EVALUATION OF YUKON® HERBICIDE RATES FOR YELLOW NUTSEDGE CONTROL IN CORN GROWN IN ROTATIONS FOLLOWED BY ONION

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Introduction

Yellow nutsedge has become a major production threat in many agricultural fields in the Treasure Valley of eastern Oregon. The gravity of this problem is especially noticeable when the land is planted to onions. Thus, development of effective yellow nutsedge control strategies is necessary for the continued sustainability of the local onion industry. Control of yellow nutsedge presents a challenge because of its ability to reproduce vegetatively through rhizomes and tubers that can survive in the soil for 2-5 years. Research results at the Malheur Experiment Station indicate that millions of tubers are produced per acre each season in heavily infested fields (Felix and Ishida 2007, Shock et al. 2006). Successful control of yellow nutsedge will partly require development of elaborate crop rotation schemes that include tillage, fumigation, and herbicides to destroy those pesky tubers. Farming activities play a significant role in yellow nutsedge distribution in infested fields (Schippers et al. 1993). Yukon® herbicide is a premix of halosulfuron-methyl and sodium salt of dicamba marketed by Gowan Company for selective control of some annual broadleaf weeds and yellow nutsedge. Herbicides containing the active ingredient halosulfuron are arguably the best products on the market for yellow nutsedge control. The downside to these products is that onions tend to be ultra sensitive to even low soil residues. This study is an attempt to test products that will enhance yellow nutsedge control in rotations that include onions.

Materials and Methods

A field study was established in 2008 in a grower field near Fruitland, Idaho to determine the rates of Yukon herbicides that can be used to control yellow nutsedge in corn grown in rotation preceding onion in the Treasure Valley of eastern Oregon and southwestern Idaho. The trial was conducted in a well-drained, furrow-irrigated field that had been planted to corn the previous year. The predominant soil was an Owyhee silt loam with a pH of 6.8, organic matter of 1.1 percent, and a cation exchange capacity of 9 meq/100g soil. The study area was moldboard plowed, disked, and bedded to 30-inch spacing on April 29, 2008. The study was laid out in a randomized complete block design with four replications. Individual plots were 10 ft wide (4 rows) by 30 ft long. Four soil core samples (4.25-inch diameter) for yellow nutsedge quantification were taken to 12-inch depth on May 8, 2008. Follow-up samples to characterize treatment performance were taken on October 6 using the same methodology. The wash and sieve method was used to recover tubers from the soil samples, and tubers were

counted for each plot. Pre-emergence (PRE) treatments were applied on May 19 and a bed harrow was used for incorporation into the soil. Roundup Ready® corn hybrid 'DK C52-59-RR' was planted with a John Deere model 71 flexi planter on May 22, at 7⅞-inch spacing within the row. Corn plants were fertilized on June 18 using a compound fertilizer at the rate of 180, 20, and 3 lb/acre, nitrogen, potassium, and zinc, respectively. The study was corrugated and watered on June 20 and postemergence (POST) treatments were applied on June 24. All herbicide treatments were applied using a CO_2-pressurized backpack sprayer calibrated to deliver 20 gal/acre at 40 psi and 3 mph. Plots were visually evaluated for crop injury and weed control using 0-100 percent scale (where 0 = no crop injury or no weed control and 100 = complete crop kill or complete weed control) at 8 and 24 days after POST herbicide application timing. Treatment performance, changes in yellow nutsedge tubers, and corn yield data are presented in Tables 1 and 2. Harvesting was done by hand-picking corn ears at maturity on October 17, 2008 from the 2 center rows and 20-ft length.

Results and Discussion

Corn growth in the untreated plots was severely reduced (Table 1). Similarly, plant growth reduction was noticed in plots not treated with PRE herbicides. Use of PRE Eradicane® 6.7E or Dual Magnum® at 6 pt/acre or 1.33 pt/acre, respectively, produced the best early corn growth before POST applications. Yellow nutsedge control 8 days after POST application ranged between 19 and 86 percent with plots that received PRE herbicides giving the best performance. Visual control for common lambsquarters, pigweed species, and large crabgrass at 8 days after treatment (DAT) was recorded at 99 percent. In fact all herbicide treatments provided season-long control for these weed species.

Samples taken at the beginning of the study suggested uniform distribution of yellow nutsedge tubers at the site (Table 2). The average tuber population density ranged between 207 and 278/ft^2. Yellow nutsedge control 24 DAT ranged between 70 and 97 percent across herbicide treatments. Plots treated with PRE herbicides had the highest control once again. Soil samples taken at the end of the season indicated dramatic reduction in the number of yellow nutsedge tubers across treatments. Herbicide treatments reduced yellow nutsedge tubers by 54 to 72 percent across treatments. Corn yield varied greatly across herbicide treatments, with plots that received PRE herbicides producing the highest yield and the untreated control the lowest. Yield ranged from 137 bu/acre to 276 bu/acre across treatments. The results suggest significant reduction in yellow nutsedge when corn is planted, preferably, in the first year of a 3-year rotation. The Yukon label recommends that at least 18 months must elapse before planting onions. In fields heavily infested with yellow nutsedge, a generalized rotation of growing corn for 2 years in a row, with applications of Yukon in year 1 followed by Dual Magnum in year 2 before planting wheat in the year preceding onions, may provide the best yellow nutsedge control.

References

Felix, J., and J. Ishida. 2007. Effect of tuber placement on yellow nutsedge reproduction. Oregon State University Agricultural Experiment Station Special Report 1087:206-210.

