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POPULATION TREND OF CANOLA APHID, *LIPAPHIS ERYSIMI* (KALT) (HOMOPTERA: APHIDIDAE) UNDER FIELD CONDITION

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ABSTRACT

The field experiment on the population trend of *Lipaphis erysimi* (Kalt.) was conducted at New Developmental Farm, The University of Agriculture, Peshawar, from 2021 to 2022. The results revealed that aphids appeared at rates of 1.00 and 0.75 per leaf during January 8-14, reaching their peak at 10.10 and 11.35 per leaf during March 12-18. Subsequently, they disappeared from the field after April 9-15 in both years (2021 and 2022). Therefore, as L. erysimi reaches its peak population during SMW 11 (March 12-18), plants should be closely observed during this period, and control methods with rapid curative action should be applied if needed.

1. INTRODUCTION

Canola, *Brassica napus* L. is one of the key oil seed crops. It is an herbaceous, annual crop, which belongs to family *Brassicaceae*. Primary it is cultivated for seeds and edible oil (Possent *et al.*, 2017). In Pakistan, it has been grown in all the regions over an area of 26.02 thousand hec with annually production of 102.0 thousand tones contributing up to 17 percent of the local edible oil production. The major cultivating areas of Rapeseed and Mustard include Rawalpindi, Attock, Jhelum, Faisalabad, Chakwal, Multan, Bahawalpur, Bahawalnagar, Muzaffargarh, Rahim Yar Khan (AARI, 2019). In Pakistan, the low production of canola crop is due to many factors including a widespread series of biotic and abiotic stresses. Abiotic stresses include flooding, drought, cold, heat, extreme light intensity and salinity. In many crops, the most susceptible phase is reproductive stages has been studied towards temperature stress. Biotic stresses include a wide range of insects and pathogens (Buchanan *et al.*, 2000). In canola crop aphids can reduce yields up to approximately 97 percent.

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These losses in yield are affected by insect pests, like, the phloem-feeding aphids, which parasitize the crop by deploying their defensive mechanism (Giordanengo *et al.* 2010; Jaouannet *et al.* 2014; Kumar, 2019). The nymph and adult are the major stages of aphid life cycle which damage plants by directly sucking cell sap from different portions. The pest raises parthenogenetically, and females can provide birth between 25 to 135 nymphs, which increase rapidly and reproduced in 6 to 9 days. Managing approaches for insects largely depend upon chemical insecticides (Karami *et al*., 2018). Presently, the easiest and most effective approach towards this pest is use of systemic insecticides such as neonicotinoids (El-Wakeil *et al.*, 2013; Stapel *et al.*, 2000). Though, this type of controlling pest is ecologically unmaintainable (Zhang *et al.*, 2014b). Application of insecticides and natural enemies use have limited achievement in the management of insect pests. Though, insecticides create a negative effect on bio-control agents (Capinera, 2008), while resistance has developed in aphids against mostly synthetic insecticides (Mottaghinia *et al.*, 2011). Therefore, HPR has benefit in managing the population of pests with eco-friendly method (Smith, 2005).

Many efforts have been taken in Pakistan, to increase the quality, productivity and resistance in rapeseed canola varieties. In order to these, fresh varieties have been evaluated and tested in multiple regions of Pakistan. New varieties are better in oil contents, quality and strength (Swati, 2005). Thus, keeping in view, the significance of the crop and aphid this study is aimed to population trend of canola aphid, *lipaphis erysimi* (kalt) (homoptera: aphididae) on selected canola variety (Abaseen) under field condition.

2. MATERIALS AND METHODS

The field experiment (Population trend of *L. erysimi* Kalt.) was conducted in New Developmental Farm, The University of Agriculture, Peshawar.

Population trend of L. erysimi (Kalt)

To study the population trend of *L. erysimi*, a susceptible variety (Abaseen) was sown in sub plots with four replications. The number of aphids were recorded on 3 leaves from top, middle and lower part of four randomly selected plants from each replication and evading the boarder rows of every plot. The number of aphids was counted through a magnifying glass and data were recorded on weekly basis (Ahmad *et al*., 2013).

Statistical Analysis

The data were analyzed by using analysis of variance (ANOVA) with help of Statistix 8.1. The significant data were separated by calculating least significant difference (LSD) at 5% level of significance (Steel & Torrie, 1997).

