

Effect of Pollinators and Insecticides on Seed Setting 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 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 differences among the varieties. However, significant differences were observed among varieties for number of flowers, fertilized flowers, seed weight per umbel and umbel weight. This reduction in seed production could be due to pesticides application or attraction 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 and Sunyanarayana 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; Sihaq, 1985). More honey bees caused more seed setting (Kubisova *et al.*, 1986).

However, seed setting in onion depends upon kind of pollinator (Currah and Ockendon, 1983) and varieties of onion. Because trend of pollinators remained deferential in different varieties (Kumar *et al.*, 1985). This is because, some varieties are more attractive due to more sugar concentration of the nectar, varying from 67.00 to 75.00% (Rao and Lazar, 1983). Some time crops grown across of the onion caused more attraction to pollinators and consequently 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 (RCBD) with plant to plant 30 cm and row to row 75 cm spacing. Bulbs having 300-400 g were sown on 15 October 2001 at Vegetable Research Sub-Station, Multan on one side of ridges. Fertilizer at the rate of 125 kg DAP and 125 Kg potash ha⁻¹ 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 and 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 difference (P<0.01) for all characters except seed setting %age (Table 1).

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

SOV	Number of fertilized Flowers per umbel	total number of flowers per umbel	Seed setting (%)	Total umbel weight (g)	Seed weight of umbel (g)
Replications	4307	591	4	0.00	0.04
Variety	18852	36269	97	16.87	3.55
Error	985	892	110	1.33	0.01

P < 0.01, NS= Non-Significant

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

SOV	Number of fertilized Flowers per umbel	total number of flowers per umbel	Seed setting (%)	Total umbel weight (g)	Seed weight of umbel (g)
Phulkara	420	716	53	7	3
Dark Red	479	793	50	8	4
Desi	613	973	61	11	5
Rubina	531	868	60	12	6
LSD (5%)	62	62	20	2	0

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) number of fertilized flowers (613) and seed setting (61) followed by Rubina showing 868, 531 and 60% values for these traits respectively. The variety Rubina got highest umbel weight, seed weight per umbel and Desi remained second having 11 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. The results are in agreement with the findings of Kumar *et al.* (1989) who 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 trial, 9.8% in cages and seed weight per umbel was 3.6 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) and observed that even 2-3 days delay in introduction of honey bees caused reduction in seed yield as much as 15%.

In the present experiment, varieties did not show significant difference for seed setting %, which may due to similar attraction varieties to pollinators. Orlova *et al.* (1981) also supported our results and they concluded that amount of sugar secreted 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, it is due to similar concentration of sugar in flower.

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. Moreover application of pollinators preventive insecticides at the evening time could enhance seed setting by retarding mortality rate of biological agents.

Response of varieties in the experiment for seed setting remained similar, because sugar concentration in onion flowers was same. However varieties possessing more concentration of sugar (nectary) in flowers could show better seed setting due to more attraction of pollinators.

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