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Effect of Pollinators and Insecticides on Seed Reduction of Onion (*Allium cepa* L.)

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Abstract: Four varieties of onion viz; Phulkara Dark Red, Desi and Rubina were evaluated to see the effect of pollinator and insecticides on seed setting. Reduced or limited visiting of pollinators caused substantial reduction in seed production of onion showing 50 to 61% seed setting with non significant difference among the varieties. However significant differences were observed among varieties for number of flowers per umbel, number of fertilized flowers per umbel, umbel weight and seed weight per umbel. This reduction in seed production could be due to pesticides application of side grown crops (sunflower, brassica and coriander etc.).

Key words: Onion, pollinator, seed, varieties

Introduction

It remained a problem for onion growers to get optimum seed yield in Southern region of Punjab due to some barriers. Being a cotton belt, abundant application of sprays caused increase in mortality rate of pollinators. Non availability of pollinators during the flowering period of onion caused only 16.88% fruit setting and free availability of pollinators increased fruit setting upto 72.07% (Rao *et al.,* 1989). Rao and Lazer (1983) recorded 93.5% fruit setting with 3.6 g seed per umbel in free availability of pollinators and 9.8% fruit setting with out pollinators with 0.3 g seed per umbel. In open pollinated field, seed yield was higher than controlled environment (Orlova *et al.,* 1981; Sihag, 1985). More honey bees caused more seed setting (Kubisava *et al.,* 1986).

However, seed setting in onion depends upon kind of pollinators (Currah and Ockendog, 1983) and varieties of onion. Because trend of pollinators remained differential in different varieties (Kumer, 1985). This is because, some varieties are more attractive due to more sugar concentration of the nectar, varying from 67 to 75%. (Rao and Lazar, 1983). Sometimes crops grown aside of the onion caused more attraction to pollinators and consequently they preferred those crops instead of onion. Sprays at flowering also caused distraction of pollinators, which ultimately resulted in substantial reduction in seed setting of onion.

Materials and Methods

Four varieties viz, Phulkara, Dark red, Desi and Rubina were randomized in triplicate Randomized Complete Block Design with plant to plant 30 cm and row to row 75 cm spacing. Bulbs having 300-400 g were sown on 15.10.2001 at Vegetable Research Sub-Station, Multan on one side of ridges. Fertilizers at the rate of 125 kg DAP and 125 potash per hectare were applied as basal dose during land preparation and 250 kg urea were added during apparent flowering and umbel formation of crop in two split doses. Possible efforts were taken to complete spraying schedule before on set of flowering to minimize the errors. However, last sprays were applied at evening time, after proper visiting of pollinators. At crop termination, data of 10 plants was recorded in each variety. Average data for number of flowers per umbel, number of fertilized flowers per umbel, seed setting %age, average umbel weight and average seed weight of umbel were calculated for all varieties. Umbel weight was recorded before threshing and seed weight of umbel was measured after proper threshing and winnowing. Statistical analysis was carried out by Steel and Torrie (1981).

Results and Discussion

Analysis of variance showed significant differences ($P<0.01$) for all characters except seed setting %age (Table 1).

It is obvious from the Table 2 that varieties, Desi and Rubina showed highest mean value for all characters. Desi showed highest number of flowers per umbel (973.4) number of fertilized flowers (613.9), seed setting %age (61.07%) flowered by Robina showing 868.2, 531.2 and 60.07% value for these traits, respectively. The variety Robina got highest umbel weight and seed weight per umbel and Desi remained second having 11.52 g for umbel weight and 5.54 g seed weight per umbel. The reduction in seed setting was 40 to 50%. This reduction could be compensated by increasing the number of pollinators and decreasing the effect of side grown crops and number of sprays during flowering. For example, Kumar *et al.* (1989) recorded three times more yield in open pollinated field than controlled environment (cages) due to non availability of pollinators. Similarly Rao and Lazer (1983) observed 93.5% seed setting in onion in open pollinated

Table 1: Mean squares of fertilized flowers per umbel, total number of flowers per umbel, %age of seed setting, total umbel weight and seed weight per umbel in open pollinated field

SOV	D.F.	Number of flowers fertilized per umbel	Total number of flower per umbel	Seed setting %age	Total umbel weight (g)	Seed weight of umbel (g)
Replications	2	4307.3	591.3	4.76	0.004	0.040
Variety	3	18852.7**	36269.1**	97.20ns	16.870**	3.550**
Error	6	985.4	892.5	110.30	1.330	0.013

P<0.01

Table 2: Mean data for five characters of four varieties of onion

SOV	Number of flowers fertilized per umbel	Total number of flower per umbel	Seed setting %age	Total umbel weight (g)	Seed weight of umbel (g)
Phulkara	420.7	716.9	53.1	7.77	3.77
Dark red	479.6	793.8	50.4	8.36	4.36
Desi	613.9	973.4	61.07	11.52	5.54
Robina	531.2	868.2	60.07	12.63	6.16
LSD (5%)	62.72	62.62	20.98	2.30	0.23

trial and 9.8% in cages and seed weight per umbel was 3.6 g in open pollinated field and 0.3 g in cages. This substantial reduction in seed setting and seed weight was due to absence or very low visiting of pollinators (Orlova *et al*., 1981). He observed that even 2-3 days delay in introduction of honey bees caused reduction in seed yield as much as 15%.

In this experiment varieties did not show significant differences for seed setting %age, which may be due to similar attraction of varieties to pollinators. Because Orlova *et al.* (1981) concluded that amount of sugar secreted by the nectaries varied from 0.49 to 4.8 mg per flower of onion, which is major substance for attraction. However in these four varieties similar response was observed, perhaps it is due to similar concentration of sugar in flowers.

Proper visiting of pollinators could enhance seed production upto 50% by minimizing the side grown attractive crops and completing the spraying schedule before onset of flowering. Response of varieties for setting remained similar. Application of pollinators preventive insecticides at the evening time could enhance seed setting by retarding mortality rate of biological agents.

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