

Weed Control Report - Bean and Beet Farm - 2005 Field Season

PI: Christy Sprague, Department of Crop and Soil Sciences.

Gary Powell, Department of Crop and Soil Sciences.

Research was conducted at the Bean and Beet Farm in Sugarbeet, Dry Edible Bean, and Soybean. Included below are summaries of this year's research. Because of space constraints individual treatment data is not included in this report. If you would like this information it is available electronically through the Weed Science project.

Sugarbeet Research

Title: *Kochia Control in Sugarbeet*

SUMMARY - Kochia is starting to become a problem in various sugar beet fields throughout Michigan. Most of the kochia that we have found in these fields is resistant to ALS-inhibiting herbicides (i.e., UpBeet). Michigan Sugar Co. in conjunction with MSU conducted a study examining different control strategies for kochia. Under an extremely high kochia infestation the most effective treatment for control of kochia included Nortron (PRE) at 3 pt/A followed by a split application of Betamix at 2 followed by 3 pt/A + UpBeet at 0.5 oz/A + Stinger at 0.25 pt/A + Nortron at 2 oz/A + Outlook at 8 fl oz/A + NIS at 0.25% v/v. Although this treatment was the most effective it caused severe sugarbeet stunting and would also be very expensive. Overall if kochia is a problem control measures should be diligent in rotational crops and the use of Nortron PRE is extremely important.

Title: *Betamix and Progress Formulations Comparison*

SUMMARY - New formulations of Betamix and Progress were compared to current formulations in micro-rate and standard split applications. These new formulations are isofenone-free, twice the concentration, and are different than formulations studied in the past. Micro-rate herbicide applications were made every 225 GDD₃₄ after the first application. Sugar beet injury and common lambsquarters control was similar between Bayer's new and old formulations of both Betamix and Progress. However, differences did occur in common lambsquarters control between standard micro-rate applications of Betamix and Progress. Common lambsquarters control was 10 to 15% greater with the Betamix micro-rate compared with the Progress micro-rate. Even with the standard Betamix micro-rate of Betamix + Upbeet + Stinger + MSO, common lambsquarters control was not complete 87%, 6 DA-D and 79%, 14 DA-D. Lack of control was probably due to the cold (<50°F)-dry (low relative humidity) weather at the time of the 2nd micro-rate application. When the Betamix rate of the new formulation was increased in the micro-rates, 6 fl oz (1st and 2nd app.) and 11 fl oz (3rd and 4th app.), control of common lambsquarters and Powell amaranth was improved, however crop injury was also greater. The addition of Upbeet + Stinger to standard-splits of Betamix or Progress also improved common lambsquarters and Powell amaranth control. The addition of

these two herbicides would also improve common ragweed. The treatment that provided the greatest control of common lambsquarters (93%, 14 DA-D) and Powell amaranth (95%, 14 DA-D) in this study consisted of higher rates of the new formulation of Betamix at 6 fl oz/A in the 1st and 2nd applications and 11 fl oz/A in the 3rd and 4th applications, all application contained Upbeet + Stinger + MSO.

Title: *Optimizing Weed Control with Dual Magnum and Outlook in Microrates I*

SUMMARY - Dual Magnum and Outlook applied in combination with micro-rate herbicide treatments were evaluated to determine the appropriate application timing of these two herbicides for optimum weed control without causing significant crop injury. Micro-rate herbicide applications were made every 225 GDD₃₄ after the first application. PRE applications of Outlook reduced sugar beet stand and caused significant crop injury. Although not always statistically different, applications of Dual Magnum or Outlook PRE, or in the 1st or 2nd micro-rate tended to cause more sugar beet injury, consistent with results from 2004. Increased Betamix rates (12 fl oz/A fb. 12 fl oz/A fb. 16 fl oz/A fb. 16 fl oz/A) in the micro-rates with Dual Magnum or Outlook applied in the 2nd micro-rate caused the greatest sugar beet injury. However, these higher rates of Betamix improved common lambsquarters control, 10 to 15% greater than standard micro-rate. Due to high common lambsquarters pressure and reduced control overall sugarbeet yields were low. Yield was not reduced from any of the herbicide treatments compared with the 4 micro-rate applications alone. Without any weed control strategies in place yield was reduced 75%.

