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Weed Control in Garlic Crop in Relation to Weedicides

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Abstract: Efficacy of two weedicides at recommended rate i.e., pendimethalin (liter ha⁻¹) and oxadiazon (0.8 liter ha⁻¹) was tested and compared with weed free (manual hoeing) and weedy control. Single application of any of above weedicide was not sufficient to obtain yield equal to weed free treatment. Application of pendimethalin and oxadiazon were effective in controlling weeds initially for 80-90 days. Highest bulb yield (10 ha⁻¹) was found in weed free treatment followed by oxadiazon (5.293 ha⁻¹), pendimethalin (4.043 ha⁻¹). Lowest bulb yield was found in weedy control.

Key words: Weed control, garlic, pendimethalin, oxadiazon

Introduction

Garlic is widely used (*Allium sativum*) after onion and considered as a valuable spice for food. It is grown throughout Pakistan. It was cultivated over an area of 9200 hectares with a production of 82700 tones (Anonymous, 1999).

Garlic crop is closely planted crop with very less canopy and hand weeding therefore, is an important cultural practice for higher marketable bulb production. Manual weeding is tedious, expensive and often damages the crop. Application of weedicides is an other method of weed control. Qasem (1996) claimed that post-emergence application of oxyfluorfen and oxadiazon at 3-4 leave stage gave better crop yield as compared to weed free crop. Madan *et al.* (1994) observed 100% weed control in hand weeding, 86.9 to 87.7% with herbicide + hand weeding and 66.7 to 88.2% weed control with herbicide alone.

Field studies conducted in India during the rabi season regarding effect of herbicides (oxyfluorfen, oxadiazon) on growth, yield and yield attributes of garlic resulted in lowest weed population in weed free control followed by oxyfluorfen + one hand hoeing and oxadiazon and fluchloralin application (Vora and Mehta, 1999). Vora and Mehta (1998) observed highest bulb yield of garlic in weed free control while herbicide application alone did not control weeds effectively. Tewari *et al.* (1998) found the greatest net monetary returns with hand weeding followed by pendimethalin + hand weeding and oxyfluorfen + hand weeding. Sandhu *et al.* (1997) claimed that pendimethalin and fluchloralin supplemented with one hoeing after 105 days of sowing resulted in significant increase in bulb yield compared to the weed free control. Most of the work on weed control in relation to weedicides have been conducted in foreign countries, therefore, it was considered desirable to conduct this experiment under existing agroecological conditions and draw some conclusion which may be beneficial to researchers and farmers.

Materials and Methods

Two weedicides at recommended rate of application i.e., pendimethalin (1.0 liter ha⁻¹) and oxadiazon (0.8 liter ha⁻¹) was used for weed control and compared with a weed free and weedy control. A local garlic cultivar (Lehson Ghulabi) was sown on 10th

Oct, 2000. The weedicides were sprayed in "tar wattar" condition on 14th Oct, 2000 before emergence of garlic crop.

The experiment was conducted in Vegetable Crop Research Programme, National Agricultural Research Centre, Islamabad. The plot size was 4.0 m². Plant to plant and row to row distances were 10 and 25cm, respectively. Chemical fertilizer NPK @ 100:90:60 kg ha⁻¹ was applied in two doses i.e., half at land preparation and remaining at six-leaf stage of the crop. Randomized complete block design was used with three replications. Data on weight, number of bulbs, weed weight at harvest, yield ha⁻¹, average bulb weight, clove number/bulb and average clove weight were determined as reported by Mahmood *et al.* (2001). The data were analyzed using F-test and treatments were compared by using Duncan's Multiple Range Test (Steel and Torrie, 1980).

Results and Discussion

Weed growth: Minimum weed weight (0.33 g plot⁻¹) at harvest was found in weed free treatment. This treatment was kept weed free by four manual hoeings starting after 20 days of germination of garlic crop. Significantly high weed weight (15.67 kgs) at harvest was observed in weedy control as expected. Pendimethalin and oxadiazon application were effective in controlling weeds for 80-90 days after germination of garlic crop but weeds appeared in abundance and competed with crop at bulb formation stage which affected bulb size and yield. The weed weight at harvest in both weedicide treatments was not significantly different with each other (Table 1).

