptor + Ultra Blazer treatment which resulted in significantly lower giant ragweed and giant foxtail control, and the Pursuit Plus/ Rezult B + Rezult G treatment which provided significantly better giant ragweed control on the July 12 rating than the glyphosate standard. This difference, however, did not carryover to July 19 rating. Common waterhemp control was also significantly lower with the Pursuit Plus/ Rezult B + Rezult G treatment than the glyphosate standard (Table 1.).

Soybean yield was significantly lower with two treatments. In the Prowl H₂O / Raptor + Ultra Blazer program, giant ragweed control was significantly less than other treatments resulting in greater weed competition and reduced yield. In the Pursuit Plus/ Rezult B + Rezult G program, common waterhemp control was significantly less than other treatments resulting in greater competition and reduced yield (Table 1.).

The comparison of ten glyphosate products resulted in minimal differences. Significant differences were observed in two of the glyphosate treatments; Touchdown Hi-Tech + AMS + NIS, and Roundup Original + AMS + NIS. On the July 12 common waterhemp rating, Touchdown Hi-Tech + AMS + NIS had significantly lower control than Touchdown Total + AMS, Touchdown IQ + AMS, GF-1279 + AMS, ClearOut 41 Plus + AMS, Buccaneer Plus + AMS, Roundup UltraMax + AMS, and Roundup WeatherMax + AMS. These differences were not measurable in the July 19 ratings for common waterhemp. Common waterhemp control was significantly lower on the July 12 rating with Roundup Original + AMS + NIS than Touchdown Total + AMS, ClearOut 41 Plus + AMS, and Roundup UltraMax + AMS. On the July 19 common waterhemp rating, Roundup Original + AMS + NIS had significantly lower control than the Touchdown Total + AMS and Roundup WeatherMax + AMS treatments. Roundup Original + AMS + NIS was significantly lower on the July 12 rating of common lambsquarters than Roundup WeatherMax + AMS. This difference was not observed in the subsequent July 19 rating. Soybean yield was statistically the same for all treatments, even with the slight differences in weed control (Table 2.). (University of Minnesota Extension Service, Regional Center, Rochester, MN)

Table 1. Performance of Prowl H₂O and glyphosate herbicide programs for weed control in soybean on June 29, July 12, and July 19 at Rochester, MN in 2004. (Breitenbach, Behnken, Griffin, and Schaufler).

| Treatment | Rate | Giant ragweed control | | | Common lambsquarters control | | | Common waterhemp control | | | Giant foxtail control | | | Soybean yield |
|----------------------------------------------------------------------|--------------------------------------------------|-----------------------|------|------|------------------------------|------|------|--------------------------|------|------|-----------------------|------|------|---------------|
| | | 6/29 | 7/12 | 7/19 | 6/29 | 7/12 | 7/19 | 6/29 | 7/12 | 7/19 | 6/29 | 7/12 | 7/19 | |
| | (rate/A) | 6/29 7/12 7/19 (%) | | | 6/29 7/12 7/19 (%) | | | 6/29 7/12 7/19 (%) | | | 6/29 7/12 7/19 (%) | | | (bu/A) |
| PPI / POST | | | | | | | | | | | | | | |
| Prowl H ₂ O / Raptor + Ultra Blazer + NIS + AMS | 43 oz / 4 oz + 8 oz + 0.25% v/v + 3 lbs | 0 | 58 | 81 | 90 | 99 | 99 | 85 | 99 | 96 | 88 | 58 | 90 | 29 |
| Prowl H ₂ O / Extreme + NIS + AMS | 43 oz / 3 pts + 0.25 % v/v + 3 lbs | 0 | 89 | 96 | 91 | 98 | 99 | 81 | 97 | 96 | 86 | 99 | 99 | 41 |
| Prowl H ₂ O / Extreme + Headline ¹ + NIS + AMS | 43 oz / 3 pts + 6 oz + 0.25 % v/v + 3 lbs | 0 | 85 | 95 | 90 | 98 | 99 | 84 | 95 | 96 | 88 | 100 | 99 | 41 |
| PRE / POST | | | | | | | | | | | | | | |
| Prowl H ₂ O + Outlook/ Roundup Original + NIS + AMS | 16 oz + 12.6 oz / 24 oz + 0.25 % v/v + 3 lbs | 23 | 92 | 98 | 96 | 98 | 97 | 99 | 98 | 98 | 94 | 99 | 98 | 42 |
| Pursuit Plus/ Rezult B + Rezult G + NIS + AMS | 2.5 pts / 1.6 pts + 1.6 pts + 0.25 % v/v + 3 lbs | 66 | 99 | 99 | 100 | 99 | 99 | 83 | 46 | 49 | 88 | 95 | 99 | 37 |
| Roundup WeatherMax + AMS | 22 oz + 3 lbs | 0 | 93 | 98 | 0 | 96 | 98 | 0 | 93 | 98 | 0 | 98 | 97 | 43 |
| Untreated | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 16 |
| LSD = (0.05) | | 8 | 5 | 3 | 1 | 4 | 2 | 4 | 4 | 3 | 2 | 2 | 2 | 3 |

Headline¹ = Headline fungicide, NIS = AGRI-DEX nonionic surfactant, Helena; and AMS = spray grade ammonium sulfate, Helena.

Table 2. Performance of glyphosate products applied with AMS and/or NIS for weed control in soybean on July 12 and July 19 at Rochester, MN in 2004 (Breitenbach, Behnken, Griffin, and Schaufler).

| Treatment | Rate | Giant ragweed control | | Common lambsquarters control | | Common waterhemp control | | Giant foxtail control | | Soybean yield |
|------------------------------|----------------------------|-----------------------|------|------------------------------|------|--------------------------|------|-----------------------|------|---------------|
| | | 7/12 | 7/19 | 7/12 | 7/19 | 7/12 | 7/19 | 7/12 | 7/19 | |
| | (rate/A) | (%) | | (%) | | (%) | | (%) | | (bu/A) |
| POST | | | | | | | | | | |
| Touchdown Total + AMS | 24 oz + 3 lbs | 91 | 97 | 94 | 97 | 96 | 98 | 99 | 96 | 40 |
| Touchdown HiTech + NIS + AMS | 20 oz + 0.25 % v/v + 3 lbs | 90 | 96 | 93 | 97 | 85 | 96 | 98 | 96 | 43 |
| Touchdown IQ + AMS | 32 oz + 3 lbs | 91 | 97 | 93 | 97 | 93 | 97 | 98 | 96 | 42 |
| GlyphoMax Plus + AMS | 32 oz + 3 lbs | 91 | 97 | 93 | 97 | 91 | 97 | 99 | 97 | 42 |
| GF-1279+ AMS | 24 oz + 3 lbs | 91 | 97 | 91 | 97 | 93 | 97 | 98 | 96 | 41 |
| Clearout 41 Plus + AMS | 32 oz + 3 lbs | 92 | 97 | 95 | 97 | 94 | 97 | 99 | 97 | 41 |
| Buccaneer Plus + AMS | 32 oz + 3 lbs | 90 | 96 | 93 | 97 | 92 | 96 | 98 | 97 | 41 |
| Roundup Original + NIS + AMS | 32 oz + 0.25 % v/v + 3 lbs | 91 | 96 | 90 | 98 | 87 | 93 | 98 | 97 | 42 |
| Roundup UltraMax + AMS | 26 oz + 3 lbs | 93 | 97 | 94 | 97 | 96 | 97 | 98 | 97 | 41 |
| Roundup WeatherMax + AMS | 22 oz + 3 lbs | 93 | 98 | 96 | 98 | 93 | 98 | 98 | 97 | 43 |
| Untreated | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 16 |
| LSD = (0.10) | | 4 | 3 | 3 | 1 | 4 | 3 | 2 | 2 | 2 |

AMS = spray grade ammonium sulfate, Helena; and NIS = nonionic surfactant, Helena.

Comparison of sequential two-pass and single-pass herbicide systems with glyphosate and conventional herbicide programs for weed control in soybean at Potsdam, MN in 2004.

Behnken, Lisa M., Fritz R. Breitenbach, Kira L. Stearns, and Angela L. White.

The objective of this trial was to compare sequential two-pass and single-pass herbicide systems with glyphosate and conventional herbicide programs for weed control in soybean in southeastern Minnesota. The research site was a Port Byron silt loam containing 3.2% organic matter with a pH of 6.7 and soil test P and K levels of 66 ppm and 376 ppm, respectively. The previous crop was corn. The field was disked and field cultivated once prior to planting. The soybean variety, Pioneer 92-M00, was planted on May 28, 2004 at a depth of 1.5 inches in 30-inch rows at 150,000 seeds/A. A randomized complete block design with four replications was used. Preemergence (PRE) and postemergence (POST I, II, III, and IV) treatments were applied with a tractor-mounted sprayer, delivering 20 gpa at 32 psi using Turbo Tee 11002 nozzles. Evaluations of the plots were taken on July 1, July 20, and October 4, 2004. Application dates, environmental conditions, and crop and weed stages are listed below.

| Date | May 28 | July 1 | July 12 | July 14 | July 23 |
|-----------------------------------|--------|----------|----------|----------|----------|
| Treatment | PRE | POST I | POST II | POST III | POST IV |
| Temperature (F) | | | | | |
| air | 69 | 80 | 76 | 77 | 67 |
| Relative humidity (%) | 45 | 59 | 76 | 55 | 56 |
| Wind (mph) | 3 | 3 | 9 | 12 | 13 |
| Soybean | | | | | |
| stage | seeded | V3 | V4 | V4-R1 | R2 |
| height (inches) | | 6.0 | 11.0 | 14.5 | 19 |
| Giant ragweed | | | | | |
| weed density | -- | moderate | moderate | moderate | moderate |
| height (inch) | -- | 5.8 | 16 | 20 | 30 |
| Common lambsquarters | | | | | |
| weed density | -- | moderate | moderate | moderate | moderate |
| height (inch) | -- | 2.5 | 5 | 7.5 | 9 |
| Wild proso millet | | | | | |
| weed density | -- | moderate | moderate | moderate | moderate |
| height (inch) | -- | 1.1 | 11 | 13.8 | 22 |
| Rainfall after application (inch) | | | | | |
| week 1 | 1.30 | 2.08 | 0.04 | 0.0 | 0.65 |
| week 2 | 4.32 | 0.93 | 0.75 | 0.75 | 0.58 |
| week 3 | 3.19 | 0.19 | 0.68 | 1.11 | 0.11 |

Preemergence applications containing FirstRate or Gauntlet (co-pack) provided close to 90 percent giant ragweed control (July 1 rating). A preemergence application of Python provided some giant ragweed control at 53 percent (July 1 rating). Preemergence treatments with only Boundary or Boundary + Authority resulted in 0 percent giant ragweed control. POST I, POST II, and POST III applications of Flexstar or glyphosate provided excellent control of giant ragweed. All preemergence applications resulted in excellent common lambsquarters control (July 1 rating). Late season common lambsquarters control decreased in the Boundary + Firstrate / Fusion treatment. The POST I applications of Flexstar + Fusion+ Harmony GT provided the lowest common lambsquarters control in the trial (75%). All treatments provide excellent wild proso millet control. Soybean yields were similar across all treatments, except one. Boundary + Authority / Fusion provided no giant ragweed control, resulting in soybean yields similar to the untreated check, 19 and 20 bu/A, respectively. (University of Minnesota Extension Service, Regional Center, Rochester, MN)

Table. Performance of sequential two-pass and single-pass herbicide systems for weed control in soybean on July 1, July 20 and October 4 at Potsdam, MN in 2004 (Behnken, Breitenbach, Stearns, and White).

| Treatment | Rate | Giant ragweed control | | | Common lambsquarters control | | | Wild-proso millet control | | | Soybean yield (bu/A) |
|--------------------------------------------------------------------|-----------------------------------------------------------|-----------------------|------|------|------------------------------|------|------|---------------------------|------|------|-------------------------|
| | | 7/1 | 7/20 | 10/4 | 7/1 | 7/20 | 10/4 | 7/1 | 7/20 | 10/4 | |
| | (rate/A) | (%) | | | (%) | | | (%) | | | |
| Preemergence / Postemergence I | | | | | | | | | | | |
| Boundary / Flexstar + Fusion+ MSO + 28% UAN | 1.5 pt / 1 pt + 8 oz + 1 % v/v + 2.5 % v/v | 0 | 99 | 96 | 97 | 98 | 92 | 88 | 98 | 100 | 39 |
| Boundary / Flexstar + Fusion+ FirstRate + MSO + 28% UAN | 1.5 pt / 1 pt + 8 oz + 0.3 oz + 1 % v/v + 2.5 % v/v | 0 | 99 | 100 | 99 | 99 | 99 | 87 | 97 | 99 | 40 |
| Boundary + Authority / Fusion + MSO + 28% UAN | 1.5 pt + 4 oz / 8 oz + 1 % v/v + 2.5 % v/v | 0 | 0 | 0 | 99 | 99 | 100 | 87 | 98 | 100 | 19 |
| Boundary + Python / Fusion + MSO + 28% UAN | 1.5 pt + 0.89 oz / 8 oz + 1 % v/v + 2.5 % v/v | 53 | 55 | 55 | 99 | 98 | 96 | 84 | 96 | 100 | 35 |
| Boundary + FirstRate / Fusion + MSO + 28% UAN | 1.5 pt + 0.4 oz / 8 oz + 1 % v/v + 2.5 % v/v | 89 | 80 | 83 | 99 | 96 | 86 | 86 | 96 | 100 | 40 |
| Boundary + Gauntlet (co-pack) ¹ / Fusion+ MSO + 28% UAN | 1.5 pt + (3.59 oz + 0.41 oz) / 8 oz + 1 % v/v + 2.5 % v/v | 91 | 93 | 93 | 99 | 99 | 100 | 89 | 97 | 100 | 36 |
| Preemergence / Postemergence II | | | | | | | | | | | |
| Boundary / Touchdown Total + AMS | 1.25 pts / 1.5 pts + 3 lbs | 0 | 94 | 99 | 96 | 99 | 100 | 84 | 99 | 100 | 41 |
| Boundary / Touchdown Total + AMS | 1.5 pts / 1.5 pts + 3 lbs | 0 | 94 | 100 | 95 | 99 | 100 | 87 | 99 | 100 | 41 |
| Postemergence I | | | | | | | | | | | |
| Flexstar + Fusion + Harmony GT + MSO + 28% UAN | 1 pt + 8 oz + 0.042 oz + 1 % v/v + 2.5 % v/v | 0 | 95 | 95 | 0 | 88 | 75 | 0 | 94 | 98 | 36 |
| Postemergence II / Postemergence IV | | | | | | | | | | | |
| Touchdown Total + AMS / Touchdown Total + AMS | 1.5 pts + 3 lbs / 1.5 pts + 3 lbs | 0 | 90 | 100 | 0 | 99 | 100 | 0 | 99 | 100 | 42 |
| Postemergence III | | | | | | | | | | | |
| Roundup WeatherMax + AMS | 22 oz + 3 lbs | 0 | 90 | 99 | 0 | 99 | 98 | 0 | 99 | 100 | 41 |
| Untreated Check | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 20 |
| LSD (0.05) | | 4 | 11 | 7 | 3 | 1 | 5 | 3 | 2 | 1 | 10 |

1. Gauntlet (co-pack) = Gauntlet (sulfentrazone) + Gauntlet (cloransulam), MSO = methylated sunflower oil, Loveland; 28% UAN = an aqueous solution of urea and ammonium nitrate, Helena; and AMS = spray grade ammonium sulfate, Helena.

Evaluation of clethodim formulations, V-10137 and Select 2EC, in combination with Harmony GT for wild proso millet and common lambsquarters control in soybean at Potsdam, MN in 2004.

Breitenbach, Fritz R., Lisa M. Behnken, Debra L. Lewis, and Kevin R. Griffin.

The objective of this trial was to evaluate clethodim formulations in combination with Harmony GT for wild proso millet and common lambsquarters control in soybean in southeastern Minnesota. The research site was a Port Byron silt loam containing 3.2% organic matter with a pH of 6.7 and soil test P and K levels of 66 ppm and 376 ppm, respectively. The previous crop was corn. The field was chisel plowed in the fall, and disked and field cultivated once prior to planting in the spring. The soybean variety, Pioneer 92-M00, was planted on May 28, 2004 at a depth of 1.5 inches in 30-inch rows at 150,000 seeds/A. A randomized complete block design with four replications was used. Preemergence (PRE) and postemergence (POST I and POST II) treatments were applied with a tractor-mounted sprayer, delivering 20 gpa at 32 psi using Turbo Tee 11002 nozzles. Evaluations of the plots were taken on July 30, August 6, and August 17. Application dates, environmental conditions, and crop and weed stages are listed below.

| Date | May 28 | July 19 | July 26 |
|-----------------------------------|--------|----------|----------|
| Treatment | PRE | POST I | POST II |
| Temperature (F) | | | |
| air | 69 | 80 | 71 |
| Relative humidity (%) | 45 | 71 | 52 |
| Wind (mph) | 3 | 3 | 1 |
| Soybean | | | |
| stage | seeded | R2 | R3 |
| height (inches) | 0 | 15 | 20 |
| Wild proso millet | | | |
| weed density | -- | moderate | moderate |
| height (inch) | -- | 7 | 14 |
| Common lambsquarters | | | |
| weed density | -- | moderate | moderate |
| height (inch) | -- | 2 | 4 |
| Rainfall after application (inch) | | | |
| week 1 | 1.30 | 0.75 | 0.69 |
| week 2 | 4.32 | 0.69 | 0.62 |
| week 3 | 3.19 | 0.62 | 1.63 |

Significant differences in crop response were measured, with greater injury (soybean stunting) observed when Harmony GT and clethodim, as V-10137 or Select 2EC, were tank mixed, as opposed to being applied separately as POST I and POST II treatments (less stunting). The combination of V-10137 and Harmony GT also produced a higher percentage of crop response than the combination of clethodim as Select 2EC, and Harmony GT with similar additives. V-10137, applied at 0.125 lb/A at POST I with NIS + AMS resulted in greater soybean injury than when applied at the lower rate of 0.094 lb/A at POST I with NIS + AMS, 27% and 21%, respectively, August 6 rating. POST II applications of V-10137 provided less control of wild proso millet than POST I applications tank mixed with Harmony GT. Sequential postemergence applications of Harmony GT and V-10137 with similar additives resulted in similar control of common lambsquarters as tank mixed postemergence applications. (University of Minnesota Extension Service, Regional Center, Rochester, MN)

Table. Performance of clethodim formulations, V-10137 and Select 2EC, in combination with Harmony GT for wild proso millet and common lambsquarters control in soybean on July 30, August 6, and August 17 at Potsdam, MN in 2004. (Breitenbach, Behnken, Lewis, and Griffin).

| Treatment | Rate | Injury/Stunting | | Wild proso Millet control | | | Common lambsquarters control | | |
|----------------------------------------------------------|-------------------------------------------------------------------|-----------------|------|---------------------------|------|------|------------------------------|------|------|
| | | 7/30 | 8/06 | 7/30 | 8/06 | 8/17 | 7/30 | 8/06 | 8/17 |
| | (rate/A) | (%) | | (%) | | | (%) | | |
| Preemergence | | | | | | | | | |
| FirstRate | 0.6 oz | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Preemergence / Postemergence I | | | | | | | | | |
| FirstRate / V-10137 + Harmony GT + NIS + AMS | 0.6 oz / 16 oz + 0.83 oz + 0.25 % v/v + 2 lbs | 25 | 27 | 96 | 95 | 97 | 62 | 87 | 91 |
| FirstRate / V-10137+ Harmony GT + COC + AMS | 0.6 oz / 16 oz + 0.83 oz + 0.5 % v/v + 2 lbs | 25 | 26 | 97 | 98 | 98 | 56 | 84 | 81 |
| FirstRate / Select 2EC + Harmony GT + COC + AMS | 0.6 oz / 8 oz + 0.83 oz + 0.5 % v/v + 2 lbs | 20 | 21 | 97 | 98 | 98 | 59 | 84 | 91 |
| FirstRate / V-10137 + Harmony GT + NIS + AMS | 0.6 oz / 12 oz + 0.83 oz + 0.25 % v/v + 2 lbs | 23 | 21 | 95 | 95 | 99 | 53 | 84 | 85 |
| FirstRate / V-10137 + Harmony GT + COC + AMS | 0.6 oz / 12 oz + 0.83 oz + 0.5 % v/v + 2 lbs | 24 | 26 | 96 | 96 | 97 | 60 | 85 | 86 |
| Preemergence / Postemergence I / Postemergence II | | | | | | | | | |
| FirstRate / Harmony GT + NIS + AMS / V-10137 + COC + AMS | 0.6 oz / 0.83 oz + 0.25 % v/v + 2 lbs / 16 oz + 0.5 % v/v + 2 lbs | 15 | 12 | 0 | 82 | 85 | 50 | 83 | 83 |
| FirstRate / Harmony GT + COC + AMS / V-10137 + COC + AMS | 0.6 oz / 0.83 oz + 0.5 % v/v + 2 lbs / 16 oz + 0.5 % v/v + 2 lbs | 15 | 15 | 0 | 84 | 91 | 50 | 81 | 79 |
| Untreated Check | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| LSD (0.05) | | 4 | 3 | 1 | 4 | 3 | 4 | 5 | 9 |

NIS = AGRI-DEX nonionic surfactant, Helena; AMS = spray grade ammonium sulfate, Helena; COC = crop oil concentrate, Helena.

Evaluation of the performance of clethodim formulations, V-10137 and Select 2EC, for woolly cupgrass control in soybean at Rochester, MN in 2004.

Breitenbach, Fritz R., Lisa M. Behnken, Kevin R. Griffin, and Kira L. Stearns.

