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Insect pests and Predators associated with different Mustard varieties at Tandojam

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Abstract: A field experiment was carried out in the experimental area of Entomology Section, Agriculture Research Institute Tandojam during Rabi season of 2008-2009.Seeds of six Brassica varieties i.e. E-R-22, Gaj, P-78, P-53-59,tShiralla and Agati Sarsoon, were sown in a Randomize Complete Block Design during the 4 h week of January. A net plot area of 14 x 46ft was kept for each variety. During observation period four species of sucking insect pests whitefly, aphid, thrip, and painted bug and four species of predators i.e. beetles, chrysoperla carnea, wasp, and spider were observed associated with all six varieties of Brassica. Whitefly appeared in the initial stage of crop on all varieties while the aphid and thrips reached their peak in the end of February. The population of aphid, thrip and painted bug remained in low number. The population of predators was low and remained similar, during the months of December and January. Overall data suggested that the population of insect pests and predators remained constant on all varieties. The less population of the predators was due to less population of aphids.

Keywords: Insect pests and Predators associated.

1. INTRODUCTION

The oilseed crops play an important role in the economy of the country because of their value in import substitution. The Brassica family (cruciferae) consists of 275 genera and 3200 species of plants (Jessop and Toelkon, 1996). It is grown in Pakistan, India, Australia, Europe and china. According to Prain (1978), this crop is originated in china and from there it was introduced to India.

Mustard, *Brassica compestris* L, incude important oil seed crops i.e. Torio (*Brassica compestris* var. Torio), Sarson Raya or Rai (*Brassica compestris* var. sarson) and Taramira or Jambho (*Eruca sativa)*. These are main established oilseed crops of Sindh Province. In Pakistan these crops are mostly grown in Rabi season (Khoso, 1998).

Mustard is oil is edible and used in culinary for and preparing ointment and soap, making, condiment green manure and fodder crops. In Indo Pak subcontinents the most commonly grown *Brassica* oil seed crops occupy significant place regarding the edible oil production because the seeds of *Brassica* contain about 42% oil products. Amongst the cruciferous crops, the rapeseed and mustard is grown on 81% of the total area under oil seed crops (Nazir, 1994).

The mustard is grown in spring season and is sown on an area of 268.9 "000" hectares in Pakistan with annual production of about 823 kg/hectares, where as area in Sindh is about 76.1 "000" hectors with annual production of about 71.1 kg/hectors (Anonymous, 2002). The yield of oil seed crops is very low in Pakistan as compared to other countries. One of the most important factors responsible for low yield is the damage caused by insect pests. Mustard crop is exposed to a variety of insect pests, such as mustard sawfly, *Athalia proxima*, painted bug, *Bagrada picta* and mustard aphid *Lipaphis erysimi* L, etc. (Chaudhry, 1985).

Mustard aphid *Lipaphis erysimi* both the adults and nymphs are pale- greenish in color and look like louse and feed in large numbers on leaves, flower-buds, pods and shoots of cruciferous oilseeds i.e. toria, Sarsoon, raya and taramira. Both nymphs and adults such cell sap from leaves, stem, inflorescence or the developing pods of the host plants. The attacked leaves show a curly appearance, the flowers fail to form pods and the developing pods do not produce healthy seeds. Cloudy and cold weather is favorable for the development of the pest. They feed on cruciferous oilseeds and vegetables like cabbage, cauliflower, potato etc. (Prasad and Katiyar, 1997).

The insect pests of painted bug both adults and nymphs of suck the sap of leaves and pods of Brassica by making scratches and holes in them. The attacked plant parts gradually wilt and dry. The adult bugs are black, colored, such as ovate in shape, having a number of orange or brownish spots on the wings. Nymphs are black colored with brown marking. (Rajeeve, 2003). The whitefly adults are minute insects measuring about 2-5 mm long. They have two pairs of wings. The body is covered with a white waxy powdered. Nymphs are small and wing legs. They are light yellow to which in color.

