YELLOW NUTSEDGE MANAGEMENT WITH DUAL MAGNUM® AND OUTLOOK® IN TRANSPLANTED DRY BULB ONIONS

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Introduction

Yellow nutsedge is a perennial weed common in irrigated row crop production in eastern Oregon and southwestern Idaho. Yield losses of up to 87 and 89 percent for agronomic and horticultural crops, respectively, have been attributed to yellow nutsedge competition (Keeley 1987). Yellow nutsedge is problematic in many crops, especially those that are short in stature such as onion. Because of the onion's short stature and relatively small leaf area, much of the available sunlight reaches the soil surface and is not intercepted by the crop canopy. Yellow nutsedge has a C_4 photosynthetic pathway and therefore responds well to conditions of high light intensity that exist in onion production. Keeley and Thulen (1978) used several artificial shading regimes to determine that the number of yellow nutsedge shoots, tubers, and total dry matter increased in direct proportion to increasing amounts of light. In the same trial it was determined that the time required for 95 percent canopy interception of photosynthetically active radiation in onion took considerably longer within the rows and was less overall in the furrows when compared to several other crops having faster developing and more complete canopies (Keeley and Thullen 1978). In addition to high light conditions, management practices that include frequent irrigation and high nitrogen fertilization required to maximize onion yield also stimulate yellow nutsedge growth (Keeling et al. 1990).

Chemical options for effective yellow nutsedge control in onions are limited. Of the products currently registered for use on onions, only Dual Magnum® (s-metolachlor), Outlook® (dimethenamid-p), and Nortron® (ethofumesate) provide acceptable levels of yellow nutsedge control. Dual Magnum and Outlook can be applied postemergence to two-leaf or larger onions while Nortron can be applied preplant incorporated. Dual Magnum and Outlook provide greater yellow nutsedge control if they are applied before yellow nutsedge emergence. Transplanting onions provides an opportunity to apply these products at the most efficacious timing.

The objective of this study was to determine the response of transplanted dry bulb onions to Dual magnum and Outlook herbicides when applied before yellow nutsedge emergence.

Materials and Methods

The study was conducted in 2008 in a field heavily infested with yellow nutsedge along HWY 201 about 2 miles from the Malheur Experiment Station, Ontario, Oregon. The field was disked twice during fall 2007 to create a smooth seedbed as practiced by onion growers in the area. The study area was fertilized as determined by the soil analysis. After fertilization, 22-inch-wide beds were created to facilitate furrow irrigation during the growing season. The study was laid out in randomized complete block design with four replications. Individual plots were 7.33 ft wide (4 rows) by 15 ft long. The beds were harrowed on March 14, 2008 before transplanting onions.

Onion seedlings (variety 'Vaquero') were raised in the greenhouse and transplanted on April 23, 2008 in double rows spaced 3.7 inches apart on 22-inch beds with 3.93-inch spacing within the row. Lorsban® 15G at 3.7 oz/1,000 ft of row was applied on March 20 as a preventive measure against onion maggot. The herbicides were broadcast on May 2 using a CO_2-pressurized backpack sprayer fitted with boom equipped with four 8002EVS Teejet nozzles and calibrated to deliver 20 gal/acre of spray solution. The herbicide rates for Outlook and Dual Magnum were 21 fl oz/acre and 1.33 pt/acre, respectively. Plants were fertilized on June 16 with a compound fertilizer to supply 180, 20, and 3 lb/acre of nitrogen, potassium, and zinc, respectively. Except for the untreated control, all plots were sprayed again with Dual Magnum at 1.33 pt/acre on June 26 after hand pulling all emerged broadleaf and grass weeds. Plants were sprayed for thrips control using Success® (8 oz/acre) plus Aza-Direct® (16 oz/acre) plus Ad-wet (1 qt/acre) starting June 25, 2008. The trial was furrow irrigated on a calendar schedule to maintain moisture at a level suitable for onions. Visual observations for onion injury and weed control were done based on a 0 percent = no injury or weed control and 100 percent for total crop kill or complete weed control. Onions were harvested at maturity on August 19 from the 2 center rows and 10-ft length and graded into different marketable categories. The data were subjected to analysis of variance and means separated using least significance difference (LSD, $P = 0.05$).

Results and Discussion

There was no visual indication of onion injury from the herbicides tested. Visual evaluations on July 14 indicated yellow nutsedge control was as high as 95 percent for both herbicides (data not shown). This level of control was sustained until onion harvest on August 19, 2008. There was no difference in the number and yield of marketable onions for different grades (Tables 1 and 2). The results suggest that transplanting onions would provide better yellow nutsedge control in the Treasure Valley. However, the likelihood of growers adopting this practice may be hindered by the expected high labor cost for transplanting onions. Also, adoption of this practice is further complicated because onion transplants have to be imported into the area. There is a fear that bringing transplants from other areas may introduce diseases and insects that do not currently exist in the Treasure Valley of eastern Oregon and southwestern Idaho. Adoption of this practice would be easily accepted by growers if mechanical transplanting of onions was developed and a source of commercial transplants developed locally.

References

Keeley, P. E. 1987. Interference and interaction of purple and yellow nutsedge (*Cyperus rotundus* and *esculentus*) with crops. Weed Technology 1:78-81.

Keeley, P. E., and R. J. Thulen. 1978. Light requirements of yellow nutsedge (*Cyperus esculentus*) and light interception by crops. Weed Science 26:10-16.

Keeling, J.W., D.A. Bender, and J. R. Abernathy. 1990. Yellow nutsedge (*Cyperus esculentus*) management in transplanted onions (*Allium cepa*). Weed Technology 4:68-70.

Table 1. Number of marketable dry bulbs for transplanted onions at the Malheur Experiment Station, Oregon State University, Ontario, OR, 2008.

Treatment	Rate	Unit	Timing†	Marketable yield by grade					
				Small <2.5 in	Medium 2.25-3 in	Jumbo 3-4 in	Colossal 4-4.25 in	Supercolossal >4.25 in	Total marketable 2.25->4.25 in
				number/acre					
Untreated				3,564	28,905	56,623	792	396	86,716
Dual Magnum	1.33	pt/a	A	3,168	29,301	61,374	1,188	0	91,864
Outlook	22	fl oz/a	A	3,168	14,651	70,878	1,584	396	87,508
LSD ($P = 0.05$)				NS	NS	NS	NS	NS	2,906

†A = applied 10 days after onion transplanting in 2008.

Table 2. Marketable dry bulb yield for transplanted onions at the Malheur Experiment Station, Oregon State University, Ontario, OR 2008.

Treatment	Rate	Unit	Timing†	Marketable yield by grade					
				Small <2.5 in	Medium 2.25-3 in	Jumbo 3-4 in	Colossal 4-4.25 in	Supercolossal >4.25 in	Total marketable 2.25->4.25 in
				CWT/acre					
Untreated				9.1	143.3	447.0	8.4	4.0	602.7
Dual Magnum	1.33	pt/a	A	8.2	128.6	481.1	12.4	0.0	622.1
Outlook	22	fl oz/a	A	9.5	74.4	577.4	17.9	5.2	675.0
LSD ($P = 0.05$)				NS	NS	NS	NS	NS	NS

†A = Applied 10 days after onion transplanting in 2008.