3. RESULTS AND DISCUSSION

Population trend of L. erysimi

Data was recorded on a weekly basis to determine the population trend of aphids on susceptible variety Abaseen during 2021 and 2022 (Table No. 1 and Figure No. 1). The pest appears in the field during Standard Meteorological Week 2 (SMW 2) (January 8-14) in 2021 (1.00 aphids' leaf^{-1}) and 2022 (0.75 aphids' leaf^{-1}). The pest continues to increase its population gradually till its peak was recorded in SMW 11 (March 12-18) during both years (8.80 aphids' leaf^{-1} in 2021 and 10.35 aphids' leaf^{-1} in 2022). After that, the pest population started to decline gradually till SMW 15 (April 9-15) (0.32 aphids' leaf^{-1} in 2021 and 0.47 aphids' leaf^{-1} in 2022). From SMW 15 onwards the pest disappeared from the field. Canola aphids *L. erysimi* is one of the economically important pests of canola crops and cause significant yield losses every year. This research was performed to find the population trend of the pest in this region. The population trend was observed on variety 'Abaseen' in 2021 and 2022. Where, aphids appear in the field during Standard Meteorological Week 2 (January 08-14) then the pest reaches to its peak population during SMW 11 (Mar 12-18) after that the insect population declined gradually and disappears from the field after SMW 15 (April 09-15) during both years.

Similar, result was recorded by Aslam *et al.*, (2005) and Saljoqi *et al.*, (2011). Furthermore, Jitendra *et al.*, (2000) has also observed a parallel population density of mustard aphid on Brassica germplasm. Khan *et al.*, (2015) recorded that at young stage, crop have fleshy leaves which provide medium for higher infestation of aphids in comparison with later stages, then plant tissues are rough and harden. Preceding works have verified different theories and conclusions concerning the reasons that may be responsible for the population trend of aphids in vivo conditions such as physiological age of plant (Smith, 2005) soil fertility, growth pattern (Painter, 1951), natural enemies and environmental stresses Aheer *et al.*, (2007).Thus it is concluded that no single factor might be responsible for the aphids disappearing from field, which is a complex phenomenon and may be convoyed by multiple factors.

4. CONCLUSION

The current research work concluded that the Peak population of *L. erysimi* was recorded in SMW 11 (March 12-18) during both years (2021 and 2022) while the pest disappears from the field till SMW 15 (April 9-15). Thus, As the *L. erysimi* reaches to its peak population during SMW 11 (March 12-18) thus, the plants should be observed closely during this period and control methods having rapid curative action should be applied if needed.

5. CONFLICT OF INTEREST

All authors have declared that there is no conflict of interests regarding the publication of this article.

REFERENCES

Aheer, G. M., Malik, N. A., Ahmad, J., & Razaq, A. (2007). Screening of *Brassica* varieties/advanced lines against aphid attack. *J. Agric. Res., 37*(4), 195-200.

Ahmad, M., Naeem, M., & Khan, I. A. (2013). Relative abundance of aphid's population on different brassica genotypes. *Sarhad J. Agric., 29*(1), 133-138.

Aslam, M., Razaq, M., Islam, Z., & Shahzad, A. (2005). Comparison of different canola (*Brassica napus* L.) varieties for resistance against cabbage aphids (*B. brassicae* L.). *Intl. J. Agric. Biol., 13*(7), 781-782.

Ayub Agricultural Research Institute (AARI), Faisalabad. (2018-19).

Buchanan, B., Gruissem, W., & Jones, R. (2000). Part 5: Plant environment and agriculture. In: Gruissem W, Jones R, Buchanan BB, eds. *Biochemistry and molecular biology of plants.* American Society of Plant Biologists (USA), 1102-1319.

Capinera, J. L. (Ed.). (2008). *Encyclopedia of entomology*. Springer Science and Business Media.

El-Wakeil, N., Gaafar, A., Sallam, A., & Volkmar, C. (2013). Side effects of insecticides on natural enemies and the possibility of their integration into plant protection strategies. In: Stanislav Trdan (Ed.) Insecticides: Development of safer and more effective technologies.

Giordanengo, P., Brunissen, L., Rusterucci, C., Vincent, C., van Bel, A., Dinant, S., Girousse, C., Faucher, M., & Bonnemain, J. L. (2010). Compatible plant-aphid interactions: how aphids manipulate plant responses. *C. R. Biol., 333*(6-7), 516-523.

Jaouannet, M., Rodriguez, P. A., Thorpe, P., Lenoir, C. J. G., MacLeod, R., Martinez, C. E., & Bos, J. I. B. (2014). Plant immunity in plant-aphid interactions. *Front Plant Sci.*

Jitendra, A. K., Hoppes, M. K., & Xin, Y. P. (2000). Enhancing main idea comprehension for students with learning problems: The role of a summarization strategy and self-monitoring instruction. *J. SPCL. Edu., 34*(3), 127-139.

Karami, A., Fathipour, Y., Talebi, A. A., & Reddy, G. V. P. (2018). Parasitism capacity and searching efficiency of *Diaeretiella rapae* parasitizing *Brevicoryne brassicae* on susceptible and resistant canola cultivars. *J. Asia Pacific Entomol., 21*, 1095-1101.