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Both nymphs and adult whiteflies such the sap from plants, reducing the vitality and yield of the crop. They nymphs secrete honeydew, which promotes the growth of sooty mould. (Ramsey et al.1996). The adult thrips are very minute, slender yellow in color with long and narrow wings and active insects. They are pointed at both ends. The males are wingless. The females have four slender wings with fringed hairs. The nymphs measure about one mm in length and are black or brown in color. The pest is active from germination of crop till harvesting. Maximum damage is caused when crop is young. The thrip lace rates the tissues on the underside of the leaves and suck the sap. The attacked leaves are deformed and develop and silvery coating on the lower surface, (Lohar 2001).

Many insects, which are predators on other insects (entomophagous insects) play a very important role in killing insect pests of various kinds, for example the ladybird beetles belonging to family Coccinellidae, lacewing Chrysoperla carnea, spider Tibellus oblongus, wasp Polistus hebroens, are the common natural enemies of many insect pests. The predators hunt their prey and feed on them. While the parasites instead of killing their hosts immediately, deposit eggs on or into their bodies, these eggs hatch and larvae grew by consuming the contents of the host body, which is gradually killed. (Singh *et al*., 2002).

Predator control can be achieved by providing conditions, which help the natural enemies to increase their population. Predator control can be adapted by preservation and augmentation. Biological agent or natural enemies are the main source of reduction the population of noxious insect pests. (James,1994). In biological control natural enemies are encourage which play an important role in pests control. In natural agro-ecosystem they suppress the population of pests and regulate the natural balance of eco-system. Biological agents reduce the pest population below the cause economic damage. If pest populations are reduced to the point where economic damage is negligible the control program is success. Biological control measures are successfully established, because they are permanent in their effect and have an efficient capability of predation on insect pests, these methods are primarily preventive and not corrective. In cultivation of crops the occurrence of insect pest and tier predators have significantly natural proportional ratio of population which been disturbed by man (Verma and Bhatia 1999).

During research work the experiment was conducted to observe insect pests and predators associated with different mustard varieties at Tandojam. This research will help in implementation of IPM strategies in Brassica Pest Management Programs in future.

2. MATERIALS AND METHODS

The studies on insect pests and predators associated with different mustard varieties at Tandojam were conducted at Entomology Section Agriculture Research Institute Tandojam during Rabi season of 2008-2009. Experimental Design The crop was sown by drilling method in a plot havintg area 14x46ft. and distance of 50 cm between row to row was kept Crop was sown during 4 h week of November 2008. Six varieties of Brassica viz, E-R-22, (Sarsoon), Gaj (Sarsoon), Agati (Sarsoon), P-53-59 (Sarsoon), shiralla (Sarsoon), and P-78 were sown in a randomized complete block design. Each variety was sown in five rows. The crop received the first irrigation after twenty days of sowing and subsequent irrigation followed at the intervals of 15 days.

Sampling Techniques The observations were started on 15 December, 2008 to record the incidence, occurrence and population of different insect pests and predators on six varieties of Brassica. For observation, twenty plants from each variety were selected randomly from each variety and five leaves per plant i.e. two from bottom two from middle and one from top and at the time of fruiting one terminal per plant were observed. Regular weekly counts were made from germination till crop maturity. For observation, both the adults and nymphs of insect pests and predators was recorded; the data thus obtained will be subjected to statistical analysis.

3. RESULTS

Mean population of insect pests on Brassica variety E-R-22 (Sarsoon).

The results on insect pests and predators associated with different mustard varieties at Tandojam have been presented in **(Fig. 1)**. The data on mean population of insect pests on variety E-R-22 (Sarsoon), indicated that the B. tabaci was more at the initial vegetative stage 3 of crop then declined gradually as season advanced .The peak population was observed during the month of January. On average it was 14.42/plant. While the population of L. erysimi was low in the early stage of the crop then increased and reached maximum during the month of February. The mean population of L. erysimi was 2.6/plant. Similar trend of population fluctuation was observed in case of T. tabaci The population was increased gradually and reached at its peak during January and remained constant in the month of February then declined there after. The mean population of T. tabaci was 2.36/plant while the population of B. hilaris was less than other pests. It was at its peak during December and its average was 1.23/plant.

