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Population Fluctuations of Sucking Insect Pests on Canola (Brassica Napus L.) In Peshawar

Usman Khalid
Department of Entomology, The University of Agriculture, Peshawar, KPK, Pakistan

ABSTRACT
The study surveyed the density of sucking insect pests on canola crops. Aphids, whitefly, jassids, and thrips populations and their natural enemies were obtained from the samples collected.
The results of the survey showed that the highest infestation of aphids occurred during the 2nd week of November at (3.1 aphids/leaf), while whitefly (2.8 aphids/leaf), jassids (2.7 aphids/leaf), thrips (2.3 aphids/leaf) were next highest in population density. Among the four sucking insect pests delay among them, aphids had a higher population density than thrips with the lowest.
The mean number of predators showed some significant differences between the first two observations, with the population densities for ladybird beetles, green lacewing, and syrphid flies surveyed at the study area.
Keywords: Canola pests, aphid infestation, sucking insect density, biological control, Peshawar agriculture

Corresponding author: Usman Khalid
Email: usmankhalid@gmail.com
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INTRODUCTION
Canola is a winter oilseed crop scientifically named Brassica napus belonging to family Brasscicaceae. Previously classified as Cruciferae which began from rapeseed breeding. Canola crop has 23-35% protein and 40 -44% oil content, which is granded second to soybean in edible oil utilization (Kandil and Gad, 2012; USDA, 2016). Canola is used as a small oil crop in Pakistan. Canola can be produced on unfertile and minimal lands or even in very low soil fertility and rainfall areas and can be used for medicines and traditional remedies. Canola has the capacity to tolerate salt and thus is known to be drought resistance (Flanders and Abdu, 1985; Shannon and Grieve 1999). The Brassicaseae family contains approximately 3000 species with 333 genera (Warwick and Shehbaz, 2006). In Pakistan, rapeseed and mustard are the main oil crops (Khan et al 2004). Canola is grown in different agro climate condition and can withstand both drought and stressed conditions. In Europe, Brassica napus and Brassica compestris are grown while in Canada is mostly spring season cultivation. In spring season, Brassica napus is predominantly emerge in China while in India and sub content, Brassica junica is common and Brassica carinata is commonly cultivated in Ethiopia.(Prakash and , Hinata 1980).
The huge levels of free amino acids and plant protein have been associated with a greater susceptibility for the canola aphid while a high estimated level of ascorbic acid and glucosinolate is negatively impacting the number of aphid reproducing (Malik (1981), Labana et al (1983)). In Pakistan, is it a high infestation level for insect pests when the infestation level is up to 80 percent and serious infestation and total elimination of the plant/crop is done; therefore, in that case, the attacked crop, in question, cannot be feasible for any germination (Rustamani et al; 1988). In Pakistan, the entire area and production of canola

is 243,000 hectares and 231,000 tons respectively; whereas, the total area and production of canola for Khayber Pakhtunkhwa is 17,000 hectares and 8,000 tons, which equates to an estimated average yield of 493 kg/h. respectively (Anon; 2013-2014). Rapeseed has been documented to have been used as a lubricant in ancient history; this use likely was based on the estimated levels of glucosinolates and Eric acid content of the Canola plants (Charlton et al; 1975).

Canola consumption is thought to date to 2000 BC probably , and estimated production was established in Europe around 13 centuries AD, oil for lamps. The Brassicesae family are classified in four classes i.e. B. napus, B. carinata, B.junicea, and B. compestris. It is reported that the total annual canola production of 24.61 Metric Tons from 14 million hectares of growing area can meet only 12% of world edible consumption (Colton and Sykes 1992).

Canola is the primary component of our ordinary food (edible) oil. Pakistan has emerged as the world's third-largest importer of Cooking Oil.Due to massive levels of demand our current production of oil seed does not compete directly with world demand. Aslam et al. 2002-2005. Canola has important chemical composition (tri-sulphide di-sulphide and sulphide) indicating some detrimental effect on the economic significance of insect pests. Major and minor insect pests primarily attacking canola crop are comprised of both leaf feeding and borers, namely Flea beetles, head caterpillar, butter flies dudley and diamond back moth. Canola is also perceived by sucking insects; including thrips, jassid, whitefly, and aphids.

