

Evaluation of New Preemergence and Postemergence Herbicides for Onion Weed Control

K. Umeda and N. Lund

Abstract

In the preemergence test, flumioxazin at 0.1 to 0.3 lb AI/A severely reduced the onion crop stand. Flumioxazin applied caused significant onion injury of 23 to 37% at 2 WAT for rates of 0.04 to 0.1 lb AI/A. Fluroxypyr and carfentrazone applied postemergence did not show any onion injury at 5 WAT. Fluroxypyr and carfentrazone did not offer acceptable control of annual yellow sweetclover at any rate. Carfentrazone at 0.063 lb AI/A demonstrated activity on lambsquarters and control nearly approached acceptable levels at 83% after 5 WAT. Fluroxypyr did not provide acceptable control of lambsquarters.

Introduction

As new herbicides are introduced for agronomic crop use, investigations are being initiated for determining potential efficacy and safety in minor crops. Early exploratory field studies indicated that flumioxazin, fluroxypyr, and carfentrazone demonstrated some degree of onion crop safety and weed control efficacy. A preemergence (PREE) herbicide would be desirable to complement DCPA to provide broadspectrum and economical weed control to enable onion stand establishment. For postemergence (POST) weed control, a herbicide that would control difficult to control winter annuals and especially annual yellow sweetclover (*Melilotus officinalis*) along with not causing crop injury would be highly desirable. These field studies were conducted to evaluate PREE and POST herbicide crop safety and weed control efficacy for dry bulb onions.

Materials and Methods

Two small plot field studies were conducted at the University of Arizona Maricopa Agricultural Center, Maricopa, AZ. Dry bulb onions were direct seeded in two seedlines per 40-in raised bed on 16 October 2000. The treatment replicates consisted of two beds measuring 35 ft in length. The tests were established in a randomized complete design with three replicates. The onions were furrow irrigated as necessary throughout the growing season. The herbicide treatments were applied using a CO₂ backpack sprayer that was equipped with a hand-held boom with four flat fan 8002 nozzle tips spaced 20-in apart. The sprayer was pressurized to 30 psi and delivered the herbicides in 20 gpa water. The PREE test was applied immediately after planting on 16 October 2000. The soil was dry and then the onions were furrow irrigated within one day to activate the herbicides by completely wetting across the beds. The POST herbicides were applied on 21 February 2001 when the onions were at the 4 true leaf stage of growth and measured 6-10 inches in height.

Results and Discussion

In the PREE test, flumioxazin at all rates tested severely reduced the onion crop stand (Table). At 0.3 lb AI/A, flumioxazin reduced all of the onion crop as none emerged. Some onion emergence occurred with the lower rates of 0.1 and 0.2 lb AI/A applications.

Flumioxazin applied POST caused significant onion injury of 23 to 37% at 2 weeks after treatment (WAT) for all rates tested. Crop injury was severe height reduction and chlorosis of the foliage. The injury symptoms worsened between 9 DAT and 2 WAT when the chlorosis and collapse of older leaves was more visible. At 5 WAT, onions continued to show unacceptable stunting from flumioxazin applied at 0.08 lb AI/A or more. Weed control of annual yellow sweetclover and lambsquarters did not approach acceptable levels for any rate of flumioxazin.

Fluroxypyr and carfentrazone applied POST did not show any onion injury at 5 WAT. Fluroxypyr was completely safe on onions at all rates at 2 WAT. Fluroxypyr and carfentrazone did not offer acceptable control of annual yellow sweetclover at any rate. Carfentrazone at 0.063 lb AI/A demonstrated activity on lambsquarters and control nearly approached acceptable levels at 83% after 5 WAT. Fluroxypyr did not provide acceptable control of lambsquarters.

Table. Evaluation of preemergence and postemergence herbicides of onion weed control.

Treatment	Rate (lb AI/A)	Timing	Onion Crop Stand # /10 ft	Onion Injury		Weed Control			
				2 WAT	5 WAT	MEUOF		CHEAL	
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				%	%	% %		% %	
Untreated check				0	0	0	0	0	0
Handweeded check			131	0	0	99	99	99	99
Flumioxazin	0.1	PREE	25						
Flumioxazin	0.2	PREE	1.3						
Flumioxazin	0.3	PREE	0						
Flumioxazin	0.04	POST		23	12	33	65	0	17
Flumioxazin	0.08	POST		35	23	57	75	25	57
Flumioxazin	0.1	POST		37	32	73	78	40	75
Fluroxypyr	0.1	POST		0	0	7	7	0	0
Fluroxypyr	0.188	POST		0	0	47	50	0	33
Fluroxypyr	0.25	POST		0	0	67	53	0	63
Carfentrazone	0.032	POST		0	0	3	33	33	67
Carfentrazone	0.063	POST		7	0	43	53	63	83
LSD (p=0.05)			15.6	8.1	8.3	23.6	19.3	26.5	26.8

MEUOF = *Melilotis officinalis* (annual yellow sweetclover),

CHEAL = *Chenopodium album* (lambsquarters)