

Effect of spray volume and herbicide rate on early postemergence weed control in onion, 2005

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Objective: Field research was conducted at Carrington, ND, in 2005 to determine the effect of bromoxynil and oxyfluorfen rate and spray volume on early postemergence weed control in onion (*Allium cepa* L.). Bromoxynil and oxyfluorfen are two postemergence herbicides commonly used in onion. Bromoxynil and oxyfluorfen may cause leaf injury, so a high application volume (50 gal/A) is necessary to increase safety to onion. Onion must also be in the two-leaf stage before herbicide application, but at this stage, many broadleaf weeds are already beyond the growth stage for control by either herbicide.

Materials and Methods: The study was conducted at the Carrington Research Extension Center, Carrington, ND. The soil was a Heimdal-Emerick/Fram-Wyard loam with 2.9 % organic matter and a pH 7.9, with soybean as the previous crop. Onion variety 'Teton' pelleted seed was planted on May 3 using a Stanhay four double-row planter unit, with 4-inch paired rows and 14-inches between main rows. To evaluate bromoxynil and oxyfluorfen use rates, bromoxynil was applied at 0.075 and 0.3 lb ai/A and oxyfluorfen was applied at 0.025 and 0.1 lb ai/A. To evaluate the effect of volume, high and low herbicide rates were sprayed with 10, 25 and 50 gal/A of water. Treatments were applied at the first true leaf stage (June 9) and applied with a CO₂-pressurized backpack sprayer delivering the necessary volume to 6 foot wide and 20 foot long plots arranged in a randomized complete block design with four replications. Treatments were evaluated for weed coverage and control, onion height and injury one and three wks after application. At the fifth leaf stage, a standard application of bromoxynil and oxyfluorfen was made to all treatments, except checks. Rates were 0.375 lb ai/A and 0.125 lb ai/A, respectively, at a volume of 50 gal/A. An application of pendimethalin at a rate of 0.62 lb ai/A at a volume of 20 gal/A was made after the fifth leaf stage as a final late season weed control measure. A final weed control evaluation was taken one week before harvest. On September 22, 10 feet of the middle two rows of each plot were harvested for grade and yield analysis. After harvest, onions were allowed to cure and then were graded. Split, diseased and double bulbs were graded as culls regardless of diameter.

Results: Onion height did vary depending on the treatment early in the growing season. However, one week before harvest, height was the same for all treatments except the weedy check. Plant stand was same for all treatments. Treatments at the low rate and 50gal/A had the greatest weed density for both herbicides. Grades of cull, small and medium were not significantly different between treatments. There were differences between treatments for large grade onions and total yield. No treatment yielded as well as the hand-weeded check. Treatments with oxyfluorfen resulted in the same yield regardless of rate and volume. As for bromoxynil, the high rate at 25 and 50 gal/A had a better yield than 10 gal/A and low rate yield was the same with any volume.

Table 1. Effect of herbicide rate and volume on onion injury and weed control.

