Annals of Arid Zone 42(2): 201-203, 2003

Short Communication

# Integrated Weed Management in Garlic in Arid Zone Conditions

**R.S. Yadav* and P.C. Yadav**

*Agricultural Research Station, Rajasthan Agricultural University, Mandor, Jodhpur 342 304, India*

Garlic (*Allium sativum* L.) is a short statured crop with slow initial growth, which makes it incapable to compete with aggressive weeds. Weeds may reduce bulb yield by 40 to 60% (Sharma *et al.*, 1983; Sandhu *et al.*, 1997). Although hand weeding effectively controls weeds, yet it is tedious, time consuming and expensive. Use of fluchloralin and pendimethalin was found effective in garlic for control of weeds (Pandey *et al.*, 1993). However, sole dependence on herbicides may lead to dominance of non-susceptible weeds and other problems. Taking into consideration the above points, experiment on integrated weed management in garlic under irrigated condition was carried out in arid zone of Rajasthan.

The field experiment was conducted at the Agricultural Research Station, Mandor, Jodhpur, during the winter seasons of 1996-97 and 1997-98. The soil was loamy sand having low organic carbon (0.26%), moderate phosphorus (12.80 kg $ha^{-1}$) and high potash (360 kg $ha^{-1}$) with pH 8.3. The experiment was laid out in randomized block design (RBD) with three replications. The treatments included fluchloralin 1.0 kg $ha^{-1}$ as pre-plant incorporation (PPI); fluchloralin 1.0 kg $ha^{-1}$ applied just after irrigation; fluchloralin 1.0 kg $ha^{-1}$ along with irrigation; fluchloralin 1.0 kg $ha^{-1}$ (PPI) + one hand weeding at 30 days after sowing (DAS) pendimethalin 1.0 kg $ha^{-1}$ applied after irrigation; pendimethalin at 1.0 kg $ha^{-1}$ + one hand weeding at 30 DAS; weed free and weedy check. Garlic variety RGL 1 was sown on 15 October 1996 and 12 October 1997, at 15 x 10 cm spacing. A basal dose of 50 kg N, 50 kg $P_2O_5$ and 100 kg $K_2O$ $ha^{-1}$ was applied during seed bed preparation and 50 kg N $ha^{-1}$ was top dressed at 30 DAS. Weed number was recorded at 30 DAS and dry weight of weeds was recorded at harvest using 50 x 50 $cm^2$ quadrate.

The dominant weed flora of the experimental plots was *Chenopodium album* L., *Chenopodium murale* L. and *Rumex dentatus* L. Other weeds present were *Cyperus rotundus* and *Amaranthus viridis* L. Pooled data of two years showed that all the herbicidal treatments significantly reduced the number and dry weight of weeds as compared to weedy check (Table 1). Application of fluchloralin or pendimethalin at 1.0 kg $ha^{-1}$ along with one hand weeding at 30 DAS significantly reduced the dry weight of weeds as compared to all other

* Department of Agronomy, Rajasthan Agricultural University, Bikaner 334 006, India.

*Table 1. Effect of different weed control treatments on the weeds, bulb yield of garlic and net return (mean of two years)*