Schippers, P., S.J. Ter Borg, J.M. Van Groenendael, and B. Habekotte. 1993. What makes *Cyperus esculentus* (yellow nutsedge) an invasive species? A spatial model approach. Proceedings Brighton Crop Protection Conference: 495-504.

Shock, C.C., J. Ishida, and E. Feibert. 2006. Yellow nutsedge nutlet production in response to nutlet planting depth. Oregon State University Agricultural Experiment Station Special Report 1075:160-162.

Table 1. Visual weed control at 8 days after herbicide application in Fruitland, Idaho, 2008.

Treatment	Rate	Unit	Application timing ‡	Corn growth reduction	Weed control †			
					Yellow nutsedge	Common lambsquarters	Pigweed species	Large crabgrass
					%			
Untreated check				46 a	0 d	0 b	0 b	0 b
Eradicane 6.7E	6	pt/a	PPI	0 b	86 ab	99 a	99 a	99 a
Yukon	4	oz/a	POST					
Roundup PowerMax	20	fl oz/a						
AMS*	3.2	pt/a						
NIS*	0.4	pt/a						
Eradicane 6.7E	6	pt/a	PPI	8 b	74 b	99 a	99 a	99 a
Yukon	8	oz/a	POST					
Roundup PowerMax	20	fl oz/a						
AMS	3.2	pt/a						
NIS	0.4	pt/a						
Yukon	4	oz/a	POST	35 a	31 c	99 a	99 a	99 a
Roundup PowerMax	20	fl oz/a						
AMS	3.2	pt/a						
NIS	0.4	pt/a						
Yukon	8	oz/a	POST	30 a	25 c	99 a	99 a	99 a
Roundup PowerMax	20	fl oz/a						
AMS	3.2	pt/a						
NIS	0.4	pt/a						
Yukon +	4	oz/a	EPOST	43 a	23 c	99 a	99 a	99 a
Roundup PowerMax	20	fl oz/a						
AMS	3.2	pt/a						
NIS	0.4	pt/a						
Yukon +	4	oz/a	2wks after					
Roundup PowerMax	20	fl oz/a	EPOST					
AMS	3.2	pt/a						
NIS	0.4	pt/a						
Sandea	1.33	oz/a	POST	38 a	19 c	99 a	99 a	99 a
Roundup PowerMax	20	fl oz/a						
AMS	3.2	pt/a						
NIS	0.4	pt/a						
Dual Magnum	1.33	pt/a	PPI	3 b	89 a	99 A	99 a	99 a
Sandea	1.33	oz/a	POST					
Roundup PowerMax	20	fl oz/a						
AMS	2.34	pt/a						

‡ PPI = Preplant incorporated, EPOST = Early postemergence, POST = postemergence.
† Means within a column followed by the same letter are not significantly different according to LSD $P = 0.05$.
* AMS = ammonium sulfate, NIS = non-ionic surfactant.

Table 2. Number of yellow nutsedge tubers before (5/8/2008) and after (10/16/2008) the herbicide treatment, control at 24 days after herbicide application, and corn yield (bu/acre) in Fruitland, Idaho, 2008.

Treatment	Rate	Unit	Timing ‡	Yellow nutsedge †			Corn yield*
				Tubers (before)	Control	Tubers (after)	
				Number/ft^2	%	Number/ft^2	bu/acre
Untreated check				228 a	0.0 d	287 (+21%) A	137 D
Eradicane 6.7E	6	pt/a	PPI	250 a	95 a	80 (-68%) B	276 A
Yukon	4	oz/a	POST				
Roundup PowerMax	20	fl oz/a					
AMS**	3.2	pt/a					
NIS**	0.4	pt/a					
Eradicane 6.7E	6	pt/a	PPI	207 a	94 a	78 (-62%) B	242 Ab
Yukon	8	oz/a	POST				
Roundup PowerMax	20	fl oz/a					
AMS	3.2	pt/a					
NIS	0.4	pt/a					
Yukon	4	oz/a	POST	259 a	86 ab	95 (-63%) b	218 bc
Roundup PowerMax	20	fl oz/a					
AMS	3.2	pt/a					
NIS	0.4	pt/a					
Yukon	8	oz/a	POST	259 a	79 bc	120 (-54%) b	195 c
Roundup PowerMax	20	fl oz/a					
AMS	3.2	pt/a					
NIS	0.4	pt/a					
Yukon +	4	oz/a	EPOST	272 a	79 bc	121 (-56%) b	219 bc
Roundup PowerMax	20	fl oz/a					
AMS	3.2	pt/a					
NIS	0.4	pt/a					
Yukon +	4	oz/a	2wks after				
Roundup PowerMax	20	fl oz/a	EPOST				
AMS	3.2	pt/a					
NIS	0.4	pt/a					
Sandea	1.33	oz/a	POST	271 a	70 c	102 (-62%) b	187 c
Roundup PowerMax	20	fl oz/a					
AMS	3.2	pt/a					
NIS	0.4	pt/a					
Dual Magnum	1.33	pt/a	PPI	278 a	97 a	78 (-72%) b	267 a
Sandea	1.33	oz/a	POST				
Roundup PowerMax	20	fl oz/a					
AMS	2.34	pt/a					

‡ PPI = Preplant incorporated, EPOST = Early postemergence, POST = postemergence.

† Means within a column followed by the same letter are not significantly different according to LSD $P = 0.05$.

* Corn yield has been adjusted to 15.5 percent moisture content and 56 lbs/bu.

** AMS = ammonium sulfate, NIS = non-ionic surfactant.