Preemergence Weed Control in Onion, 2005

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Field research was conducted in 2005 to compare early weed control with bromoxynil, DCPA, dimethenamid-P and pendimethalin (aqueous capsule formulation) in onion (*Allium cepa* L.) and to evaluate the injury caused by these herbicides on onion.

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 7.9 pH, 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. Herbicides were applied at a low, medium and high rate, starting with the middle labeled rate and increasing and decreasing the middle rate by half. Treatments were applied immediately after planting, except bromoxynil, which was applied 10 days after planting. Herbicides were applied with a CO_2-pressurized backpack sprayer delivering 20 gal/A 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 and onion height and injury at one and three weeks after application. At the fifth-leaf stage, a standard application of 0.375 lb. ai/A bromoxynil and 0.125 lb. ai/A oxyfluorfen was made to all treatments except checks 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 also made after the fifth-leaf stage as a final late-season weed control measure. A final weed control evaluation was made 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.

Dimethenamid-P applied at the high rate reduced plant stand and plant height. Treatment eight reduced height at four weeks after treatment, but at the end of the season differences in height were not significant. At the end of the season DCPA at the low rate and bromoxynil at all rate had the highest weed density. However, all the plots were virtually weed free throughout the growing season. There were significant differences among treatments for cull, small and large grades and total yield. Pendimethalin and dimethenamid–P at the middle and high rates resulted in yields similar to DCPA. Treatments 4, 6, 8 and 11 had the highest total yield with greater than 750 cwt/A.

Table 1. Effect of preemergence herbicide on weed control and plant stand (6ft of row).

Treatment	Herbicide	Rate	Plant Stand	% Weed Control[2]	
		lb. ai/A	12WAT[1]	4WAT	1WBH
1	Pendimethalin	0.475	14.6^{abc}*	90^{bcde}	80^{cd}
2	Pendimethalin	0.95	13.9^{abc}	96.3^{abc}	93.8^{ab}
3	Pendimethalin	1.9	14^{abc}	97.5^{ab}	97.5^{a}
4 [3]	Pendimethalin + Glyphosate	0.95 + 0.5	14.3^{abc}	97.5^{ab}	96.3^{ab}
5	DCPA	3.38	14.6^{abc}	85^{e}	75^{d}
6	DCPA	6.75	15.4^{a}	95^{abcd}	97.5^{a}
7	DCPA	13.5	14.5^{abc}	100^{a}	97.5^{a}
8 [3]	Bromoxynil	0.156	14.6^{abc}	86.3^{e}	95^{ab}
9	Bromoxynil	0.312	13.6^{abc}	87.5^{de}	87.5^{bc}
10	Bromoxynil	0.625	13^{c}	87.5^{de}	92.5^{ab}
11	Dimethenamid-P	0.28	14.5^{abc}	75^{f}	95^{ab}
12	Dimethenamid -P	0.56	14.4^{abc}	88.8^{cde}	98.8^{a}
13	Dimethenamid-P	1.13	10.9^{d}	98.7^{a}	98.8^{a}
14	Glyphosate[3], Pendimethalin[4]	0.5 + 0.95	13.2^{c}	88.8^{cde}	93.8^{ab}
15	Weedy check	-	13.4^{bc}	0^{g}	0^{a}
16	Hand-weeded check	-	15.3^{ab}	100^{a}	100^{a}

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

[1]Abbreviations: WAT, weeks after treatment; WBH, week before harvest. [2] Average control of common lambsquarters and redroot pigweed.

[3]Applied as a delayed preemergence 10 days after planting. [4]Applied as a delayed preemergence at the 1-leaf stage.

Table 2. Effect of preemergence herbicide on onion yield and grade.

Treatment	Herbicide	Rate	Yield (cwt/A)				
		lb. ai/A	1-2 ¼ in	2 ¼-3 in	3 in or >	Total	Culls
1	Pendimethalin	0.475	11.3^{b}*	212.1^{a}	361^{d}	621.6^{bc}	37.2^{abcd}
2	Pendimethalin	0.95	10.3^{b}	122.7^{a}	553.1^{abc}	738.5^{ab}	52^{abc}
3	Pendimethalin	1.9	10^{b}	102.8^{a}	592.6^{a}	736.4^{ab}	31.1^{abcd}
4[1]	Pendimethalin + Glyphosate	0.95 + 0.5	10.2^{b}	140.4^{a}	568.5^{ab}	786.5^{a}	67.4^{a}
5	DCPA	3.38	14.8^{b}	139.2^{a}	432.6^{bc}	627.7^{cb}	41.1^{abc}
6	DCPA	6.75	13.4^{b}	126.1^{a}	560.2^{abc}	768.2^{a}	68.5^{a}
7	DCPA	13.5	14.5^{b}	134.3^{a}	561.1^{abc}	736.9^{ab}	27^{bcd}
8[1]	Bromoxynil	0.156	6.6^{b}	68.5^{a}	623^{a}	761.9^{a}	56^{ab}
9	Bromoxynil	0.312	10.3^{b}	132.5^{a}	442.6^{cd}	616.8^{bc}	23.9^{bcd}
10	Bromoxynil	0.625	3^{b}	111.4^{a}	567.2^{ab}	719.9^{ab}	38.3^{abcd}
11	Dimethenamid-P	0.28	10^{b}	110^{a}	588.7^{a}	758.4^{a}	49.7^{abc}
12	Dimethenamid -P	0.56	8.1^{b}	129.5^{a}	544.5^{abc}	736.3^{ab}	54.2^{ab}
13	Dimethenamid-P	1.13	12.5^{b}	141.6^{a}	391.1^{b}	558.1^{c}	12.9^{bc}
14	Glyphosate[1], Pendimethalin[2]	0.5 + 0.95	10.2^{b}	107.3^{a}	453.3^{bcd}	613.1^{bc}	42.2^{abc}
15	Weedy check	-	66.3^{a}	49.2^{a}	6.58^{e}	122.1^{d}	0^{d}
16	Hand-weeded check	-	8.6^{b}	98^{a}	601^{a}	734.4^{ab}	26.8^{bcd}

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

[1]Applied as a delayed preemergence 10 days after planting. [2] Applied as a delayed preemergence at the 1-leaf stage.