| Treatment | Weed number at 30 DAS (No. $m^{-2}$) | Weed dry weight at harvest (g $m^{-2}$) | WCE (%) | Bulb yield (t $ha^{-1}$) | Net return (Rs. $ha^{-1}$) |
|---|---|---|---|---|---|
| Weedy check | 22.0 (485) | 611 | 0.0 | 4.2 | 1241 |
| Weed free | 0.7 (00) | 0 | 100.0 | 10.4 | 35816 |
| Fluchloralin 1.0 kg $ha^{-1}$ as pre-plant incorporation (PPI) | 10.6 (112) | 156 | 74.5 | 8.8 | 27682 |
| Fluchloralin 1.0 kg $ha^{-1}$ after irrigation | 13.9 (194) | 321 | 47.5 | 7.7 | 20896 |
| Fluchloralin 1.0 kg $ha^{-1}$ with irrigation | 9.8 (96) | 159 | 74.0 | 8.5 | 26028 |
| Fluchloralin 1.0 kg $ha^{-1}$ with hand weeding at 30 DAS | 10.5 (110) | 39 | 93.6 | 10.5 | 37411 |
| Pendimethalin 1.0 kg $ha^{-1}$ with irrigation | 8.7 (76) | 120 | 80.3 | 9.8 | 32956 |
| Pendimethalin 1.0 kg $ha^{-1}$ after irrigation | 7.9 (62) | 123 | 80.8 | 9.2 | 29356 |
| Pendimethalin 1.0 kg $ha^{-1}$ with hand weeding at 30 DAS | 7.7 (59) | 19 | 96.9 | 11.0 | 39901 |
| C.D. 5% | 2.8 | 24 | – | 0.9 | – |

DAS = Days after sowing; Data transformed $\sqrt{x} + 05$ to scale. Original data are given in parenthesis.

herbicidal treatments. Sandhu *et al.* (1997) also reported similar results. The number and dry weight of weeds in plots that received fluchloralin along with irrigation water ($T_5$) were statistically comparable with fluchloralm applied as PPI (recommended method). Application of fluchloralin after the irrigation ($T_4$) had significantly poor weed control compared to recommended method of pre-plant incorporation (PPI). Pendimethalin applied along with irrigation water ($T_7$) significantly reduced the number and dry weight of weeds as compared to pendimethal applied after irrigation ($T_8$). The weed control efficiency (WCE) was maximum in the treatments of pendimethalin at 1.0 kg $ha^{-1}$ + one hand weeding followed by fluchloralin 1.0 kg $ha^{-1}$ as PPI + one hand weeding (Table 1). The WCE was lowest in the plots where fluchloralin (1.0 kg $ha^{-1}$) was applied just after irrigation ($T_4$). Madan *et al.* (1994) also reported 66 to 88% WCE of different herbicides to control weeds in garlic.

Maximum bulb yield of garlic was produced in the plots treated with pendimethalin 1.0 kg $ha^{-1}$ + one hand weeding followed by weed free and

fluchloralin at 1.0 kg $ha^{-1}$ + one hand weeding and were significantly higher than weedy check and all other herbicidal treatments (Table 1). There was no significant difference in the method of application of pendimethalin as expressed by the bulb yield of garlic. However, fluchloralin applied just after irrigation ($T_4$) gave significantly lower bulb yield of garlic compared to its application as PPI ($T_3$) or along with irrigation ($T_5$). Maximum net return (Rs. 39,901 $ha^{-1}$) was obtained in the treatment of pendimethalin at 1.0 kg $ha^{-1}$ + one hand weeding followed by fluchloralin at 1.0 kg $ha^{-1}$ + one hand weeding (Rs. 37,411 $ha^{-1}$) and weed free. Similar results were reported by Sharma *et al.* (1983) and Sandhu *et al.* (1997). It is concluded from the two years study that application of pendimethalin at 1.0 kg $ha^{-1}$ as pre-emergence + one hand weeding at 30 DAS produced higher bulb yield of garlic and was more profitable for controlling weeds in garlic.

## References

Madan, S.P.S., Jassal, N.S. and Saimbhi, M.S. 1994. Herbicidal control of weeds in garlic. *Punjab Vegetable Grower* 29: 1-2.

Pandey, U.B., Singh, S.P. and Mishra, V.K. 1993. Studies on use of weedicides in controlling weeds of garlic crop. *News Letter National Horticultural Research and Development Foundation* 13: 13-15.

Sandhu, K.S., Singh, D. and Singh, J. 1997. Weed management in garlic (*Allium sativum* L.) under Punjab conditions. *Vegetable Science* 24: 7-9.

Sharma, A.B., Patel, R.K. and Tiwari, J.P. 1983. Chemical weed control in garlic. *Indian Journal of Weed Science* 15: 17-22.