Yield characteristic Number of bulb harvested plot⁻¹ was significantly higher in Pendimethalin, Oxadiazon and weed free treatment than in weedy control (Table 2).

Less number of bulbs harvested in weedy control was due to the fact that weeds appeared immediately after sowing and competed with garlic crop till harvest and it was extremely difficult to locate and harvest bulbs. Highest bulb yield was observed in weed free treatment (10 t ha⁻¹) which was significantly higher than rest of two treatments (Table 1). Oxadiazon application produced next best yield (2.12 t ha⁻¹) which was significantly higher than that of

Table 1: Effect of different treatments of weed control on yield and other parameters of garlic crop

Treatments	No. of bulbs harvested/plot (kgs)	Wt. of bulbs harvested/Plot (kgs)	Bulb yield (t ha ⁻¹)	Weed weight at harvest/plot (kgs)	Avg. bulb weight (g)	Bulb size (cm)	Number of cloves per bulb	Avg. clove Wt. (g).
Pendimethalin	92.33a	1.62bc	4.04bc	7.83b	16.08bc	3.29b	17.47	0.68b
Oxadiazon	96.00a	2.12b	5.29b	4.00bc	20.01b	3.60b	17.27	1.02a
Weed free (Manual hoeing)	106.67a	4.0a	10.00a	0.33c	32.04a	4.53a	21.27	1.35a
Weedy control	38.33b	0.48c	1.21c	15.67a	11.04c	2.45c	12.87	0.65c

Values followed by the same letters do not differ significantly at 5% level of significance according to DMR test

Mahmood *et al.*: Weed control in garlic

Table 2: Weed fauna present in garlic crop

Local name	Botanical name
Jangli javi*	<i>Avena fatua</i>
Bathu	<i>Chenopodium album</i>
Karund	<i>Chenopodium murale</i>
Jangli halon	<i>Coronopus didymus</i>
Chathri dhodak	<i>Euphorbia helioscopia</i>
Shahtara papra	<i>Fumaria parviflora</i>
Pit papra	<i>Fumaria indica</i>
Maina	<i>Medicago denticulata</i>
Dumbi grass*	<i>Phalaris minor</i>
Jangli palak	<i>Rumex dextatus</i>
Souchal	<i>Malva neglecta</i>
Sainji	<i>Melilotus indica</i>
Poa grass*	<i>Poa annua</i>
Poppy	<i>Papaver somniferum</i>

*Grassy weeds (Other broad leaf weeds)

weedy control (0.48 t ha⁻¹). It was followed by Pendimethalin treatment yielding (1.62 t ha⁻¹). However the bulb yield recorded in Pendimethalin and Oxadiazon were statistically non-significant. Pendimethalin and Oxadiazon have been reported as effective herbicides against weeds in garlic crop by many researchers (Qasem, 1996; Madan *et al.*, 1994; Vara and Mehta, 1998 and 1999; Tewari *et al.*, 1998; Sandhu *et al.*, 1997). Single application of Pendimethalin and Oxadiazon application were effective in controlling weeds for approximately 80-90 days but was not effective in producing yield like weed free treatment. These result are not in agreement with the findings of Qasem *et al.* (1996), who claimed that single application of oxadiazon gave better yield than weed free control. There is a need for more experiments by integrating herbicide application with manual hoeing and analyzing its economic feasibility. The average bulb weight was significantly higher in weed free (32.04 g) treatment followed by Oxadiazon application (20.01 g) (Table 1).

There was no significant difference in average bulb weight between oxadiazon and pendimethalin application. Almost same pattern of significance was seen in average bulb size. Minimum bulb size was observed in weedy control. Number of cloves per bulb in all treatments was not significantly different (Table 1). Average clove weight was significantly higher in weed free treatment (1.35 g) followed by Oxadiazon (1.02 g). Rest of the treatments was not significantly different with each other. It could be concluded that weed density did not affect the number of clove per bulb but significantly affect average clove weight which contributed to higher bulb size, weight and higher marketable yield of garlic crop.

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