The objective of this trial was to evaluate the performance of clethodim formulations, V-10137 and Select 2EC, for woolly cupgrass control in soybean in southeastern Minnesota. The research site was a Lawler loam series containing 3.9% organic matter with a pH of 6.3 and soil test P and K levels of 52 ppm and 198 ppm, respectively. The previous crop was corn. The field was chisel plowed in the fall and spring disked. The area was fertilized with Ag-lime in the spring at a rate of 3 T/A and field cultivated once prior to planting. The soybean variety, NK S15-B1, was planted on June 7, 2004 at a depth of 1.5 inches in 30-inch rows at 150,000 seeds/A. A randomized complete block design with four replications was used. Preemergence (PRE) and postemergence (POST) treatments were applied with a tractor-mounted sprayer, delivering 20 gpa at 32 psi using Turbo Tee 11002 nozzles. Evaluations of the plots were taken on July 30, August 6, and August 13. Application dates, environmental conditions, and crop and weed stages are listed below.

| Date | June 8 | July 20 |
|-----------------------------------|--------|----------|
| Treatment | PRE | POST |
| Temperature (F) | | |
| air | 78 | 82 |
| Relative humidity (%) | 69 | 71 |
| Wind (mph) | 14 | 6 |
| Soybean | | |
| stage | seeded | R2 |
| height (inches) | 0 | 15 |
| Woolly cupgrass | | |
| weed density | -- | moderate |
| height (inch) | -- | 13 |
| Rainfall after application (inch) | | |
| week 1 | 5.65 | 0.75 |
| week 2 | 1.92 | 1.11 |
| week 3 | 0.57 | 0.20 |

Clethodim, in the form of V-10137, provided similar woolly cupgrass control to clethodim, in the Select 2EC formulation, when tank mixed with NIS and AMS. V-10137 tank mixed with crop oil concentrate and AMS offered faster burn-down and better control of woolly cupgrass than V-10137 tank mixed with NIS and AMS, and Select 2EC tank mixed with NIS and AMS as shown in the July 30 ratings. V-10137 tank mixed with crop oil concentrate and AMS offered better weed control compared to when tank mixed with NIS and AMS on the August 6 rating date. No differences were observed among the clethodim treatments on the August 13 rating date. (University of Minnesota Extension Service, Regional Center, Rochester, MN)

Table. Performance of clethodim formulations, V-10137 and Select 2EC, for woolly cupgrass control in soybean on July 30, August 6, and August 13 at Rochester, MN in 2004. (Breitenbach, Behnken, Griffin and Stearns).

| Treatment | Rate | Injury | | | Woolly cupgrass control | | |
|---------------------------------------|---------------------------------------|--------|-----|------|-------------------------|-----|------|
| | | 7/30 | 8/6 | 8/13 | 7/30 | 8/6 | 8/13 |
| | (rate/A) | (%) | | | (%) | | |
| Preemergence | | | | | | | |
| FirstRate | 0.3 oz | 0 | 0 | 0 | 0 | 0 | 0 |
| Preemergence / Postemergence I | | | | | | | |
| FirstRate / V10137+ NIS + AMS | 0.3 oz / 16 oz + 0.25 % v/v + 2.5 lbs | 0 | 0 | 0 | 68 | 89 | 90 |
| FirstRate / V10137 + COC + AMS | 0.3 oz / 16 oz + 1 % v/v + 2.5 lbs | 0 | 0 | 0 | 73 | 93 | 92 |
| FirstRate / Select 2EC + NIS + AMS | 0.3 oz / 8 oz + 0.25 % v/v + 2.5 lbs | 0 | 0 | 0 | 67 | 92 | 88 |
| LSD (0.10) | | 0 | 0 | 0 | 4 | 3 | 5 |

NIS = AGRI-DEX nonionic surfactant, Helena; AMS = spray grade ammonium sulfate, Helena; and COC = crop oil concentrate, Helena.

Weed emergence patterns and the effect of time of weed removal on soybean yield at Rochester, MN in 2004.

Breitenbach, Fritz R., Lisa M. Behnken, Thomas R. Hoverstad and Jeffrey L. Gunsolus.

The objective of this trail was to evaluate the effect of time of weed removal on soybean yield in southeastern Minnesota. The research site was a Lawler loam series containing 2.5% organic matter with a pH of 6.1 and soil test P and K levels of 42 ppm and 135 ppm respectively. The area was fertilized with 3 T/A of lime in the spring. The previous crop was corn. The field was disked and field cultivated once prior to planting. The soybean variety, Pioneer 92-MOO, was planted on May 28, 2004 at a depth of 1.5 inches in 30-inch rows at 150,000 seeds/A. A randomized complete block design with four replications was used. Preemergence (PRE) and postemergence (POST I, II, III, IV, V, and VI) treatments were applied with a tractor-mounted sprayer, delivering 20 gpa at 32 psi using Turbo Tee 11002 nozzles. Application dates, environmental conditions, and crop and weed stages are listed below.

| Date | May 26 | June 21 | June 28 | July 2 | July 8 | July 14 | July 19 |
|-----------------------------------|----------|----------|----------|----------|----------|----------|----------|
| Treatment | PRE | POST I | POST II | POST III | POST IV | POST V | POST VI |
| Temperature (F) | | | | | | | |
| air | 57 | 72 | 70 | 74 | 73 | 72 | 79 |
| Relative humidity (%) | 64 | 57 | 51 | 78 | 48 | 68 | 71 |
| Wind (mph) | 13 | 8 | 9 | 10 | 7 | 12 | 7 |
| Soil moisture | adequate | adequate | adequate | adequate | adequate | adequate | adequate |
| Soybean | | | | | | | |
| stage | -- | V1 | V2 | V3 | V4 | V5 | R1 |
| height (inches) | -- | 4.7 | 6.7 | 8.0 | 12.5 | 18.0 | 22.0 |
| Giant ragweed | | | | | | | |
| weed density/ft ² | -- | 1.1 | 0.8 | moderate | moderate | moderate | moderate |
| height (inch) | -- | 2.8 | 5.4 | 7.6 | 12.0 | 26.0 | 8.0 |
| Common lambsquarters | | | | | | | |
| weed density/ft ² | -- | 2.1 | 1.7 | light | light | light | light |
| height (inch) | -- | 0.6 | 0.75 | 1.8 | 4.0 | 3.0 | 0.25 |
| Common waterhemp | | | | | | | |
| weed density/ft ² | -- | 4.6 | 4.8 | moderate | moderate | moderate | moderate |
| height (inch) | -- | 1.0 | 1.0 | 2.0 | 6.0 | 12.0 | 0.25 |
| Giant foxtail | | | | | | | |
| weed density/ft ² | -- | 8.8 | 6.3 | moderate | moderate | moderate | Moderate |
| height (inch) | -- | 1.0 | 2.7 | 2.7 | 12.0 | 16.0 | 2.0 |
| Rainfall after application (inch) | | | | | | | |
| week 1 | 1.31 | 0.63 | 0.16 | 1.73 | 0.92 | 0.60 | 0.60 |
| week 2 | 0.20 | 0.16 | 2.82 | 0.92 | 0.60 | 0 | 1.36 |
| week 3 | 5.46 | 2.82 | 0.23 | 0.60 | 1.00 | 2.09 | 0.81 |

Different weeds emerge at different times during the growing season. If left uncontrolled, weeds emerging before or with the crop are more competitive than weeds that emerge after crop emergence. The preemergence application of Boundary at 1.25 pt/A was not enough to maximize yield, 28.3 bu/A. At this location, Touchdown Total applied alone and following Boundary performed well at POST I, II, III and IV (1, 3, 5 and 7 inch weeds) or when applied as a sequential application at POST II and VI.

In the combined location study from Lamberton, Morris, Rochester, Waseca, Luverne, and Potsdam, the results indicate that a one-pass Touchdown Total application at 5 inch weeds (POST III) could maximize yield. If the application of Touchdown Total was made too early,

soybean yield was reduced. The preemergence application Boundary followed by POST III application of Touchdown Total also provided good results. Two pass Touchdown Total at POST II and POST V also provided an effective weed control program. This data is presented in the next report. (University of Minnesota Extension Service, Regional Center, Rochester, MN)

Table. Effect of time of weed removal on soybean yield at Rochester, MN in 2004 (Breitenbach, Behnken, Hoverstad and Gunsolus).

| Treatment number | Treatment | Rate | Soybean yield (bu/A) |
|------------------|------------------------------------------------------------------------------------------------------|------------------------------------|----------------------|
| 11 | PRE Boundary | 1.25 pt | 28.3 |
| 1 | PRE / POST I (1" weeds) Boundary / Touchdown Total + AMS | 1.25 pt / 24 oz + 2.5 lb | 42.2 |
| 2 | POST I (1" weeds) Touchdown Total + AMS | 24 oz + 2.5 lb | 42.1 |
| 3 | PRE / POST II (3" weeds) Boundary / Touchdown Total + AMS | 1.25 pt / 24 oz + 2.5 lb | 41.3 |
| 4 | POST II (3"weeds) Touchdown Total + AMS | 24 oz + 2.5 lb | 42.6 |
| 5 | PRE / POST III (5"weeds) Boundary / Touchdown Total + AMS | 1.25 pt / 24 oz + 2.5 lb | 39.6 |
| 6 | POST III (5"weeds) Touchdown Total + AMS | 24 oz + 2.5 lb | 40.9 |
| 7 | PRE / POST IV (7"weeds) Boundary / Touchdown Total + AMS | 1.25 pt / 24 oz + 2.5 lb | 40.8 |
| 8 | POST IV (7"weeds) Touchdown Total + AMS | 24 oz + 2.5 lb | 41.2 |
| 9 | PRE / POST V (9"weeds) Boundary / Touchdown Total + AMS | 1.25 pt / 24 oz + 2.5 lb | 38.4 |
| 10 | POST V (9"weeds) Touchdown Total + AMS | 24 oz + 2.5 lb | 39.1 |
| 12 | POST II / POST V (3" weeds / 3" regrowth) Touchdown Total + AMS / Touchdown Total + AMS | 24 oz + 2.5 lb / 24 oz + 2.5 lb | 40.8 |
| | LSD (0.10) | | 3.2 |

Weed emergence patterns and the effect of time of weed removal on soybean yield at Potsdam, MN in 2004.

Breitenbach, Fritz R., Lisa M. Behnken, Thomas R. Hoverstad and Jeffrey L. Gunsolus.

The objective of this trial was to evaluate the effect of time of weed removal on soybean yield in southeastern Minnesota. The research site was a Port Byron silt loam containing 3.2% organic matter with a pH of 6.7 and soil test P and K levels of 66 ppm and 376 ppm respectively. The previous crop was corn. The field was chisel plowed in the fall and disked and field cultivated once prior to planting in the spring. The soybean variety, Pioneer 92-MOO, was planted on May 28, 2004 at a depth of 1.5 inches in 30-inch rows at 150,000 seeds/A. A randomized complete block design with four replications was used. Preemergence (PRE) and postemergence (POST I, II, III, IV, and V) treatments were applied with a tractor-mounted sprayer, delivering 20 gpa at 32 psi using Turbo Tee 11002 nozzles. Application dates, environmental conditions, and crop and weed stages are listed below.

| Date | May 28 | June 25 | July 1 | July 12 | July 19 | July 23 |
|-----------------------------------|--------|---------|---------|----------|----------|----------|
| Treatment | PRE | POST I | POST II | POST III | POST IV | POST V |
| Temperature (F) | | | | | | |
| air | 69 | 67 | 80 | 76 | 82 | 67 |
| Relative humidity (%) | 45 | 43 | 60 | 76 | 69 | 56 |
| Wind (mph) | 3 | 18 | 3 | 9 | 6 | 13 |
| Soybean | | | | | | |
| stage | -- | V1-V2 | V3 | V4 | R2 | R2 |
| height (inches) | -- | 4.5 | 6.0 | 11 | 15 | 19 |
| Giant ragweed | | | | | | |
| weed density/ft ² | -- | 0.2 | 0.7 | moderate | moderate | moderate |
| height (inch) | -- | 2.5 | 5.8 | 10.0 | 22.0 | 30.0 |
| Common lambsquarters | | | | | | |
| weed density/ft ² | -- | 7.4 | 12.7 | moderate | moderate | moderate |
| height (inch) | -- | 0.75 | 2.5 | 1.0 | 5.0 | 9.0 |
| Velvetleaf | | | | | | |
| weed density/ft ² | -- | 6 | 0.9 | light | light | light |
| height (inch) | -- | 1.0 | 0.5 | 1.5 | 2.0 | 2.5 |
| Wild proso millet | | | | | | |
| weed density/ft ² | -- | 4.2 | 6.1 | moderate | moderate | moderate |
| height (inch) | -- | 0.5 | 1.1 | 3.0 | 6.0 | 22 |
| Rainfall after application (inch) | | | | | | |
| week 1 | 1.3 | 0.26 | 1.73 | 0.23 | 1.1 | 0.65 |
| week 2 | 4.32 | 1.73 | 0.92 | 1.1 | 0.54 | 0.58 |
| week 3 | 3.24 | 0.92 | 0.32 | 0.54 | 1.72 | 0.11 |

Different weeds emerge at different times during the growing season. If left uncontrolled, weeds emerging before or with the crop are more competitive than weeds that emerge after crop emergence. The preemergence application of Boundary at 1.25 pt/A was not enough to maximize yield, 33.9 bu/A. Touchdown Total applied alone and following Boundary performed the best when applied at POST I, II and III (1, 3, and 5 inch weeds) or when applied as a sequential application at POST II and V. The exception was Boundary followed by Touchdown Total at POST V.

In the combined location study from Lamberton, Morris, Rochester, Waseca, Luverne, and Potsdam, the results indicate that a one-pass Touchdown Total application at 5 inch weeds (POST III) could maximize yield. If the application of Touchdown Total was made too early, soybean yield was reduced. The preemergence application Boundary followed by POST III

application of Touchdown Total also provided good results. Two pass Touchdown Total at POST II and POST V also provided an effective weed control program. Data from this trial is presented in a following report. (University of Minnesota Extension Service, Regional Center, Rochester, MN)

Table. Effect of time of weed removal on soybean yield at Potsdam, MN in 2004 (Breitenbach, Behnken, Hoverstad and Gunsolus).

| Treatment Number | Treatment | Rate (rate/A) | Soybean yield (bu/A) |
|-------------------|--------------------------------------------------|--------------------------------------|-------------------------|
| | PRE | | |
| 11 | Boundary | 1.25 pt | 33.9 |
| | PRE/POST I (1"weeds) | | |
| 1 | Boundary / Touchdown Total + AMS | 1.25 pt / 24 oz + 2.5 lb | 44.1 |
| | POST I (1"weeds) | | |
| 2 | Touchdown Total + AMS | 24 oz + 2.5 lbs | 46.6 |
| | PRE / POST II (3"weeds) | | |
| 3 | Boundary / Touchdown Total + AMS | 1.25 pt / 24 oz + 2.5 lb | 45.3 |
| | POST II (3"weeds) | | |
| 4 | Touchdown Total + AMS | 24 oz + 2.5 lbs | 45.1 |
| | PRE / POST III (5"weeds) | | |
| 5 | Boundary / Touchdown Total + AMS | 1.25 pt / 24 oz + 2.5 lb | 42.4 |
| | POST III (5"weeds) | | |
| 6 | Touchdown Total + AMS | 24 oz + 2.5 lbs | 43.8 |
| | PRE / POST IV (7"weeds) | | |
| 7 | Boundary / Touchdown Total + AMS | 1.25 pt / 24 oz + 2.5 lb | 39.7 |
| | POST IV (7"weeds) | | |
| 8 | Touchdown Total + AMS | 24 oz + 2.5 lbs | 38.1 |
| | PRE / POST V (9"weeds) | | |
| 9 | Boundary / Touchdown Total + AMS | 1.25 pt / 24 oz + 2.5 lb | 42.1 |
| | POST V (9"weeds) | | |
| 10 | Touchdown Total + AMS | 24 oz + 2.5 lbs | 39.6 |
| | POST II / POST V (3" / 3" regrowth) | | |
| 12 | Touchdown Total + AMS / Touchdown Total + AMS | 24 oz + 2.5 lbs / 24 oz + 2.5 lbs | 45.3 |
| LSD (0.10) | | | 4.8 |

Effect of Time of Weed Removal on Soybean Yield

(multiple locations)

One pass or two? What would a PRE do?

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Weed Emergence Patterns and the Effect of Time of Weed Removal Soybean Yield

- Different weeds emerge at different times during the growing season
- If left uncontrolled, weeds emerging before or with the crop are more competitive than weeds that emerge after crop emergence
- Weed effects on yield will depend upon:
 - Weed species
 - Weed density
 - Environmental conditions
 - Duration of weed/crop competitive period

Question: What effect does time of weed removal have on soybean yield?

Weed Emergence Patterns and the Effect of Time of Weed Removal Soybean Yield

- In 2004, research compared 5 glyphosate timings (1", 3", 5", 7" and 9" weed heights), with and without a ½-rate of a PRE herbicide on crop yield and economic returns
- Studies were conducted six locations for soybean (Lamberton, Morris, Rochester, Waseca, Luvverne, and Potsdam)

Major weeds in soybean at each site:

Lamberton: Yellow foxtail, Common lambsquarters, Redroot pigweed, Wild buckwheat

Morris: Green foxtail, Common lambsquarters, Powell amaranth, Wild mustard

Rochester: Giant foxtail, Giant ragweed, Common waterhemp, Common lambsquarters

Waseca: Giant foxtail, Common ragweed, Common waterhemp, Velvetleaf, Redroot pigweed,

Luverne: Green foxtail, Common lambsquarters, Powell amaranth

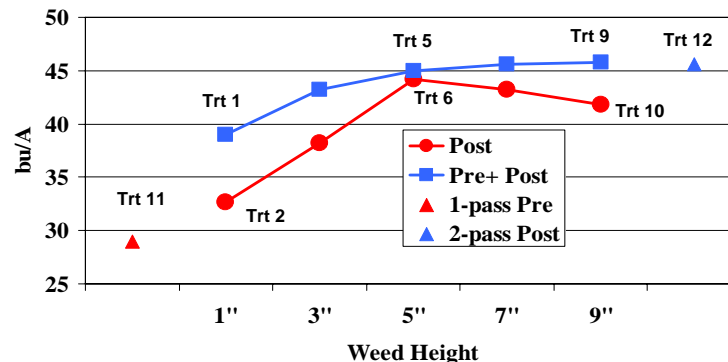
Potsdam: Giant foxtail, Giant ragweed, Common lambsquarters, Velvetleaf

Trial Treatments and Timing

| Trt # | Description | Timing |
|-------|--------------------------------------------------|-----------------------------|
| 1 | Boundary / Touchdown Total + AMS | Pre / 1 "weeds |
| 2 | Touchdown Total + AMS | 1" weeds |
| 3 | Boundary / Touchdown Total + AMS | Pre / 3 "weeds |
| 4 | Touchdown Total + AMS | 3" weeds |
| 5 | Boundary / Touchdown Total + AMS | Pre / 5 "weeds |
| 6 | Touchdown Total + AMS | 5" weeds |
| 7 | Boundary / Touchdown Total + AMS | Pre / 7 "weeds |
| 8 | Touchdown Total + AMS | 7" weeds |
| 9 | Boundary / Touchdown Total + AMS | Pre / 9 "weeds |
| 10 | Touchdown Total + AMS | 9" weeds |
| 11 | Boundary | Pre |
| 12 | Touchdown Total + AMS / Touchdown Total + AMS | 3" weeds / 2-4" regrowth |

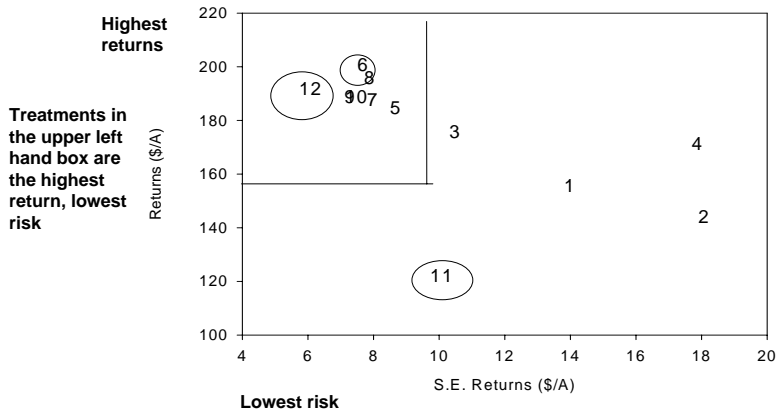
Boundary at 1.25 pt/A
Touchdown Total at 24 oz/A + AMS at 2.5 lb/A

Glyphosate Timing and Soybean Yield Across Locations, 2004



Trt 5 – Boundary (1.5 pt./A) / Touchdown Total (24 oz/A) + AMS at 5 inch weeds
 Trt 6 – Touchdown Total (24 oz/A) + AMS at 5 inch weeds
 Trt 11 – Boundary PRE
 Trt 12 – Touchdown Total + AMS / Touchdown Total + AMS at 3"/ 2-4" regrowth

Mean returns vs. standard error of mean returns for soybean treatments across locations, 2004



Trt 5 – Boundary (1.5 pt./A) / Touchdown Total (24 oz/A) + AMS at 5 inch weeds
 Trt 6 – Touchdown Total (24 oz/A) + AMS at 5 inch weeds
 Trt 11 – Boundary PRE
 Trt 12 – Touchdown Total + AMS / Touchdown Total + AMS at 3"/ 2-4" regrowth

2004 Summary over All Locations

Under Cool & Wet Conditions:

Soybean

One-pass glyphosate (5 inch weeds) could maximize yield and return. (Treatment 6)

The application of glyphosate too early (less than 5 inch weeds) reduced crop yield and economic return.

PRE/POST applications (5 inch weeds or larger) provided good economic returns.

Two pass glyphosate system is very effective and risk efficient.

Evaluation of herbicide combinations for weed control in soybean at Potsdam, MN in of 2004.

Behnken, Lisa, M., Fritz, R. Breitenbach, Thomas R. Hoverstad, and Jeffrey L. Gunsolus.

The objective of this trial was to evaluate herbicide combinations for weed control in soybean in southeastern Minnesota. The research site was a Port Byron silt loam containing 3.2% organic matter with a pH of 6.7 and soil test P and K levels of 66 ppm and 376 ppm, respectively. The previous crop was corn. The field was disked and field cultivated once prior to planting. The soybean variety, Pioneer 92-M00, was planted on May 28, 2004 at a depth of 1.5 inches in 30-inch rows at 150,000 seeds/A. A randomized complete block design with four replications was used. Preplant incorporated (PPI), preemergence (PRE), and postemergence (POST I, II, and III) treatments were applied with a tractor-mounted sprayer, delivering 20 gpa at 32 psi using Turbo Tee 11002 nozzles. Evaluations of the plots were taken on July 1, July 20, and October 4, 2004. Application dates, environmental conditions, and crop and weed stages are listed below.

| Date | May 28 | May 28 | July 1 | July 14 | July 23 |
|-----------------------------------|--------|--------|----------|----------|----------|
| Treatment | PPI | PRE | POST I | POST II | POST III |
| Temperature (F) | | | | | |
| air | 60 | 69 | 77 | 78 | 67 |
| Relative humidity (%) | 61 | 45 | 64 | 53 | 56 |
| Wind (mph) | 5 | 9 | 0 | 12 | 13 |
| Soybean | | | | | |
| stage | -- | seeded | V3 | R1 | R2 |
| height (inches) | -- | -- | 6 | 14.5 | 19 |
| Giant ragweed | | | | | |
| weed density | -- | -- | moderate | moderate | moderate |
| height (inch) | -- | -- | 6 | 20 | 30 |
| Common lambsquarters | | | | | |
| weed density | -- | -- | moderate | moderate | moderate |
| height (inch) | -- | -- | 3 | 8 | 9 |
| Wild proso millet | | | | | |
| weed density | -- | -- | moderate | moderate | moderate |
| height (inch) | -- | -- | 1 | 14 | 22 |
| Rainfall after application (inch) | | | | | |
| week 1 | 1.30 | 1.30 | 2.08 | 1.85 | 0.65 |
| week 2 | 4.32 | 4.32 | 0.93 | 0.63 | 0.58 |
| week 3 | 3.19 | 3.19 | 0.19 | 0.38 | 0.11 |

Several herbicide treatments caused up to 26% injury to soybean. Pendimax / FirstRate + Select + Cobra caused 26% injury to soybean and Valor SX + FirstRate / Phoenix + V-10137 caused 20%. Weed control ratings were generally good with these two treatments however, yields may have been impacted by injury, especially the Pendimax / FirstRate + Select + Cobra which yielded only 27 bushels. Soybeans were chlorotic (July 1 rating) in plots with Pursuit Plus applied PPI.

All sequential and postemergence only herbicide programs provided over 90% control of wild proso millet by July 20 and October 4 ratings. The preemergence only program of Pendimax + Gangster V + Gangster FR provided only 73% to 79% control during the same rating dates, respectively.

