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POPULATION DYNAMICS OF MUSTARD APHID *LIPAPHIS ERYSIMI* (KALTENBACH) AND ITS NATURAL ENEMIES

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ABSTRACT

A field experiment on the population dynamics of mustard aphid *Lipaphis erysimi* (Kaltenbach) and its natural enemies in Indian mustard *Brassica juncea* was conducted during 2016-17 and 2017-18. The peak infestation was observed in the 5th week of January (213.68 aphids/ 10 cm terminal shoot) and 4th week of January (168.80 aphids/ 10 cm terminal shoot) in the 2016-17 and 2017-18, respectively. The maximum temperature had significant negative effect (r= -0.64), while relative humidity exhibited a significant positive effect (r= 0.64); and minimum temperature and rainfall led to non-significant effect. The coccinellid predator *Coccinella septempunctata* L., revealed a significant positive correlation with aphid (r= 0.76 and 0.72), and a non-significant correlation was observed with weather parameters.

Key words: *Lipaphis erysimi*, *Brassica juncea*, population dynamics, temperature, relative humidity, rainfall, Coccinella septempunctata, correlation coefficients

Indian mustard *Brassica juncea* is an important oilseed crop, with area under rapeseed-mustard in India being 6.2 million ha a productivity of 1281 kg ha^{-1} (Anonymous, 2016). It's productivity is very low as the damage inflicted by various insect pests is serious. Bakhetia and Sekhon (1984) listed 38 species of insect pests on rapeseed and mustard crop in India. Among these, the mustard aphid *Lipaphis erysimi* (Kalt.); mustard sawfly *Athalia lugens proxima* (Klug.); painted bug *Bagrada hilaris* (Kirk.) and the leaf miner *Phytomyza horticola* (Goureau) are the major ones. The aphid *L. erysimi* sucks cell sap from the leaves, inflorescences and immature pods and affects the yield (Awasthi, 2002). It is well known that attack of insect pests depends upon climatic conditions, crop growth stage or phenology and presence of natural enemies at a particular time. Weather factors like temperature, relative humidity and rainfall greatly influence the population of insect pests (Kisimoto and Dyck, 1976). Studies on the interaction between pest activity and environmental factors help in deriving predictive models to forecast incidence. Aphidiphagous coccinellids play a significant role in the management of pestiferous aphids (Kalra, 1988; Rana et al. 1995). This study evaluates the population dynamics of *L. erysimi* on mustard.

MATERIALS AND METHODS

To study the population dynamics of mustard aphid *L. erysimi* and its natural enemies in mustard *Brassica juncea*, the variety, Varuna (T- 59) was sown in five plots on 14th and 16th October, during 2016-17 and 2017-18, respectively. The plot size was 3 x 2 m with row to row and plant to plant distance of 30 and 10 cm, respectively. The incidence of aphid was recorded on 10 cm terminal central shoot/ plant on each randomly selected tagged plant/ plot. The occurrence of coccinellid predator *Coccinella septempunctata* L. (both adults and grubs). was observed on the same plants at weekly intervals. Correlation coefficients were computed between incidence with weather parameters, viz., maximum and minimum temperature, average relative humidity (RH) and rainfall. The correlation was also computed between weather parameters and *C. septempunctata*.

RESULTS AND DISCUSION

The results revealed that the aphid *L. erysimi* incidence began in the 1st standard meteorological week (SMW) of January in both the years, reaching a peak in the 5th SMW in 2017 and in the 4th SMW in 2018; maximum temperature showed a significant negative correlation, while the mean RH showed a significant positive correlation, whereas, minimum temperature and rainfall exhibited a non- significant effect (Figs. 1, 2). Tripathi et al. (2005), Jat et al. (2006), Kalita et al. (2016), Kumar et al. (2016) and Kumar and Paul (2017) observed that the maximum temperature exhibited a significant negative effect and

RH with a significant positive effect, whereas, minimum temperature and rainfall had non-significant effects. The coccinellid *C. septumpunctata* was found preying *L. erysimi*, with the peak incidence coinciding with the peak aphid incidence; a significant positive correlation (r= 0.76, 0.72) was observed between aphids and *C. septumpunctata* (Figs. 1, 2). These findings corroborate with those of Singh and Lokeshwari (2010), Singh et al. (2017) and Varshney et al. (2017).

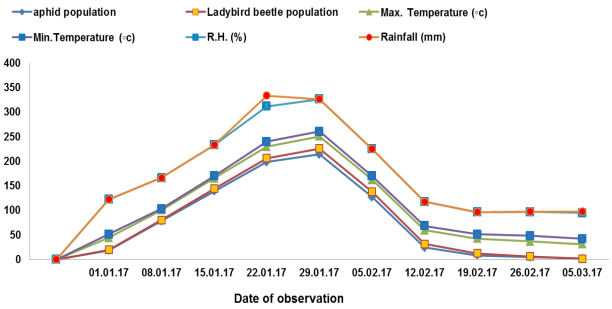

Fig. 1. Population dynamics of *L. erysimi* and *C. septempunctata* on mustard (2016-17)

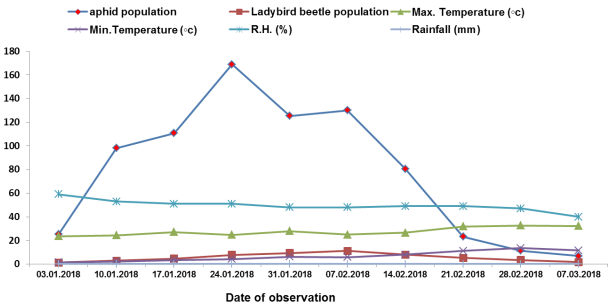

Fig. 2. Population dynamics of *L. erysimi* and *C. septempunctata* on mustard (2017-18)

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