

Population Trend of Canola Aphid, *Lipaphis erysimi* (Kalt) (Homoptera: Aphididae) On Different Brassica Lines

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Abstract

*The trial was conducted to find out the population trend of *Lipaphis erysimi* (Kalt) at The Agriculture University of Peshawar the experimental farm during cropping season 2013. Eight different brassica lines WASTER 209, VANGARD 210, GANYOU 211, CRUSHER 212, OSCAR 213, RAINBOW 214, TORCH 233 and LEGEND 248. The data showed that the infestation of aphid started invariably in all cultivars during 2nd week of November 2013 (observed at first time). The highest population of 6.0 aphids per leaf was noted during first seven days of December and on the other side in contrast the minimum number of 1.1 aphid per leaf was collected during November 2nd week.*

Keywords: *Lipaphis erysimi* (Kalt), Brassica Lines

Introduction

There are three genus of Brassica namely, Brassica oleraceae Brassica napus, and Brassica rapa. Among them the variety Brassica oleracea includes various essential vegetables like broccoli and cauliflower. All over the world the two cultivars Rapa and napus are grown for important oil purpose. There are two subspecies such as oilseed rape (subspecies oleifera) and Swede (subspecies Brassica) of Bassica napus also used for different oil purpose. The cultivar Oilseed rape is considered the high valuable crop in Sweden for the production of oil (Svensk, 2008).

The oil of mustard is used for consumption in indo- pak as well as for making condiment, soap, as a green manure in the field and also used for feeding livestock. The purpose of brassica crop seed is used for the extraction of its oil because it has a great importance for the consumption of human beings further more it has vital importance because the seed of

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brassica consist of 42% the product of oil. Amongst the cruciferous crops, Rapeseed and Mustard the crops in between the cruciferous and the percentage of the whole grown area is about 81 percent (Nazir, 1994).

In the world every country is focusing to give importance to their economic problems, among those oilseed crops are considered a valuable crop because of their value in important substitution for the growth of the wealth of the country. In the cruciferous family of Brassica is having about 3200 species and 275 genera of plants (Jessop and Toelkon, 1996).

Over all Pakistan, mostly the oil is obtained from cotton seed and Brassica rank in the second position for the production of vegetable oil. Annually the production of Brassica is 233,000 tones on the total area of 307,000 hectares and the contribution of the same crop for domestic edible oil purpose is about 17% which help in the prosperity of the country (PARC, 2006).

The total area of about 3% is grown under rapeseed during the cropping in Khyber Pakhtunkhwa. Average yield of rapeseed in Khyber Pakhtunkhwa as compared the national yield is even less (only 472 kg per hectare), showing that proper action be taken for the improvement and production of the minimum yield at national level. With the increase in the population of the country the requirement of the crop has increased and needs to be grown about 3-4% in the country every year. (AOCS, 2006).

The backbone of the country is agriculture but unfortunately majority of the agriculture base commodities are imported worldwide by Pakistan to maintain nutritional need of the people. Currently in 2006 about 69% of the production oil was imported from other countries and only 31% of the oil requirement was fulfill by the country (MINFAL, 2006).

The yield of the crop is slight in our country with relation to other developed and developing countries. There are various factors in minimum production of oil crop among them insect pests are serious factor due to their high damage the production of the crop is low. The Mustard crop is attacked by different pest among the one of serious pest is *Athalia proxima* and with these crops more than three dozen insect pests associated. The pest aphid on Mustard Kalt is studied carefully among all the pests and considered as that it caused serve damage to the crop (Ali et al. 2009, Ali and Rizvi 2008a;).

Numbers of pests are serious to Canola crop; the pest with the most serious infestation is caused by aphids. There are three aphid species which were observed to be serious and caused maximum loss to canola crop such as green peach aphid, cabbage aphid and turnip aphid (Rehman et al., 1987).