Mean population of predators on Brassica variety E-R-22 (Sarsoon

The results presented in **(Fig. 2)** shows that the population of C. carnea was more abundant (0.257/plant),

the seasonal population trends indicates thatndduring early phase of the crop it was found more active then and it was reduced during the 2 week of march. Further it was found that the population of spiders Tibellus oblongus was maximum during the month of January then declined with an average it was 0.134/plant. Where as the population of Coccinellid beetle and wasp Polistus hebroens were more or less similar 0.18 and 0.20/plant respectively. The wasp was found more active during the month of January and February, while beetles were found active during January-2009.

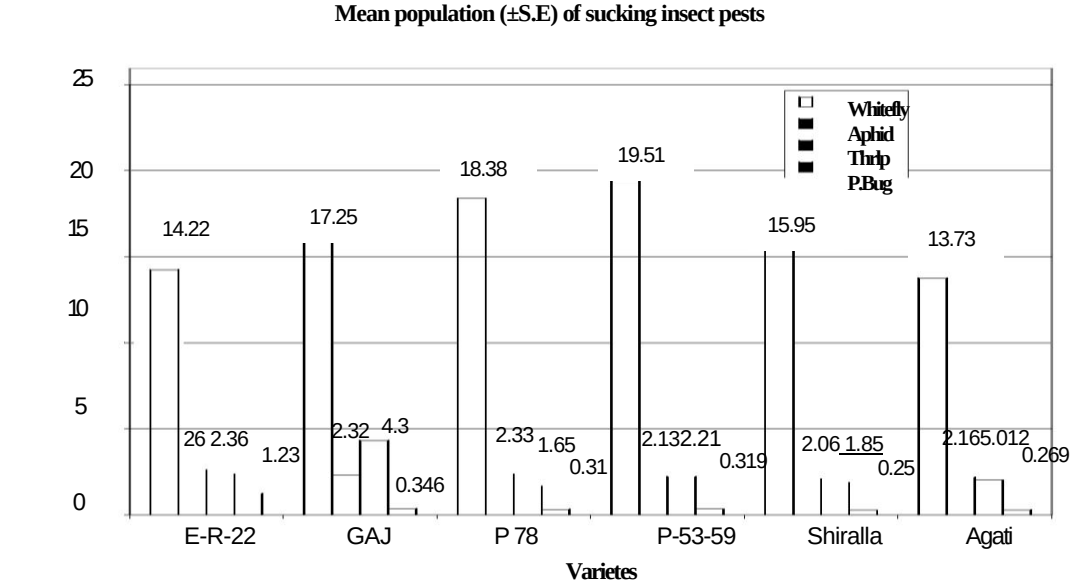


Fig. 1 Mean population (per plant) of sucking insect pests on different varieties of Brassica Campestris under fields conditions