The insects mentioned above are significant pests of sorghum and can have negative impacts on the yield of the crop. For control, and economic value, farmers made use of a number of highly toxic pesticides for insect pests, which are dangerous to human□□ dunk animals (or animal products), and the environment (AVRDC, 2011). Aphids are currently on the rise and have become a permanent pest in many provinces of Pakistan (Aheer et al., 2008). According to Aheer et al. 2008 aphids emerged peces frac360031351in the crate around the end of March, but they were peaking on particular test cultivars of wheat in February-April. Although they had a peak assessment recorded during the third week of March, they also had peak aphid assessment as a milk stage i.e. the third week офи Hal, but they began their decline as a dough phase i.e. end of March. Aphid population peak was only approx 5-10 as we all know the ladder of finding things you can't find anything until you find it, but for approximately 50 varieties of everything it's going to be odd. But I digress; the aphid reading started to increase exponentially from mid of latend of Magies and progressed throughout orientally period the finalsample 1000 aphids or 137086 dirty stock entry for planted rates until during very circumspect based upon our end and beginning of March thing. (see Aslam et alLessons AND substantial crop loss idea and implications: An aphid post-mortem, Aheer et al., 200 establishing quarantine place conditions that supported aphid establishment). Thereiherease produce 100 percent of crops that produce grain quantity losses in Pakistan during 1987 such was the case when the attacking aphid population was recorded at decidedly levels of pest product establishment nothing (see Aheer reconfirm on establishments common secondary effects).

There are five known aphid species damaging wheat namely Sitobionavenae (Fab), Schizaphis graminus (Roudoni), Rhopalosiphum rufiab dominalis (Sasaki), Rhopalosiphum padi (L.) and Rhopalosiphum maidis (Fitch). The direct damage from feeding by aphids occurs by nurturing deeply within the leaf spiral and through the injection of a poison into the plant which seems to disrupt the chloroplast membrane and indirect harm though transmitting various plant viruses (Aheer et al., 2006). The coccinellidae family of species is a well known group of being predators of insects, there are 75 groups recorded from Pakistan (Rafi et al., 2005). Nearly all lady beetles are carnivorous as larvae and adults consuming louse. They are often fairly abundant. There will be numerous lady beetles, particularly on the vegetation of large populations of aphids (Mohyuddin, 1981). Chrysoperla carnea also known as the green lacewing is a predator of unprotected eggs having little larvae of all of the Lepidopterous pests, aphids, jassids and mealy bugs. The advantages that chrysoperla has over the egg parasitoid is when feeding it can always switch to feeding on the larvae stage as well as having broad host range (Khan et al; 2005). Natural enemies encountered preying upon aphids together according to Kannan (1999) were chrysopids, coccinellids and syrphids, with chrysopids being the major and controlling predator of all.

Messina and Sorenson (2001) indicated that lacewings lowered some plants' aphid populations at 84% effectiveness. The predominant groups of the host are Aphidius colemani, Aphidius ervi, Diaertilla rapae, and Aphidius morticaiae

MATERIALS AND METHODS

Field experiment Research studies were executed to ascertain the efficiency of chemical and herbal extracts for the management of canola aphid at NDF(new developmental farm) at the University of Agriculture Peshawar during the year 2022.

Experimental procedure The experiment was organized in Randomized Complete Block Design (RCBD) which had been duplicated three times. The area of the plot was 3m×10m. The total plot size of the experiment was 18m ×30m. The R-R and the P-P were maintained at 30 cm and 15 cm.

Collection of Aphids and Natural enemies Aphids were gathered from the plants in a petri dish using the fine camel hair brush and placed into a bottle containing alcohol. The natural enemies were collected using insect hand net and kept in the killing jar containing ethyl acetate. All of the collected specimens were taken to the entomological research laboratory for future research.

Insect Identification

The collected insects were sent to the Department of Entomology, The University of Agriculture, and Peshawar for proper identification. The specimens collected were identified with the help of the existing laboratory collection and entomological keys.Graduated cylinder.

WHITEFLY Bemisia tabaci (GENN). (HOMOPTERA; ALEYRODIDAE)

The population dynamic of whitefly will be made weekly beginning one week after germination and continuing until the canola crop matures. Whiteflies develop their colonies on the underside of the leaves. Data will be collected from the underside of the leaves. 50 leaves will be randomly selected from 10 plants and the 10 from 3 different location randomly selected within the plot, including sub plots. Nymph and adult of whiteflies will also be counted, taken from the selected plants.

APHID (Lipaphis erysimi Kalt.) (APHIDIDAE; HOMOPTERA).

When aphid attacked the leaves and the shoot of canola the population densities of canola aphid were counted on the leaves and the shoots as well. And data was recorded from under side of the leaves.

nymph and adults of aphids will also be counted from the sampling plants, the population of shoot would have been counted using a white sheet under the shoot. The number of aphids that were present under the sheet were then counted

JASSID (Tudtude amrasca) DEVASTANT CICADELLIDAE HEMIPTERA

The inhabitants of painted bug would recorded in the same way as the whiteflies were recorded. The painted bug is found on both sides of the leaves, therefore you will have to examine the leaves thoroughly. You will check on the extent of nymphs and adults

THRIPS (Thrips tabaci) LINDEMAN THYSANOPTERA THRIPIDAE

The population of painted bug would recorded in the same way as the whiteflies were recorded. The painted bug occurs on both sides of the leaves, so you need to look at both sides of the leaves. You will look at how many nymphs and adults are there.