There are different species of aphids which attack various crop and cause high damage to every crop. From the same crop Canola is one which is seriously infested by aphid different species, with the same damage it results as reduce growth and minimize the yield. Favorable conditions are best for aphids in which rapid growth and dense colonies are made easily on plants. The plants are not only infested by the pest, there are different diseases, which decrease the production of the crop. Some pests are transmitter of different disease among them plant viral diseases are transmitted, such as turnip mosaic virus, with the control of aphids which can be only managed effectively. In the yield of the crop about 70-80% losses are caused by aphid and the pest is considered as the major pest for the same crop (Bedford and Henry, 1998).

In the family Brassicaceae cabbage aphid is the most destructive pest. It lives in the form of large colonies on different places such as on stems, inflorescence and leaves, causes heavy loss to the crop and severe distortion of leaves. The crops when infested by Aphids decrease the growth, and cause about 9-77% loss in seed yield. In the same way 11% reduction is observed in seed oil content by aphid infestation (Kelm & Gadomski, 1995).

For the management of the pest different practices were proposed to decrease the loss, the same practices were being developed continuously one step ahead of pathogen evolution. Breeding of resistant varieties, development of advanced agricultural methods and genetic engineering are said to be effective control measures to minimize the loss of the yield. In the modern agriculture different insecticides and fungicide play vital role to increase the production. World-wide annually fungicides and pesticides active ingredient equivalent to 768,000 tons are used, which leads on the environment an additional strain. About 80,000 tons of the chemicals are used annually by united states and the value of that cost over four and a half billion dollars (U.S. Environmental Protection Agency, 2008).

In the year 2000 According to the report of the agriculture department of United States, the number of rapeseed was on third position in the world for the production of vegetable oil, after oil palm and soybean. Rapeseed consists of high amount of protein and considered the 2nd chief source of meal protein around the world. According to the UN organization report of Food and Agriculture in world production is increasing fast, Food and Agriculture organization of united nation reported the production of 36 million tones of rapeseed in the cropping season 2003-04 increased to 46 million tons during 2004-05. The crop with its high value focused the people to do more and more production, in consideration it is estimated that the

production in 1965 was only 5.2 million tones. China is an agricultural dependent country and the highest producer of rapeseed, followed by Canada and India. In Europe Germany is the largest production of rapeseed (FOA, 2008).

Pakistan is considered agriculture dependent country but for the production of edible oil crop Pakistan depends on other countries and do imports of the edible oil that cost a huge quantity of overseas trade. Its import statement is constantly the 2nd biggest after fuel and constitutes the single prime costs on every imported foodstuff substance. In the year 2009-10, in tons about 1.246 millions of the oil used for consumption was done by Pakistan with the payment of Rs 77.78 billion (MINFA, 2010).

An extra quantity of about 24.368 billion was used upon the seed import by the trade therefore the overall import bill was further increased. In The province KPK, Mustard and Rapeseed are full-sown about 17.7 T/H (thousand hectares), whole yield of 7.4 Thousand/T. About 418 kg per hectare average yield is obtained (MINFA, 2009).

Winter season is the favorable for sowing of rapeseed and the oil crop mustard. In the year 2002-03 in Pakistan the grown area and the obtained yield of rape and mustard were about 649x103 acres, 217x103 tonns of extracted oil from seeds and 69x103 tonns oil (Anonymous, 2002-03).

Aphids have been considered a serious pest throughout the growing areas of two crops (rape and mustard) in the country. Aphid *Myzus persicae* (Sulz.) is a serious pest of oiliferous Brassica, widely distributed throughout the world. In general both the adults and young one suck the liquid that is called cell sap from the soft and green portion of the plant particular. The affected leaves curl up and deform in shape and due to attack of pathogens the leaves become vulnerable, which ultimately affect the plant vigour (Khan and Ahmed, 1967).

Graham (1984) said that *Brevicoryne brassicae* nominated pest and cause maximum loss to the common crop brassica and with change of the season also minimizes the production of the oil from the seed.

Under favorable condition the number of Aphids increase quickly on different parts of the plant such as on stems, leaves and flowers, from where the mechanism of pest is to suck the sap for its consumption. By the infestation of aphids on Brassica affect seeds and pods and minimize the growth of the crop (Devi et al., 2002).

By the attack of the sucking pest on Brassica spp causes the yield loss of about 30-35 percentage. (Phadke, 1985).

