

Layby Herbicide Treatments to Control Weeds During Row Closure in Sugar Beets Grown for Seed, 2015

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Abstract

Sugar beets grown for seed in central Oregon is a small, established industry. Weed control in sugar beets is dependent on precise application timings early in weed development for adequate control while minimizing crop damage. This project was designed to evaluate layby herbicide applications to extend weed control during row closure and minimize the need for hand weeding. Outlook at 18 oz/acre plus Nortron at 16 oz/acre provided the best control at 75 percent. There was a broad spectrum of weed species in the plot area, with common lambsquarter, hairy nightshade, redroot pigweed and knotweed included on the herbicide labels that were tested.

Introduction

A small acreage of sugar beet seed production has been grown in Jefferson County since the late 1990's. While the acreage is modest in size, sugar beet seed has been a consistent part of agricultural production in the area. Effective weed control in sugar beets is an inherently difficult process, as sugar beets are in the plant family Amaranthaceae that includes difficult to control types of pigweed. Herbicides are first applied to the crop at the two-leaf stage in an effort to control young weeds without damaging the crop.

The objective of this project was to evaluate layby herbicide applications to provide additional weed control during the growing season while row closure is taking place. Once row closure occurs the crop is able to more effectively compete with the weed pressure.

Methods and Materials

Plots were established at layby following the last cultivation in the spring. Plots 20 feet wide by 24 ft long included 4 female rows with blank rows and a male row on each side. Plots were replicated 4 times in a randomized design centered down the single set of 4 females. Five treatments included Outlook alone and in combination with Dual Magnum and Nortron at two rates, along with an untreated check. Treatments were applied May 21 using a CO₂ pressurized, hand-help boom sprayer at 40 psi and 20 gal/acre water. Plots were evaluated June 11 for percent weed control. A follow-up evaluation was conducted on June 16 to count the number of plants for each weed species per plot.

Results and Discussion

The best layby weed control was provided by Outlook at 18 oz/acre plus Nortron at 16 oz/acre with 75 percent control (Table 1). This was followed by Outlook alone at 21 oz/acre and in combination with Nortron at 8 oz/acre with 68 percent control. Outlook at 21 oz/acre plus Dual Magnum at 16 oz/acre provided 42 percent control.

There was a broad spectrum of weed species in the plot area. Weeds species listed on the herbicide label for Outlook includes common lambsquarter, hairy nightshade and redroot pigweed, the label for Nortron includes common lambsquarter, redroot pigweed and prostrate knotweed, while the label for Dual II Magnum includes hairy nightshade and redroot pigweed.

When evaluating herbicide treatment performance against each of the weed species, Nortron at both rates plus Outlook provided 100 percent control of buttonweed, Nortron at 16 oz/acre in combination with Outlook provided the best control of kochia and lambsquarter, and Dual II Magnum with Outlook provided the best control of hairy nightshade. All treatments controlled watergrass and appeared to have some control against redroot pigweed and common groundsel. The data is less conclusive for knotweed, field bindweed, buttonweed and was inconclusive for China lettuce and yellow mustard.

Acknowledgements

The primary author would like to thank Holly Sugar for funding this project, Gordon Fellows and Joe Bristol for their assistance in the design and management of the project, and Bob Vanek for his participation as grower cooperator.

Table 1. Anthesis initiation, termination, and duration, total number of ergot spores captured during anthesis, and ergot incidence and severity at harvest for 12 Kentucky bluegrass cultivars grown in artificially infested plots at COARC¹

Treatment	Anthesis initiation	Anthesis termination	Anthesis duration	Total spores during anthesis	Incidence (%)	Severity
Blue Ghost	136.0 b	153.0 bc	17.0 b	229 c	11 ab	27.5 ab
Gateway	141.0 a	159.0 abc	18.0 b	511 abc	8 ab	11.0 b
Shamrock	134.8 b	153.0 bc	18.3 b	229 c	3 b	11.0 b
Bluechip	134.5 b	161.0 ab	26.5 a	605 b	10 ab	23.0 ab
Gladstone	134.8 b	159.0 abc	24.3 ab	511 abc	11 ab	35.3 ab
Nuglade	143.5 a	164.5 ab	21.0 ab	811 a	10 ab	26.3 ab
PST-K4-7	141.0 a	161.0 ab	20.0 ab	605 ab	5 b	5.0 b
Fielder	135.3 b	155.0 bc	19.8 ab	323 bc	3 b	3.3 b
Midnight II	143.8 a	162.8 ab	19.0 ab	686 ab	17 a	51.8 a
Jumpstart	136.0 b	155.0 bc	19.0 ab	323 bc	2 b	3.8 b
Right	135.3 b	153.0 bc	17.8 b	229 c	4 b	6.0 b
DB-1013	135.8 b	153.0 bc	17.3 b	229 c	7 ab	14.0 b
	$P < 0.0001$	$P < 0.0001$	$P = 0.003$	$P < 0.0001$	$P = 0.0002$	$P = 0.0006$

¹ Means followed by the same letters are not statistically different using Tukey's comparison. Anthesis initiation and termination dates are presented as perpetual Julian days (134 = May 14; 164 = June 12)