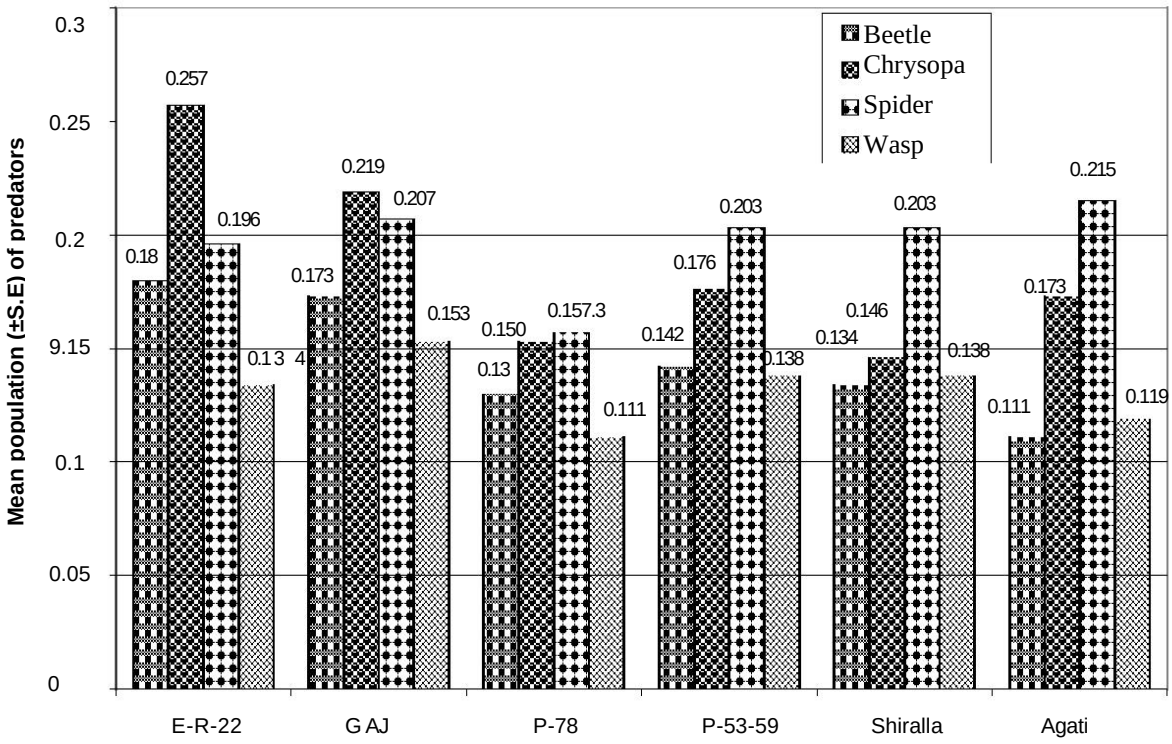


Fig.2 Mean population (per plant) of natural enemies (predators) on different varieties of *Brassica campestris* under field conditions.

Mean population of insect pests on Brassica variety Gaj (Sarsoon).

The results on the mean population of insect pests on Gaj variety of Brassica figure 1 revealed that the population of B. tabaci was more during the month of December 2003, and January 2004, the declined progressively, the mean population recorded was 17.25/plant. Further it was found that L. erysimi appeared comparatively late and reaches their peak during the month of February, on average it was 2.32/plant. Whilet T. tabaci also showed similar trends of buildup, the maximum population was during the 1s February over all mean population was 4.3/plant. However B. hilaris were in trace, it was more during the month of January and on average it was 0.246/plant.

Mean population of predators on Brassica variety Gaj (Sarsoon).

The results figure 2 further depicted that among four species of predators appeared on variety Gaj, the maximum average population was observed incase of wasp (0.21/plant), closely followed by C. carnea (0.20/plant), and Coccinellid beetle (0.346/plant) respectively. While the lesser population was recorded in case of spiders (0.153/plant). Jan. and Feb. were the peak period for all species of predators observed in the field.

Mean population of insect pests on Brassica variety P-78 (Sarsoon)

The results figure 1 on population fluctuation of insect indicated that among the various insect pests B. tabaci was motre abundant. It was high during the month of December 2008 and remained active up to 1s week of March 2009 then declined; on average the population of B. tabaci was 18.38/plant.stWhile L. erysimi was in trace during early stage of crop and reaches its peak during the 1 week of March, on average the population of L. erysimi was 2.33/plant. A similar trend of population build up was observed incase of T. tabaci, on average it was 1.65/plant, while B. hilaris was trace during the month of December then increased during January then declined on average it was 0.31/plant.

Mean population of predators on Brassica variety P-78 (Sarsoon)

The results of figure 2 further indicate that wasp was more active during the month of January and February then declined, on average it was 0.157/plant. A similar trend of population build up was observed incase of Chrysoperla carnea which averaged 0.153/plant. However the population of Coccinellid beetles was more during January then showed some reduction, while incasse thereafter and average 0.13/plant, while the spiders were found active and peaked during 1 t week of February.