The infestation of the pest on Brassica may increase the yield loss up to 70 percent (Bhatti et al., 1976).

METHODS AND MATERIALS

A trial was conducted to discover the number of the pest i.e. Brassica aphid, in various lines of Brassica viz WASTER 209, VANGARD 210, GANYOU 211, CRUSHER 212, OSCAR 213, RAIMBOW 214, TORCH 233 and LEGEND 248 at experimental Farm The Agriculture University Peshawar, during cropping season (2013).

Parameters

1. Population trend of Brassica aphid, on every selected leaf.

I. Sowing of Seed

Seeds of all the lines Brassica were grown in the experimental farm, close to Biotechnology department of the Agriculture University of Peshawar 30th October 2013. With the help of hand hoe in row the seeds were sown. Each block has 30 rows of plants and the distance between row to row was 60 cm .There were total 3 blocks.

II. Population trend of *Lipaphis erysimi*.

To know the number of aphid population, in eight various lines of Brassica including WASTER 209, VANGARD 210, GANYOU 211, CRUSHER 212, OSCAR 213, RAIMBOW 214, TORCH 233 and LEGEND 248 were sown in different blocks. The data was observed randomly from top, middle and bottom of three leaves from the known plants in every row. Data were collected interval of three days from the month of November in the 2nd week till the month of December 1st week.

III. Data Analysis

The special package SPSS was used for data analysis.

IV. RESULTS

The mean number of aphid, in various lines of Brassica

The analysis of variance in the figure one for effect of the lines of Brassica and the interval time of three days showed the collected data of the Canola aphid population in various time intervals of three days on the mean figure of aphid per leaf of Brassica plant.

Fig-1 shows the infestation of aphid on various cultivars of brassica and the data taken in time interval of three days on the average figure of per leaf of aphid on the plant of Brassica.

The Mean average rate of data collection indicated that at the emergence of the infestation was slight, which was (1.1 aphid per leaf) on second week of November but with time interval the population of aphid's maximized and the recorded data with maximum population was 6.0 aphid on every leaf at the starting of December (W1).

Along with brassica lines, highest aphid's number of (3.6 aphid on each leaf) on the line namely Torch 233 was noted and Wester 209 was the line showed minimum number of 2.9 aphids on every selected leaf.

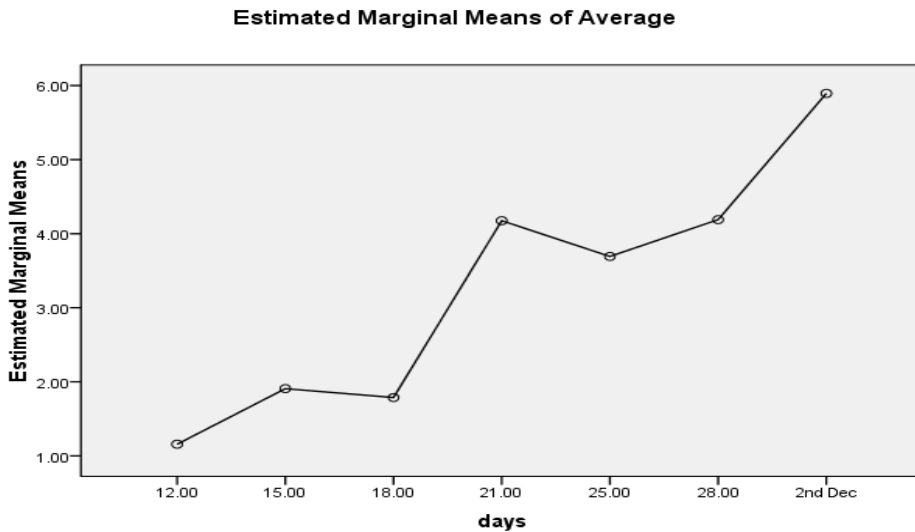


Fig-1. The response of the lines of Brassica and time intervals (three days) of the mean number of Canola aphids on every selected leaf of Brassica plant.

On these days data were taken.