Title: *Comparison of Different Adjuvants in Microrates*

SUMMARY - Several different adjuvants were evaluated for weed control and sugar beet tolerance in standard micro-rate herbicide applications. Micro-rate herbicide applications were made every 225 GDD₃₄ after the first application. Common lambsquarters control ranged from 62 to 87% with the different adjuvants tested, 6 days after the 4th micro-rate application. Out of the 14 different adjuvants tested, 6 provided similar common lambsquarters control to Loveland's MSO throughout the season. None of these adjuvants provided greater common lambsquarters control compared to the standard MSO used in MSU trials. Of the 6 adjuvants that provided similar common lambsquarters control, 2 provided significantly greater crop injury, 6 days after the 4th micro-rate application.

Title: *Timing of Amistar with Micro-Rate Programs*

SUMMARY - Amistar was applied to 2-leaf and 4 to 6-leaf sugar beets. Amistar applied with micro-rate herbicide applications significantly injured sugar beets. Injury from these applications was as much as 75 and 60% within three days after application to 2-leaf and 4-leaf sugar beets, respectively. Amistar applications within 3 days of a micro-rate application also injured sugar beets greater than a standard micro-rate, even though these applications caused significant sugarbeet injury not all of this equated to significant reductions in yield. However, yield and recoverable white sugar per acre was lower than the weed-free treatment when Amistar

was applied 2 d and 4 d after the 2nd micro-rate treatment and 1 d before and after the 3rd micro-rate treatment. To reduce the risk of injury and possible yield reductions, Amistar should not be applied less than 3 d before or after the 3rd micro-rate application. Progress micro-rate treatments with and without Amistar yielded less than the weed-free control.

Title: *Weed Control and Crop Toleramce in Roundup Ready Sugarbeets*

SUMMARY - Weed control of field pennycress, common lambsquarters, Pennsylvania smartweed, and sowthistle was excellent (>95%) will all treatments that contained glyphosate. In comparison, micro-rate treatments with Betamix provided significantly less common lambsquarters, Pennsylvania smartweed, and sowthistle control than glyphosate treatments. Sugar beet injury was less than 10% with all treatments. Additionally, regardless of formulation all glyphosate products provided similar weed control. Tank-mixtures with Dual Magnum, Outlook, Nortron, Stinger, or Amistar did not increase sugar beet injury compared with glyphosate applications alone and increased rates of glyphosate formulations did not significantly affect sugar beet injury. Even though sugarbeets were treated 4 times for Cercospora leaf spot, this variety was extremely sensitive to this disease resulting in low sugarbeet yields.

Title: *Sugarbeet Varitey Trial with Dual Magnum and Outlook I*

SUMMARY - PRE treatments of Dual Magnum and Outlook significantly injured 9 out of 12 and 12 out of 12 sugar beet varieties, respectively, even with the lack of precipitation within 2 weeks after application. Outlook applied to 2-leaf sugar beets caused injury to more varieties than Dual Magnum applied at the same time. Across all application timing, Dual Magnum and Outlook was safest applied to 4-leaf sugar beets. However, at this timing there were differences in varieties to both of these herbicides. Yield was lower when Dual Magnum was applied to C 271 at the 2-leaf stage and when Outlook was applied at the 4-leaf stage to B 5883 compared with their respective untreated control plots.

Title: *Tillage Comparison with Microrate I*

SUMMARY - Tillage type did not significantly affect sugar beet injury from micro-rate herbicide treatments or injury from PRE treatments of Dual Magnum, Nortron, or Nortron + Pyramin followed by a micro-rate treatment. However, late-season common lambsquarters control was significantly better with the micro-rate treatment in areas that were moldboard plowed compared with chisel plowed areas. By mid-August soil-applied herbicides improved overall pigweed weed control compared with the micro-rate treatment alone. Due to dry conditions early in the season soil-applied herbicides did not effect sugar beet growth or emergence. Across herbicide treatments sugar beet emergence was greater in the chisel plowed area compared with the moldboard plowed area within the first month after planting. By 35 days after planting sugar beet emergence was equivalent between the chisel and moldboard plowed areas. Sugar beet canopy closure was not different between the two tillage types. Yield was not affected by the herbicide treatments in either tillage system. However, yield was significantly higher in the moldboard plowed treatments compared with the chisel plowed treatments.

Dry Edible Bean Research

Title: *PPI, Pre, and Postemergence Weed Control in Black Bean*

SUMMARY - Heavy rainfall in early- and mid-June delayed planting that reduced the overall weed pressure at this site. Overall all sequential herbicide programs provided good control common lambsquarters and Powell amaranth. PPI programs adequately controlled common lambsquarters; however pigweed control was reduced due to later emergence.