Common lambsquarters control was over 95% with most herbicide programs by October 4 rating. Pendimax followed by FirstRate + Select + Cobra provided only 87% control and Flexstar + Fusion + FirstRate gave only 85% control.

Giant ragweed control was very good to excellent for all but one herbicide program by the July 20 and October 4 ratings. However, only five herbicide programs gave season long control, with only three of these providing over 90% control at the July 1 rating.

A comparison of three glyphosate products revealed that there were no differences in weed control or yield. (University of Minnesota Extension Service, Regional Center, Rochester, MN)

Table. Performance of herbicide combinations for weed control in soybean on July 1, July 20, and October 4 at Potsdam, MN in 2004 (Behnken, Breitenbach, Hoverstad and Gunsolus).

| Treatment | Rate | Giant ragweed control | | | Common lambsquarters control | | | Wild proso millet control | | | Soybean injury | Soybean yield |
|------------------------------------------------------------|----------------------------------------------------|-----------------------|------|------|------------------------------|------|------|---------------------------|------|------|----------------|---------------|
| | | 7/1 | 7/20 | 10/4 | 7/1 | 7/20 | 10/4 | 7/1 | 7/20 | 10/4 | | |
| | (rate/A) | 7/1 7/20 10/4 (%) | | | 7/1 7/20 10/4 (%) | | | 7/1 7/20 10/4 (%) | | | 7/20 (%) | (bu/A) |
| PRE | | | | | | | | | | | | |
| Pendimax + Gangster V + Gangster FR | 3 pts + 3 oz + 0.6 oz | 92 | 91 | 95 | 99 | 96 | 98 | 87 | 73 | 79 | 0 | 33 |
| PPI / POST I | | | | | | | | | | | | |
| Prowl H ₂ O / Raptor + Ultra Blazer + NIS + AMS | 43 oz / 4 oz + 8 oz + 0.25 % v/v + 2.5 lbs | 0 | 92 | 88 | 63 | 93 | 96 | 70 | 92 | 93 | 19 | 34 |
| Pursuit Plus / Rezult B + Rezult G + NIS + AMS | 2.5 pts / 1.6 pts + 1.6 pts + 0.25 % v/v + 2.5 lbs | 75 | 93 | 91 | 96 | 95 | 97 | 87 | 93 | 98 | 8 | 36 |
| Prowl H ₂ O / Extreme+ NIS + AMS | 43 oz / 3 pts + 0.125 % v/v + 2.5 lbs | 0 | 98 | 99 | 65 | 99 | 99 | 76 | 98 | 99 | 6 | 36 |
| PRE / POST I | | | | | | | | | | | | |
| Valor SX + FirstRate / Phoenix + V-10137 + AMS | 3 oz + 0.6 oz / 10 oz + 16 oz + 2 lbs | 96 | 99 | 96 | 98 | 98 | 98 | 92 | 98 | 99 | 20 | 35 |
| Pendimax / FirstRate + Select + Cobra + COC + AMS | 3 pts / 0.3 oz + 8 oz + 6 oz + 1 % v/v + 2.5 lbs | 0 | 89 | 90 | 86 | 85 | 87 | 85 | 97 | 96 | 26 | 27 |
| Boundary/ Flexstar+ Fusion + COC + AMS | 1.5 pts / 16 oz + 8 oz + 1 % v/v + 2.5 lbs | 0 | 94 | 92 | 100 | 98 | 99 | 90 | 99 | 100 | 13 | 38 |
| Authority / Flexstar+ Assure II+ COC + AMS | 5.3 oz / 16 oz + 9 oz + 1 % v/v + 2.5 lbs | 0 | 100 | 96 | 100 | 100 | 100 | 85 | 99 | 100 | 11 | 38 |
| PRE / POST II | | | | | | | | | | | | |
| IntRRo / Roundup WeatherMax + AMS | 2 qts / 22 oz + 2.5 lbs | 0 | 90 | 100 | 64 | 99 | 99 | 83 | 99 | 100 | 0 | 39 |
| Prowl H ₂ O + Outlook/ Roundup WeatherMax + AMS | 1 pt + 12.6 oz / 22 oz + 2.5 lbs | 0 | 90 | 100 | 76 | 99 | 100 | 86 | 99 | 100 | 0 | 38 |
| Gangster V + Gangster FR / Roundup WeatherMax + AMS | 1.5 oz + 0.3 oz / 22 oz + 2.5 lbs | 95 | 97 | 100 | 95 | 100 | 100 | 81 | 100 | 100 | 0 | 44 |
| Boundary/ Touchdown Total + AMS | 1.25 pts / 24 oz + 2.5 lbs | 0 | 90 | 97 | 81 | 100 | 99 | 83 | 100 | 100 | 0 | 41 |
| Valor SX / Roundup WeatherMax + AMS | 2 oz / 22 oz + 2.5 lbs | 0 | 90 | 100 | 83 | 100 | 100 | 75 | 100 | 100 | 0 | 39 |
| Valor SX + Python / Roundup WeatherMax + AMS | 1.5 oz + 0.5 oz / 22 oz + 2.5 lbs | 55 | 91 | 99 | 100 | 99 | 100 | 77 | 99 | 100 | 0 | 41 |
| Authority / Roundup WeatherMax + AMS | 4 oz / 22 oz + 2.5 lbs | 0 | 90 | 97 | 100 | 99 | 100 | 76 | 99 | 100 | 0 | 39 |
| POST I | | | | | | | | | | | | |
| Flexstar+ Fusion + Harmony GT + COC + AMS | 16 oz + 10 oz + 0.04 oz + 1 % v/v + 2.5 lbs | 0 | 95 | 93 | 0 | 94 | 93 | 0 | 96 | 100 | 16 | 35 |
| Flexstar+ Fusion + FirstRate + COC + AMS | 16 oz + 10 oz + 0.3 oz + 1 % v/v + 2.5 lbs | 0 | 100 | 99 | 0 | 68 | 85 | 0 | 97 | 97 | 11 | 37 |
| POST I / POST III | | | | | | | | | | | | |
| Roundup WeatherMax + AMS / Roundup WeatherMax + AMS | 22 oz + 2.5 lbs / 22 oz + 2.5 lbs | 0 | 100 | 100 | 0 | 95 | 100 | 0 | 96 | 100 | 0 | 43 |
| POST II | | | | | | | | | | | | |
| GF 1279 + FirstRate + AMS | 24 oz + 0.3 oz + 2.5 lbs | 0 | 90 | 100 | 0 | 99 | 99 | 0 | 99 | 100 | 0 | 42 |
| ClearOut 41 Plus + AMS | 32 oz + 2.5 lbs | 0 | 90 | 97 | 0 | 99 | 99 | 0 | 99 | 100 | 0 | 43 |
| GF 1279 + AMS | 24 oz + 2.5 lbs | 0 | 90 | 99 | 0 | 99 | 99 | 0 | 99 | 100 | 0 | 40 |
| Roundup WeatherMax + AMS | 22 oz + 2.5 lbs | 0 | 90 | 97 | 0 | 99 | 100 | 0 | 99 | 100 | 0 | 41 |
| Weedy | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 13 |
| Weed-Free | | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 0 | 41 |
| LSD (0.05) | | 4 | 6 | 6 | 8 | 4 | 3 | 9 | 3 | 5 | 2 | 6 |

NIS = AGRI-DEX nonionic surfactant, Helena, AMS = spray grade ammonium sulfate, Helena; and COC = crop oil concentrate, Helena.

2004 Soybean Herbicide Evaluation (Rochester, Lamberton, and Waseca Results)

Hoverstad, Thomas R., Fritz R. Breitenbach, Jodie K. Getting, and Jeff L. Gunsolus

| Herbicide | Rate (product / A) | Giant foxtail | Yellow foxtail | Wild proso millet | Common lambsquarters | Redroot pigweed | Common ragweed | Giant ragweed | Velvetleaf | Tall waterhemp | Yield | Cost | Returns | |
|------------------------------------------------------|------------------------------------------------------|----------------------------------------------|-------------------|----------------------|-------------------------|--------------------|-------------------|------------------|------------|-------------------|--------|------------------|---------|-----|
| | | Number of locations | | | | | | | | | | 6 | 6 | |
| | | 4 | 1 | 1 | 5 | 3 | 2 | 2 | 2 | 1 | (bu/A) | -----(\$/A)----- | | |
| <u>Preemergence</u> | | | | | | | | | | | | | | |
| 1 | Pendimax + Gangster | 3 pt + 3.6 oz | 83 | 78 | 79 | 98 | 98 | 96 | 95 | 99 | 73 | 46.4 | 32.30 | 187 |
| <u>Preplant incorporate 2X/POST I (4-inch weeds)</u> | | | | | | | | | | | | | | |
| 2 | Prowl H2O / Raptor + UltraBlazer + NIS + AMS | 43 oz / 4 oz + 8 oz + 0.25% + 2.5 lb | 83 | 93 | 93 | 99 | 86 | 30 | 54 | 99 | 99 | 24.2 | 44.52 | 104 |
| 3 | Pusuit Plus / Rezult B + Rezult G + NIS + AMS | 2.5 pt / 1.6 pt + 1.6 + 0.25% + 2.5 lb | 99 | 97 | 98 | 98 | 96 | 24 | 59 | 99 | 61 | 30.2 | 38.11 | 134 |
| 4 | Prowl H2O / Extreme + NIS + AMS | 43 oz / 3 pt + 0.125% + 2.5 lb | 99 | 97 | 99 | 98 | 98 | 92 | 97 | 99 | 99 | 46.2 | 32.91 | 192 |
| <u>Preemergence/POST I (4-inch weeds)</u> | | | | | | | | | | | | | | |
| 5 | Valor SX / FirstRate + Phoenix + V10137 + AMS | 3 oz / 0.6 oz + 10 oz + 16 oz + 2 lb | 97 | 93 | 99 | 99 | 100 | 99 | 91 | 99 | 99 | 45.9 | - | |
| 6 | Pemdimax / FirstRate + Select + Cobra + COC + AMS | 3 pt / 0.3 oz + 8 oz + 6 oz + 1% + 2.5 lb | 98 | 94 | 96 | 93 | 78 | 94 | 82 | 99 | 99 | 43.4 | 45.76 | 161 |
| 7 | Boundary / Flexstar + Fusion + COC + AMS | 1.5 pt / 16 oz + 8 oz + 1% + 2.5 lb | 95 | 96 | 100 | 99 | 100 | 97 | 86 | 99 | 97 | 44.9 | 48.39 | 174 |
| 8 | Authority / Flexstar + Assure + COC + AMS | 5.3 oz / 16 oz + 9 oz + 1% + 2.5 lb | 97 | 96 | 100 | 99 | 99 | 98 | 79 | 99 | 99 | 42.3 | 42.20 | 173 |
| <u>Preemergence/POST I (6-inch weeds)</u> | | | | | | | | | | | | | | |
| 9 | InRRo / Roundup WeatherMax + AMS | 4 pt / 22 oz + 2.5 lb | 98 | 97 | 100 | 99 | 97 | 97 | 98 | 99 | 99 | 49.0 | 38.98 | 200 |
| 10 | Prowl H2O + Outlook / Roundup WeatherMax | 1 pt + 12.6 oz / 22 oz + 2.5 lb | 98 | 97 | 100 | 99 | 98 | 90 | 98 | 99 | 96 | 50.3 | 47.25 | 193 |
| 11 | Gangster/ Roundup WeatherMax + AMS | 1.8 oz / 22 oz + 2.5 lb | 97 | 95 | 100 | 99 | 99 | 99 | 100 | 99 | 99 | 53.3 | 38.79 | 218 |
| 12 | Boundary / Touchdown Total + AMS | 1.25 pt / 24 oz + 2.5 lb | 99 | 97 | 100 | 99 | 94 | 95 | 98 | 99 | 98 | 53.3 | 41.69 | 212 |

Table continued. 2004 Soybean Herbicide Evaluation (Rochester, Lambertton, and Waseca Results)

| Herbicide | Rate (product / A) | Giant foxtail | Yellow foxtail | Wild proso millet | Common lambsquarters | Redroot pigweed | Common ragweed | Giant ragweed | Velvetleaf | Tall waterhemp | Yield | Cost | Returns | |
|------------------------------------------------------|------------------------------------------------------|------------------------------------------|-------------------|----------------------|-------------------------|--------------------|-------------------|------------------|------------|-------------------|-------|--------|----------------|-----|
| | | Number of locations | | | | | | | | | | 6 | 6 | |
| | | 4 | 1 | 1 | 5 | 3 | 2 | 2 | 2 | 1 | 6 | | | |
| | | ----- (% control) ----- | | | | | | | | | | (bu/A) | ----(\$/A)---- | |
| <u>Preemergence/POST I (6-inch weeds) continued.</u> | | | | | | | | | | | | | | |
| 13 | Valor SX / Roundup WeatherMax + AMS | 2 oz / 22 oz+2.5 lb | 97 | 97 | 100 | 99 | 97 | 99 | 96 | 99 | 99 | 51.7 | 36.83 | 211 |
| 14 | Valor SX + Python / Roundup WeatherMax + AMS | 1.5 oz + 0.5 oz / 22 oz + 2.5 lb | 97 | 98 | 100 | 99 | 100 | 97 | 99 | 99 | 93 | 53.6 | 39.64 | 216 |
| 15 | Authority / Roundup WeatherMax + AMS | 4 oz / 22 oz+2.5 lb | 98 | 98 | 100 | 99 | 100 | 91 | 96 | 99 | 99 | 49.9 | 35.52 | 205 |
| <u>POST I (4-inch weeds)</u> | | | | | | | | | | | | | | |
| 16 | Flexstar + Fusion + HarmonyGT + COC + AMS | 16 oz + 10 oz + 0.04 oz + 1% + 2.5 lb | 85 | 95 | 100 | 92 | 89 | 88 | 68 | 99 | 85 | 34.5 | 31.29 | 155 |
| 17 | Flexstar + Fusion + FirstRate + COC + AMS | 16 oz + 10 oz + 0.3 oz + 1% + 2.5 lb | 87 | 94 | 97 | 65 | 79 | 88 | 94 | 99 | 67 | 38.6 | 38.79 | 163 |
| <u>POST I (4-inch weeds)/POST III (Canopy)</u> | | | | | | | | | | | | | | |
| 18 | Roundup WeatherMax + AMS/ Roundup Weather Max+AMS | 22 oz + 2.5 lb / 22 oz + 2.5 lb | 99 | 97 | 100 | 97 | 94 | 99 | 100 | 99 | 99 | 47.9 | 39.98 | 196 |
| <u>POST II (6-inch weeds)</u> | | | | | | | | | | | | | | |
| 19 | GF 1279 + FirstRate + AMS | 24 oz + 0.3 oz + 2.5 lb | 99 | 98 | 100 | 95 | 97 | 97 | 96 | 99 | 99 | 46.9 | - | |
| 20 | Clearout 41Plus + AMS | 32 oz + 2.5 lb | 99 | 97 | 100 | 96 | 92 | 94 | 95 | 99 | 96 | 46.3 | 18.16 | 213 |
| 21 | GF 1279 + AMS | 24 oz + 2.5 lb | 99 | 97 | 100 | 95 | 78 | 93 | 96 | 99 | 99 | 46.9 | - | |
| 22 | Roundup WeatherMax + AMS | 22 oz + 2.5 lb | 99 | 97 | 100 | 98 | 83 | 95 | 95 | 99 | 99 | 46.0 | 23.99 | 205 |
| <u>Checks</u> | | | | | | | | | | | | | | |
| 23 | Weedy | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8.3 | 0.00 | 40 |
| 24 | Hand-Weeded | - | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 52.0 | 0.00 | 249 |
| LSD(0.10) | | | 3 | 3 | 4 | 4 | 12 | 8 | 9 | 12 | 12 | 3.0 | | 11 |

Soybean Price = \$4.91
(Waseca Co. 2004 Loan Rate)

2004 Soybean Herbicide Evaluation (Rochester)

| Herbicide | Rate (pt/A) | Wild Proso Millet ----- | Common Lambs. (% control) | Velvetleaf | Giant ragweed ----- | Yield (bu/A) | Cost ----- | Income Over Herb (\$/A) ----- |
|------------------------------------------------------|-------------------------------------------|-------------------------------|---------------------------------|------------|---------------------------|-----------------|---------------|-------------------------------------|
| <u>Preemergence</u> | | | | | | | | |
| 1 Pendimax + Gangster | 3 +3.6 oz | 79 | 98 | 100 | 95 | 33.4 | 32.30 | 132 |
| <u>Preplant incorporate 2X/POST I (4-inch weeds)</u> | | | | | | | | |
| 2 Prowl H2O / Raptor + UltraBlazer + NIS + AMS | 43 oz / 4 oz + 8 oz + 0.25% + 2.5 lb | 93 | 96 | 100 | 88 | 29.1 | 44.52 | 98 |
| 3 Pusuit Plus / Rezult B + Rezult G + NIS + AMS | 2.5 / 1.6 + 1.6 + 0.25% + 2.5 lb | 98 | 97 | 100 | 91 | 36.0 | 38.11 | 139 |
| 4 Prowl H2O / Extreme + NIS + AMS | 43oz / 3 pt + 0.125% + 2.5 lb | 99 | 99 | 100 | 99 | 35.8 | 32.91 | 143 |
| <u>Preemergence/ POST I (4-inch weeds)</u> | | | | | | | | |
| 5 Valor SX / FirstRate + Phoenix + V10137 + AMS | 3 oz / 0.6 oz + 10 oz + 16 oz + 2 lb | 99 | 98 | 100 | 96 | 34.8 | - | - |
| 6 Pemdimax / FirstRate + Select + Cobra + COC + AMS | 3 / 0.3 oz + 8 oz + 6 oz + 1% + 2.5 lb | 96 | 87 | 100 | 90 | 26.5 | 45.76 | 85 |
| 7 Boundary / Flexstar + Fusion + COC + AMS | 1.5 pt / 16 oz + 8 oz + 1% + 2.5 lb | 100 | 99 | 100 | 92 | 37.5 | 48.39 | 136 |
| 8 Authority / Flexstar + Assure + COC + AMS | 5.3 oz / 16 oz + 9 oz + 1% + 2.5 lb | 100 | 100 | 100 | 96 | 38.4 | 42.20 | 146 |
| <u>Preemergence/ POST I (6-inch weeds)</u> | | | | | | | | |
| 9 InRRo / RoundupWeatherMax + AMS | 4 / 22 oz + 2.5 lb | 100 | 99 | 100 | 100 | 39.4 | 38.98 | 154 |
| 10 Prowl H2O + Outlook / Roundup WeatherMax | 1 + 12.6 oz / 22 oz + 2.5 lb | 100 | 100 | 100 | 100 | 37.6 | 47.25 | 137 |
| 11 Gangster / Roundup WeatherMax + AMS | 1.8 oz / 22 oz + 2.5 lb | 100 | 100 | 100 | 100 | 44.2 | 38.79 | 178 |
| 12 Boundary / Touchdown Total + AMS | 1.25 pt / 24 oz + 2.5 lb | 100 | 99 | 100 | 97 | 40.6 | 41.69 | 157 |
| 13 Valor SX / Roundup WeatherMax + AMS | 2 oz / 22 oz + 2.5 lb | 100 | 100 | 100 | 100 | 39.1 | 36.83 | 155 |
| 14 Valor SX + Python / Roundup WeatherMax + AMS | 1.5 oz + 0.5 oz / 22 oz + 2.5 lb | 100 | 100 | 100 | 99 | 41.1 | 39.64 | 162 |
| 15 Authority / Roundup WeatherMax + AMS | 4 oz / 22 oz + 2.5 lb | 100 | 100 | 100 | 97 | 38.8 | 35.52 | 155 |

Table continued. 2004 Soybean Herbicide Evaluation (Rochester)

| Herbicide | Rate (pt/A) | Wild Proso Millet ----- | Common Lambs. (% control) | Velvetleaf ----- | Giant ragweed ----- | Yield (bu/A) | Cost ----- | Income Over Herb (\$/A) ----- |
|-----------------------------------------------------------|------------------------------------------|-------------------------------|---------------------------------|---------------------|---------------------------|-----------------|---------------|-------------------------------------|
| <u>POST I (4-inch weeds)</u> | | | | | | | | |
| 16 Flexstar + Fusion + HarmonyGT + COC + AMS | 16 oz + 10 oz + 0.04 oz + 1% + 2.5 lb | 100 | 93 | 100 | 93 | 35.3 | 31.29 | 142 |
| 17 Flexstar + Fusion + FirstRate + COC + AMS | 16 oz + 10 oz + 0.3 oz + 1% + 2.5 lb | 97 | 85 | 100 | 99 | 37.3 | 38.79 | 145 |
| <u>POST I (4-inch weeds) / POST III(Canopy)</u> | | | | | | | | |
| 18 Roundup WeatherMax + AMS/ Roundup Weather Max + AMS | 22 oz + 2.5 lb / 22 oz + 2.5 lb | 100 | 100 | 100 | 100 | 42.8 | 39.98 | 170 |
| <u>POST II (6-inch weeds)</u> | | | | | | | | |
| 19 GF 1279 + FirstRate + AMS | 24 oz + 0.3 oz + 2.5 lb | 100 | 99 | 100 | 100 | 42.4 | - | - |
| 20 Clearout 41Plus + AMS | 32 oz + 2.5 lb | 100 | 99 | 100 | 97 | 42.9 | 18.16 | 192 |
| 21 GF 1279 + AMS | 24 oz + 2.5 lb | 100 | 99 | 100 | 99 | 40.1 | - | - |
| 22 Roundup WeatherMax + AMS | 22 oz + 2.5 lb | 100 | 100 | 100 | 97 | 41.3 | 23.99 | 179 |
| <u>Checks</u> | | | | | | | | |
| 23 Weedy | - | 0 | 0 | 0 | 0 | 12.7 | 0.00 | 62 |
| 24 Hand-Weeded | - | 100 | 100 | 100 | 100 | 40.9 | 0.00 | 201 |
| LSD(0.10) | | 4 | 3 | 1 | 5 | 5.2 | | 26 |

Soybean Price = \$4.91
(Waseca Co. 2004 Loan Rate)