Mean population of insect pests on Brassica variety P-53-59 (Sarsoon) The results on mean population of insect pests are presented in the figure1. It may be observed that population of B. tabaci was more abundant during the initial stage of the December 2008 and January 2009, then declined gradually on average the population of B tabaci was 19.51/plant, it was noted that the trend of population build up incase of L. erysimi and T. tabaci was more less similar, they appear gradually and reaches their peak during the month of January and February on average L. erysimi was 2.13/plant, while T. tabaci was 2.21/plant respectively. However, the population of B. hilaris was cooperatively low it was high during December and January their declined on average it was 0.139/plant.

Mean population of predators on Brassica variety P-53-59 (Sarsoon) .

The results of figure 2 further revealed that the population of wasp was more during among the predator 1st to 8th and 11 intervals; on average it was 0.203/plant, while the next higher population was observed in case of Chrysoperla carnea (0.176/plant), Coccinellid beetle (0.142/plant) while spider was in trace (0.138/plant).

Mean population of insect pests on Brassica variety Shiralla (Sarsoon).

The results on population build up of insect pests' figure 1 on Brassica variety Shiralla revealed that among the four sucking insect pests the B. tabaci was more abundance it was maximum during the early period of crop then declined significantly on average the population of B. tabaci was 15.95/planstt . While L. erysimi was appeared little late then increases and reaches its peak during 1 week of March, on average the population of L. erysimi was (2.057 /plant), likewise nthe population T. tabaci was less during initial stage of the crop and reaches it peak during 2 d week of February on average it was 1.85 /plant. While the population of B. hilaris was high in early stage of the crop then reduced gradually, on average it was 0.257 /plant.

Mean population of predators on Brassica variety Shiralla (Srasoon) .

Results fig. 2 shows that the population of wasp is concerned it was low during early stage of the crop than increased and declined therefore, on average it was 0.203 /plant, a similar trend of population development was observed in case of C. carnea which average 0.146 /plant, and spiders (0.138) plant, while the population of Coccinellid beetle was more during the month of December, Jan. and February on average it was 0.134 /plant. Mean population of insect pests on Brassica variety Agati (Sarsoon) .

The results on seasonal mean population development insect pests on Brassica variety

Agati Sarsoon during 15-12-2003 to 8-3-2004 are displayed in the figure 1. It was found from the results that among the four sucking pests recorded *B. tabaci* was the serious pest, the population w$_d$as more during the early stage of the crop then declined gradually, the peak time was the 2^n

interval, on average it was 13.73 /plant further the *L. erysimi* population increased gradually and reaches its peak during the forth week of February and 1st week of march on average the population of *L. erysimi* was 2.165 /plant, while trend of population build up incase of aphid the mean population of *T. tabaci* recorded was 2.003 /plant. The population of *B. hilaris* was comparatively low it was remained in the field throughout the study period the greater population was recorded during the 2nd of 2 week of December.

Mean population of predators on Brassica variety Agati (Sarsoon)

The results figure 2 further revealed that among the four species of *Coccinellid* predators recorded the population of wasp was more, it was increased gradually and reaches it peak fourth week of observation, on average the population of wasp 0.215 /plant. The population of *C. carnea* was maximum during the 5t and 6t week of observation then declined gradually, on average it was 0.173 /plant, while spider showed similar trend of development and averaged 0.119 /plant .the less population was observed in case of *Coccinellid* beetle, it was more during the week of observation and averaged 0.111 /plant. Over all mean population of insect pests on six varieties of Brassica The results on mean population of insect pests recorded on six varieties of Brassica obtained are summarized in the fig.-1.It may be seen from the results that the differences in the population of insect pests between the six varieties were non -significant.

However, varieties Agati Sarsoon, E-R-22 Sarsoon, and Shiralla Sarsoon comparatively showed some resistance against all sucking pests studies, while rest of the varieties P-53-59 Sarsoon, P-78 Sarsoon, and Agati Sarsoon, proved to show moderate resistance but these differences were statistically non significant indicating that the pest pressure was more or less similar on all varieties evaluated. The over all mean population of insect pests on all varieties indicated that *B. tabaci* was more abundant (16.54/plant), followed by *T. tabaci* (2.39) *L. erysimi* (2.26) *B. hilaris* (0.455), respectively.

