

# Population Trend of Grasshopper (*Chortjippus Brunneus*) and Cabbage Butter Fly (*Pieris Brassicae*) on Mustard (*Brassica (Campestris L.)*)



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## Abstract

Present study was conducted on population dynamics of two insects Grasshopper (*Chortjippus brunneus*) and Cabbage Butterfly (*Pieris brassicae*) on mustard (*Brassica campestris*). The results of weekly mean population showed that the mean population of *Pieris brassicae* ranged from 0.0 to 1.4 in first week. Among the population maximum attack of caterpillar (1.4) was recorded in treatment 5; whereas no attack of caterpillar was recorded in treatment 1 (0.0). Second week the attack of caterpillar ranged from 0.3 to 3.0. Among the population maximum attack of caterpillar (3.0) was recorded in treatment 4; whereas the minimum attack of caterpillar was recorded in treatment 2 (0.3). Third week the attack of caterpillar ranged from 0.0 to 21.7. Among the population maximum attack of caterpillar (21.7) was recorded in treatment 1; whereas no attack of caterpillar was recorded in treatment 4 (0.0). Fourth week the attack of caterpillar ranged from 0.0 to 3.3. Among the population maximum attack of caterpillar (3.33) was recorded in treatment 3 whereas no attack of caterpillar was recorded in treatment 1 (0.0). While the mean population of grasshopper per plant ranged from 0.7 to 2.0 in first week. Among the population, maximum attack of grasshopper (2.0) was recorded in treatment 2; whereas the minimum attack of grasshopper was recorded in treatment 5 (0.7). Second week the attack of grasshopper ranged from 0.3 to 3.33. Among the population maximum attack of grasshopper (0.3) was recorded in treatment 3; whereas the minimum attack of grasshopper was recorded in treatment 4 (3.33). Third week the attack of grasshopper ranged from 0.3 to 3.0. Among the population maximum attack of grasshopper (0.3) was recorded in treatment 5; whereas the minimum attack of grasshopper was recorded in treatment 1 (3.0). Fourth week the attack of grasshopper ranged from 0.0 to 2.4 and so on whereas no attack of grasshopper was recorded in treatment 3, 4 and 7.

**Keywords:** Population Trend; Grasshopper; Cabbage Butterfly; Mustard plant

## Introduction

Rapeseed commonly known as sarson belongs to the family *cruciferae*. Among different types, the most common grown in Pakistan are *B. campestris*, *B. napus*, *B. juncea* and *Eruca sativa*. In General, the rapeseed refers to *B. campestris* and *B. napus* [1] The term rape is derived from the Latin word "rapen" means turnip. The rape seed is obtained from species of Brassica consisting of about 160 species. Many of them have economic importance and all parts of the plant contribute to their usefulness [2,3].

The origin of rapeseed and mustard is not definitely known. Its cultivation has been traced to 2000 B.C in India, China and Japan. Pak-Afghan region, Mediterranean region and the Turko-Iranian region are also its origin places. Brassica seed was first used for oil extraction in India [1]. According to Peolman & Borthakur

[4] the origin of the different rapes and mustard has been reported as Asia, Europe and perhaps Africa. Rape and mustard are extensively cultivated in Asia, Japan and Western Europe.

Rapeseed and mustard are annual Rabi crops. It has a tap root system with many roots concentrate in the shallow surface soil and produce usually yellow flowers. Self-pollination is the rule in *B. napus* but *B. campestris* is both self and cross pollinated. The fruit is a pod, 5-10cm long. Each pod contains 15-40 small round seed of different colors, weighing 4-6 g per thousand seeds [1].

According to Patel & Dee [5] *B. campestris* L. tends to a lighter, shorter and more erect growth habit than *B. napus* L. Its stem height varies considerably with variety from 50-200cm (with 80-150cm most common).

China is the largest producer of rape and mustard and together with India and Pakistan they grow over 90 percent of the world production [4]. The average yield of this crop depends very much on climate and variety of the crop grown (Holmes, 1984). The highest yield is being obtained in the Netherlands, whereas the average is just over 2.6 tones/ha. While the average yield of rape seed and mustard in Pakistan based on the average of four years (i.e. from 1990-91 to 1993-94) is 745 kg/ha. The total production of rape and mustard in KP in the year 1993-94 was 14396.2 tones [6]. Weiss [7] stated that rape seed initial use was mainly to produce oil for industry and domestic lighting. Oil has been produced from oil seed rape and other brassica seed crops in Europe since at least the fifteen century and for a much longer period in Asia probably China [8]. Oil is now produced from rape in every continent [9]. Young leaves of rape and mustard are used as vegetable and as fodder. The oil is used in cooking and in making pickles and in industry as lubricant. Since the oil of conventional varieties contains high levels of erucic acid which is injurious to human health; cultivars have been evolved which are low in both erucic acid and *glucosinolates* which are designated as '00' types [1]. Jourges [10] mentioned that the averages percentage composition of rape is oil (45%): protein (22%), carbohydrates (22-25%), Klason lignin (5%), phytic acid (2%) and glucosinolates (1-4%). Pathak et al. [11] stated that *the B. campestris L.* Seed has 46.38% oil, 17.67% protein, 6.0% moisture, 3.74% ash and 0.46% allyl-iso-thiocyanate.

