

Bio-efficacy and Phytotoxicity of Oxadiargyl in Onion (*Allium cepa* var. *aggregatum*)

R. M. Kathiresan, I. Gnanavel, U. V. Jayakanth, M. P. Arulchezhian,
R. Anbhazhagan and S. P. Padmapriya

Department of Agronomy
Annamalai University, Annamalainagar-608 002 (Tamil Nadu), India

ABSTRACT

Oxadiargyl at 90 g ha⁻¹ applied three days after planting recorded the least weed count and weed dry matter production favouring higher bulb yield (11.1 t ha⁻¹). Oxadiargyl at 75 g ha⁻¹ was next in order followed by oxadiargyl at 60 g ha⁻¹. No phytotoxicity was observed in all the treatments including four times the recommended dose of oxadiargyl (360 g ha⁻¹), in respect of wilting, vein clearing, necrosis, epinasty and hyponasty.

INTRODUCTION

Onion is an important commercial vegetable and spice crop. Its high yield potential, profitability, storability and export quality make it a lucrative cash crop. It is shallow rooted, closely spaced and requires frequent irrigation to meet out higher demand for water. Frequent irrigations on light and loamy soils often lead to weed problems. Uncontrolled weeds reduced bulb yield of onion to the tune of 54% when compared with hand weeded crop (Tewari *et al.*, 1999). Removal of weeds through hand weeding is laborious, costly and time consuming. Herbicidal control of weeds assumes greater significance, being efficient and economical method (Verma and Singh, 1996). Keeping the above facts in view, an experiment was conducted to study the bio-efficacy of oxadiargyl on weeds and onion under irrigated conditions.

MATERIALS AND METHODS

Experiment was conducted at New Vegetable Complex, Faculty of Agriculture, Annamalai University, Annamalainagar during *rabi* seasons of 2000 and 2001. The soil of the experimental field was clayey loam with pH of 8.01, EC of 0.45 mmhos cm⁻¹, low in available nitrogen (210 kg ha⁻¹), medium in available phosphorus (17.96 kg ha⁻¹) and high in available potassium (320.8 kg ha⁻¹). The New

Vegetable Complex is located at 11°24' N latitude, 79°41' E longitude at an altitude of 5.79 m above mean sea level. A set of seven treatments (Table 1) was laid out in randomized block design with four replications. The planting of onion bulbs of CO-2 variety was done at 45 x 10 cm spacing. The recommended dose of 60 kg N, 60 kg P₂O₅ and 30 kg K₂O ha⁻¹ was applied alongwith farm yard manure (FYM) at 25 t ha⁻¹. The whole quantity of P₂O₅, K₂O, FYM and half dose of nitrogen were applied at the time of field preparation. Remaining half dose of nitrogen was applied at 30 days after planting (DAP). The herbicides were sprayed 3 DAP by knapsack sprayer using flood jet nozzle using 600 l of water ha⁻¹ as per the treatments. Fluchloralin was sprayed on dry soil and irrigated immediately. The phytotoxicity symptoms were observed in respect of wilting, vein clearing, necrosis, epinasty and hyponasty.

RESULTS AND DISCUSSION

Effect on Weeds

The predominant weeds of experimental field were: *Cyperus rotundus* (L.) (36.7%), *Trianthema portulacastrum* (L.) (18.3%), *Echinochloa colona* (L.) (13.3%), *Eclipta alba* (L.) (11.7%), *Euphorbia hirta* (L.) (10.0%) and *Phyllanthus niruri* (L.) (6.7%). Oxadiargyl at 90 g ha⁻¹ recorded the least weeds.