Khan, I. A., Ahmad, M., Akbar, R., Hussain, S., Saeed, M., Farid, A., Shah, R. A., Fayaz, W., Shah, B., & Din, M. M. (2015). A study on losses due to *B. brassicae* in different Brassica genotypes under screen house conditions. *J. Entomol. Zool. Stu., 3*(6), 16-19.

Kumar, S. (2019). Aphid-plant interactions: implications for pest management. In: Manuel Oliveira, Anabela Fernandes-Silva, Feyza Candan (Eds.) *Plant Communities and their environment.* Intech Open UK.

Mottaghinia, L., Razmjou, J., Nouri-Ganbalani, G., & Rafiee-Dastjerdi, H. (2011). Antibiosis and antixenosis of six commonly produced potato cultivars to the green peach aphid, *Myzus persicae* Sulzer (Hemiptera: Aphididae). *Neot. Entomol., 40*, 380-386.

Painter, R. H. (1951). The economic value and biologic significance of insect resistance in plants. *J. Econ. Entomol., 14*, 358-367.

Possenti, M., Baima, S., Raffo, A., Durazzo, A., Giusti, A. M., & Natella, F. (2017). Glucosinolates in food. In *GSLs. Ref. Ser. Phytochem*, 87-132.

Saljoqi, A. U. R., Zada, R., Khan, I. A., Munir, I., Rehman, S., & Khan, H. J. A. (2011). Population Trend of Canola Aphid, *Lipaphis erysimi* (Kalt.) (Homoptera: Aphididae) and its associated natural enemies in different brassica lines along with the effect of gamma radiation on their population. *Intl. J. Agric. Biosyst Eng., 5*(1), 1-8.

Smith, C. M. (2005). *Plant resistance to arthropods.* 1st ed. Dordrecht, The Netherlands: Springer.

Stapel, J. O., Cortesero, A. M., & Lew, W. J. (2000). Disruptive sublethal effects of insecticides on biological control: altered foraging ability and lifespan of a parasitoid after feeding on extrafloral nectar of cotton treated with systemic insecticides. *Bio. Con., 17*, 243-249.

Steel, R. G. D., & Torrie, J. H. (1997). *Principles and procedures of statistics.* McGraw Hill Book Co., Inc. New York, pp. 232-251.

Swati, Z. A. (2005). Genetic Improvement of Brassica Oilseed by Integrated use of conventional and Molecular Biological approaches. *Instt. Biotech. Genetic. Engg., The Univ. Agric. Peshawar, Pakistan.* Project Final Compl. Rep. of ALP Project, 33p.

Zhang, X. L., Liu, X. Y., Zhu, F. X., Li, J. H., You, H., & Lu, P. (2014). Field evolution of insecticide resistance in the brown plant hopper *Nilaparvata lugens* (Stal) in China. *Crop. Protec., 58*, 61-66.

Table 1. Mean population trend of *L. erysimi* on a susceptible variety (Abaseen) during 2021 -2022 under field condition.

Months and Dates	Standard Meteorological Weeks	Population Density 2021	Population Density 2022
Jan (08-14)	SMW 02	01.00 ± 0.40 i	00.75 ± 0.47 i
Jan (15-21)	SMW 03	02.00 ± 0.70 h	03.50 ± 0.64 g
Jan (22-28)	SMW 04	03.30 ± 0.23 g	04.75 ± 0.62 f
Jan-Feb (29-04)	SMW 05	05.00 ± 0.40 f	06.05 ± 0.62 e
Feb (05-11)	SMW 06	06.20 ± 0.40 e	07.05 ± 0.62 d
Feb (12-18)	SMW 07	07.00 ± 0.40 de	07.75 ± 0.62 d
Feb (19-25)	SMW 08	07.50 ± 0.40 cd	08.65 ± 0.62 c
Feb-Mar (26-04)	SMW 09	08.10 ± 0.40 bc	09.35 ± 0.62 c
Mar (05-11)	SMW 10	08.80 ± 0.40 b	10.35 ± 0.62 b
Mar (12-18)	SMW 11	10.10 ± 0.40 a	11.35 ± 0.62 a
Mar (19-25)	SMW 12	08.10 ± 0.40 bc	09.25 ± 0.62 c
Mar-Apr (26-01)	SMW 13	04.10 ± 0.40 g	05.05 ± 0.62 f
Apr (02-08)	SMW 14	02.10 ± 0.40 h	02.05 ± 0.62 h
April (09-15)	SMW 15	00.32 ± 0.25 i	00.47 ± 0.28 i
LSD (0.05)		1.195	1.719

Mean followed in column by same alphabets are insignificant at 5% level of probability.