Nazir [1] mentioned that the major insect pests of rape and mustard are the painted bug and aphids. Both the adults and nymphs of these insect's suck cell sap from leaves, flowers and pods. Aphid control should be started when the nymph population reaches five per leaf. According to Gould [12]; like many other Brassica, rape falls prey to the infestation of a wide spectrum of insect, from the seedling stage to maturity damaging the crop and result in yield reduction. Srivastava et al. [13] stated that the aphid (*L. erysimi*) causes considerable damage not only to mustard but also to rape, tori and several other crop species. The incidence of the pest increases with the delayed sowing, while proper sowing time reduces the pest infestation.

The pollen beetles, mustard sawfly, pea leaf miner, flea beetles, seed pod weevils, hairy caterpillar and cabbage butterfly are the most damaging insect pests of the rape crop. Majority of the pests infest the plant reproductive parts. The insects like pea leaf

### Grasshopper

**Table 2:** Mean population trend of Grasshopper *Chortjippus brunneus* per mustard plant during October to December 2016.

		Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8
<b>T1</b>	R1	1	1.7	3	1.3	0.3	0.7	0	0
	R2	1	1.3	0.7	1	1.7	1.7	0	1
	R3	1.7	2	0.7	2	1.3	0.7	0	1
<b>T2</b>	R1	1	1.3	0.7	0.7	1.3	1	0	1
	R2	2	1	0.7	0.3	2	1	0	0.3
	R3	1.7	1.3	0.7	0.7	2.3	2.7	0	0.3

miners which attack the vegetative parts are less damaging and often more easily measurable [14].

The present study was carried out to record the incidence and population density of Grasshopper (*Chortjippus brunneus*) and cabbage butter fly (*Pieris brassicae*) on mustard (*Brassica campestris L.*) crop.

### Materials and Methods

This study was conducted to record the incidence of grasshopper (*Chortjippus brunneus*) and cabbage butterfly (*Pieris brassicae*) on mustard crop at the Agricultural Research Institute Tarnab Peshawar, Pakistan in the year 2016 Rabi season.

The mustard variety 'Bulbul 98' was raised on ridges in well prepared soil at Agriculture Research Institute Tarnab, during September 21, 2016. The experiment was conducted in RCBD with three replications and five treatments per replication. The length and width of each experimental unit was 5 and 3 meters, respectively. Each experimental unit was 3 meters apart from other.

The direction of replications was East-West and treatment direction was North-South. Crop germinated on September 21, 2016. The field was visited regularly to the record population density of the concerned insect pest Table 1.

**Table 1:** During study the following insect's pest was recorded on mustard crop.

Common name	Scientific name	Family	Order
Grass hopper	<i>Chortjippus brunneus</i>	<i>Acrididae</i>	<i>Orthoptera</i>
Cabbage butterfly	<i>Pieris brassicae</i>	<i>Pierilidae</i>	<i>Lepidoptera</i>

### Data Recording

Common insect pest of mustard crop is Grasshopper and caterpillar which attack on leaves. The data was collected on five randomly selected plants in each experimental unit and averaged over plant i.e. to present data as number of insects per plant.

### Results

The insect pests of mustard other than aphids were recorded from its time of germination till harvest. The mean population of Grasshopper and Caterpillar were recorded on at weekly interval as given in Tables.

T3	R1	2	0.3	1.3	1.3	1	0.7	0	0.3
	R2	1.3	2	1.7	1	1	0.6	0	1.3
	R3	1.7	2	1	2.4	1.3	1.3	0	1
T4	R1	1.7	3.3	1	2	1	0.7	0	1.2
	R2	1	1	0.7	1.7	0.3	2.3	0	0.7
	R3	1	1.3	0.7	0	1.3	0.7	0	0.3
T5	R1	0.7	1.3	2.3	2.3	1	1	0	0.3
	R2	1	1.3	1	1	1	2.2	0	0.7
	R3	1.3	1.3	0.3	2	2	2	0	0.7

Mean population trend of Grasshopper *Chortjippus brunneus* per mustard plant during October to December 2016 is given in Table 2.