2004 Soybean Herbicide Evaluation (Lamberton)

| Herbicide | Rate (pt/A) | Yellow foxtail ----- | Common lambsquarters (% control) ----- | Redroot pigweed ----- | Yield (bu/A) | Cost ----- | Income Over Herb (\$/A) ----- |
|------------------------------------------------------|-------------------------------------------|----------------------------|----------------------------------------------|-----------------------------|-----------------|---------------|-------------------------------------|
| <u>Preemergence</u> | | | | | | | |
| 1 Pendimax + Gangster | 3 +3.6 oz | 78 | 100 | 98 | 48.9 | 32.30 | 208 |
| <u>Preplant incorporate 2X/POST I (4-inch weeds)</u> | | | | | | | |
| 2 Prowl H2O / Raptor + UltraBlazer + NIS + AMS | 43 oz / 4 oz+ 8 oz+0.25%+2.5 lb | 93 | 100 | 98 | 55.8 | 44.52 | 230 |
| 3 Pusuit Plus / Rezult B + Rezult G + NIS + AMS | 2.5 / 1.6 + 1.6 + 0.25% + 2.5 lb | 97 | 98 | 94 | 53.9 | 38.11 | 227 |
| 4 Prowl H2O / Extreme + NIS + AMS | 43oz / 3 pt+0.125%+2.5 lb | 97 | 100 | 98 | 54.5 | 32.91 | 235 |
| <u>Preemergence/ POST I (4-inch weeds)</u> | | | | | | | |
| 5 Valor SX / FirstRate + Phoenix + V10137 + AMS | 3 oz / 0.6 oz + 10 oz + 16 oz + 2 lb | 93 | 100 | 100 | 54.6 | - | - |
| 6 Pemdimax / FirstRate + Select + Cobra + COC + AMS | 3 / 0.3 oz + 8 oz + 6 oz + 1% + 2.5 lb | 94 | 94 | 99 | 52.6 | 45.76 | 213 |
| 7 Boundary / Flexstar + Fusion + COC + AMS | 1.5 pt / 16 oz + 8 oz + 1% + 2.5 lb | 96 | 100 | 100 | 54.7 | 48.39 | 220 |
| 8 Authority / Flexstar + Assure + COC + AMS | 5.3 oz / 16 oz + 9 oz + 1% + 2.5 lb | 96 | 100 | 100 | 55.3 | 42.20 | 229 |
| <u>Preemergence / POST I (6-inch weeds)</u> | | | | | | | |
| 9 InRRo / Roundup WeatherMax + AMS | 4 / 22 oz + 2.5 lb | 97 | 100 | 99 | 56.0 | 38.98 | 236 |
| 10 Prowl H2O + Outlook / Roundup WeatherMax | 1 + 12.6 oz / 22 oz + 2.5 lb | 97 | 100 | 99 | 54.3 | 47.25 | 219 |
| 11 Gangster/ Roundup WeatherMax + AMS | 1.8 oz / 22 oz+2.5 lb | 95 | 100 | 100 | 56.1 | 38.79 | 237 |
| 12 Boundary / Touchdown Total + AMS | 1.25 pt / 24 oz + 2.5 lb | 97 | 100 | 100 | 55.8 | 41.69 | 232 |
| 13 Valor SX / Roundup WeatherMax + AMS | 2 oz / 22 oz+2.5 lb | 97 | 100 | 100 | 56.4 | 36.83 | 240 |
| 14 Valor SX + Python / Roundup WeatherMax + AMS | 1.5 oz + 0.5 oz / 22 oz + 2.5 lb | 98 | 100 | 100 | 56.3 | 39.64 | 237 |
| 15 Authority / Roundup WeatherMax + AMS | 4 oz / 22 oz+2.5 lb | 98 | 100 | 100 | 55.2 | 35.52 | 235 |

Table continued. 2004 Soybean Herbicide Evaluation (Lamberton)

| Herbicide | Rate (pt/A) | Yellow foxtail ----- | Common lambsquarters (% control) ----- | Redroot pigweed ----- | Yield (bu/A) | Cost ----- | Income Over Herb (\$/A) ----- |
|-----------------------------------------------------------|------------------------------------------|----------------------------|----------------------------------------------|-----------------------------|-----------------|---------------|-------------------------------------|
| <u>POST I (4-inch weeds)</u> | | | | | | | |
| 16 Flexstar + Fusion + HarmonyGT + COC + AMS | 16 oz + 10 oz + 0.04 oz + 1% + 2.5 lb | 95 | 91 | 96 | 54.2 | 31.29 | 235 |
| 17 Flexstar + Fusion + FirstRate + COC + AMS | 16 oz + 10 oz + 0.3 oz + 1% + 2.5 lb | 94 | 89 | 90 | 55.0 | 38.79 | 231 |
| <u>POST I (4-inch weeds)/POST III(Canopy)</u> | | | | | | | |
| 18 Roundup WeatherMax + AMS/ Roundup Weather Max + AMS | 22 oz + 2.5 lb / 22 oz + 2.5 lb | 97 | 100 | 98 | 54.1 | 39.98 | 226 |
| <u>POST II (6-inch weeds)</u> | | | | | | | |
| 19 GF 1279 + FirstRate + AMS | 24 oz + 0.3 oz + 2.5 lb | 98 | 100 | 100 | 54.7 | - | - |
| 20 Clearout 41Plus + AMS | 32 oz + 2.5 lb | 97 | 99 | 100 | 54.9 | 18.16 | 251 |
| 21 GF 1279 + AMS | 24 oz + 2.5 lb | 97 | 98 | 98 | 55.1 | - | - |
| 22 Roundup WeatherMax + AMS | 22 oz + 2.5 lb | 97 | 100 | 100 | 55.1 | 23.99 | 247 |
| <u>Checks</u> | | | | | | | |
| 23 Weedy | - | 0 | 0 | 0 | 2.9 | 0.00 | 14 |
| 24 Hand-Weeded | - | 100 | 100 | 100 | 55.6 | 0.00 | 273 |
| LSD(0.10) | | 3 | 3 | 3 | 1.9 | | 9 |

Soybean Price = \$4.91
(Waseca Co. 2004 Loan Rate)

2004 Soybean Herbicide Evaluation (Waseca)

Giant Ragweed Site

| Herbicide | Rate (pt/A) | Giant foxtail ----- | Giant ragweed (% control) ----- | Common lambsquarters ----- | Yield (bu/A) | Cost ----- | Income Over Herb (\$/A) ----- |
|------------------------------------------------------|-------------------------------------------|---------------------------|---------------------------------------|----------------------------------|-----------------|---------------|-------------------------------------|
| <u>Preemergence</u> | | | | | | | |
| 1 Pendimax + Gangster | 3 +3.6 oz | 96 | 96 | 99 | 53.3 | 32.30 | 229 |
| <u>Preplant incorporate 2X/POST I (4-inch weeds)</u> | | | | | | | |
| 2 Prowl H2O / Raptor+UltraBlazer+NIS+AMS | 43 oz / 4 oz+ 8 oz+0.25%+2.5 lb | 96 | 20 | 99 | 11.9 | 44.52 | 14 |
| 3 Pusuit Plus / Rezult B + Rezult G + NIS + AMS | 2.5 / 1.6 + 1.6 + 0.25% + 2.5 lb | 99 | 28 | 99 | 20.5 | 38.11 | 62 |
| 4 Prowl H2O / Extreme+NIS+AMS | 43oz / 3 pt+0.125%+2.5 lb | 99 | 95 | 99 | 49.4 | 32.91 | 210 |
| <u>Preemergence/ POST I (4-inch weeds)</u> | | | | | | | |
| 5 Valor SX / FirstRate + Phoenix + V10137 + AMS | 3 oz / 0.6 oz + 10 oz + 16 oz + 2 lb | 97 | 87 | 99 | 47.3 | - | - |
| 6 Pemdimax / FirstRate+Select+Cobra+COC+AMS | 3 / 0.3 oz + 8 oz + 6 oz + 1% + 2.5 lb | 99 | 74 | 99 | 40.6 | 45.76 | 154 |
| 7 Boundary / Flexstar + Fusion + COC + AMS | 1.5 pt / 16 oz + 8 oz + 1% + 2.5 lb | 96 | 80 | 99 | 38.4 | 48.39 | 140 |
| 8 Authority / Flexstar + Assure + COC + AMS | 5.3 oz / 16 oz + 9 oz + 1% + 2.5 lb | 97 | 63 | 99 | 32.4 | 42.20 | 117 |
| <u>Preemergence/ POST I (6-inch weeds)</u> | | | | | | | |
| 9 InRRo / RoundupWeatherMax + AMS | 4 / 22 oz + 2.5 lb | 99 | 97 | 99 | 52.1 | 38.98 | 217 |
| 10 Prowl H2O + Outlook / Roundup WeatherMax | 1 + 12.6 oz / 22 oz + 2.5 lb | 99 | 96 | 99 | 52.1 | 47.25 | 209 |
| 11 Gangster/ Roundup WeatherMax+AMS | 1.8 oz / 22 oz+2.5 lb | 99 | 99 | 99 | 51.1 | 38.79 | 212 |
| 12 Boundary / Touchdown Total + AMS | 1.25 pt / 24 oz + 2.5 lb | 99 | 99 | 99 | 50.3 | 41.69 | 205 |
| 13 Valor SX / Roundup WeatherMax+AMS | 2 oz / 22 oz+2.5 lb | 99 | 93 | 99 | 48.1 | 36.83 | 200 |
| 14 Valor SX + Python / Roundup WeatherMax+AMS | 1.5 oz + 0.5 oz / 22 oz + 2.5 lb | 99 | 98 | 99 | 52.4 | 39.64 | 218 |
| 15 Authority / Roundup WeatherMax+AMS | 4 oz / 22 oz+2.5 lb | 99 | 96 | 99 | 49.2 | 35.52 | 206 |

Table continued. 2004 Soybean Herbicide Evaluation (Waseca) Giant Ragweed Site

| Herbicide | Rate (pt/A) | Giant foxtail ----- | Giant ragweed (% control) | Common lambsquarters ----- | Yield (bu/A) | Cost ----- | Income Over Herb (\$/A) ----- |
|-------------------------------------------------------|------------------------------------------|---------------------------|---------------------------------|----------------------------------|-----------------|---------------|-------------------------------------|
| <u>POST I (4-inch weeds)</u> | | | | | | | |
| 16 Flexstar + Fusion + HarmonyGT + COC + AMS | 16 oz + 10 oz + 0.04 oz + 1% + 2.5 lb | 93 | 43 | 99 | 25.7 | 31.29 | 95 |
| 17 Flexstar + Fusion + FirstRate + COC + AMS | 16 oz + 10 oz + 0.3 oz + 1% + 2.5 lb | 94 | 90 | 50 | 38.6 | 38.79 | 151 |
| <u>POST I (4-inch weeds)/POST III(Canopy)</u> | | | | | | | |
| 18 Roundup WeatherMax+AMS/ Roundup Weather Max+AMS | 22 oz + 2.5 lb / 22 oz + 2.5 lb | 99 | 99 | 99 | 51.2 | 39.98 | 211 |
| <u>POST II (6-inch weeds)</u> | | | | | | | |
| 19 GF 1279 + FirstRate + AMS | 24 oz + 0.3 oz + 2.5 lb | 99 | 92 | 99 | 47.3 | - | - |
| 20 Clearout 41Plus + AMS | 32 oz + 2.5 lb | 99 | 93 | 99 | 47.1 | 18.16 | 213 |
| 21 GF 1279 + AMS | 24 oz + 2.5 lb | 98 | 92 | 99 | 45.0 | - | - |
| 22 Roundup WeatherMax+AMS | 22 oz + 2.5 lb | 99 | 92 | 99 | 43.0 | 23.99 | 187 |
| <u>Checks</u> | | | | | | | |
| 23 Weedy | - | 0 | 0 | 0 | 4.2 | 0.00 | 21 |
| 24 Hand-Weeded | - | 100 | 100 | 100 | 47.9 | 0.00 | 235 |
| LSD(0.10) | | 3 | 16 | 14 | 7.2 | | 37 |

Soybean Price = \$4.91
(Waseca Co. 2004 Loan Rate)

2004 Soybean Herbicide Evaluation (Waseca)

Common Cocklebur Site

| Herbicide | Rate (pt/A) | Giant | Common | Common | Common | Velvetleaf | Yield (bu/A) | Cost ----- | Income | |
|------------------------------------------------------|---------------------------------------------------|-------------------------------------------|-----------|---------|--------------|------------|-----------------|---------------|-----------|-----|
| | | foxtail | cocklebur | ragweed | lambquarters | | | | Over Herb | |
| | | ----- (% control) ----- | | | | | | ----- | ----- | |
| <u>Preemergence</u> | | | | | | | | | | |
| 1 | Pendimax + Gangster | 3 +3.6 oz | 86 | 84 | 94 | 99 | 99 | 41.1 | 32.30 | 169 |
| <u>Preplant incorporate 2X/POST I (4-inch weeds)</u> | | | | | | | | | | |
| 2 | Prowl H2O / Raptor + UltraBlazer + NIS + AMS | 43 oz / 4 oz+ 8 oz + 0.25%+2.5 lb | 74 | 78 | 36 | 99 | 74 | 4.3 | 44.52 | -24 |
| 3 | Pusuit Plus / Rezult B + Rezult G + NIS + AMS | 2.5 / 1.6 + 1.6 + 0.25% + 2.5 lb | 98 | 49 | 16 | 99 | 99 | 10.4 | 38.11 | 13 |
| 4 | Prowl H2O / Extreme + NIS + AMS | 43 oz / 3 pt + 0.125% + 2.5 lb | 99 | 93 | 86 | 91 | 97 | 24.5 | 32.91 | 87 |
| <u>Preemergence/ POST I (4-inch weeds)</u> | | | | | | | | | | |
| 5 | Valor SX / FirstRate + Phoenix + V10137 + AMS | 3 oz / 0.6 oz + 10 oz + 16 oz + 2 lb | 98 | 98 | 99 | 99 | 99 | 28.7 | - | - |
| 6 | Pendimax / FirstRate + Select + Cobra + COC + AMS | 3 / 0.3 oz + 8 oz + 6 oz + 1% + 2.5 lb | 98 | 94 | 90 | 91 | 57 | 28.9 | 45.76 | 96 |
| 7 | Boundary / Flexstar + Fusion + COC + AMS | 1.5 pt / 16 oz + 8 oz + 1% + 2.5 lb | 95 | 86 | 95 | 99 | 99 | 35.0 | 48.39 | 123 |
| 8 | Authority / Flexstar + Assure + COC + AMS | 5.3 oz / 16 oz + 9 oz + 1% + 2.5 lb | 99 | 93 | 97 | 99 | 99 | 34.5 | 42.20 | 127 |
| <u>Preemergence/ POST I (6-inch weeds)</u> | | | | | | | | | | |
| 9 | InRRo / Roundup WeatherMax + AMS | 4 / 22 oz + 2.5 lb | 97 | 93 | 96 | 99 | 96 | 31.3 | 38.98 | 115 |
| 10 | Prowl H2O + Outlook / Roundup WeatherMax | 1 + 12.6 oz / 22 oz + 2.5 lb | 99 | 91 | 82 | 99 | 96 | 41.5 | 47.25 | 156 |
| 11 | Gangster/ Roundup WeatherMax + AMS | 1.8 oz / 22 oz + 2.5 lb | 94 | 96 | 99 | 99 | 99 | 50.7 | 38.79 | 210 |
| 12 | Boundary / Touchdown Total + AMS | 1.25 pt / 24 oz + 2.5 lb | 99 | 89 | 90 | 96 | 89 | 47.4 | 41.69 | 191 |
| 13 | Valor SX / Roundup WeatherMax + AMS | 2 oz / 22 oz + 2.5 lb | 95 | 97 | 99 | 99 | 94 | 47.1 | 36.83 | 194 |
| 14 | Valor SX + Python / Roundup WeatherMax + AMS | 1.5 oz + 0.5 oz / 22 oz + 2.5 lb | 94 | 98 | 95 | 99 | 99 | 49.0 | 39.64 | 201 |
| 15 | Authority / Roundup WeatherMax + AMS | 4 oz / 22 oz + 2.5 lb | 96 | 95 | 84 | 99 | 99 | 38.5 | 35.52 | 153 |

Table continued. 2004 Soybean Herbicide Evaluation (Waseca) Common Cocklebur Site

| Herbicide | Rate (pt/A) | Giant foxtail | Common cocklebur | Common ragweed | Common lambsquarters | Common Velvetleaf | Yield (bu/A) | Cost | Income Over Herb (\$/A) |
|-----------------------------------------------------------|------------------------------------------|------------------|---------------------|-------------------|-------------------------|----------------------|-----------------|-------|-------------------------------|
| <u>POST I (4-inch weeds)</u> | | | | | | | | | |
| 16 Flexstar + Fusion + HarmonyGT + COC + AMS | 16 oz + 10 oz + 0.04 oz + 1% + 2.5 lb | 61 | 87 | 83 | 91 | 83 | 12.8 | 31.29 | 32 |
| 17 Flexstar + Fusion + FirstRate + COC + AMS | 16 oz + 10 oz + 0.3 oz + 1% + 2.5 lb | 67 | 95 | 80 | 41 | 68 | 16.9 | 38.79 | 44 |
| <u>POST I (4-inch weeds)/POST III(Canopy)</u> | | | | | | | | | |
| 18 Roundup WeatherMax + AMS/ Roundup Weather Max + AMS | 22 oz + 2.5 lb / 22 oz + 2.5 lb | 98 | 96 | 99 | 88 | 89 | 32.7 | 39.98 | 121 |
| <u>POST II (6-inch weeds)</u> | | | | | | | | | |
| 19 GF 1279 + FirstRate + AMS | 24 oz + 0.3 oz + 2.5 lb | 98 | 94 | 95 | 89 | 94 | 33.5 | - | - |
| 20 Clearout 41Plus + AMS | 32 oz + 2.5 lb | 98 | 96 | 89 | 86 | 85 | 33.6 | 18.16 | 147 |
| 21 GF 1279 + AMS | 24 oz + 2.5 lb | 98 | 96 | 87 | 79 | 57 | 33.7 | - | - |
| 22 Roundup WeatherMax + AMS | 22 oz + 2.5 lb | 97 | 96 | 91 | 91 | 65 | 32.4 | 23.99 | 135 |
| <u>Checks</u> | | | | | | | | | |
| 23 Weedy | - | 0 | 0 | 0 | 0 | 0 | 1.0 | 0.00 | 5 |
| 24 Hand-Weeded | - | 100 | 100 | 100 | 100 | 100 | 48.0 | 0.00 | 236 |
| LSD(0.10) | | 9 | 10 | 15 | 14 | 24 | 6.6 | | 33 |

Soybean Price = \$4.91
(Waseca Co. 2004 Loan Rate)

2004 Soybean Herbicide Evaluation (Waseca)

Tall Waterhemp Site

| Herbicide | Rate (pt/A) | Giant foxtail --- (% control) --- | Tall waterhemp --- | Yield (bu/A) | Cost ----- | Income Over Herb (\$/A) ----- |
|------------------------------------------------------|----------------------------------------|-----------------------------------------|--------------------------|-----------------|---------------|-------------------------------------|
| <u>Preemergence</u> | | | | | | |
| 1 Pendimax + Gangster | 3 +3.6 oz | 61 | 73 | 37.1 | 32.30 | 150 |
| <u>Preplant incorporate 2X/POST I (4-inch weeds)</u> | | | | | | |
| 2 Prowl H2O / Raptor + UltraBlazer + NIS+AMS | 43 oz / 4 oz+ 8 oz + 0.25% + 2.5 lb | 69 | 99 | 33.8 | 44.52 | 121 |
| 3 Pusuit Plus / Rezult B + Rezult G + NIS + AMS | 2.5 / 1.6 + 1.6 + 0.25% + 2.5 lb | 99 | 61 | 40.5 | 38.11 | 161 |
| 4 Prowl H2O / Extreme + NIS+AMS | 43 oz / 3 pt + 0.125% + 2.5 lb | 99 | 99 | 53.8 | 32.91 | 231 |
| <u>Preemergence / POST I (4-inch weeds)</u> | | | | | | |
| 5 Valor SX / FirstRate + Phoenix + V10137 + AMS | 3 oz / 0.6 oz + 10 oz + 16 oz + 2 lb | 97 | 99 | 50.1 | - | - |
| 6 Pendimax / FirstRate + Select + Cobra + COC + AMS | 3 / 0.3 oz + 8 oz + 6 oz + 1% + 2.5 lb | 99 | 99 | 48.5 | 45.76 | 192 |
| 7 Boundary / Flexstar + Fusion + COC + AMS | 1.5 pt / 16 oz + 8 oz + 1% + 2.5 lb | 95 | 97 | 50.1 | 48.39 | 198 |
| 8 Authority / Flexstar + Assure + COC + AMS | 5.3 oz / 16 oz + 9 oz + 1% + 2.5 lb | 93 | 99 | 44.8 | 42.20 | 178 |
| <u>Preemergence / POST I (6-inch weeds)</u> | | | | | | |
| 9 InRRo / Roundup WeatherMax + AMS | 4 / 22 oz + 2.5 lb | 96 | 99 | 54.3 | 38.98 | 228 |
| 10 Prowl H2O + Outlook / Roundup WeatherMax | 1 + 12.6 oz / 22 oz + 2.5 lb | 95 | 96 | 49.7 | 47.25 | 197 |
| 11 Gangster/ Roundup WeatherMax + AMS | 1.8 oz / 22 oz + 2.5 lb | 94 | 99 | 49.7 | 38.79 | 205 |
| 12 Boundary / Touchdown Total + AMS | 1.25 pt / 24 oz + 2.5 lb | 99 | 98 | 53.8 | 41.69 | 223 |
| 13 Valor SX / Roundup WeatherMax + AMS | 2 oz / 22 oz + 2.5 lb | 97 | 99 | 54.9 | 36.83 | 233 |
| 14 Valor SX + Python / Roundup WeatherMax + AMS | 1.5 oz + 0.5 oz / 22 oz + 2.5 lb | 96 | 93 | 53.4 | 39.64 | 222 |
| 15 Authority / Roundup WeatherMax + AMS | 4 oz / 22 oz + 2.5 lb | 98 | 99 | 54.7 | 35.52 | 233 |
| <u>POST I (4-inch weeds)</u> | | | | | | |
| 16 Flexstar + Fusion + HarmonyGT + COC + AMS | 16 oz + 10 oz + 0.04 oz + 1% + 2.5 lb | 92 | 85 | 45.1 | 31.29 | 190 |
| 17 Flexstar + Fusion + FirstRate + COC + AMS | 16 oz + 10 oz + 0.3 oz + 1% + 2.5 lb | 93 | 67 | 45.1 | 38.79 | 183 |

Table continued. 2004 Soybean Herbicide Evaluation (Waseca) Tall Waterhemp Site

| Herbicide | Rate (pt/A) | Giant foxtail --- (% control) --- | Tall waterhemp --- | Yield (bu/A) | Cost ----- | Income Over Herb (\$/A) ----- |
|-----------------------------------------------------------|---------------------------------|-----------------------------------------|--------------------------|-----------------|---------------|-------------------------------------|
| <u>POST I (4-inch weeds) / POST III(Canopy)</u> | | | | | | |
| 18 Roundup WeatherMax + AMS/ Roundup Weather Max + AMS | 22 oz + 2.5 lb / 22 oz + 2.5 lb | 99 | 99 | 50.8 | 39.98 | 209 |
| <u>POST II (6-inch weeds)</u> | | | | | | |
| 19 GF 1279 + FirstRate + AMS | 24 oz + 0.3 oz + 2.5 lb | 99 | 99 | 53.1 | - | - |
| 20 Clearout 41Plus + AMS | 32 oz + 2.5 lb | 98 | 96 | 47.6 | 18.16 | 215 |
| 21 GF 1279 + AMS | 24 oz + 2.5 lb | 99 | 99 | 52.3 | - | - |
| 22 Roundup WeatherMax + AMS | 22 oz + 2.5 lb | 99 | 99 | 53.7 | 23.99 | 240 |
| <u>Checks</u> | | | | | | |
| 23 Weedy | - | 0 | 0 | 13.7 | 0.00 | 67 |
| 24 Hand-Weeded | - | 100 | 100 | 54.7 | 0.00 | 268 |
| LSD(0.10) | | 8 | 12 | 5.7 | | 29 |