Table 2. Correlations (*r*-values) between the number of ergot spores captured and environmental data collected from Watchdog data loggers placed in the field or environmental data collected from the AgriMet MRSO weather station located at COARC¹

Environmental variable	Field	MRSO
Maximum air temperature	0.38*	0.40*
Minimum air temperature	0.50*	0.52*
Mean air temperature	0.46*	0.47*
Air daily degree days	0.25*	0.46*
Air cumulative degree days	0.33*	0.32*
Maximum soil temperature	-0.02	0.52*
Minimum soil temperature	0.48*	0.47*
Mean soil temperature	0.36*	0.49*
Soil daily degree days	0.30*	0.51*
Soil cumulative degree days	0.35*	0.32*
Relative humidity	0.17	0.04
Dewpoint	0.52*	0.51*
Soil moisture	0.48*	NR ²
Daily precipitation	NR	-0.11
Evapotranspiration	NR	0.37*

¹ An *r*-value = 1 indicates a perfect correlation, while an *r*-value = 0 indicates no correlation. A * indicates the correlation was significant at $P < 0.05$.

² Not recorded

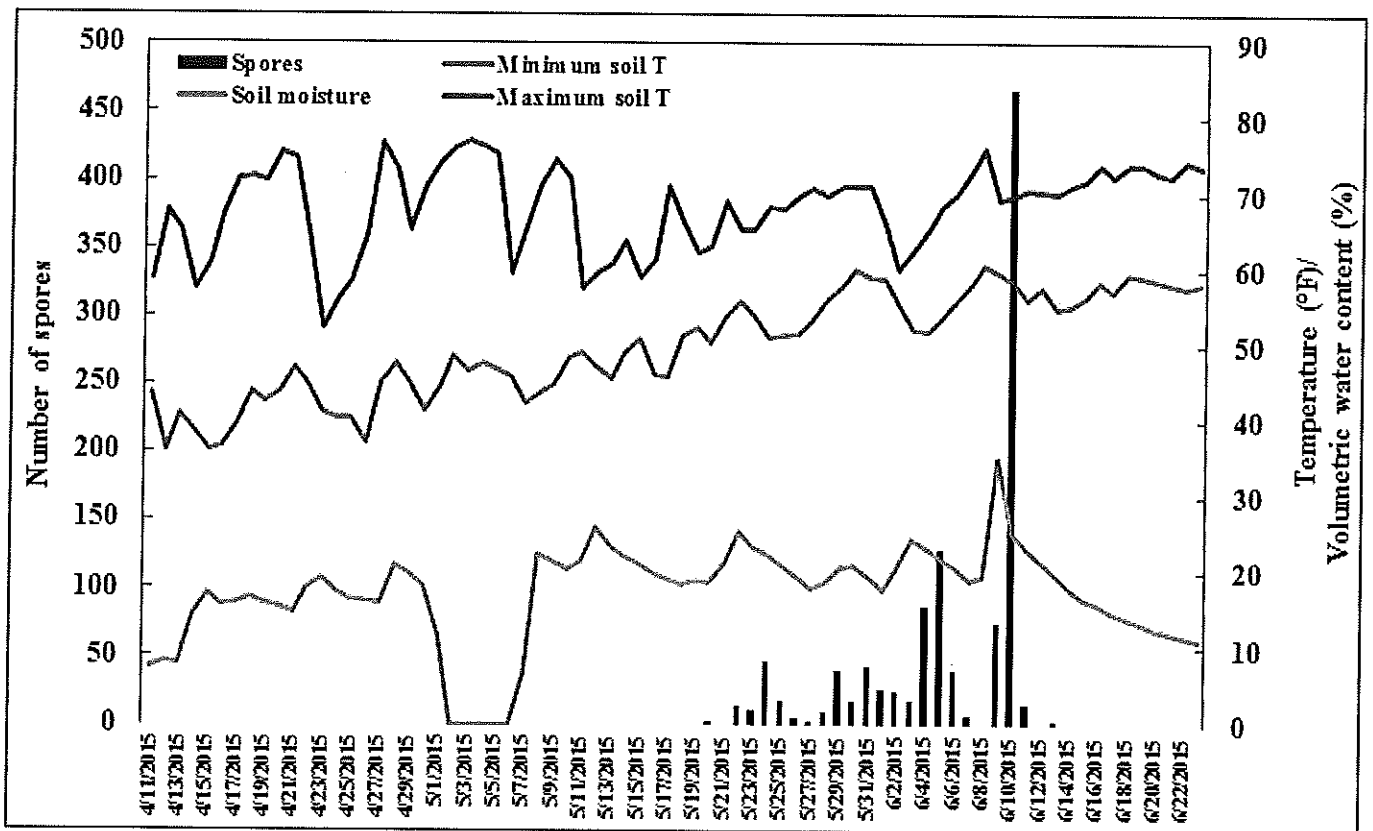


Figure 1. Daily number of ergot spores captured in artificially infested Kentucky bluegrass plots located at COARC (black bars) plotted with minimum daily soil temperature (green line), maximum daily soil temperature (red line), and mean daily soil moisture measured as volumetric water content (blue line).