The mean population of grasshopper per plant ranged from 0.7 to 2.0 in first week. Among the population, maximum attack of grasshopper (2.0) was recorded in treatment 2; whereas the minimum attack of grasshopper was recorded in treatment 5 (0.7). Second week the attack of grasshopper ranged from 0.3 to 3.33. Among the population maximum attack of grasshopper (0.3) was recorded in treatment 3; whereas the minimum attack of grasshopper was recorded in treatment 4 (3.33). Third week the attack of grasshopper ranged from 0.3 to 3.0. Among the population maximum attack of grasshopper (0.3) was recorded in treatment 5; whereas the minimum attack of grasshopper was recorded in treatment 1 (3.0). Fourth week the attack of grasshopper ranged from 0.0 to 2.4. Among the population maximum attack of grasshopper (2.4) was recorded in treatment 3; whereas no attack of

grasshopper was recorded in treatment 4 (0.0). Fifth week the attack of grasshopper ranged from 0.3 to 2.3. Among the population maximum attack of grasshopper (2.3) was recorded in treatment 2; whereas no attack of grasshopper was recorded in treatment 4 (0.3). Sixth week the attack of grasshopper ranged from 0.6 to 2.3. Among the population maximum attack of grasshopper (2.3) was recorded in treatment 4; whereas no attack of grasshopper was recorded in treatment 3 (0.6). Seventh week no attack of grasshopper was found on mustard crop. Eighth week the attack of grasshopper ranged from 0.0 to 1.3. Among the population maximum attack of grasshopper (1.3) was recorded in treatment 3; whereas no attack of grasshopper was recorded in treatment 1 (0.0).

### Caterpillar

Mean population trend of cabbage butterfly *Pieris brassicae* per mustard plant during October to December 2016 is given in Table 3.

**Table 3:** Mean population trend of Cabbage butterfly *Pieris brassicae* per mustard plant during October to December 2016.

		Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8
T1	R1	0	1.3	21.7	0	2.3	1.7	0	0.7
	R2	0.7	0.7	0.7	1.3	1	3.3	0	0.3
	R3	0.3	1.7	1.7	2	2.7	2	0	1.7
T2	R1	0.3	0.3	0.3	1.3	0.7	1.3	0	0
	R2	0.3	2.9	1	0.3	1.7	0.3	0	1.7
	R3	0.3	1.3	0.7	0.7	1.7	2.3	0	0.7
T3	R1	0.3	1	1	1	1	1.7	0	0.7
	R2	1.3	1.7	1.3	3.3	2.3	1.3	0	0.3
	R3	1.3	1.7	1	0.3	3.3	0.2	0	0
T4	R1	1	1.7	1	2	0.3	1.3	0	0.3
	R2	0.3	3	1.3	3	1	1.7	0	2
	R3	1	1.7	0	1	1	1.7	0	0.3
T5	R1	1.4	2	1.7	1.7	1.3	2	0	0.3
	R2	0.3	2.7	1.7	0.7	1.3	1	0	0.3
	R3	0.3	2	1.3	1.7	1.3	1.7	0	0.3

The mean population of *Pieris brassicae* ranged from 0.0 to 1.4 in first week. Among the population maximum attack of caterpillar (1.4) was recorded in treatment 5; whereas no attack of

caterpillar was recorded in treatment 1 (0.0). Second week the attack of caterpillar ranged from 0.3 to 3.0. Among the population maximum attack of caterpillar (3.0) was recorded in treat-

ment 4; whereas the minimum attack of caterpillar was recorded in treatment 2 (0.3). Third week the attack of caterpillar ranged from 0.0 to 21.7. Among the population maximum attack of caterpillar (21.7) was recorded in treatment 1; whereas no attack of caterpillar was recorded in treatment 4 (0.0). Fourth week the attack of caterpillar ranged from 0.0 to 3.3. Among the population maximum attack of caterpillar (3.33) was recorded in treatment 3 whereas no attack of caterpillar was recorded in treatment 1 (0.0). Fifth week the attack of caterpillar ranged from 0.3 to 2.7. Among the population maximum attack of caterpillar (2.7) was recorded in treatment 1; whereas the minimum attack of caterpillar was recorded in treatment 3 (0.3). Sixth week the attack of caterpillar ranged from 0.2 to 3.3. Among the population maximum attack of caterpillar (3.3) was recorded in treatment 1; whereas the minimum attack of caterpillar was recorded in treatment 3 (0.2). Seventh week no attack of caterpillar was found on mustard crop. Eighth week the attack of caterpillar ranged from 0.0 to 2.0. Among the population maximum attack of caterpillar (2.0) was recorded in treatment 4 whereas no attack of caterpillar was recorded in treatment 3 (0.0).

