

WEED CONTROL RESEARCH WITH LABELED AND NEW HERBICIDES

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For the 2004 growing season research was conducted at the St. Gabriel Research Station and in Assumption, Lafayette, Iberia, St. James, St. Martin, St. Mary, and West Baton Rouge parishes.

Valor

Application of Valor in March to emerged sugarcane caused severe injury but recovery was rapid as growth rate increased with the warmer temperatures. Sugarcane was not injured with Valor as a directed application at layby. Application of Valor in the fall to emerged plant-cane was injurious and plants did not recover before winter. Excellent winter weed control without crop injury was obtained with Valor applied to the soil at planting.

DuPont K-4

Research evaluated rate and timing of application of DuPont K-4. Response of LCP 85-384 was evaluated for Dupont K-4 applied at 4 lb/A in the spring followed by 2 lb/A at layby and 3 lb/A in the spring followed by 3 lb/A at layby. These rates provided for a total of 6 lb/A, which is the label limit. Sugarcane injury was not observed, but weed control was compromised when only 2 lb/A was applied at layby. This led to a follow-up study where DuPont K-4 was applied with Prowl at rates of 4 lb/A + 4 qt/A (K-4 + Prowl), 3 lb/A + 4 qt/A, 3 lb/A + 3 qt/A, and 4 lb/A + 3 qt/A. These herbicide combinations provided excellent broad spectrum weed control with no crop injury. The cost of the combinations, however, would determine their utility. In another study, significant injury to LCP 85-384 occurred when either DuPont K-4 (4 lb/A) or Direx was applied postemergence overtop in March, April, or May. For the March application, maximum air temperature for the period seven days before and seven days after application ranged from 67° to 81° F with an average of 75.1°. For the April application maximum air temperature for the 15-day period ranged from 66° to 87° with an average of 79.9°. For the May application, maximum air temperature for the 15-day period ranged from 81° to 89° with an average of 86.4°. Reduced sugarcane and sugar yield occurred only for the mid-May application of the herbicides. It can be concluded that the response is temperature related and, if temperature at the time of application is around 85°, Dupont K4 or Direx should not be applied overtop of sugarcane.

Envoke

When applied alone Envoke at 0.3 oz/A did not provide complete control of rhizome johnsongrass or itchgrass, but did control morningglory (tie-vines) and nutsedge. Combinations of Envoke with Asulox/Asulam provided complementary broadleaf and grass weed control. Envoke at 0.3 oz/A applied with Asulox/Asulam at 2 qt/A (half rate) controlled large rhizome johnsongrass equal to or better than Asulox/Asulam applied alone at 4 qt/A (full rate). Envoke at 0.2 oz/A applied with Asulox/Asulam at 2 qt/A controlled itchgrass better than Asulox/Asulam applied alone at 4 qt/A. Weed death occurred three to four weeks after application, depending on species and growing conditions. Envoke applied overtop of sugarcane caused some yellowing

and white banding on leaves present in the whorl at application and slight stunting, but recovery was rapid and sugarcane yield was not affected.

Note: Specific data for all weed control experiments conducted in 2004 are presented in the Weed Science 2004 Annual Research Report and can be viewed at www.lsuagcenter.com/weedscience.

REDUCED TILLAGE AND RESIDUE MANAGEMENT IN SUGARCANE

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Sugarcane is a perennial crop, and in Louisiana four to six harvests are made from a single planting. Traditionally sugarcane row shoulders and middles are tilled to promote crop growth, eliminate ruts, incorporate residue from the previous crop, incorporate fertilizer, and control weeds. The row top (usually 24 inches wide) is not disturbed over the entire crop cycle. Although some form of reduced tillage is used in most agronomic crops, sugarcane growers have been slow to adopt reduced tillage practices.

In 2002, herbicides were applied in March at several locations after sugarcane was either off-barred (tillage of row shoulders and middles) or not off-barred. Sugarcane shoot population assessed around 4 weeks after herbicide application was as much as 12% greater where rows were not off-barred. Weed control was excellent in all experiments. At one site at layby in May, soil moisture was greater and sugarcane was taller in plots that had not been off-barred in March. Sugarcane height throughout the growing season was equal whether or not sugarcane had been off-barred.

Research in 2002 and 2003 evaluated the effect of off-bar tillage in March (with or without) and tillage at layby in May (with or without) on weed control and sugarcane growth. For these experiments, residue from the previous crop had been removed by burning or had naturally decayed and therefore was not a limiting factor. Dupont K4 (a premix of hexazinone and diuron) herbicide was used and weeds were not a detriment to sugarcane growth or yield regardless of tillage program. Soil temperature in the sugarcane drill for the March tillage and no-tillage treatments did not differ. Early-season sugarcane shoot population and late-season stalk population both years were each equivalent for the full tillage (off-bar plus layby tillage) and the no tillage program. Sugarcane and sugar yield were not negatively affected when tillage operations were eliminated.