Soybean Price = \$4.91
(Waseca Co. 2004 Loan Rate)

2004 Soybean Herbicide Evaluation (Waseca)

Common Ragweed Site

| Herbicide | Rate (pt/A) | Giant foxtail | Common ragweed ----- (% control) | Common lambquarters ----- | Velevet- leaf ----- | Yield (bu/A) | Cost ----- | Income Over Herb (\$/A) ----- |
|--------------------------------------------------------|-------------------------------------------|------------------|-------------------------------------------|---------------------------------|---------------------------|-----------------|---------------|-------------------------------------|
| <u>Preemergence</u> | | | | | | | | |
| 1 Pendimax + Gangster | 3 +3.6 oz | 91 | 98 | 96 | 99 | 54.1 | 32.30 | 234 |
| <u>Preplant incorporate 2X / POST I (4-inch weeds)</u> | | | | | | | | |
| 2 Prowl H2O / Raptor + UltraBlazer + NIS + AMS | 43 oz / 4 oz+ 8 oz + 0.25% + 2.5 lb | 96 | 24 | 99 | 99 | 46.9 | 44.52 | 186 |
| 3 Pusuit Plus / Rezult B + Rezult G + NIS + AMS | 2.5 / 1.6 + 1.6 + 0.25% + 2.5 lb | 99 | 33 | 99 | 99 | 49.4 | 38.11 | 205 |
| 4 Prowl H2O / Extreme + NIS + AMS | 43 oz / 3 pt + 0.125% + 2.5 lb | 99 | 98 | 99 | 99 | 57.1 | 32.91 | 248 |
| <u>Preemergence / POST I (4-inch weeds)</u> | | | | | | | | |
| 5 Valor SX / FirstRate + Phoenix + V10137 + AMS | 3 oz / 0.6 oz + 10 oz + 16 oz + 2 lb | 95 | 99 | 99 | 99 | 57.5 | - | - |
| 6 Pemdimax / FirstRate + Select + Cobra + COC + AMS | 3 / 0.3 oz + 8 oz + 6 oz + 1% + 2.5 lb | 97 | 98 | 94 | 99 | 55.8 | 45.76 | 228 |
| 7 Boundary / Flexstar + Fusion + COC + AMS | 1.5 pt / 16 oz + 8 oz + 1% + 2.5 lb | 95 | 99 | 99 | 99 | 56.1 | 48.39 | 227 |
| 8 Authority / Flexstar + Assure + COC + AMS | 5.3 oz / 16 oz + 9 oz + 1% + 2.5 lb | 98 | 99 | 98 | 99 | 57.4 | 42.20 | 240 |
| <u>Preemergence / POST I (6-inch weeds)</u> | | | | | | | | |
| 9 InRRo / Roundup WeatherMax + AMS | 4 / 22 oz + 2.5 lb | 99 | 99 | 99 | 99 | 58.4 | 38.98 | 248 |
| 10 Prowl H2O + Outlook / Roundup WeatherMax | 1 + 12.6 oz / 22 oz + 2.5 lb | 99 | 99 | 99 | 99 | 58.2 | 47.25 | 238 |
| 11 Gangster/ Roundup WeatherMax + AMS | 1.8 oz / 22 oz + 2.5 lb | 99 | 99 | 99 | 99 | 61.6 | 38.79 | 264 |
| 12 Boundary / Touchdown Total + AMS | 1.25 pt / 24 oz + 2.5 lb | 99 | 99 | 99 | 99 | 61.5 | 41.69 | 261 |
| 13 Valor SX / Roundup WeatherMax + AMS | 2 oz / 22 oz + 2.5 lb | 99 | 99 | 99 | 99 | 56.9 | 36.83 | 242 |
| 14 Valor SX + Python / Roundup WeatherMax + AMS | 1.5 oz + 0.5 oz / 22 oz + 2.5 lb | 99 | 99 | 99 | 99 | 59.8 | 39.64 | 254 |
| 15 Authority / Roundup WeatherMax + AMS | 4 oz / 22 oz + 2.5 lb | 99 | 99 | 99 | 99 | 57.3 | 35.52 | 246 |

Table continued. 2004 Soybean Herbicide Evaluation (Waseca) Common Ragweed Site

| Herbicide | Rate (pt/A) | Giant foxtail | Common ragweed | Common lambsquarters | Velevet- leaf | Yield (bu/A) | Cost | Income Over Herb (\$/A) |
|-----------------------------------------------------------|------------------------------------------|------------------|-------------------|-------------------------|------------------|-----------------|-------|-------------------------------|
| <u>POST I (4-inch weeds)</u> | | | | | | | | |
| 16 Flexstar + Fusion + HarmonyGT + COC + AMS | 16 oz + 10 oz + 0.04 oz + 1% + 2.5 lb | 93 | 93 | 88 | 99 | 54.4 | 31.29 | 236 |
| 17 Flexstar + Fusion + FirstRate + COC + AMS | 16 oz + 10 oz + 0.3 oz + 1% + 2.5 lb | 94 | 96 | 60 | 99 | 53.8 | 38.79 | 225 |
| <u>POST I (4-inch weeds) / POST III(Canopy)</u> | | | | | | | | |
| 18 Roundup WeatherMax + AMS/ Roundup Weather Max + AMS | 22 oz + 2.5 lb / 22 oz + 2.5 lb | 99 | 99 | 99 | 99 | 56.9 | 39.98 | 239 |
| <u>POST II (6-inch weeds)</u> | | | | | | | | |
| 19 GF 1279 + FirstRate + AMS | 24 oz + 0.3 oz + 2.5 lb | 98 | 99 | 91 | 99 | 53.5 | - | - |
| 20 Clearout 41Plus + AMS | 32 oz + 2.5 lb | 99 | 99 | 99 | 99 | 57.0 | 18.16 | 262 |
| 21 GF 1279 + AMS | 24 oz + 2.5 lb | 99 | 99 | 99 | 99 | 56.7 | - | - |
| 22 Roundup WeatherMax + AMS | 22 oz + 2.5 lb | 99 | 99 | 99 | 99 | 54.7 | 23.99 | 245 |
| <u>Checks</u> | | | | | | | | |
| 23 Weedy | - | 0 | 0 | 0 | 0 | 14.2 | 0.00 | 70 |
| 24 Hand-Weeded | - | 100 | 100 | 100 | 100 | 57.5 | 0.00 | 283 |
| LSD(0.10) | | 3 | 8 | 10 | 1 | 3.9 | | 19 |

Soybean Price = \$4.91
(Waseca Co. 2004 Loan Rate)

D. Production Management

Soybean Aphid Insecticide Timing and Efficacy Trial at Rochester, Minnesota in 2004.

Breitenbach, Fritz R. and Lisa M. Behnken

Soybean aphids have been a significant albeit unpredictable pest in soybean since the 2001 growing season. In 2004, we initiated two insect management trials one in Waseca and the other in Rochester. The objectives of these trials were to address soybean aphid thresholds, pesticide timing, and foliar insecticide and seed treatment efficacy. Results from the Waseca trial will not be reported due to low aphid numbers. Aphid numbers at the Waseca site never exceeded one aphid per plant, and no differences in soybean yield occurred in the trial.

The Rochester site was planted on June 5 on a Port Byron silt loam soil. Plots were 20 feet by 50 feet and consisted of eight 30-inch rows planted at a seeding rate of 150,000 seeds per acre. Plots were placed in a randomized complete block design with 4 replicates. Treatments were sprayed with a 20 ft tractor mounted plot sprayer pressured with compressed air. Spray volume was 20 gallon per acre delivered at a pressure of 32 psi. Insecticide comparison treatments were applied on August 10. Soybean aphid counts were taken prior to treatment applications. Ten soybean plants were collected and bagged from each plot. Samples were refrigerated and aphids per plant were counted. Results are reported in Tables 1-4 below.

Lower aphid populations and percent infested plants were detected with the foliar applied insecticide treatments when compared to the untreated checks and Cruiser treatment, Table 1 and 2. No aphid population differences were observed among insecticide treatments applied on August 10, Table 4. Despite differences in aphid population among treated and untreated plots, no soybean yield difference occurred, (University of Minnesota Extension Service, Regional Center, Rochester, MN and Southern Research and Outreach Center, Waseca, MN).

Table 1. Number of soybean aphids per plant by date and soybean yields at Rochester, MN 2004 (Breitenbach and Behnken)

| Treatment | Application Date | Jul 13 | Jul 21 | Jul 28 | Aug 4 | Aug 10 | Aug 18 | Aug 25 | Bu/A |
|-------------------------------|------------------|--------|--------|--------|-------|--------|--------|--------|------|
| NK S15-B1 Untreated | --- | 0.0 | 3.8 | 30.7 | 9.5 | 17.7 | 48.3 | 55.2 | 42.3 |
| NK S15-B1 Crusier 50 grams | At planting | 0.0 | 8.4 | 20.1 | 19.8 | 13.3 | 18.9 | 41.5 | 44.9 |
| NK S15-B1 w/ Warrior 3.2 oz/a | Jul 13 | 0.6 | 0.0 | 0.1 | 0.3 | 0.6 | 3.0 | 4.5 | 42.2 |
| NK S15-B1 w/ Warrior 3.2 oz/a | Jul 21 | | 2.9 | 0.0 | 0.0 | 0.3 | 0.2 | 1.9 | 44.5 |
| NK S15-B1 w/ Warrior 3.2 oz/a | Jul 28 | | | 19.2 | 0.0 | 0.0 | 0.1 | 0 | 43.7 |
| NK S15-B1 w/ Warrior 3.2 oz/a | Aug 04 | | | | 5.3 | 0.3 | 0.0 | 2.5 | 46.0 |
| NK S15-B1 w/ Warrior 3.2 oz/a | Aug 10 | | | | | 21.6 | 0.8 | 0.0 | 42.3 |
| NK S15-B1 w/ Warrior 3.2 oz/a | Aug 18 | | | | | | 10.8 | 0.0 | 43.5 |
| NK S19-V2 Untreated | --- | 0.0 | 0.3 | 1.1 | 26.4 | 23.2 | 78.8 | 34.6 | 45.1 |
| LSD (0.10) | | | | | | | | | 4.8 |

Table 2. Percent of soybean plants infested by soybean aphid with date and soybean yields at Rochester, MN 2004 (Breitenbach and Behnken)

| Treatment | Application Date | Jul 13 | Jul 21 | Jul 28 | Aug 4 | Aug 10 | Aug 18 | Aug 25 | Bu/A |
|-------------------------------|------------------|--------|--------|--------|-------|--------|--------|--------|------|
| NK S15-B1 Untreated | --- | 0 | 13 | 70 | 73 | 95 | 95 | 100 | 42.3 |
| NK S15-B1 Crusier 50 grams | At planting | 0 | 20 | 40 | 73 | 80 | 95 | 65 | 44.9 |
| NK S15-B1 w/ Warrior 3.2 oz/a | Jul 13 | 5 | 0 | 5 | 10 | 28 | 70 | 85 | 42.2 |
| NK S15-B1 w/ Warrior 3.2 oz/a | Jul 21 | | 13 | 0 | 0 | 13 | 15 | 35 | 44.5 |
| NK S15-B1 w/ Warrior 3.2 oz/a | Jul 28 | | | 45 | 0 | 5 | 10 | 0 | 43.7 |
| NK S15-B1 w/ Warrior 3.2 oz/a | Aug 04 | | | | 63 | 10 | 0 | 3 | 46.0 |
| NK S15-B1 w/ Warrior 3.2 oz/a | Aug 10 | | | | | 75 | 25 | 0 | 42.3 |
| NK S15-B1 w/ Warrior 3.2 oz/a | Aug 18 | | | | | | 65 | 0 | 43.5 |
| NK S19-V2 Untreated | --- | 0 | 8 | 25 | 80 | 55 | 100 | 90 | 45.1 |
| LSD (0.10) | | | | | | | | | 4.8 |

Table 3. Soybean height in inches by date and soybean yields at Rochester, MN 2004 (Breitenbach and Behnken)

| Treatment | Application Date | Jul 13 | Jul 21 | Jul 28 | Aug 4 | Aug 10 | Bu/A |
|-------------------------------|------------------|--------|--------|--------|-------|--------|------|
| NK S15-B1 Untreated | --- | 11.6 | 19.3 | 23.8 | 30.8 | 35.8 | 42.3 |
| NK S15-B1 Crusier 50 grams | At planting | 11.1 | 18.8 | 23.8 | 30.6 | 35.9 | 44.9 |
| NK S15-B1 w/ Warrior 3.2 oz/a | Jul 13 | 11.7 | 19.9 | 24.3 | 31.8 | 36.2 | 42.2 |
| NK S15-B1 w/ Warrior 3.2 oz/a | Jul 21 | | 19.1 | 24.1 | 31.3 | 36.1 | 44.5 |
| NK S15-B1 w/ Warrior 3.2 oz/a | Jul 28 | | | 22.9 | 29.7 | 36.1 | 43.7 |
| NK S15-B1 w/ Warrior 3.2 oz/a | Aug 04 | | | | 29.8 | 33.3 | 46.0 |
| NK S15-B1 w/ Warrior 3.2 oz/a | Aug 10 | | | | | 35.6 | 42.3 |
| NK S15-B1 w/ Warrior 3.2 oz/a | Aug 18 | | | | | | 43.5 |
| NK S19-V2 Untreated | --- | 11.2 | 17.9 | 21.4 | 27.3 | 30.2 | 45.1 |
| LSD (0.10) | | | | | | | 4.8 |

Table 4. Insecticide and seed treatment performance; August 10th application, number of soybean aphids per plant by date and soybean yields at Rochester, MN 2004 (Breitenbach and Behnken)

| Treatment | Jul 13 | Jul 21 | Jul 28 | Aug 4 | Aug 10 | Aug 18 | Aug 25 | Sept 01 | Bu/A |
|-----------------------------------|--------|--------|--------|-------|--------|--------|--------|---------|------|
| NK S15-B1 Untreated | 0.0 | 3.8 | 30.7 | 9.5 | 17.7 | 48.3 | 55.2 | 36.8 | 42.3 |
| NK S15-B1 Crusier 50 grams | 0.0 | 8.4 | 20.1 | 19.8 | 13.3 | 18.9 | 41.5 | --- | 44.9 |
| NK S15-B1 w/ Mustang Max 3.5 oz/a | | | | | 17.0 | 1.0 | 2.4 | 1.2 | 41.6 |
| NK S15-B1 w/ Lorsban 1 pt/a | | | | | 12.6 | 2.8 | 2.5 | 4.0 | 45.8 |
| NK S15-B1 w/ Asana 6.4 oz/a | | | | | 17.4 | 1.9 | 3.5 | 0.6 | 42.3 |
| NK S15-B1 w/ Warrior 2.5 oz/a | | | | | 23.0 | 0.4 | 0.3 | 0.4 | 45.4 |
| NK S15-B1 w/ Warrior 3.2 oz/ | | | | | 21.6 | 0.8 | 0.0 | --- | 42.3 |
| LSD (0.10) | | | | | | | | | 4.8 |

Potassium Fertilizer Strip Test on Soybean and the Potential Interaction with Soybean Aphid Eyota, MN 2004

High aphid populations that invade a soybean field can induce potassium (K) deficiency symptoms, especially in fields with low K soil tests. In order to show a potential interaction between K soil fertility and soybean aphid, two field trials were conducted using field length test strips. Trials were located in two fields, one with low testing soil K and the other with a high K level. Test strips with 300 lb K₂O/A applied prior to planting soybean were compared to strips with no potash applied. The treatments were replicated four times. Aphid populations were assessed twice during the season. Aphid populations were measured by collecting ten plants from each treatment (80 plants from each field) and recording the number of aphids on each plant. Results are presented in Table 1. Soybean aphid populations were extremely low during 2004.

Table 1. Average number of soybean aphids per plant on July 14, and July 30, 2004.

| | Low Testing Site | | High Testing Site | |
|---------|----------------------------|-------------------------|----------------------------|-------------------------|
| | 300 lbs/a K ₂ O | 0 lb/a K ₂ O | 300 lbs/a K ₂ O | 0 lb/a K ₂ O |
| July 14 | 2.15 | 2.25 | 2.25 | 2.33 |
| July 30 | 0.13 | 0.35 | 0.90 | 0.00 |

Due to extremely low aphid populations it is difficult to come to any sound conclusions. The data from this trial would indicate that under low aphid populations, low soil test potassium level and/or applied potassium fertilizer has no measurable effect on soybean aphids. (University of Minnesota Extension Regional Center, Rochester, MN).

Pest Management Assessment for Field Crops in SE MN

February 2004

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University of Minnesota Extension Service

Adapted from University of Wisconsin Pest Management Assessment for Field Corn
(12-6-01-Univ. of Wis.-Madison, IPCM program)



1

The National Integrated Pest Management (IPM) Initiative was announced in 1994 with the intent to achieve a national goal of IPM implementation of 75% of crop acres by 2000. For the most part, this goal has been met on high value crops, but not on commodity crops such as corn and soybeans.

Creating awareness and interest in IPM practices and relating them directly to the farm can help promote and increase adoption.

2

The “Pest Management Assessment for Field Corn”, a farmer self-assessment, was developed to help farmers take credit for IPM practices that they currently use and to provide an awareness of other IPM practices they may wish to consider.

Information gained from the assessment also helps educators develop programs that assist farmers with implementing IPM practices on their farms.

The ultimate goal is to develop a farm wide assessment that will relate IPM practices directly to the farmer in a confidential manner.

3

The assessment consists of questions in four categories: general, weed, insect, and disease management.

The following slides show the response results from approximately 412 Private Pesticide Applicators who completed the assessment during the 2004 Private Pesticide Applicator Training Workshops held throughout Southeast Minnesota.

D-7

4

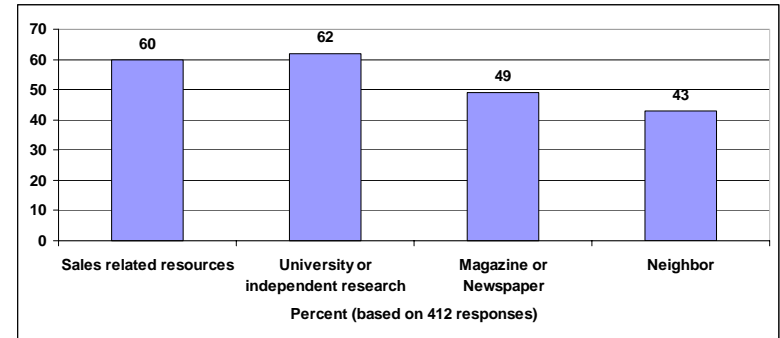
Section 1

General Management

~ 412 Responses from Private Pesticide Applicators who attended the 2004 PPAT Workshops in SE Minnesota

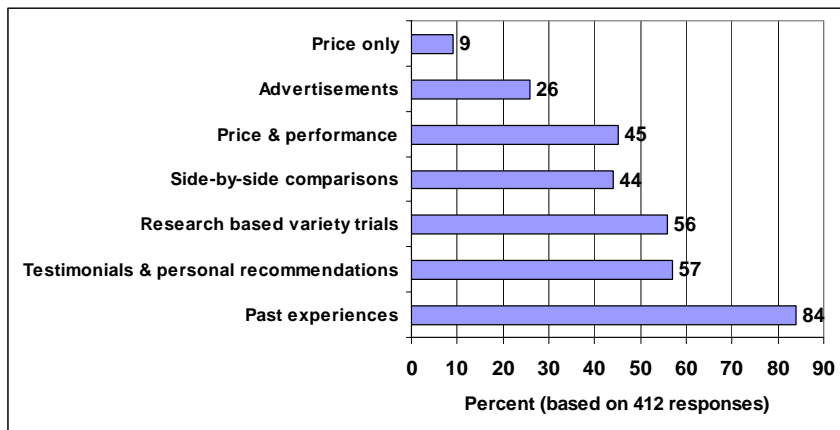
5

What sources of information do you regularly use for pest management information?



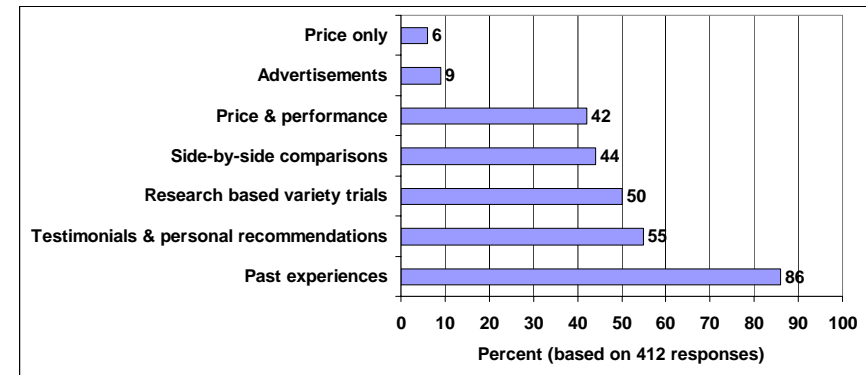
6

What sources of information do you regularly use when selecting varieties for your farm?



7

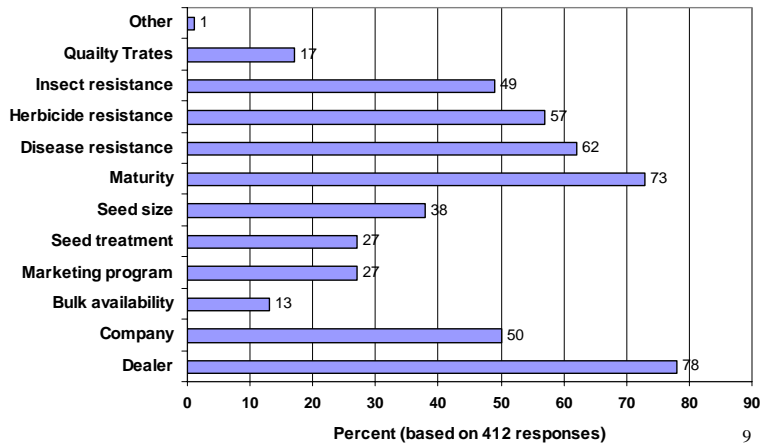
What sources of information do you value most when selecting varieties for your farm?



D-8

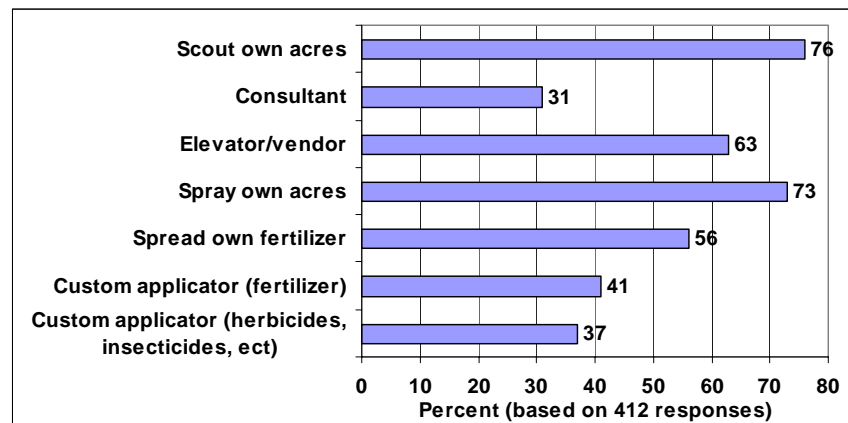
8

What other factors or traits do you consider when selecting varieties for your farm?