- 12 November 2013
- 15 November 2013
- 18 November 2013
- 21 November 2013
- 25 November 2013
- 28 November 2013
- 2 December 2013

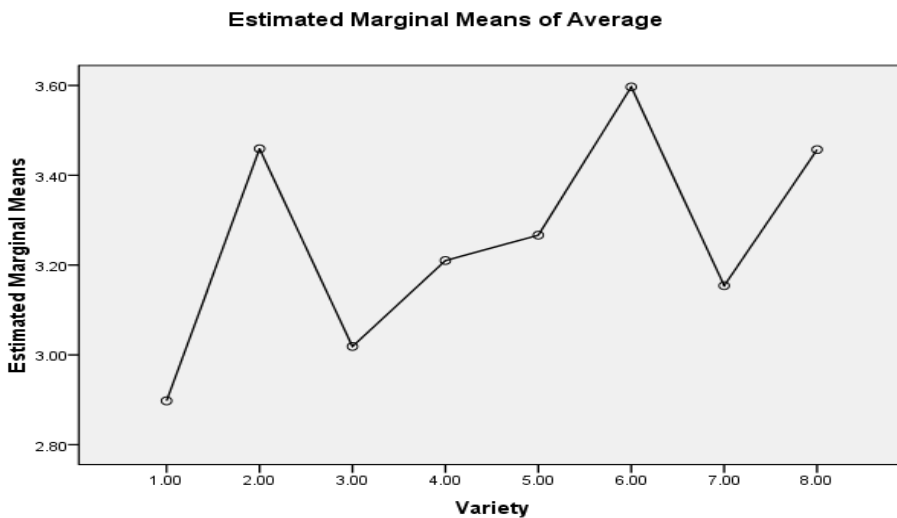


Fig-2. The response of the lines of Brassica and time intervals (three days) of the mean number of Canola aphids on every selected leaf of Brassica plant.

Name of varieties

- **WASTER 209**
- **GANYOU 211**
- **RAIMBOW 214**
- **OSCAR 213**
- **VANGARD 210**
- **CRUSHER 212**
- **TORCH233**
- **LEGEND 248**

V. DISCUSSION

Brassica species are the mostly attacked by the serious pest Aphids, and cause highest loss in the yield of Brassica different varieties so it is very necessary to study the number of aphids and to know the infestation level for their control to minimize the losses. Weibull and Melin (2003) stated that the seriously infestation of canola crop is done by aphids when the ecological circumstances are favorable for them and its yield is reduced drastically.

Brassica lines and various time intervals of three days showed that at starting the mean population of aphid was low, but when time passes the population of pest maximized and the highest number of pests was noted during the starting week of December.

The variety (Wester-209) showed the best respond in dropping the population of aphid. Our results are related to Verma et al. (2003) suggested about the response of cultivars brassica as Banasri Rai and Rohini were considered highly resistant to aphid's infestation as compared to Veruna, Vaibhav, Vardan and UPN-9, which were highly susceptible to aphid's infestation.

SUMMARY

A research was conducted to know the population infestation of the sucking pest named as aphid in Brassica lines differently at the experimental farm in the season of 2013 at The Agricultural University of Peshawar.

The lines of Brassica and different time intervals (three days) showed that in 2nd week of November the number of aphids which were counted in average were low however gradually when time passed the number of aphid population maximized and uppermost aphid population was noted in the second week of December. Brassica line, (Torch-233) showed best response as compared to WASTER 209, VANGARD 210, GANYOU 211, CRUSHER 212, OSCAR 213, RAIMBOW 214 and LEGEND 248.

The above study it was investigated that highest number of the pests were recorded through second week of December. The line Torch-233 showed that it was highly infested by the serious pest, during second week of December and in every case similar response was noted with greatest population.

CONCLUSIONS

Aphids were considered as the predominant species of the Brassica the experimental area, The Agriculture Univeirsity of Peshawar. The highest numbers of 6.0 aphids on each leaf were noted during first week of December and least number of 1.1 aphids on each leaf was collected through second week of November. Aphids highly attack the variety, (Torch-233) due to its nature of susceptibility, while the variety, (Wester-209) resisted its attack and presented highest resistance against it.

RECOMMENDATIONS

- The Brassica line, (wester-209) is recommended to be cultivation in Peshawar, because of the least attack by aphids.

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