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Population Dynamics of Cabbage Butterfly (*Pieris brassicae*) and Cabbage Aphids (*Brevicoryne brassicae*) on Five Cultivars of Cauliflower at Peshawar

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Abstract: The studies on population dynamics of Cabbage butterfly and Cabbage aphids on different Cultivars of cauliflower namely Snowball, Snowdrift, Tropical, Pioneer and Meigettsal were carried out at the Research Farm of Entomology Section, Agricultural Research Institute Tarnab Peshawar. Cabbage butterfly (*Pieris brassicae*) and aphids (*Brevicoryne brassicae*) were recorded as the major insect pests of Cauliflower crop at ARI, Tarnab, Peshawar. None of the 5 Cultivars was found completely resistant to the infestation of Cabbage butterfly and aphids. The highest average of 86.67 larvae/plant was recorded in the first week of November and the lowest average of 0.67 larvae/plant was recorded in the first week of December. The lowest and the highest average mean population of larvae were observed on Cultivars Meigettsal and snow ball, respectively. During study population density of aphids on cauliflower Cultivars ranged from 0.00 to 31.76 aphids/cm² leaf area. The lowest and highest average mean population of aphids recorded on Cultivars Snow Drift and Meigettsal, respectively. Cultivar snow drift was found the least preferred to aphids throughout the season. During study cultivar Meigettsal proved to be best against Cabbage butterfly, but showed poor performance against aphids. Cultivar snowdrift showed good performance against aphids and cabbage butterfly.

Key words: Cauliflower cultivars, population dynamics, cabbage butterfly (*Pieris brassicae*), cabbage aphids (*Brevicoryne brassicae*), Peshawar

INTRODUCTION

Cauliflower (*Brassica oleracea*) belongs to the family Cruciferae. It is among attractive vegetables due to its nutritional importance and is extensively grown in Peshawar region. But there are certain limiting factors for its quantitative and qualitative production. Among these insect pests are great one and sometimes cause complete failure of the crop. Some of such insects are enlisted as aphids (*Brevicoryne brassicae*), cabbage semilooper (*Plusia aurichalcea*), Diamond back moth (*Plutella xylostella*), cabbage butterfly (*Pieris brassicae*), Grass hoppers and Field crickets^[1].

Of these insects the Cabbage butterfly (*P. brassicae*) has been considered the most destructive pest. This pest is distributed world wide and is found wherever cruciferous vegetables are grown. It was recorded as serious pest of cabbage, cauliflower, kohlrabi, broccoli, brussels and sprouts in cauliflower growing areas of the world. It also attacks turnip, radish, sarsoon and

toria etc^[1]. Similar to other countries the Cabbage butterfly has also been reported as serious pest of cruciferous plants in Pakistan^[2].

The larvae of the pest are sparsely covered with hairs. During its development a single larva consume 74-80 sq. cm leaf area. Leaves, branches, pods and the seeds of cabbage and cauliflower are eaten by the larvae^[3,4].

Cabbage aphid (*Brevicoryne brassicae*) is another common pest of rape/mustard. This insect is the most abundant from Nov./Dec. to March/April when it infests various cruciferous oil seed crops and vegetables^[5]. The aphids suck the sap from the leaves throughout the season and when large colonies develop, the leaves become bleached and distorted and the plants are unable to develop a marketable head^[6]. Aphids play a prominent role in reducing the yield ranging from 50-80%^[7].

Determination of population dynamics is prerequisite for the implementations of control strategy against certain insect. A lot of work has been done in this

direction in the past^[2,5,8-10]. The present study is the determination of Cabbage butterfly and Cabbage aphids population on five cauliflower Cultivars in Peshawar region.

MATERIALS AND METHODS

The studies on population dynamics of Cabbage butterfly and Cabbage aphids on different cultivars of cauliflower were carried out at the Research Farm of Entomology Section, Agricultural Research Institute, Tarnab, Peshawar. The technical and laboratory facilities were provided by the Entomology Section while the test cultivars were obtained from the Vegetable Section of the Institute.

Five cultivars of cauliflower namely Snowball, Snowdrift, Tropical, Pioneer and Meigetsal were sown in the field in Randomized Complete Block Design. Each cultivar was replicated three times in a subplot size of 3x2 m. Row to row distance was kept 75 cm, while plant to plant distance was 45 cm. There were 4 rows in each plot and each row had 10 plants. There was a total of 40 plants in each plot.

Seeds of the selected cultivars were sown in the month of September and were transplanted in October. Fertilizer, irrigation and all other agronomic practices were carried out in the experimental field as and when needed. All inputs for example fertilizer application, irrigation, hoeing and other agronomic practices remained same for all cultivars. Observation on population dynamics of insect pests started as soon as their infestation were noticed. Population density was determined on randomly selected plants at weekly interval.

Cabbage butterfly (*Pieris brassicae*): The population density of Cabbage butterfly was recorded on the basis of number of larvae per plant. All the open leaves and heads of the selected plants were observed thoroughly and the number of larvae found were recorded.

Cabbage aphids (*Brevicoryne brassicae*): Aphids were found feeding on the self sap from the leaves of the plants. Actual number of adult aphids was counted on both sides of the leaves examined at one square centimeter leaf area.

RESULTS AND DISCUSSION

Population dynamics of the Cabbage butterfly and Cabbage aphids on five cauliflower cultivars namely Snowball, Snowdrift, Tropical, Pioneer and Meigetsal

were recorded at weekly interval throughout the season is presented in Table 1 and 2.