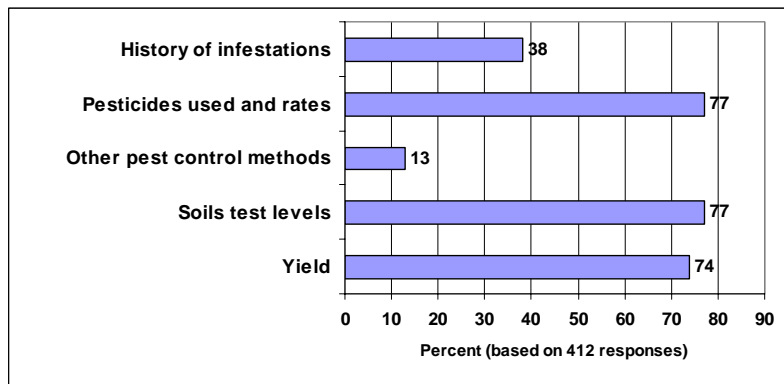
9

Which one of the following practices do you utilize on your farm?



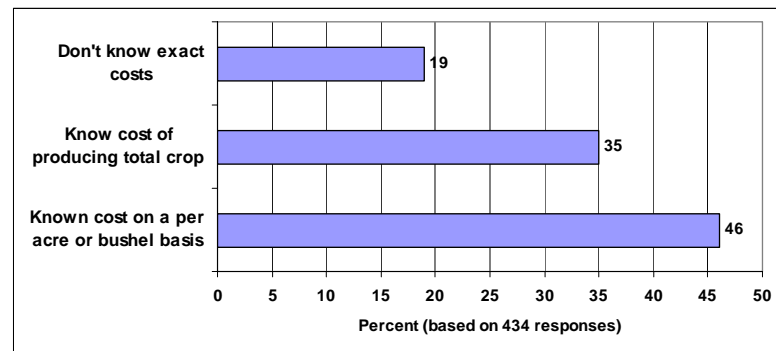
10

What Records Do You Regularly Keep for Individual Farm Fields?



11

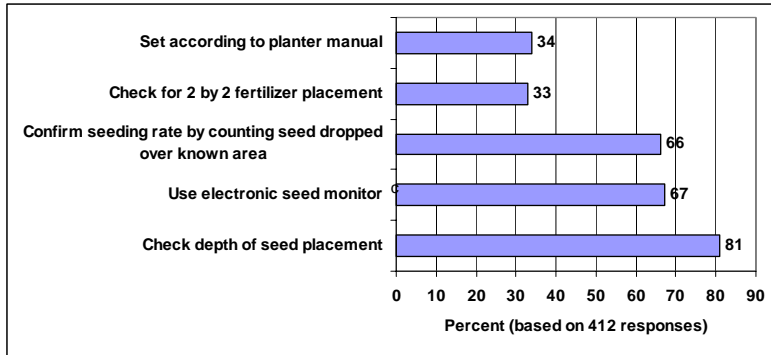
How Do You Determine the Cost of Production for Your Corn and Soybean Production System?



D-9

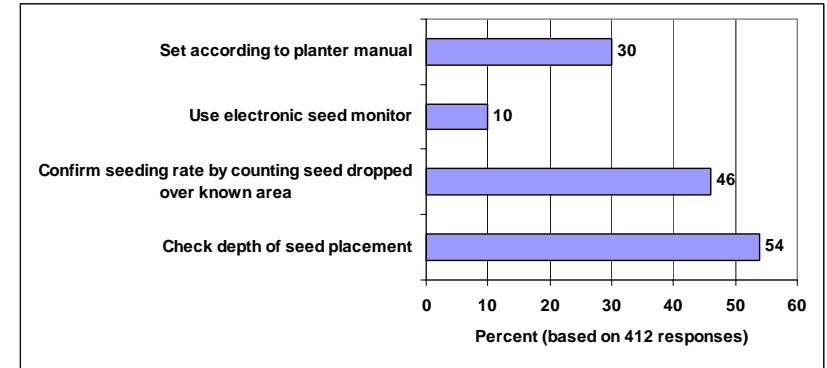
12

When calibrating and adjusting your corn planter do you:



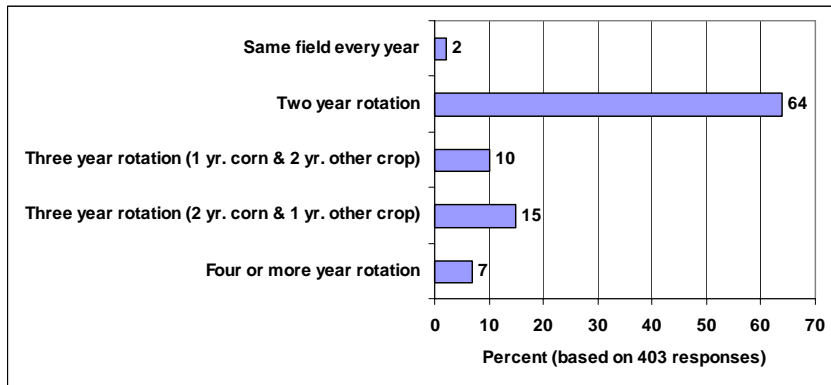
13

When calibrating and adjusting your grain drill do you:



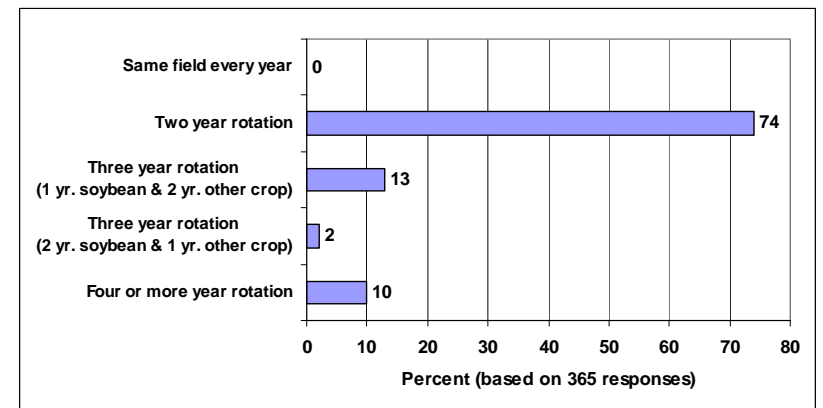
14

You generally plant corn:



15

You generally plant soybeans:



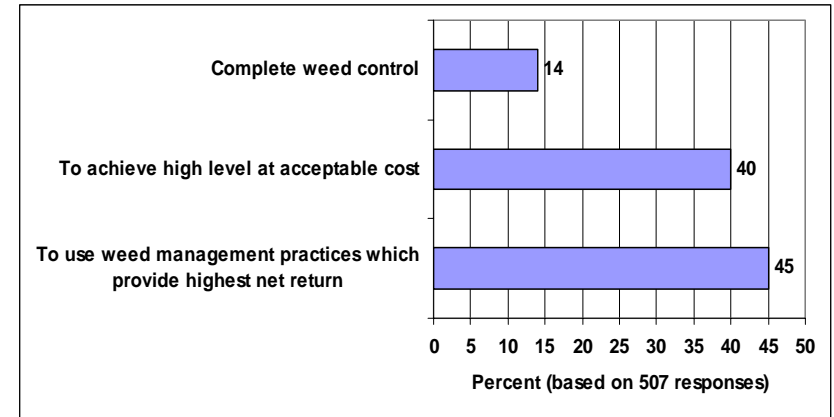
D-10

16

Section 2 Weed Management

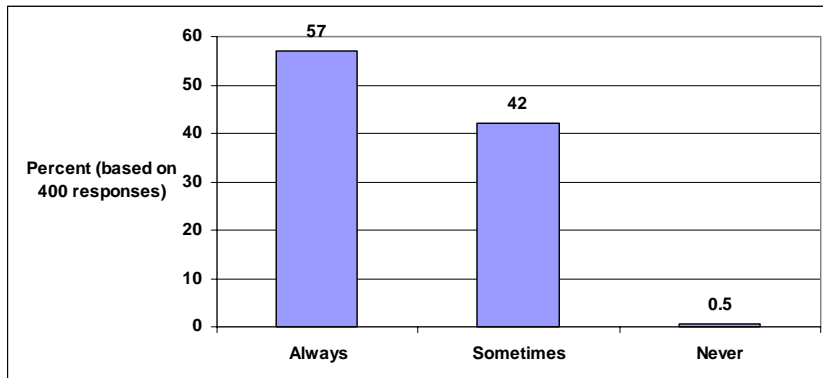
17

Which statement best describes your weed management philosophy?



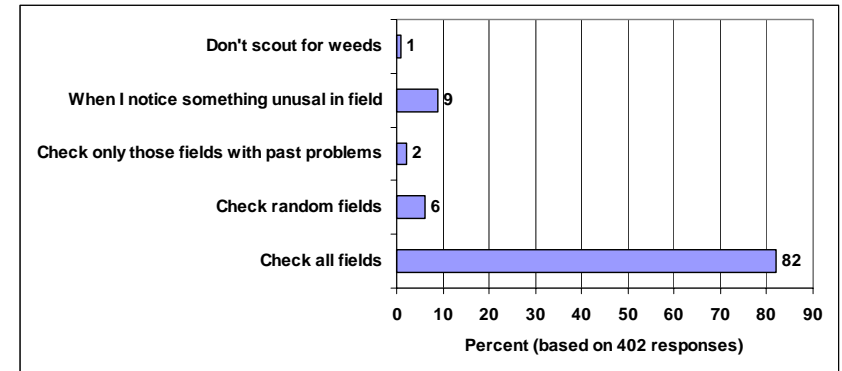
18

How confident are you that weeds on your farm have been properly identified?



19

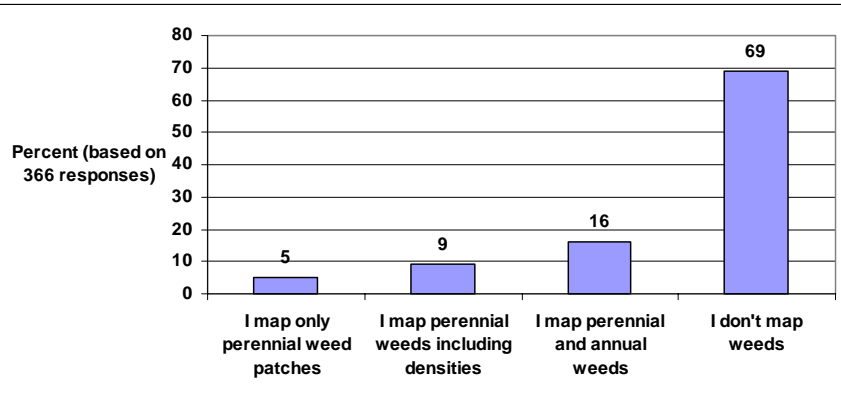
How do you scout for weeds?



D-11

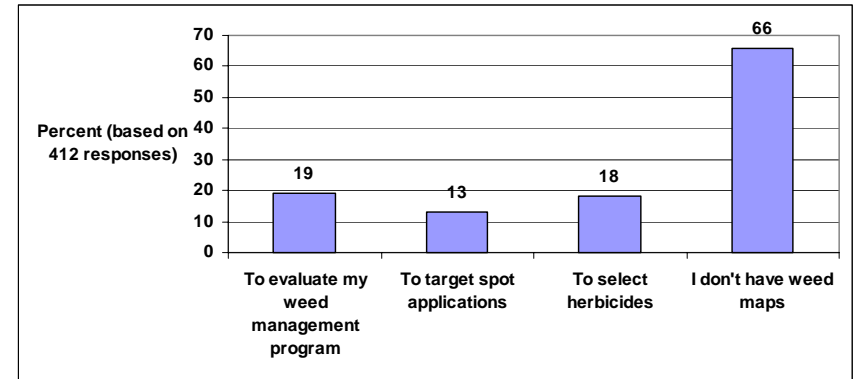
20

How detailed are your weed maps?



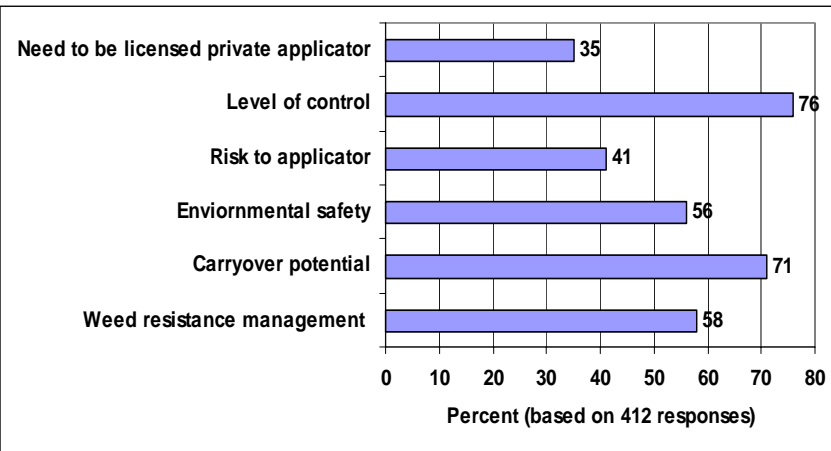
21

How do you use weed maps?



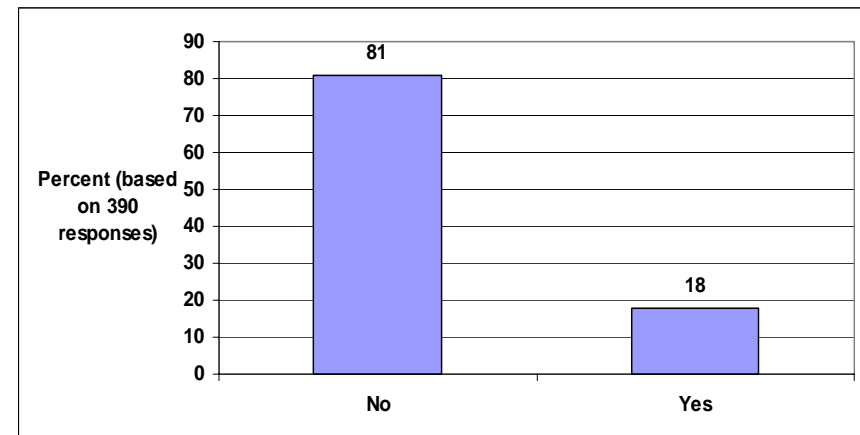
22

Which of the following do you actually consider when selecting herbicides?



23

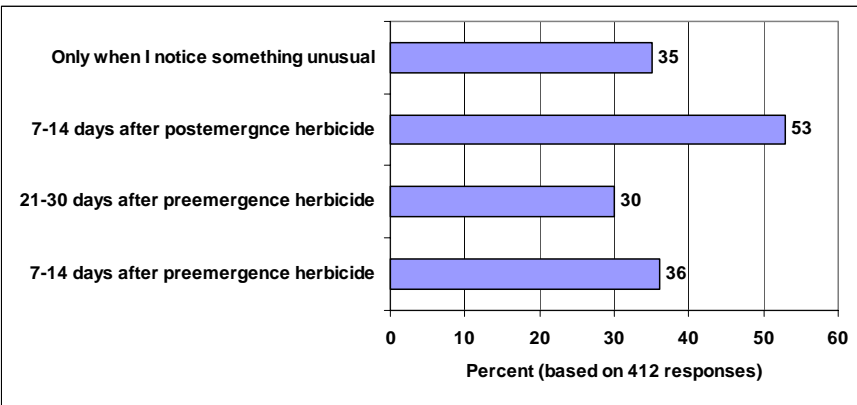
Do you leave untreated checks to assess weed pressure and percent control?



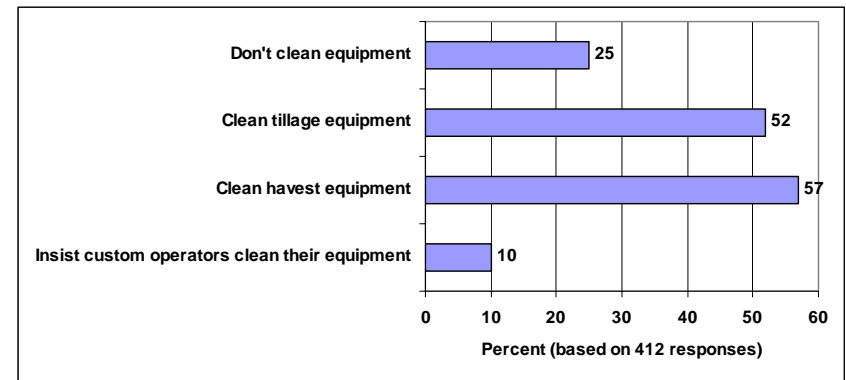
D-12

24

Do you scout fields for weed escapes to determine if additional control measures are necessary?

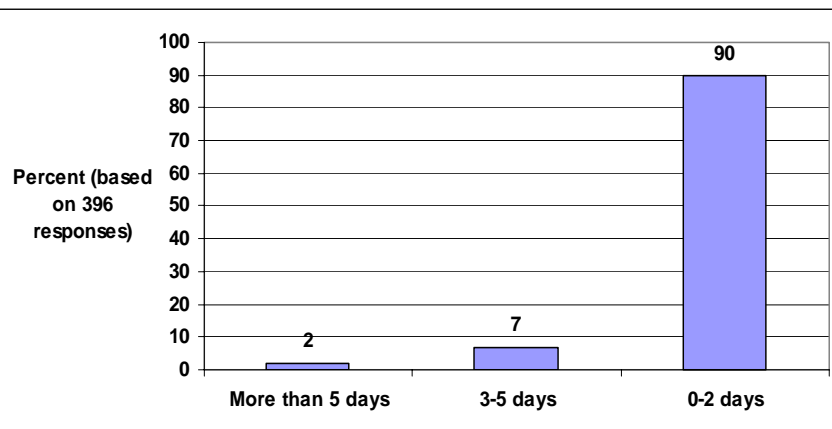


Which of the following measures do you use to prevent the spread of new weed species?



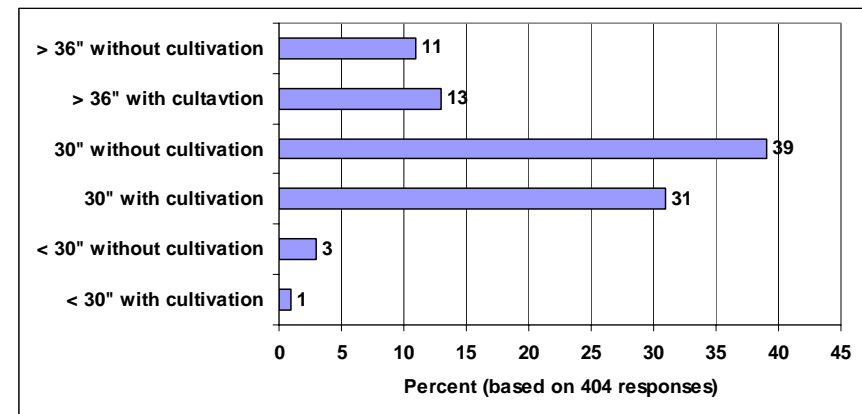
26

In general, how much time passes between final seedbed preparation and planting?



27

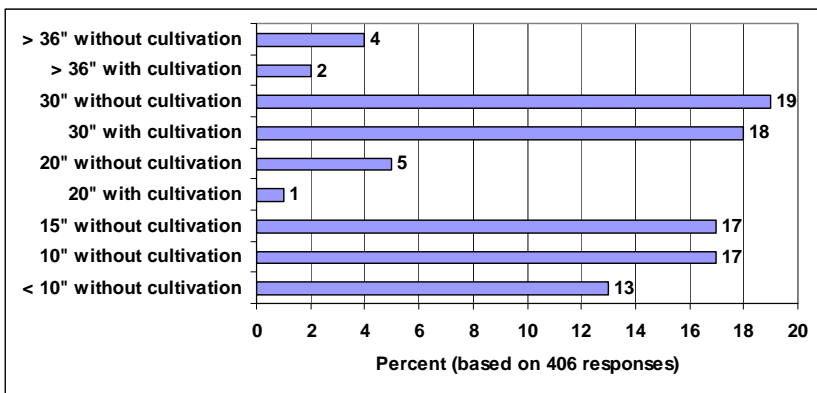
What is your corn row spacing & cultivation?



D-13

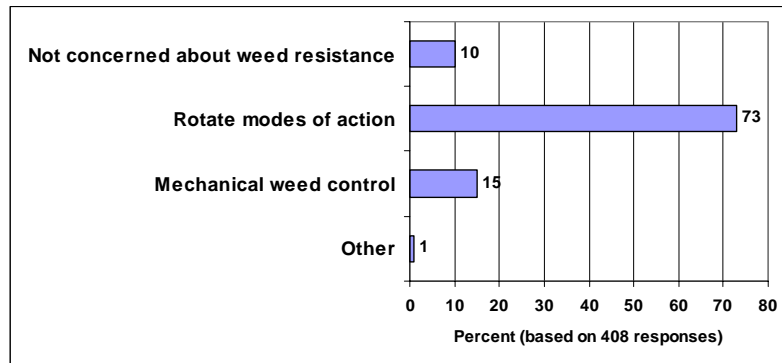
28

What is your soybean row spacing & cultivation?



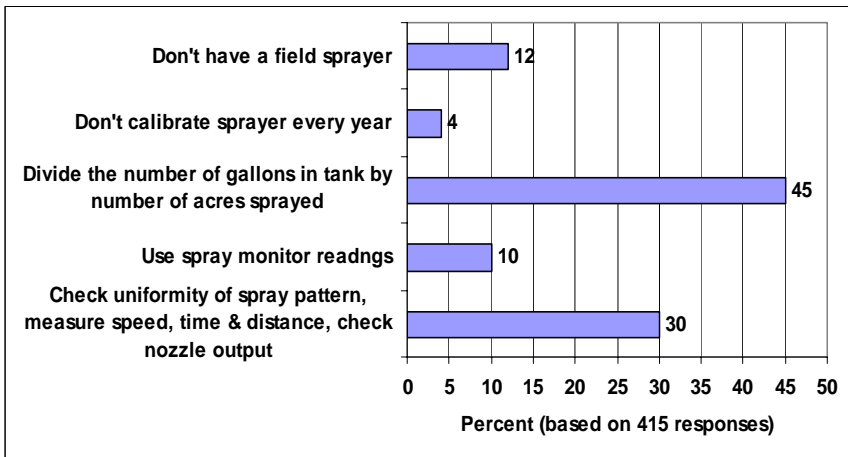
29

How do you manage weed resistance?



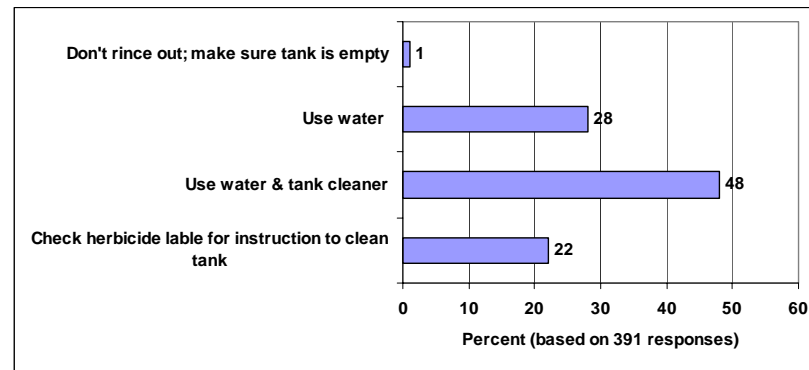
30

Which method best describes how you calibrate your field sprayer?