The over all results on mean population of predators on six varieties of Brassica are shown in the figure 2. The results revealed that there was no significant change in the population development of predators on different varieties of Brassica was observed.

The results further revealed that comparatively the population of predators was more on varieties E-R-22 Sarsoon, and Gaj Sarsoon, followed by Shiralla Sarsoon, and Agati Sarsoon, respectively. While less on other two varieties (P-78 and P-53-59 Sarsoon), but these differences were negligible, there was no similarly in the population of predators among varieties.

The over all mean population pattern of Predators given in fig.-2 indicate that the appearance of wasp was more (0.196), followed by C. carnea (0.187), Coccinellid beetle (0.145) and spider (0.132) on all six varieties of Brassica.

4. DISCUSSION

The experiment entitled, insect pests and predators associated with different mustard varieties at Tandojam, in the experimental area of Entomology Section Agriculture Research Institute Tandojam during the Rabi season of 2008.

Sucking insect pests including whitefly, aphid, thrip, and painted bug cause serious losses to the yield and potential of Brassica crop. To overcome this problem, farmers mostly use agrochemical, which causes environmental pollution. Among alternative method, predators are good biological agents andprovide effective control of many harmful insect pests.

During present study the results fig.1 demonstrate that sucking insect pests i.e. whitefly, thrip, aphid and painted bug attacked all varieties of Brassica from germination till harvesting. Similarly, the previous authors also mentioned that Brassica crop is severely attacked by a number of insect pests that suck cell sap of Brassica plants and damage the process of photosynthesis in plants (Dubey *et al.* 1998, Rangrez *et al.* 2003).

During the period of present study, it was observed that whitefly population was highest among all sucking pests on Brassica varieties observed. The overall mean population of whitefly on all varieties of Brassica was 16.54 per plant. Similarly, Ramsey *et al.* 1996 also mentioned that whitefly is a pest of Brassica in low land Britain. They developed laboratory technique for screening of 17 Brassica accessions for resistance to whitefly and among those 13 Brassica accessions were susceptible to whitefly.

After whitefly the second largest population of thrip was observed on all varieties of Brassica (2.39 per plant). Many authors reported that thrip causes severe damage to Brassica crops (Bjorn, 1995; Shelton *et al.* 1995 and Mc Call *et al.* 1999).

Few years back aphid was the major pest of *Brassica campestris* in Sindh. However, during present studies, population of aphids was lower (2.26 per plant) than whitefly (16.54) thrips (2.39), a finding supported by others, (Narang and Tripthi, 1996; Rajendran and Selvaraj, 1997; Awasthi, 1998). These workers reported an average loss of 22% in seed yield, in addition to a negative effect on plant height, branching, test weight, oil content and viability of seeds due to *L. erysimi* infestation.

During present studies lowest (overall) population of painted bug (0.455 per plant) was recorded on rape and mustard. Many other researchers also reported that the painted bug, *B. hilaris* attacked on Brassica varieties (Bhatti and Soomro, 1994; Rajendran and Selvaraj, 1997).

During present research, the activity of many predators was noted in presence of sucking insect pests on mustard varieties. The results indicated that overall maximum number of Wasp was 0.196 per plant. It was followed by *Chrysoperla carnea* (0.187), *Coccinellid* predators (0.145) and Spider (0.132). Similarly previous authors have reported the presence of predators on Brassica correlated with aphids (Rana *et al.* 1995 Awasthi, 1998 Hausammann, 1996 Singh *et al.*,2002).

5. CONCLUSION

It may be concluded that whitefly was the major pest of Brassica in Tandojam, Sindh. It was followed by thrips, aphid and painted bug. The natural predators activity also occur on Brassica in presence of sucking insect pests. The population of predators was low and more or less similar on all varieties tested.

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