### Discussion

Promptly growing population and alterations in dietary habits linked with urbanization increased the demands for food and fuel. Pakistan has become world's third largest edible oil importer. Edible oil seed crops of Pakistan are classified as conventional (rape-seed, mustard, sesame, groundnut), non-conventional (sunflower, safflower, soybean) and non-true oilseeds (cotton, maize and rice bran) [15]. Oil seed mustard (*Brassica campestris* L.), has become one of the most important oil crops in the country. Conventional mustard varieties impose health concerns due to the presence of erucic acid in oil and *glucosinolate* in meal. Canola has the advantage over other vegetable oils because it contains lowest content of saturated fatty acids and moderate content of poly-unsaturated fatty acids [16]. In Pakistan, the farmers associated with brassica crops face a lot of problems from insect pests, particularly whitefly, thrips, aphid, painted bug, Grasshopper and Cabbage Butter Fly. The control of pest insects has relied heavily on chemical insecticides which are often overused or misused. The beneficial species, such as parasites and predators are used to control pest insects that established a solid foundation for environmentally safe system for brassica growing farmers [17].

Among different insect pests attacking mustard, the Grasshopper (*Chortjippus brunneus*) and Cabbage Butter Fly (*Pieris brassicae*) are the most serious and destructive pest and major limiting factor for mustard cultivation [18]. The rate of reproduction varies from 5 to 9 Youngs in a single day by a single female and the total number of Youngs produced by the female varies from 76 to 188 [18]. In current study the mean population of *Pieris brassicae* ranged from 0.0 to 1.4 in first week. Among the population maximum attack of caterpillar (1.4) was recorded in treatment 5; whereas no attack of caterpillar was recorded in treatment 1 (0.0). Second week the attack of caterpillar ranged from 0.3 to 3.0. Among the population maximum attack of caterpillar (3.0) was

recorded in treatment 4; whereas the minimum attack of caterpillar was recorded in treatment 2 (0.3). Third week the attack of caterpillar ranged from 0.0 to 21.7 [18-30]. Among the population maximum attack of caterpillar (21.7) was recorded in treatment 1; whereas no attack of caterpillar was recorded in treatment 4 (0.0). Fourth week the attack of caterpillar ranged from 0.0 to 3.3. Among the population maximum attack of caterpillar (3.33) was recorded in treatment 3 whereas no attack of caterpillar was recorded in treatment 1 (0.0). While the mean population of grasshopper per plant ranged from 0.7 to 2.0 in first week. Among the population, maximum attack of grasshopper (2.0) was recorded in treatment 2; whereas the minimum attack of grasshopper was recorded in treatment 5 (0.7). Second week the attack of grasshopper ranged from 0.3 to 3.33. Among the population maximum attack of grasshopper (0.3) was recorded in treatment 3; whereas the minimum attack of grasshopper was recorded in treatment 4 (3.33). Third week the attack of grasshopper ranged from 0.3 to 3.0. Among the population maximum attack of grasshopper (0.3) was recorded in treatment 5; whereas the minimum attack of grasshopper was recorded in treatment 1 (3.0). Fourth week the attack of grasshopper ranged from 0.0 to 2.4 and so on whereas no attack of grasshopper was recorded in treatment 3, 4 and 7 [31-47].

### Conclusion

The results of weekly mean population presented that the mean population of *Pieris brassicae* ranged from 0.0 to 1.4 in first week. Among the population maximum attack of caterpillar (1.4) was recorded in treatment 5; whereas no attack of caterpillar was recorded in treatment 1 (0.0). Second week the attack of caterpillar ranged from 0.3 to 3.0. Among the population maximum attack of caterpillar (3.0) was recorded in treatment 4; whereas the minimum attack of caterpillar was recorded in treatment 2 (0.3). Third week the attack of caterpillar ranged from 0.0 to 21.7. Among the population maximum attack of caterpillar (21.7) was recorded in treatment 1; whereas no attack of caterpillar was recorded in treatment 4 (0.0). Fourth week the attack of caterpillar ranged from 0.0 to 3.3. Among the population maximum attack of caterpillar (3.33) was recorded in treatment 3 whereas no attack of caterpillar was recorded in treatment 1 (0.0). While the mean population of grasshopper per plant ranged from 0.7 to 2.0 in first week. Among the population, maximum attack of grasshopper (2.0) was recorded in treatment 2; whereas the minimum attack of grasshopper was recorded in treatment 5 (0.7). Second week the attack of grasshopper ranged from 0.3 to 3.33. Among the population maximum attack of grasshopper (0.3) was recorded in treatment 3; whereas the minimum attack of grasshopper was recorded in treatment 4 (3.33). Third week the attack of grasshopper ranged from 0.3 to 3.0. Among the population maximum attack of grasshopper (0.3) was recorded in treatment 5; whereas the minimum attack of grasshopper was recorded in treatment 1 (3.0). Fourth week the attack of grasshopper ranged from 0.0 to 2.4 and so on whereas no attack of grasshopper was recorded in treatment 3, 4 and 7.

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