31

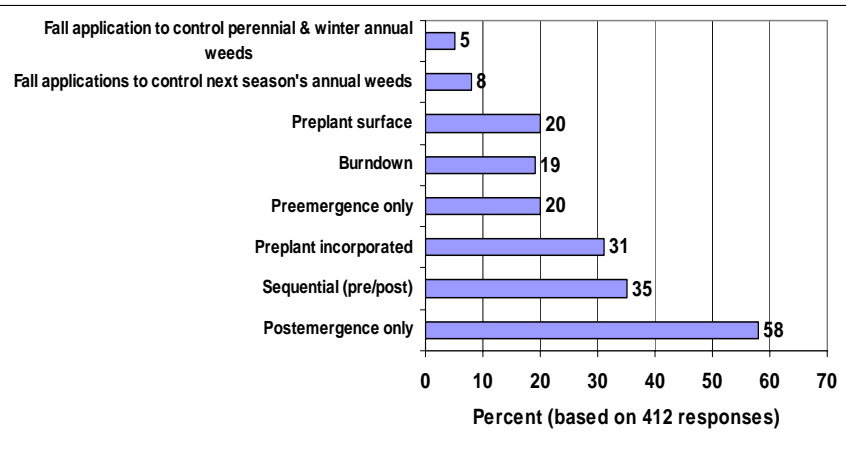
When changing from one crop to another, which method best describes how you clean the spray tank?



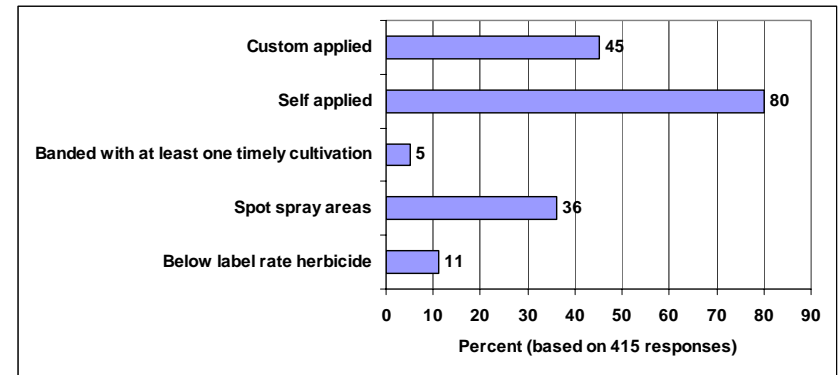
D-14

32

Which herbicide application timing(s) do you currently use?



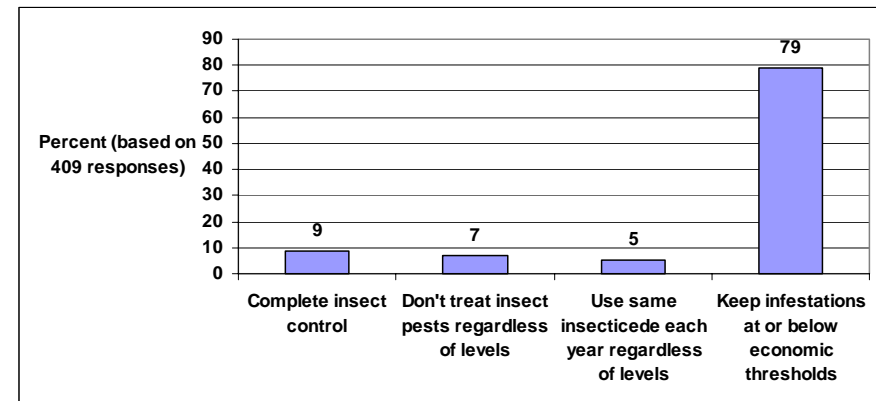
Which method of herbicide application do you generally use?



34

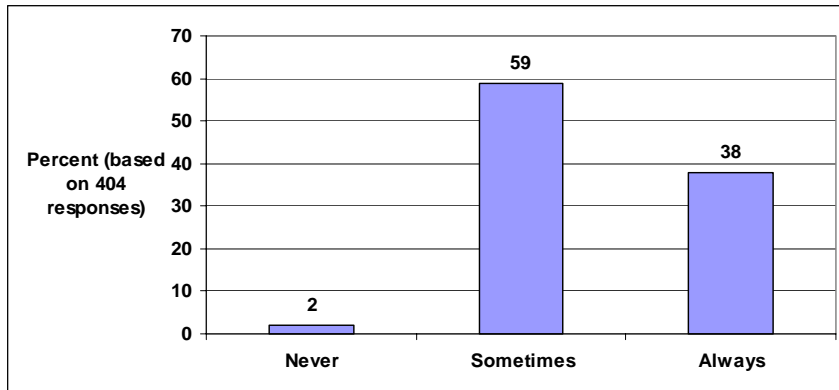
Section 3 Insect Management

Which statement best describes your insect management philosophy?



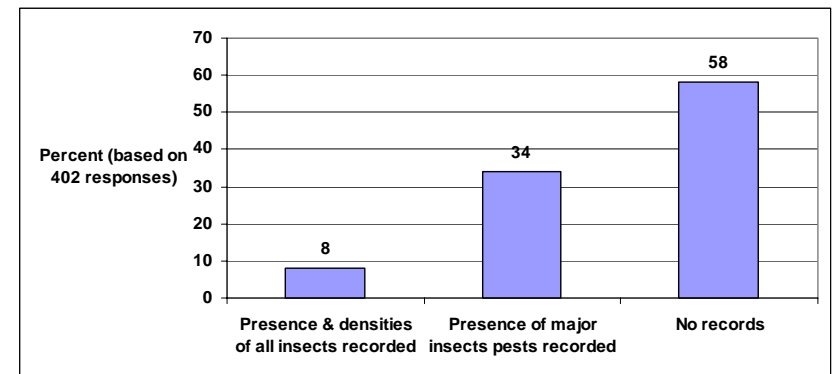
D-15

How confident are you that insect pests on your farm have been properly identified?



37

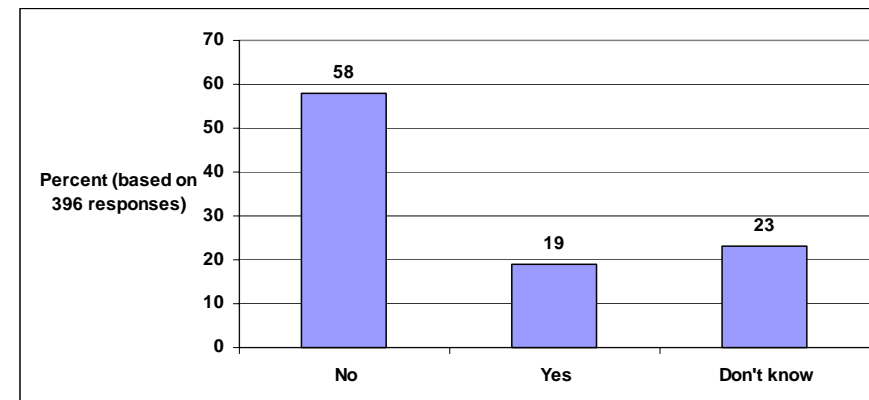
How detailed are your insect pest records?



38

Section 4 Insect Management Corn

Do you have problems with northern corn rootworms in corn following soybeans?

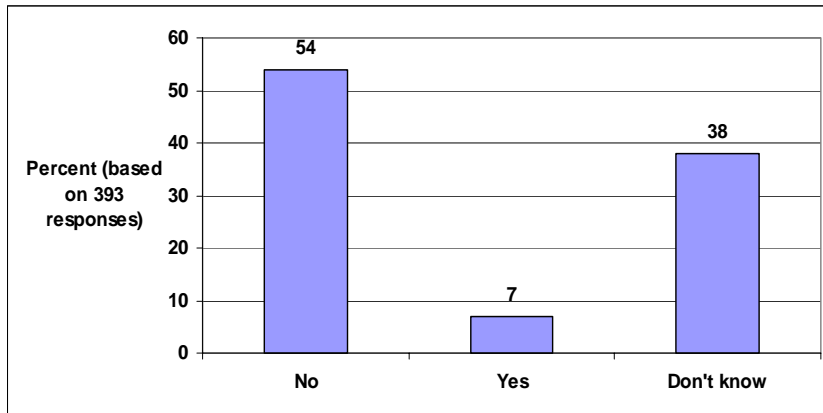


D-16

39

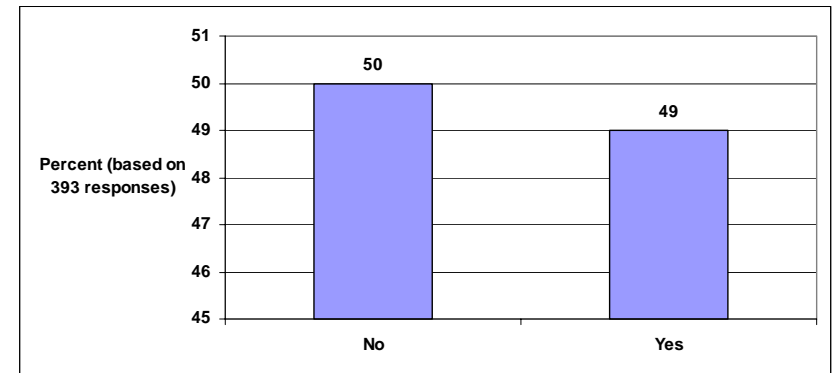
40

Do you have problems with western corn rootworms in corn following soybeans?



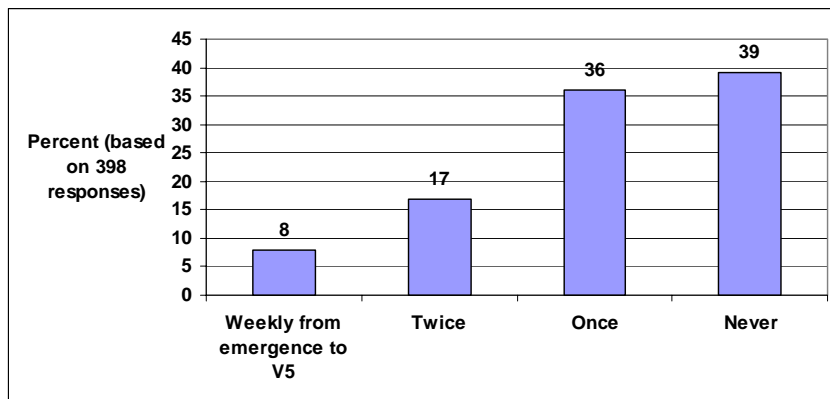
41

Is seedling corn scouted for seed corn maggot, white grub and wireworm damage?



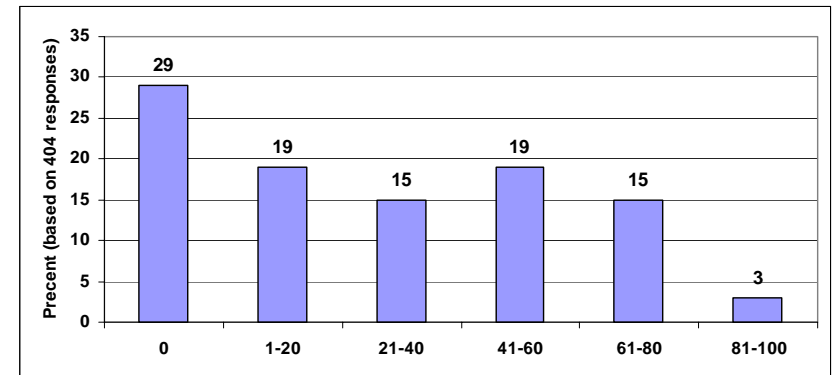
42

How often is your corn scouted for black cutworms from crop stages V1 to V5?



43

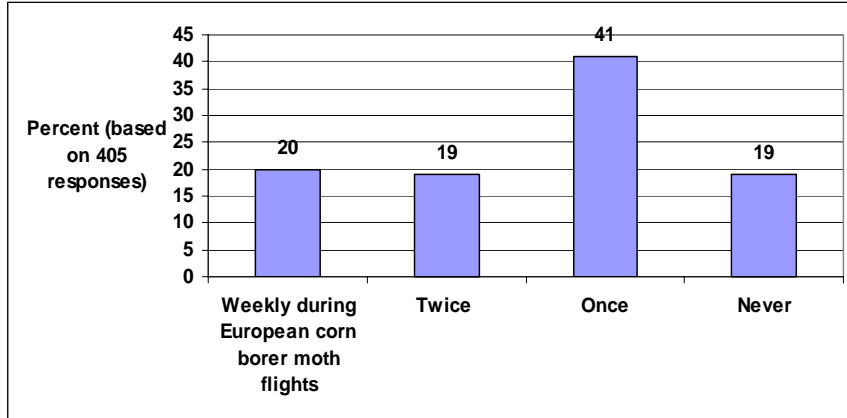
What percentage of your acreage do you plant to Bt corn hybrids?



D-17

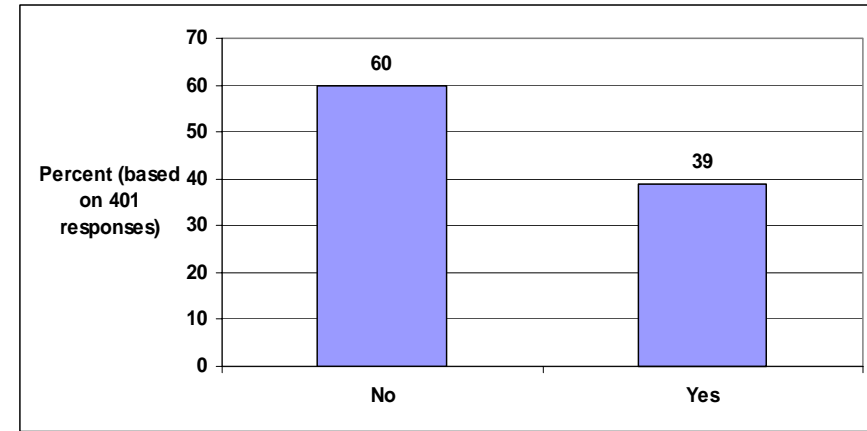
44

How often is your corn scouted for first generation European corn borer?

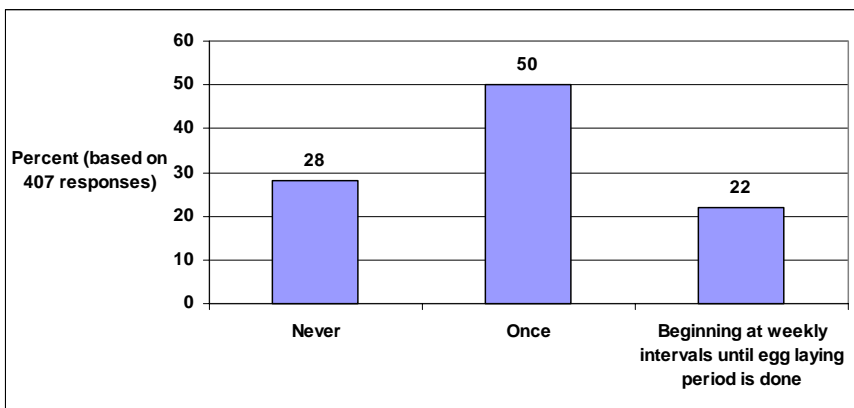


45

Do you use European corn borer scouting information to schedule harvest?

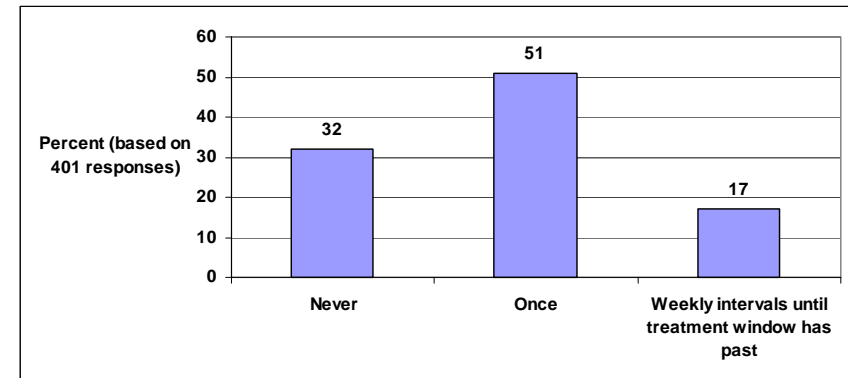


How often is your corn scouted for second generation European corn borer?



47

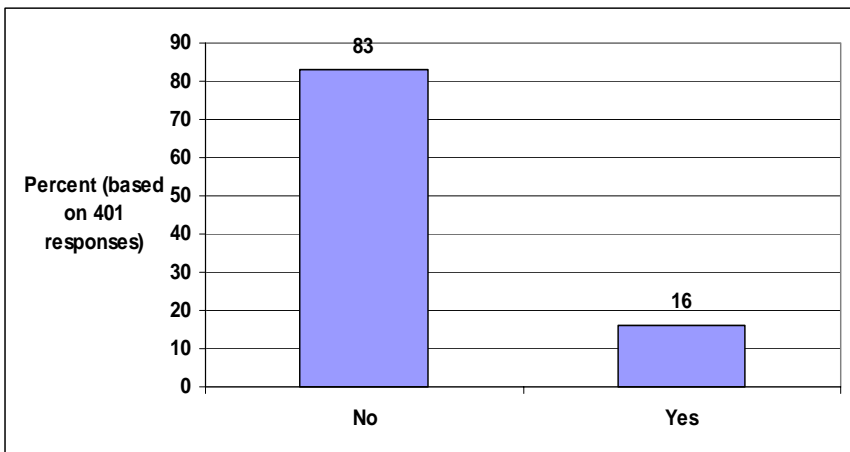
How often is corn scouted for common stalk borer?



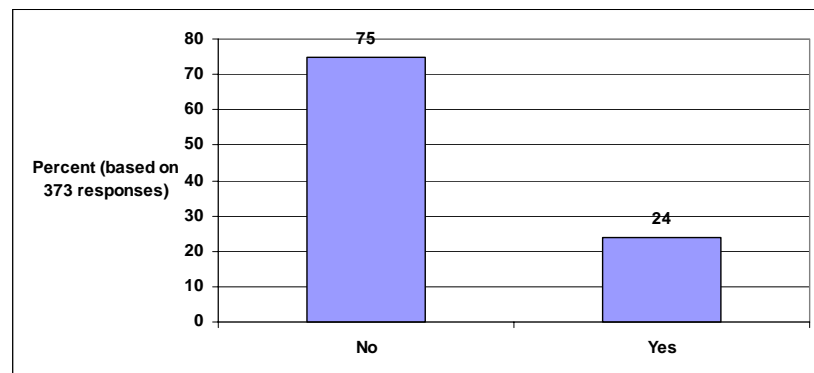
D-18

48

Do you apply insecticides on first-year corn to control corn rootworms?

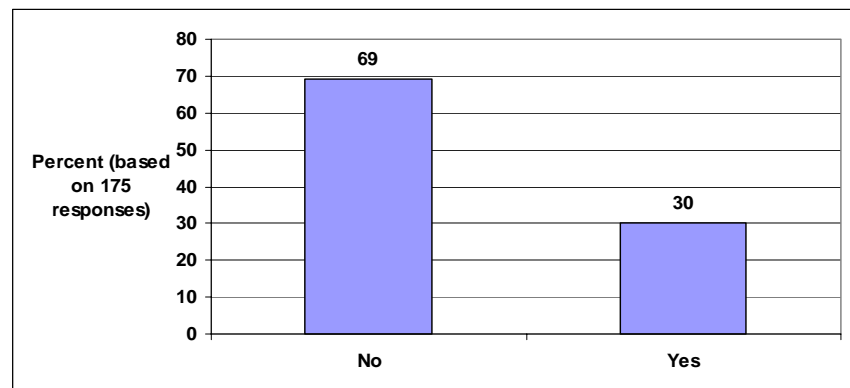


In continuous corn, do you scout for corn rootworm beetles to predict next years' damage potential?

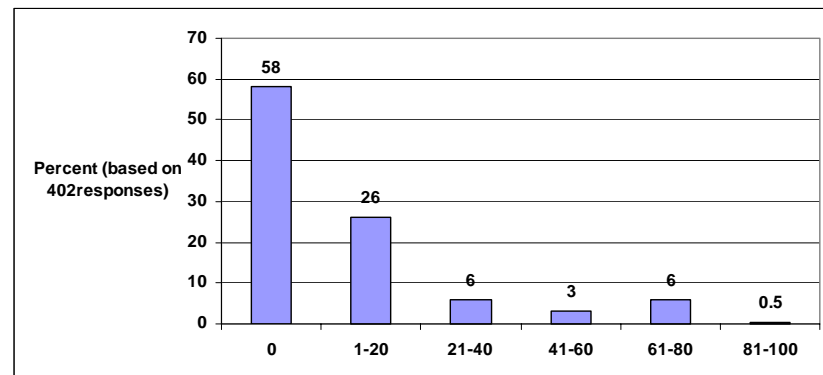


50

On continuous corn fields with light to moderate populations of corn rootworms, do you use below label rates of soil applied insecticides?

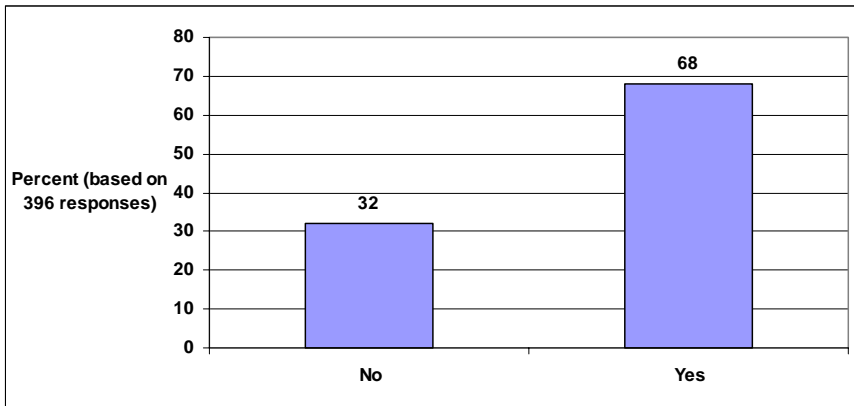


What percentage of your acreage do you plant to Bt rootworm hybrids?