Research in 2004 evaluated the possible interaction between tillage and management of sugarcane residue remaining after harvest in respect to weed control, sugarcane growth, and sugarcane and sugar yield. For the three experiments, a randomized complete block design with a factorial arrangement of treatments was used. Factor A represented crop residue management (removal by burning, mechanical removal using a Sunco Trash Tiger[®], or no removal), Factor B represented off-bar tillage in March (with or without), and factor C represented tillage at layby in May (with or without). Results confirmed those of previous research which showed that eliminating tillage is not detrimental to sugarcane growth or sugar yield when weeds are effectively controlled. Tillage efficiency in March (off-bar tillage) was not reduced where the residue was mechanically removed from the row top and placed in the row middle. When residue remained on the soil surface, some suppression of winter weed emergence and growth occurred but a spring herbicide application was still needed. Based on sugarcane and sugar yield, mechanical removal of residue was as effective as burning. Sugar yield was reduced when sugarcane residue was not removed from the row top compared with burning and mechanical removal in only one of the three experiments. Reasons for this inconsistency in response are being investigated.

INFLUENCE OF HERBICIDE RATE AND APPLICATION METHOD ON RESIDUAL CONTROL OF RED MORNINGGLORY

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In 2004, field experiments were conducted in West Baton Rouge Parish, La., to evaluate preemergence (PRE) control of red morningglory (*Ipomoea coccinea* L.) with various herbicides. In each experiment the experimental design was a randomized complete block with four replications and plot size was 10 ft by 20 ft. Herbicide treatments were applied on June 10 using a tractor-mounted, compressed air sprayer calibrated to deliver 15 GPA. To evaluate residual activity of the herbicides, red morningglory control data were collected 5, 7, 9, and 11 weeks after treatment (WAT). To eliminate weed competition as a variable, Liberty (glufosinate) was applied at 1 qt/A after each rating to control all vegetation.

In the red morningglory preemergence experiment, treatments included Spartan (sulfentrazone) at 3, 4, 5, 6, 7, and 8 oz/A; Aatrex (atrazine) at 1, 2, 3, and 4 qt/A; Valor (flumioxazin) at 2, 4, 6, and 8 oz/A; Dupont K4 (a premix of hexazinone and diuron) at 2, 3, and 4 lb/A; and Sencor (metribuzin) at 2 and 3 lb/A. Red morningglory control 5 WAT was at least 90% with Spartan at 4, 5, 6, 7 and 8 oz/A; atrazine at 3 and 4 qt/A; Dupont K4 at 3 and 4 lb/A; Sencor at 3 lb/A; and Valor at 4, 6, and 8 oz/A. Spartan at 3 oz/A, Dupont K4 at 2 lb/A, and Valor at 2 oz/A controlled red morningglory less than 80% 5 WAT. By 7 WAT, only Spartan at 4, 5, 6, 7, and 8 oz/A controlled red morningglory at least 90%. None of the other herbicide treatments controlled red morningglory more than 71% and atrazine at 1 qt/A, both rates of Sencor, and Valor at 2 and 4 oz/A controlled red morningglory no more than 50%. At 9 WAT, the five highest rates of Spartan provided at least 75% control of red morningglory and the low rate of Spartan and both rates of Dupont K4 were the only other treatments that controlled red morningglory at least 50%. At 11 WAT, the five highest rates of Spartan controlled red morningglory 71 to 76% and all other treatments provided less than 50% control.

In another experiment, treatments included Treflan (trifluralin) at 2 qt/A plus Spartan at 4, 5.3, 6.7, and 8 oz/A pre-plant incorporated (PPI), Treflan at 2 qt/A PPI followed by Spartan PRE at the same rates, Treflan PPI alone, and Spartan PRE alone. All PPI treatments were incorporated with a field cultivator equipped with a rear rolling basket. Red morningglory control 5 WAT was at least 95% when Spartan was applied PRE, but was 85 to 94% when Spartan was incorporated. At 7 WAT, the 4 oz/A rate of Spartan applied PRE controlled red morningglory as well as the higher rates. By 9 WAT, red morningglory control was no more than 76% when Spartan at 4 to 6.7 oz/A was incorporated. Spartan at 4 oz/A applied PRE, however, was still providing equivalent control to the 8 oz/A rate 9 WAT. Spartan at 8 oz/A controlled red morningglory 9 WAT 86 to 89%, but by 11 WAT control was no more than 80%.