Treatment	Herbicide	Rate (lb ai/A)	Volume (gal/A)	% Onion Injury	% Weed Control ²		
				1WAT ¹	1WAT	3WAT	1WBH
1	Weedy check	-	-	0 ^{c*}	0 ^f	0 ^g	0 ^g
2	Hand-weeded check	-	-	0 ^c	100 ^c	100 ^a	100 ^a
3	Bromoxynil	0.075	10	1.3 ^{cb}	81.3 ^{bc}	60 ^{bcd}	73.8 ^{bcd}
4	Bromoxynil	0.075	25	0 ^c	75 ^{cd}	50 ^{de}	52.5 ^{def}
5	Bromoxynil	0.075	50	0 ^c	52.5 ^e	17.5 ^{fg}	40 ^f
6	Bromoxynil	0.3	10	2.5 ^{abc}	87.5 ^{abc}	78.8 ^b	78.8 ^{abc}
7	Bromoxynil	0.3	25	5 ^a	81.3 ^{bc}	76.3 ^{bc}	81.3 ^{abc}
8	Bromoxynil	0.3	50	3.8 ^{ab}	78.8 ^{bc}	70 ^{bcd}	70 ^{bcd}
9	Oxyfluorfen	0.025	10	3.8 ^{ab}	75 ^{cd}	61.3 ^{bcd}	60 ^{cdef}
10	Oxyfluorfen	0.025	25	2.5 ^{abc}	81.3 ^{bc}	50 ^{de}	70 ^{bcd}
11	Oxyfluorfen	0.025	50	3.75 ^{ab}	60 ^{de}	32.5 ^{ef}	47.5 ^{ef}
12	Oxyfluorfen	0.1	10	3.6 ^{ab}	77.5 ^{bcd}	57.5 ^{cd}	82.5 ^{abc}
13	Oxyfluorfen	0.1	25	5 ^a	93.8 ^{ab}	77.5 ^{bc}	88.8 ^{ab}
14	Oxyfluorfen	0.1	50	5 ^a	80 ^{bc}	65 ^{bcd}	75 ^{bcd}

*Means followed by the same letters within each column are not significantly different using Fisher's protected LSD test at P≤0.05.

¹Abbreviations: WAT, weeks after treatment; WBH, week before harvest.

² Average control of common lambsquarters and redroot pigweed.

Table 2. Effect of herbicide rate and volume on onion yield and grade.

Treatment	Herbicide	Rate (lb ai/A)	Volume (gal/A)	Yield (cwt/A)				
				1-2 ¼ in	2 ¼-3 in	3 in or >	Total	Culls
1	Weedy check	-	-	57.8 ^{a*}	1.8 ^a	0 ^c	60.8 ^d	1.2 ^a
2	Hand-weeded check	-	-	11.4 ^a	278.6 ^a	527.5 ^a	849.4 ^a	32 ^a
3	Bromoxynil	0.075	10	43.8 ^a	148.4 ^a	430.4 ^{abc}	643 ^{bc}	43.8 ^a
4	Bromoxynil	0.075	25	21.3 ^a	207.6 ^a	285.9 ^{bcd}	533 ^{bc}	21.3 ^a
5	Bromoxynil	0.075	50	9.3 ^a	258.9 ^a	193.3 ^{dc}	491.4 ^c	9.3 ^a
6	Bromoxynil	0.3	10	12.9 ^a	145.7 ^a	409.3 ^{abc}	593.7 ^{bc}	25.9 ^a
7	Bromoxynil	0.3	25	34.9 ^a	245.9 ^a	370.3 ^{abcd}	677.9 ^b	26.8 ^a
8	Bromoxynil	0.3	50	16.6 ^a	202.1 ^a	418.1 ^{abc}	684 ^b	47.2 ^a
9	Oxyfluorfen	0.025	10	12 ^a	167.7 ^a	371.9 ^{abcd}	586.7 ^{bc}	12 ^a
10	Oxyfluorfen	0.025	25	34.5 ^a	208 ^a	385.7 ^{abcd}	648.2 ^{bc}	34.5 ^a
11	Oxyfluorfen	0.025	50	29 ^a	243.2 ^a	248 ^{cd}	540.7 ^{bc}	29 ^a
12	Oxyfluorfen	0.1	10	22.7 ^a	186 ^a	367.1 ^{abcd}	587.8 ^{bc}	22.7 ^a
13	Oxyfluorfen	0.1	25	48.1 ^a	161.5 ^a	390 ^{abcd}	609.2 ^{bc}	48.1 ^a
14	Oxyfluorfen	0.1	50	30.6 ^a	136.8 ^a	449.7 ^{ab}	628.9 ^{bc}	30.6 ^a

*Means followed by the same letters within each column are not significantly different using Fisher's protected LSD test at P≤0.05.