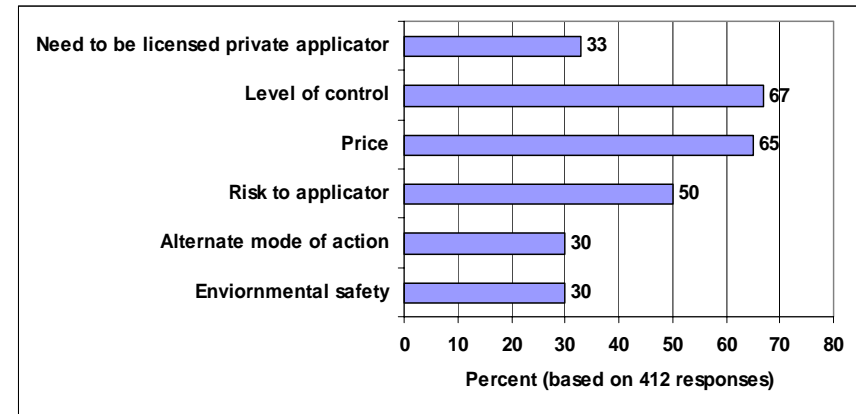
D-19

Do you consider the benefits of weed control on reducing insect pest infestations?

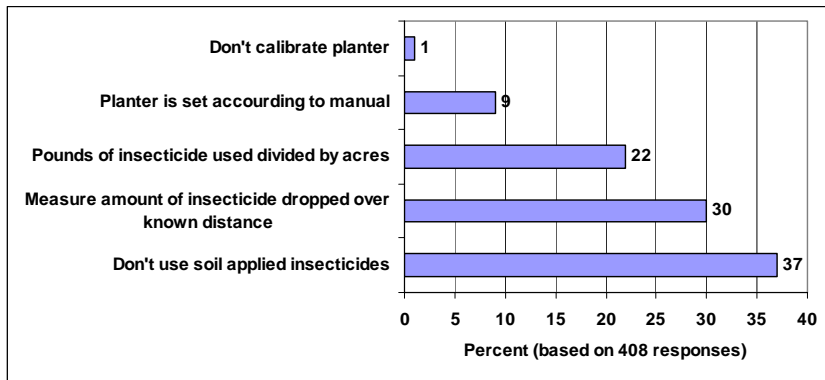


53

Which of the following do you actually consider when selecting a corn insecticide?

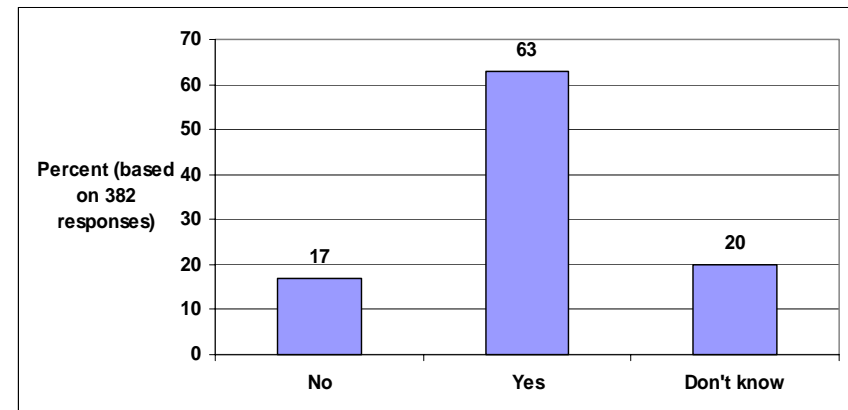


Which calibration method for soil applied insecticides do you use?



55

Do you follow the Insect Resistance Management Program when using Bt corn?



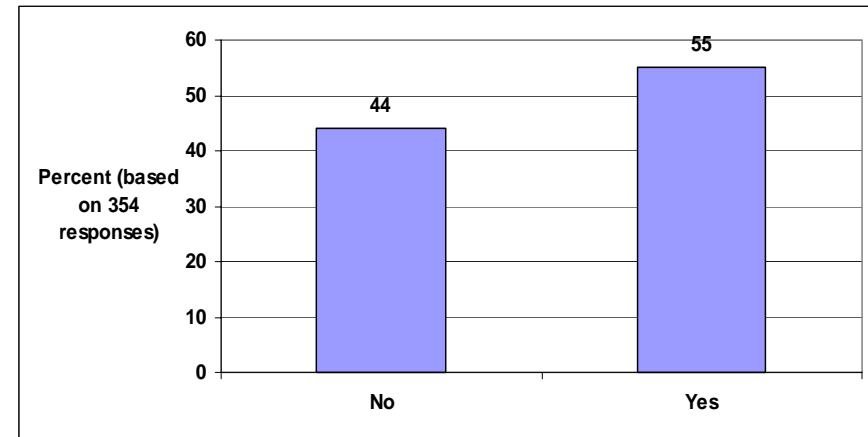
D-20

56

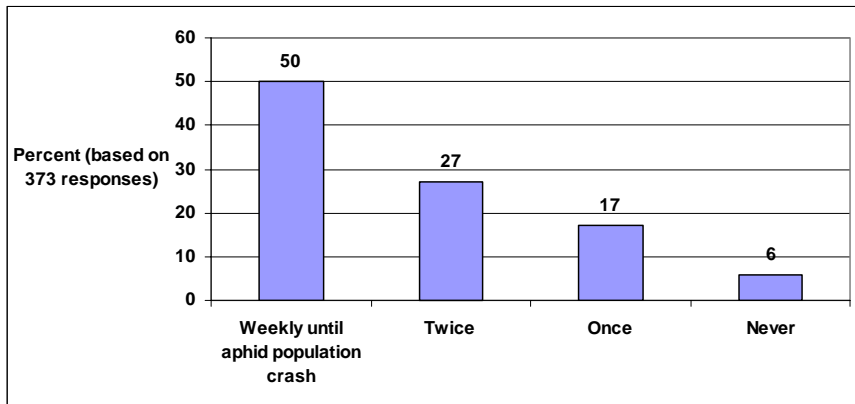
Section 5 Pest Management Soybean

57

Have you sprayed soybeans to control aphids?

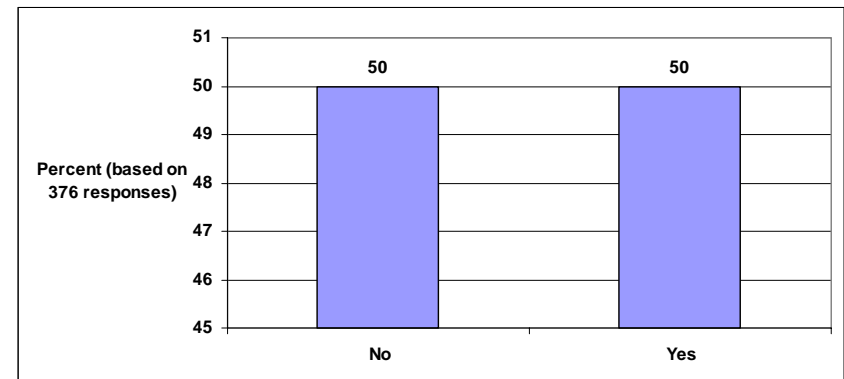


How often are your soybean fields scouted for soybean aphids?



59

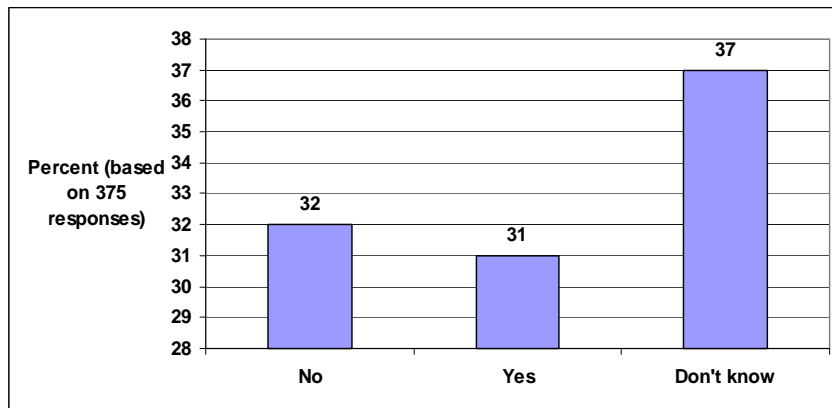
Have you scouted for SCN?



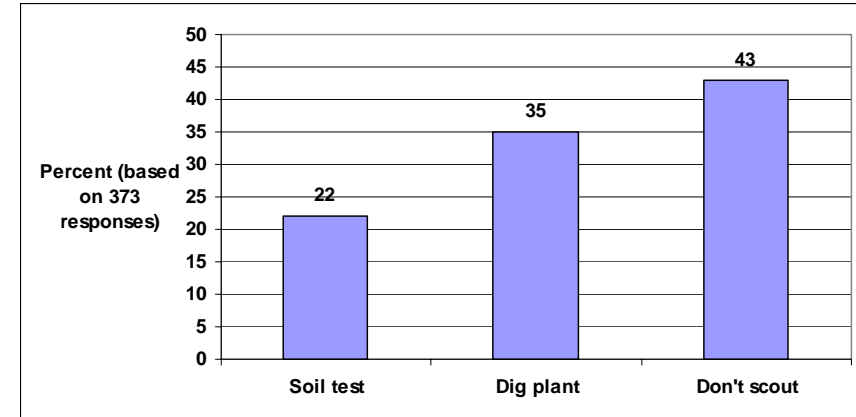
D-21

60

Do you have Soybean Cyst Nematode (SCN) on your farm?

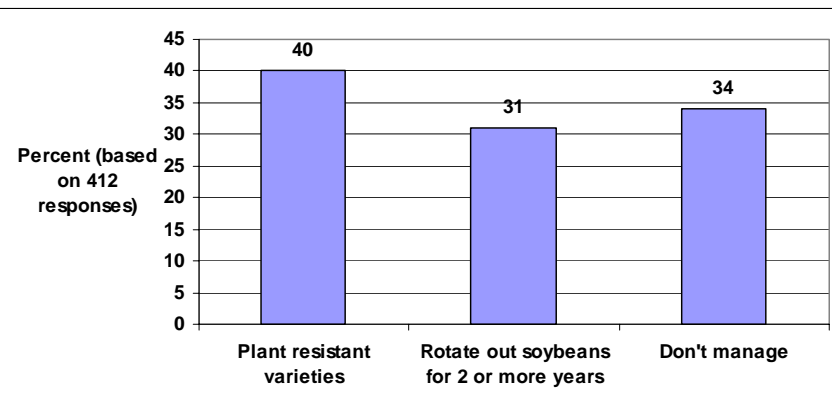


How do you scout for SCN?



62

How do you manage SCN?



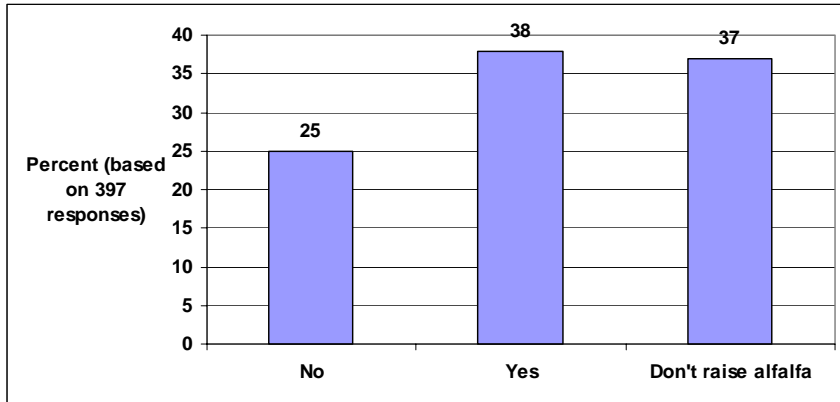
63

Section 6 Insect Management Alfalfa

D-22

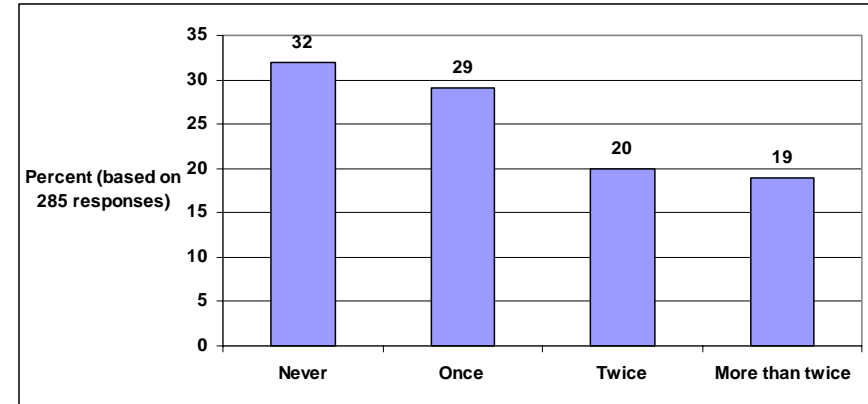
64

Have you sprayed alfalfa to control potato leafhopper?



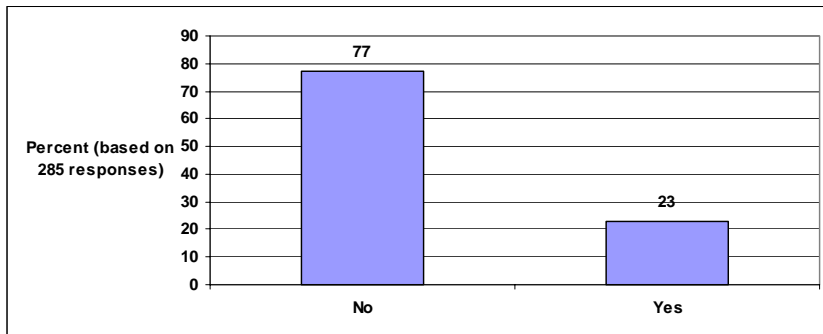
65

How often per cutting are your alfalfa fields scouted for potato leafhopper?



66

Do you use potato leafhopper resistant alfalfa varieties on your farm?



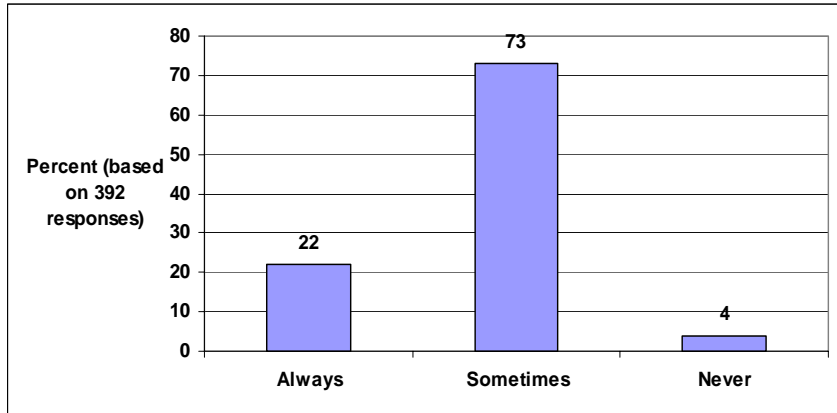
67

Section 7 Disease Management

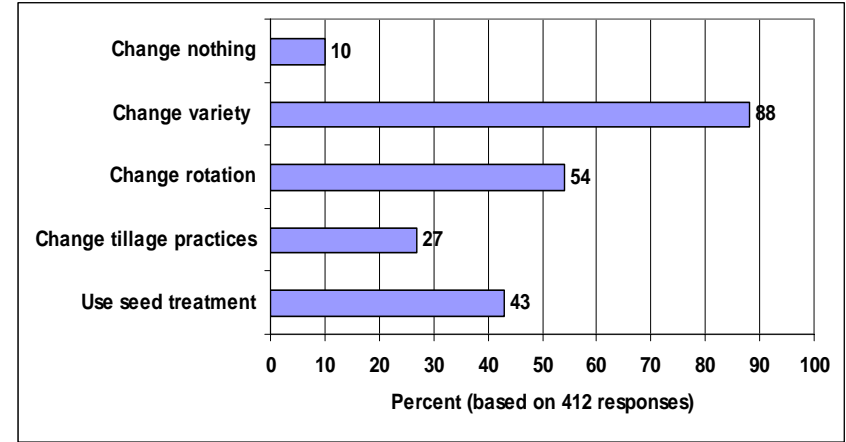
D-23

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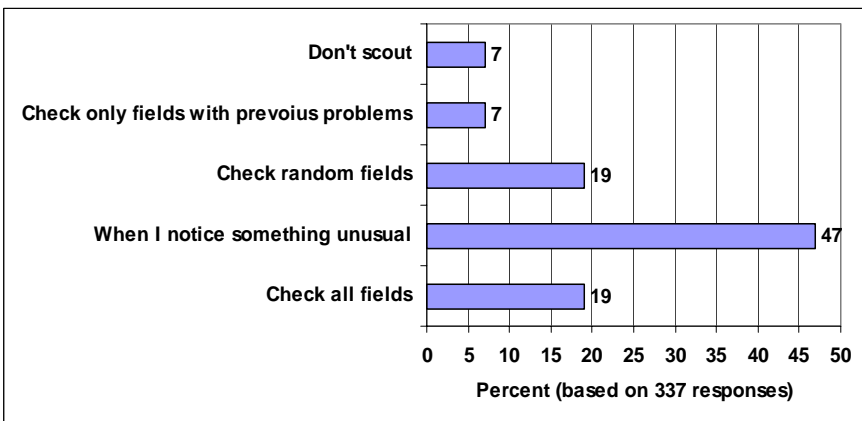
How confident are you that corn diseases on your farm have been properly identified?



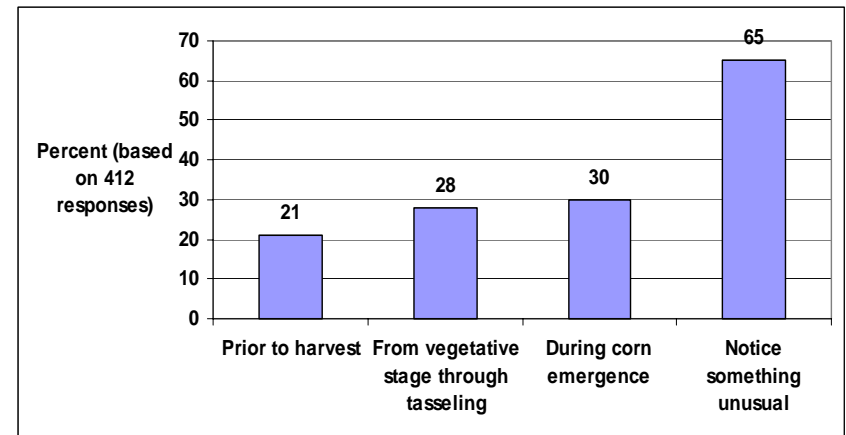
Based on the incidence of corn disease in the previous year do you:



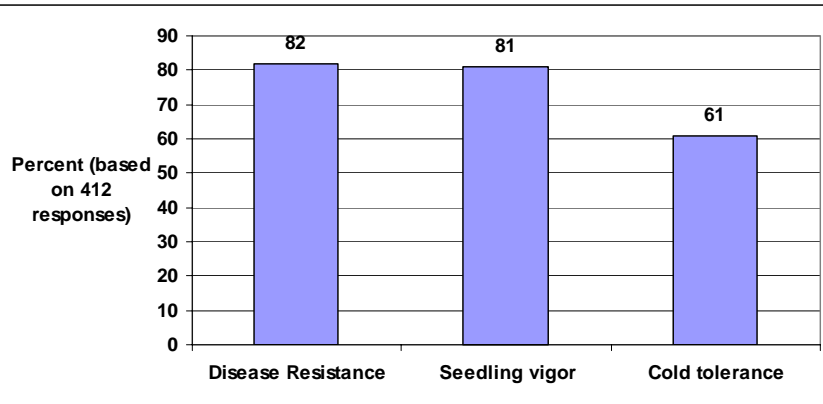
What general method do you use to scout for corn diseases?



What schedule do you use to scout corn for disease?

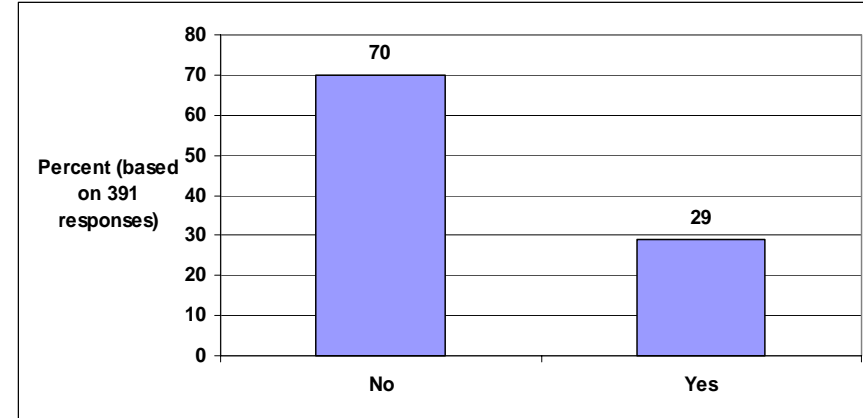


Do you consider any of the following traits when selecting a variety?



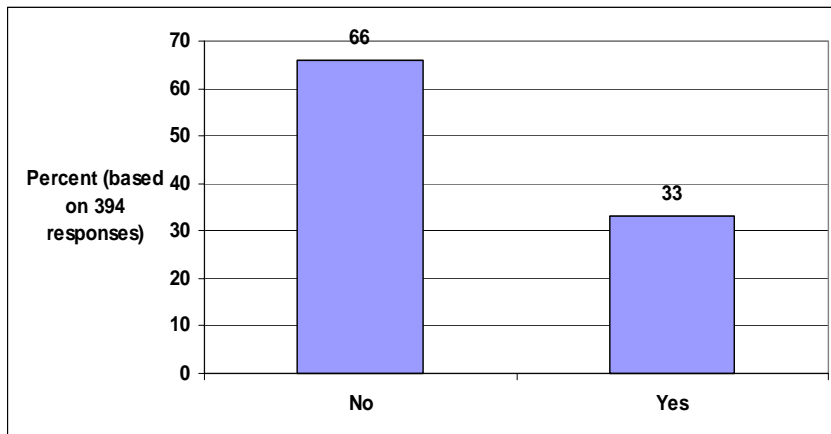
73

Do you request a specific seed treatment for seedling disease protection?



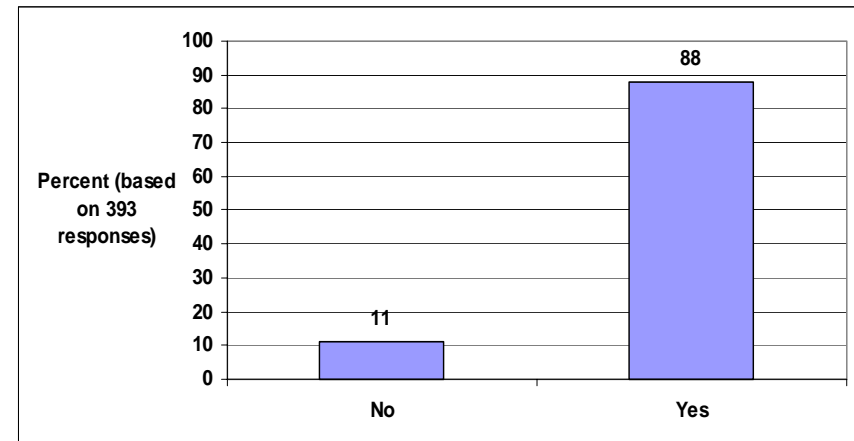
74

Do you use corn leaf health to predict stalk rot problems?



75

Do you harvest fields with stalk rot first?



D-25

76