

SUGAR BEET RESPONSE AND YELLOW NUTSEDGE CONTROL WITH DUAL MAGNUM[®] APPLIED EARLY FALL OF PRECEDING YEAR AND PRE-PLANT OF CROPPING YEAR

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Introduction

Weed control is an important component of sugar beet production. One of the most problematic weeds in some Treasure Valley fields is yellow nutsedge, which presents a crop production challenge particularly if not effectively managed in all crops grown in a rotation. The populations can expand and contract in individual fields based on a variety of environmental and management factors. However, given its perennial nature, yellow nutsedge remains a problem once it produces mature tubers in a field.

The current Dual Magnum[®] label allows post-emergence application after sugar beet plants are at the first true leaf stage, but at that time yellow nutsedge may have already emerged. Dual Magnum, a pre-emergence herbicide, does not control weeds that have already emerged including yellow nutsedge. Therefore, the use of Dual Magnum or Outlook[®] (which has the same mode of action) as post-emergence herbicides tank-mixed with glyphosate has largely failed to reduce yellow nutsedge in sugar beet fields.

Growers are advised to employ crop rotation as a technique to manage yellow nutsedge. Onion growers secured an indemnified label for Dual Magnum application to control yellow nutsedge the summer-fall preceding onion. Growers in the Treasure Valley would like this approach evaluated for sugar beet response. This study addresses that grower request.

The objective of this study was to evaluate sugar beet response to Dual Magnum applied and incorporated in the soil during late summer to early fall of the year preceding sugar beet.

Materials and Methods

A field study was initiated during fall 2017 in a field near Ontario, Oregon previously planted to wheat. The predominant soil was a Greenleaf silt loam with a pH of 7.2 and 1.79% organic matter. Wheat stubble was flailed and the field was irrigated, disked, ripped, and rototilled in August 2017. The study had a randomized complete block design with four replications. Individual plots were 14 ft wide (8 rows) by 35 ft long. Plow-down herbicide treatments were applied on September 5, 2017 and the field was immediately disked twice to incorporate the herbicides in the soil. The area was moldboard plowed on September 8 and ground-hogged on

September 11, 2017. Post-plowing treatments were applied on September 13 and plots immediately disced twice. Fall fertilizer was broadcast on October 4, 2017 based on soil analysis. The field was fumigated with Telone® C-35 and beds formed at 22-inch spacing on October 18, 2017.

Sugar beet hybrid BTS 27RR20 was planted on April 3, 2018. Pre-emergence treatments were applied immediately after planting. All plots (except untreated control) were sprayed with glyphosate at 32 fl oz/acre plus Outlook at 21 fl oz/acre in the third week of May. Sugar beet were grown following local production practices.

Evaluation for plant injury and weed control was done visually based on a scale of 0% (no sugar beet injury or no yellow nutsedge control) to 100% (complete sugar beet plant kill or total yellow nutsedge control). Evaluations were done at 42 and 56 days after sugar beet planting. In-season fertilizer was applied according the soil test results. Preventative sprays for diseases and insects were applied aerially by a commercial contractor. Roots were harvested in the third week of September and analyzed for sucrose content.

Results

Sugar beet emergence was observed April 13, 2018. Visual evaluation on May 15, 2018 indicated 0% injury for plants growing in plots treated with Dual Magnum at 1 pt/acre and 10% injury for Dual Magnum 1.33 pt/acre. Injury from surface-applied (after moldboard plowing and disking) Dual Magnum at 0.5 to 1 pt/acre was 6 and 9%, respectively. Evaluations on May 29 indicated plant injury had subsided but was still apparent in the surface applied treatments. The injury symptoms were characterized by 'lettuce like' growth habit with poorly unfurled leaves. Injury symptoms were transient and plants looked normal at about the 12-leaf stage.

Early season yellow nutsedge control on May 15 ranged from 79 to 86% for plow-down treatments, 90 to 94% for surface-broadcast treatments, and 69 to 75% for treatments applied pre-emergence (after planting in the year the sugar beets were grown) (data not shown). Mid-season yellow nutsedge control ranged from 88 to 95% for treatments applied the previous fall compared to 70 to 75% for the grower standard and pre-emergence treatments.

There were no differences in root yield across herbicide treatments. Root yield ranged from 43.3 to 47 ton/acre for Dual Magnum treatments compared to 16.1 ton/acre for fumigation only treatment (Table 1). The estimated recoverable sugar was reduced in the treatments that received Dual Magnum plow-down at 1.33 pt/acre and 0.75 pt/acre applied pre-emergence.

The prevailing weather conditions may have contributed to the results. The winter weather in 2017 and spring 2018 was dry, possibly slowing down herbicide breakdown and thus resulting in sugar beet injury from fall-applied Dual Magnum.

Acknowledgements

This project was funded by the Sugar Beet Seed Alliance, Oregon State University, the Malheur County Education Service District, and supported by Formula Grant nos. 2018-31100-06041 and 2018-31200-06041 from the USDA National Institute of Food and Agriculture.

Table 1. Sugar beet response to Dual Magnum (s-metolachlor) applied the previous fall at the Malheur Experiment Station, Ontario, OR, 2018.

Treatment	Rate	Timing ^z	Conductivity	Nitrate	Sucrose	Tare	Root yield ^y	ERS ^x
	per acre		mmhos	ppm	%	%	ton/acre	lb/acre
Fumigation			0.97	381.75	15.71 bc	4.1 ab	16.1 b ^w	4,142 c ^w
Dual Magnum	1 pt	Fall/plow	0.87	475.88	16.02 abc	3.4 ab	44.9 a	11,957 ab
Dual Magnum	1.33 pt	Fall/plow	0.95	530.38	15.91 abc	4.5 a	43.4 a	11,344 b
Dual Magnum + EPTAM	1 pt 7 pt	Fall/plow	0.95	490.38	15.85 abc	2.8 ab	46.1 a	12,029 ab
Dual Magnum + EPTAM	1.33 pt 7 pt	Fall/plow	0.88	368.13	16.52 a	3.0 ab	47.0 a	12,934 a
Dual Magnum + EPTAM fb*	0.5 pt + 7 pt	Fall/surface fb POST	0.89	384.75	16.37 ab	3.4 ab	43.3 a	11,761 ab
Dual Magnum + EPTAM	1 pt 7 pt	Fall/surface	0.89	435.13	16.37 ab	2.6 b	45.2 a	12,240 ab
Dual Magnum	0.5 pt	Fall/ plow	0.92	446.75	16.17 abc	3.7 ab	44.5 a	11,895 ab
Dual Magnum	0.5 pt	fb POST						
Dual Magnum	0.75 pt	PRE	0.95	470.50	15.66 ab	3.6 ab	44.0 a	11,304 b
Roundup + Outlook	22 fl oz 21 fl oz	POST	0.84	429.00	16.35 ab	3.3 ab	43.6 a	11,938 ab
LSD (0.05)			NS	NS	0.68	1.8	4.2	1,277

*fb = followed by.

^z Fall/plowdown = Treatments applied the fall preceding sugar beet; Fall/surface = treatments applied after soil tillage and disked in the soil twice during fall of preceding year; PRE = herbicide applied prior to sugar beet planting. POST = herbicide applied in-season to sugar beet at the 2-leaf stage.

^y Root yield was tared.

^x ERS = Estimated recoverable sucrose.

^w Means within a column followed by the same letter are not significantly different according to Fisher's protected least significant difference (LSD), $P \leq 0.05$.

Disclaimer: *products used in this study were for experimental purpose only and are NOT registered for use in sugar beet production.*