Title: *Dry Edible Bean Desiccation Study*

SUMMARY - Initial (4 DAT) dry bean desiccation was greatest with Gramoxone Max followed by Valor. However by 7 DAT, dry bean desiccation was equivalent between Roundup WeatherMax and Gramoxone Max; and desiccation from Valor was significantly less. Roundup WeatherMax provided excellent control common lambsquarters and Powell amaranth. Gramoxone Max provided excellent control of Powell amaranth. Valor did not effectively control either of these weeds.

Title: *Dry Bean Class Tolerance to PRE and POST applications of Sandea*

Comments: Varieties and populations are as follows:

- 'Vista' Navy Bean - planted at 6.1" seed spacing
- 'Jaguar' Black Bean - planted at 6.1" seed spacing
- 'Merlot' Small Red - planted at 5.1" seed spacing
- 'Othello' Pinto - planted at 5.1" seed spacing
- 'Erimo' Adzuki - planted at 5.2" seed spacing
- 'Chinook 2000 light Red Kidney - planted at 4.8" spacing
- 'Matterhorn' Great Northern - planted at 5.1" seed spacing

Summary: Six classes of dry beans and adzuki beans were planted on June 20, 2005. The objectives of this study were to determine if there were any differences in dry bean class tolerance to Sandea (halosulfuron) applied PRE at 0.67 oz/A or POST at 0.67 oz/A plus a non-ionic surfactant at 0.25% v/v. Varieties of the different dry bean classes are as follows: 'Vista' navy beans, 'Jaguar' black beans, 'Merlot' small red beans, 'Othello' pinto beans, 'Chinook 2000' light red kidney beans, 'Matterhorn' great northern beans, and 'Erimo' adzuki beans. The plots were kept weed-free throughout the season. Visual injury, maturity ratings, and yield for PRE and POST applications were compared with an untreated control using contrast statements.

Injury to the different classes of dry beans from PRE applications of Sandea ranged from 6 to 19%, 30 d after planting (DAP) and 3 to 18%, 60 DAP (Table 1). Injury consisted of mostly of stunting compared with the untreated control. Adzuki beans and the 'Chinook 2000' light red kidney beans exhibited the greatest injury. Even though all dry bean classes exhibited some stunting compared with the untreated, the 'Merlot' small red kidney beans were the only class that exhibited a significant delay to 90% maturity (2 d) compared with the untreated control. Significant reductions in yield at the $\alpha = 0.1$ probability level were observed with 'Jaguar' black beans (23.9 cwt/A compared with 27.7 cwt/A) and 'Chinook 2000' light red kidney beans (14.2 cwt/A compared with 17.3 cwt/A).

POST applications of Sandea caused stunting and chlorosis to all dry bean classes. Dry bean injury 4 d after treatment (DAT) ranged from 21 to 48% (Table 2). By 12 DAT, some dry bean classes were starting to out grow the injury; however injury in the other classes like the adzuki beans and light red kidney beans became greater. Both of these classes were the most sensitive to POST applications of Sandea throughout the whole season, even though some classes still remained stunted compared with their untreated controls. Because of this stunting there were some significant delays in maturity compared with the untreated controls. 'Jaguar' black beans and 'Matterhorn' great northern beans were delayed 2 d, 'Othello' pinto beans and 'Merlot' small reds were delayed 3 d (Table 3). The 'Erimo' adzuki beans were delayed over 20 d. Significant reductions in yield at the $\alpha = 0.05$ probability level were observed with the 'Erimo' adzuki beans (4.1 cwt/A compared with 17.1 cwt/A), 'Jaguar' black beans (22.9 cwt/A compared with 27.7 cwt/A), and 'Chinook 2000' light red kidney beans (12.9 cwt/A compared with 17.3 cwt/A) (Table 3).

Soybean Research

Title: *Soybean Row-Width and Population-Saginaw*

Comments: Variety was 'Asgrow' 2107

Populations and Row Spacings are as follows:

7.5" row- 80,000, 120,000, and 180,000 plants per acre.

15.0" row- 80,000, 120,000, and 180,000 plants per acre.

30.0" row- 80,000, 120,000, and 180,000 plants per acre.

Herbicide Treatments:

- 1) Weedy Check
- 2) Weed Free
- 3) Roundup WeatherMax (22 fld oz/acre) + Ammonium Sulfate (17lb/100 gal) at a four inch weed height.

SUMMARY - A study was conducted to determine the effect of low soybean populations and row spacing on weedy and weed-free yields. At the Saginaw location this year, neither soybean row spacing nor population had an affect on weedy and weed-free soybean yields. However, there was a trend of slightly higher yields when soybean was planted in 7.5-inch rows under weed-free conditions. There are 5 other site-years for this study and broader conclusions should be made with all of these locations combined.