Cabbage butterfly (*Pieris brassicae*) no. of larvae per plant: The population density of Cabbage butterfly (*Pieris brassicae*) recorded on the basis of number of larvae/plant on randomly selected plants throughout the season is presented in (Table 1). The table shows that the Cabbage butterfly infestation started at the last week of October with an average population density of (50.00, 23.33, 73.33, 47.67, 0.00) on cultivars Snowball, Snowdrift, Tropical, Pioneer and Meigetsal, respectively and increases gradually. It remain at the peak during first week of November with an average population density of (52.33, 28.33, 86.67, 51.67, 0.00) on Cultivars Snowball, Snowdrift, Tropical, Pioneer and Meigetsal, respectively. Population density of the pest declined gradually till the end of December and reaches to an average population density of (5.67, 0.00, 0.00, 0.00 and 0.00) larvae/plant. The result of pest incidence is some what similar to that of Qureshi^[1] and Atwal^[5] who reported that *Pieris brassicae* was observed on cauliflower crop from the month of October and from May to September.

Cultivar Meigetsal showed best performance against Cabbage butterfly by attracting the least population. Cultivar snowdrift and pioneer were next in performance against Cabbage butterfly. While Cultivars snowball and tropical developed the highest population. These observations are in agreement with that of Matin *et al.*^[11] They reported that leaf damage by *pieris brassicae* in varieties snowball and snowdrift was highly significant.

Cabbage aphids (*Brevicoryne brassicae*) no. of aphids per centimeter sq. leaf area: The population density of Cabbage aphids (*brevicoryne brassicae*) recorded on the basis of number of adult aphids per cm² leaf area on randomly selected plants throughout the season in presented in (Table 2).

The table shows that the aphids infestation started at the last week of October with an average population density of (11.33, 0.00, 0.00, 0.00 and 0.00) on Cultivars Snowball, Snowdrift, Tropical, Pioneer and Meigetsal, respectively and increases gradually. It remains at the peak from Ist week of November to mid of November with an average population density of (26.67, 0.00, 0.00, 0.00 and 31.76) and (0.00, 0.00, 0.00, 23.67 and 26.67) on Cultivars Snowball, Snowdrift, Tropical, Pioneer and Meigetsal, respectively.

The population declines on the onset of cold weather and the crop progress towards maturity at the end of December and reaches to an average population density

Table 1: Population density of cabbage butterfly (*Pieris brassicae*) larvae on 5 cauliflower cultivars/varieties

Variety	Mean densities per plant on respective dates										Pooled seasonal total
	25-10-99	01-11-99	08-11-99	15-11-99	22-11-99	29-11-99	06-12-99	13-12-99	20-12-99	27-12-99	
Snowball	50.00ab	52.33ab	49.00a	32.67a	22.33a	10.67a	13.00a	9.00a	2.67a	5.67a	247.34a
Snowdrift	23.33c	28.33ab	4.67b	0.00c	0.00c	2.00ab	11.00ab	9.67a	1.67b	0.00b	80.67bc
Tropical	73.33a	86.67a	15.00b	15.00b	11.67b	5.33b	0.67b	1.00b	0.00b	0.00b	208.67a
Pioneer	47.67b	51.67ab	0.67b	0.00c	0.00c	0.67c	1.67b	2.00ab	0.00b	0.00b	104.35b
Meigettsal	0.00c	0.00c	0.00b	0.00c	0.00c	0.00c	0.00b	0.67b	0.00b	0.00b	0.67c
LSD at 0.05	24.13	44.44	18.29	10.27	6.66	3.71	0.498	0.425	0.972	0.97	95.74

Table 2: Population density of Cabbage aphids (*Brevicoryne brassicae*) on 5 cauliflower cultivars/varieties

Variety	Mean densities per one cm ² leaf area on respective dates										Pooled seasonal total
	25-10-99	01-11-99	08-11-99	15-11-99	22-11-99	29-11-99	06-12-99	13-12-99	20-12-99	27-12-99	
Snowball	11.33a	26.67a	0.00b	0.00b	0.00b	0.00c	0.00b	0.00c	0.00c	0.00c	38.00c
Snowdrift	0.00b	0.00b	0.00b	0.00b	0.00b	0.00c	0.00b	0.00c	0.00c	0.00c	0.00d
Tropical	10.00b	0.00b	18.33a	0.00b	0.00b	0.00c	0.00b	0.00c	0.00c	0.00c	18.33cd
Pioneer	0.00b	0.00b	0.00b	23.67a	19.33a	15.67a	13.33a	10.00b	15.33a	5.00b	102.33b
Meigettsal	10.00b	31.76a	24.00a	26.67a	8.33b	9.00b	16.67a	13.33a	11.00b	7.66a	148.42a
LSD at 0.05	1.28	13.15	10.36	9.18	8.75	3.65	4.86	2.43	4.23	2.11	2.45

Means within a column followed by different letters are significantly different from each other at 5% level of probability.

Anova followed by LSD test.

of (0.00, 0.00, 0.00, 5.00, 7.66) aphids/1 cm⁻² leaf area. These results are in conformity Atwal^[5] who reported that the aphids remain most abundant during November December in Autumn season and cloudy and cold weather is very much favorable. These slight differences might be due to climatic conditions of the concerned regions or due to the presence of natural enemies in the field.

As reported by Hagen and Bosch^[12] who observed that lady birdbeetle and green lacewings feed on aphids as larvae and adult. Similarly, it also tally with the finding of Weber *et al.*^[9] who reported that the abundant aphids species in autumn near harvest is *Brevicoryne brassicae*.

Results showed that Cultivar snowdrift performed the best against aphids as no aphid was observed on this Cultivar throughout the season. Cultivar tropical and snowball were next in performance against aphids, while Cultivars Meigettsal and pioneer developed the highest pest population.

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