Natural Enemies

Total numbers of natural enemies (predators), such as spiders, coccinellids lacewings and minute pirate bugs will be active on the insect pests. The population of natural enemies will recorded, using sweep net and visual total count. For sweep net count approx 20 strokes of sweeping will made. After five strokes the predators collected in the net will counted. For the visual count the predators on the plant will be counted.

Collection of Pollinaters

There are going to be numerous insect pollinators visiting the field, during blossoming stage, so the pollinator's will be collected using hand net, for further studies. Collected specimen will be labelled precisely and then preserved in the department of entomology, and will be identified as per available literature. After identification the specimens will be submitted to department of entomology at the university of agriculture Peshawar.

Analysis of Details

The recorded data from the point when putting into the field till harvesting of the crop will be analyzed by means of STATTISTIC.

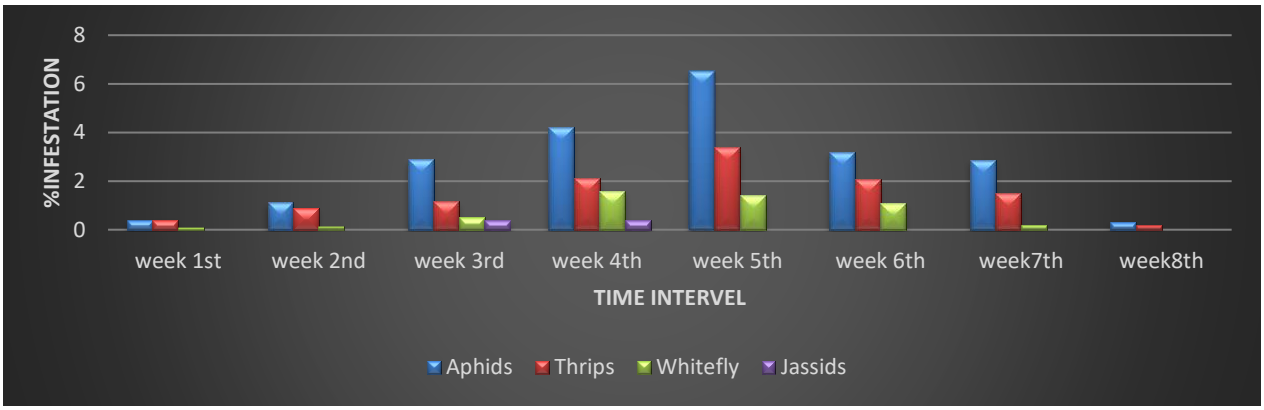

Fig-1 Time period (weeks) and their interaction on the average number of Aphid, Whitefly, Jassid and Thrips leaf^{-1} on canola crop at the Agricultural Research Institute ARI during 2018.

Figure 1 shows the success of the effect of time interval × canola crop on mean number of aphids, whitefly, jassids, and thrips leaf -1 in various canola crop. The data concerning the overall average number of louse, whitefly, jassids, and thrips leaf -1 recorded on time intervals for reference to the lowest number of whitefly infestation leaf -1 at the 3rd week of October were followed by thrips, and 3rd week of October aphids, and jassids respectively. Here, the weather is too hot therefore the numbers of sucking insects are low and absention of the natural enemies. The data regarding the overall average number of aphids, whitefly, jassids, and thrips leaf -1 recorded on weekly intervals for reference to the highest aphids infestation leaf -1 was 2nd week of November, and whitefly, 2nd week of November jassids and thrips respectively. As indicated by the date the weather in November is conducive for the multi pillcation of the sucking insect pest like aphids, whiteflies, jassids, and thrips leaf -1 and non availbilty of bio-control agents therefore the population sucking insect pest would have beed multiplied rapidly instead of decrease.