Table 1. Effect of treatments on weed species at 45 DAP (No. m²) (Average of two crop seasons)

Treatment	Dose (g ha ⁻¹)	<i>C. rotundus</i>	<i>T. portulacastrum</i>	<i>E. colona</i>	<i>E. alba</i>	<i>E. hirta</i>	<i>P. niruri</i>	Others
Weedy		4.74 (22)	3.39 (11)	2.92 (8)	2.74 (7)	2.55 (6)	2.12 (4)	1.58 (2)
Hand weeding	25 DAP	3.81 (14)	2.55 (6)	1.88 (3)	2.12 (4)	2.12 (4)	1.58 (2)	1.22 (1)
Oxadiargyl	60	3.39 (11)	1.58 (2)	1.22 (1)	1.22 (1)	1.22 (1)	1.22 (1)	1.22 (1)
Oxadiargyl	75	3.08 (9)	1.22 (1)	1.22 (1)	1.22 (1)	1.22 (1)	1.22 (1)	1.22 (1)
Oxadiargyl	90	2.55 (6)	1.22 (1)	1.22 (1)	0.71 (0)	0.71 (0)	1.22 (1)	1.22 (1)
Fluchloralin	900	3.24 (10)	1.88 (3)	1.88 (3)	1.88 (3)	1.88 (3)	1.22 (1)	1.22 (1)
Pendimethalin	750	4.30 (18)	1.58 (2)	1.58 (2)	1.88 (3)	1.58 (2)	1.22 (1)	1.22 (1)
LSD (P=0.05)	-	0.21	0.32	0.28	0.27	0.25	0.28	0.13

Figures in parentheses are original values.

Table 2. Effect of treatments on weed dry matter production, crop growth and yield of onion (Average of two crop seasons)

Treatment	Dose (g ha ⁻¹)	Weed dry weight (g m ⁻²)	Plant height (cm)	Crop dry matter (g plant ⁻¹)	Bulb yield (t ha ⁻¹)
Weedy	-	70.1	24.4	32.1	4.4
Hand weeding	25 DAP	31.3	37.0	46.0	8.1
Oxadiargyl	60	20.6	40.0	55.6	10.2
Oxadiargyl	75	13.6	43.2	58.7	10.8
Oxadiargyl	90	10.3	45.3	61.4	11.1
Fluchloralin	900	30.9	37.9	47.0	9.0
Pendimethalin	750	27.6	39.5	50.3	9.2
LSD (P=0.05)	-	25.2	3.2	4.6	0.6

density (Table 1) and weed dry weight. Oxadiargyl at 75 g ha⁻¹ was next in order followed by oxadiargyl at 60 g ha⁻¹. Fluchloralin at 900 g ha⁻¹ and pendimethalin at 750 g ha⁻¹ had higher weed density and weed dry weight than oxadiargyl at 60 g ha⁻¹.

Effect on Crop

Significantly lowest values of plant height, crop dry matter and bulb yield were recorded under weedy check. Oxadiargyl at 90 g ha⁻¹ recorded the maximum bulb yield (11.1 t ha⁻¹) (Table 2). This was at par with oxadiargyl at 75 g ha⁻¹ and significantly higher than rest of the treatments. These results are in conformity with those of Dickmann *et al.* (1997). Oxadiargyl at all the doses performed significantly superior to fluchloralin and pendimethalin and one hand weeding at 25 DAP.

The better performance of oxadiargyl is attributed to efficient and safe weed control. No phytotoxicity was observed in all the treatments including four times the recommended dose of oxadiargyl (360 g ha⁻¹), in respect of wilting, vein clearing, necrosis, epinasty and hyponasty.

REFERENCES

- Dickmann, R., R. Melgarejo, P. Loubiere and M. Montagnon, 1997. Oxadiargyl : A novel herbicide for rice and sugarcane. Proc. British Crop Protection Conference. *Weeds* 1 : 51-58.
- Tewari, A. N., K. S. Rathi, K. Hussain, J. K. Singh and B. Singh, 1999. Integrated weed management in onion (*Allium cepa* L.). *Indian J. Weed Sci.* 31 : 53-55.
- Verma, S. K. and T. Singh, 1996. Weed control in kharif onion (*Allium cepa* L.). *Indian J. Weed Sci.* 28 : 48-51.