Micro-rate Application Timings for Weed Control in Onion. Oakes, North Dakota

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An experiment was conducted at the North Dakota State Research Arboretum to evaluate the most effective number of sequential micro-rate applications for early-season, broadleaf weed control in onion (*Allium cepa* L.). The soil was an Embden sandy loam with 2.4% organic matter and 6.7 pH. Onion variety 'Teton' pelleted seed was planted at 285,000 seeds/A using a Monosem four-row, double-line planter on April 23. Plots were 6 ft. wide by 17 ft. long and arranged in a randomized complete block design with four replicates. At time of weed cotyledon stage (May 16) herbicides were applied as micro-rates at 1/8 of their lowest labeled rates every seven days, with three, four, and five total applications. Herbicide micro-rates were applied with a CO_2-pressurized backpack sprayer. A standard application of bromoxynil and oxyfluorfen was applied on June 24 (4-leaf stage) to control broadleaf weeds. Another standard application of bromoxynil and oxyfluorfen was made on July 1 (5-6-leaf stage) as a final late-season broadleaf weed control measure. Standard applications were applied using a tractor-mounted sprayer. Best management practices were used for fertility, disease, insect, and grass weed control. Treatments were evaluated for overall control of redroot pigweed (*Amaranthus retroflexus* L.) and common lambsquarters (*Chenopodium album* L.) after all micro-rate treatments were completed using a visual evaluation on June 30. On September 24, 5 ft 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 and diseased bulbs were graded as culls regardless of diameter.

Herbicide application dates, timings, and environmental conditions for Oakes, 2008.

Application Date:	5-16	5-26	6-3	6-9	6-16	6-24	7-1
Onion Stage:	loop	flag-1 lf	1-2 lf	2 lf	3 lf	4 lf	5-6 lf
Air Temp., (F):	75	50	53	61	70	75	75
Wind speed, (MPH):	5	4	6.5	2.7	4	5	5
Operating Pressure:	40 psi	40 psi	40 psi	40 psi	40 psi	40 psi	
Nozzle Type:	Flat Fan	Flat Fan	Flat Fan	Flat Fan	Flat Fan	Flat Fan	
Nozzle Size:	8002	8002	8002	8002	8002	8002	
Spray Volume, GPA:	20	20	20	20	20	20	

Results: Visual ratings indicated excellent common lambsquarters control with bromoxynil and oxyfluorfen applied four or five times, and bromoxynil applied four or five times and oxyfluorfen applied five times provided control similar to that of the untreated check. Redroot pigweed control was excellent across all herbicides and all application timings, due to the late emergence and poor weed growth during the early season. There were no yield differences within herbicides across application timings. This indicates the importance of season-long weed control as weed emergence continued through the entire growing season, further reducing yields.

Table. Effect of adjuvant on herbicide efficacy and yield for weed control in onion at Oakes, North Dakota.

Treatment			Visual Evaluations		Yield		
Herbicide	Adjuvant	Rate (herbicide + adjuvant)	colq[1]	rrpw[2]	Medium[3]	Large[4]	Total
		product/A	----% control-----		----------lb/A----------		
Oxyflourfen[5]	MSO	1 oz + 0.5% v/v	87.5	100	13324.6	32231.2	48256.8
Oxyflourfen	MSO	1 oz + 0.5% v/v	94.8	100	15125.3	36462.7	54108.8
Oxyflourfen	MSO	1 oz + 0.5% v/v	98.8	100	20257.1	25839.0	49517.2
Bromoxynil	MSO	2 oz + 0.5% v/v	81.3	100	17286.0	31150.8	51047.7
Bromoxynil	MSO	2 oz + 0.5% v/v	90.0	100	16565.8	31420.9	50597.6
Bromoxynil	MSO	2 oz + 0.5% v/v	94.8	100	20257.1	37182.9	59591.7
Hand weeded check	--	--	100	100	20167.0	540.2	30160.5
Weedy check	--	--	0	0	0	0	1080.4
LSD	--	--	8.4	0	7083.1	12659.1	12135.3

[1]common lambsquarters, [2]redroot pigweed, [3]medium grade is 2.25-3 in, [4]large grade is 3 in and >, [5]oxyfluorfen water based formulation