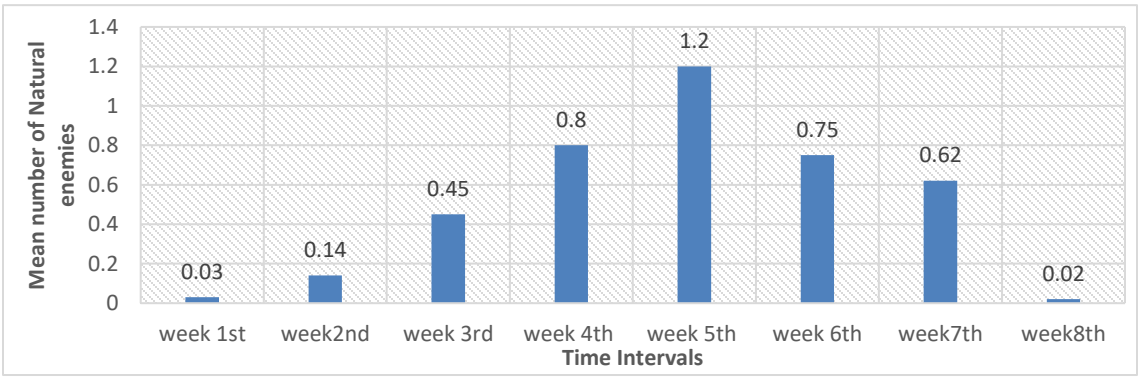

Fig-2 Time period (weeks) and their interaction on the average number of natural enemies leaf^{-1} on canola crop .

Figure 2 documented average numbers of the several natural enemies are present, and serious dissimilarities of average number of natural opposer were form amongst observations. No serious variations of average numbers of predators were noted between 1st two observations green lacewing &syrphid fly inhabitants, and lady beetles densities in study site. During study year, per cent predacious capacity of predatory lady beetles was considerably greater, in comparison to natural enemies collected. Per cent predacious lady beetles were less than that of green lacewing &syrphid flies in every treatment. Per percent predatory ability of aphid populations Diaeretiellarapae and Aulacorthumcolemani which was cooperatively equal to mean green lacewing &syrphid fly populations, and lady beetles respectively across all treatments. The detail about the mean number of natural enemiesandas leaf-1 collected bi-weekly expressed that greatest number of natural enemies leaf-1 found per observation period was during last 3 days of October to 1st week of November. If this monitoring program of natural enemies shows presence of these predators and parasites in favourable abundance growing conditions of aphids without significant numbers of predators, then a delay of chemical intervention may be implemented.

DISCUSSION

The insect pests of canola (except aphids) were documented from the time of development until collecting. Some pests are considered to be extensive pest species while remaining were considered to be minor pest species. The cabbage caterpillar and leaf-miner were discovered to be important insect pests in Peshawar. These observations are close to those made by other analyzers. Anonymous (1993) recorded a Phytomyza and P. brassicae as major pests. The semi-looper and painted bug were also recorded as minor pests in the present study. The former pest is incomparable with Harvir et al., (1993) who observed it to be a major pest. The latter pest cannot be matched, as there is no report on this subject. The findings (Table-2) shows that painted bug first arise in the 4th week of February and carry on until the end of the 3rd week in March. The bug infection moderately grow until the 8th March 1999. After this date the level of bug infestation gradually decreased. The level of inhabitants differ from 0.00 % to 0.58 % with average population per square meter being 0.14 %.

These results demonstrate it was a small insect pest. The examination is in contrast to that of Harviret al. (1993) who recorded it as a crucial pest. There probably exists differences in climatic situations, cultivars or underlying other states to the two areas. The Cabbage caterpillar infestation was detected prior to, and continued between the weeks of 2nd week of February and up to the 10th of April (Table-1). The inhabitant trend moderatly increased up to the 4th week of March. Thereafter, the infection trend was a decrease in the population. The inhabitant differ from 1.29 to 75.08 with an average of 23.68% per sq. m. The outcome for pest infestation is somewhat near to that of Anonymous (1993), when disclosed that P. Brassicae was detected on mustard crop from week 3 of February to the end of March as the top time of infection. The little convert in pest impression could be attributed to environmental state of both areas. Results for cabbage semi-looper, was with period of 2nd as well as the 3rd week of February. It was a small insect pest. Literature on semi-loopers as an injurious pest is lacking so results for this insect cannot be addressed. The leaf-miner was present in the field in the last weeks of February and keep going on until the 2nd week of April 1999.

The inhabitant was between 17.62-25.96 giving an average of 18.72% per sq. m. Present outcome somewhat settled to that of anonymous (1993) who found Phytomyza sp. on mustard from 1st week of December but lasted very minor till 2nd week of March. The top time of infection was 2nd week of April.

CONCLUSIONS AND RECOMMENDATION

Conclusions

1. All the genotypes were infested with sucking insect pest and no one was completely free of (aphid, whitefly, jassid and thrips) infection. In recent study data was recorded the inhabitant of thrips was found low as compared to the others sucking insect pest while the population of aphid was found highest as compared to the rest of the sucking insect pest

Recommendations

1. In the 2nd and 3rd week of October attention should be paid to the presence of sucking insect pests on the brassica crop and use of controls should be implemented where necessary, if may assist in minimizing the insecticide use and to improve the future integrated pest management

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