These results clearly show that reported red morningglory control failures with atrazine are directly related to lack of long-term residual activity. This can be attributed to a change in cultural practices where herbicides at layby are applied in early to mid May as opposed to late May and early June. Findings show that for most effective red morningglory control at layby, herbicide application should be delayed as long as possible. Under severe red morningglory infestations, Spartan should be used rather than atrazine, Valor, Dupont K4, or Sencor because Spartan provided longer residual control. Spartan is more effective when applied to the soil surface rather than incorporated.

SUGARCANE FALLOW PROGRAMS: WEED CONTROL AND ECONOMICS

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Optimizing input costs with the objective of maximizing net profits are concepts that have been slowly adopted by sugarcane producers in part because of industry stability. A reduction in tillage operations both in crop and in the fallow period can significantly reduce input costs. Research is under way to evaluate the effect of reduced tillage programs on weed control and sugarcane growth and yield. After three to five years of production, sugarcane plant populations in Louisiana are reduced to the point that replanting is warranted. Fields are fallowed to address problems with drainage and perennial weeds such as bermudagrass [*Cynodon dactylon* (L.) Pers.] and johnsongrass [*Sorghum halapense* (L.) Pers.]. Ineffective control of perennial weeds in fallow can have an economic impact in both the plant-cane crop (first production year) and in successive crops. A study was conducted at St. Gabriel, La., to evaluate various weed control programs in fallowed sugarcane fields, specifically to compare mechanical destruction of sugarcane stubble followed by tillage, soil-applied herbicide, and/or Roundup UltraMAX applications (conventional programs) with a no-till system where Roundup UltraMAX was used to kill sugarcane stubble and weeds. Another study conducted in Henderson, La., evaluated only the conventional programs. At both locations, standard herbicide programs at planting and throughout the first production year were implemented to allow for direct comparison of the effectiveness of the fallow treatments.

At the Henderson location sugarcane shoot emergence 36 and 247 days after planting (DAP) was not negatively affected by any of the conventional fallow programs. Bermudagrass ground cover 86 and 247 DAP showed that tillage alone provided little control of bermudagrass (45 and 73% ground cover, respectively). However, bermudagrass control where tillage and Roundup UltraMAX were used was excellent ($\leq 5\%$ ground cover) throughout the first production year. By August of the first production year, sugarcane height and stalk population were less where tillage alone was used in fallow compared to the other programs. Sugarcane growth reduction where only tillage was used in fallow was reflected in reduced sugarcane and sugar yields of approximately 40% compared with the other conventional programs. Even though the tillage alone program was the lowest cost input program (\$34.00/A), net returns were \$216 to \$291/A higher for the other programs. This was because of the significant sugar yield reduction observed where a tillage alone program was used in the fallow period.

At the St. Gabriel location, differences in shoot population, sugarcane height, sugarcane or sugar yield for the first production year were not negatively affected by the fallow treatments. Unlike the Henderson location, weeds were not a limiting factor at St. Gabriel since weeds were effectively managed in both no-till and conventional tillage programs. Therefore, the effectiveness of fallow weed control programs were based on economics where net returns (NR) were compared to the tillage only program (NR=\$0.00/A). At St. Gabriel, based on inputs and yields, the most economical program for fallow was the combination of 4 tillage operations and 1 glyphosate application (NR=\$8.23/A). However, a no-till system can be used in fallow fields to manage weeds equal to or better than conventional tillage programs without negatively affecting sugarcane production and can be economically competitive (NR=\$-1.71/A) with a tillage only fallow program.

Other experiments were conducted at St. Gabriel, La., to evaluate control of LCP 85-384 sugarcane with various rates of glyphosate and at Henderson, La., to evaluate glyphosate formulations.

Maximum control 45 days after treatment (DAT) was achieved when Roundup UltraMAX was applied at 1.0 lb ai/A to 6 to 12-inch-tall sugarcane (94%). When application was delayed until sugarcane was 18 to 24 inches tall, 2.0 lb/A was needed to obtain 95% control. Sugarcane was controlled 88 to 94% 38 DAT when Roundup WeatherMAX, Roundup OriginalMAX, Roundup UltraMAX, Mirage, or Honcho Plus was applied at 2.0 lb/A to 8- to 10-inch-tall sugarcane. In a no-till system less expensive glyphosate formulations could be used to decrease input cost without sacrificing sugarcane stubble destruction.