

POPULATION ECOLOGY OF *LIPAPHIS ERYSIMI* KALT. ON *BRASSICA CAMPESTRIS*

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Keshav P. Pandey, Arvind Kumar and C. P. M. Tripathi (1985) Population Ecology of *Lipaphis erysimi* Kalt. on *Brassica campestris*. Bull. Inst. Zool., Academia Sinica 25(2): 125-128. Observations were made on the population build-up *Lipaphis erysimi* Kalt. on the *Brassica campestris* (host plant) in the two successive years (1982-83 and 1983-84) in the Gorakhpur region (U.P.), India. In the beginning of the season the alate form appeared more as compared to the nymph and adults. Later on the nymph and adult became abundant in the field until the rain fall. After this, there was again a spurt in the nymph and adult population. The peak population of aphids during 1982-83 and 1983-84 was in the third week of December and first week of January respectively.

Key words: alate form, aphid, ecology.

Lipaphis erysimi Kalt. is a serious pest of a major oil-seed crop, *Brassica campestris* (Pandey *et al.*, 1984a, 1984b) and reduces the yield by 27 to 96% (Bakhetia, 1979; Bakhetia and Sidhu, 1983). In addition, it also infests a variety of crops (Atwal *et al.*, 1971). Lamb *et al.* (1967) and Schaller (1968) are of the opinion that aphid injects its saliva in plant during feeding which contains some metabolic inhibitors and retards the plant growth.

To undertake successfully any control measures against aphid pests, it is necessary to have proper understanding of the population dynamics of the pests, that is, to understand how and why aphid populations fluctuate between and within seasons. This will enable us at what time the effective control measure should be done. Such information can be obtained through the development of population tables (Nishida and Torrii, 1960). In view of the above information, an attempt has been made to investigate the population build-up of *L. erysimi* on *Brassica*

campestris (host plant) in two successive years in the meteorological conditions of eastern U. P.

MATERIALS AND METHODS

B. campestris was sown on September 15th in the two successive years (1982-83 and 1983-84) in the experimental plot. Aphid population (nymph, adult and alates) were counted at every 6 day interval on 15 randomly selected plants in both the years. The observations start from the appearance of the aphids till the harvest of the crop. All the observations were taken in the morning between 8-10 A. M. The minimum and maximum temperature, humidity, and rain fall (if occurs) were recorded daily and the data so obtained was analysed statistically for better understanding of their interactions.

RESULTS

Fig. 1 illustrates that during the year 1982-83 the nymph and adult first appeared on October 25th on the lower surface of leaves

indicating the commencement of the aphid colony in the experimental plot. Higher swarming of alate forms though appeared on October 19th, no counts was available due to their high flying activity. After October 25th, 1982 there was a gradual increase of population (all forms) until the rain fall (116 cm) on November 6th, 1982. Thereafter, the population again rises which decreases after attaining the maximum value on December 24th, 1982. Interestingly, the population of

alates show an increasing trend after the rain fall till November 24th, 1982 and thereafter, it gradually decreases till December 24th, 1982 and then again increases till harvesting.

In the second year i.e. 1983-84 (Fig. 2), it has been observed that the nymph and adults first appeared on November 12th, 1983 and the orientation of the aphids was likewise the previous year. The population of nymph and adults increases up to December 24th, then it decreases sharply due to rain fall (130 cm). Few days after rain fall the population of both the nymph and adults increases and attains a maximum value in the first week of January, thereafter, it decreases

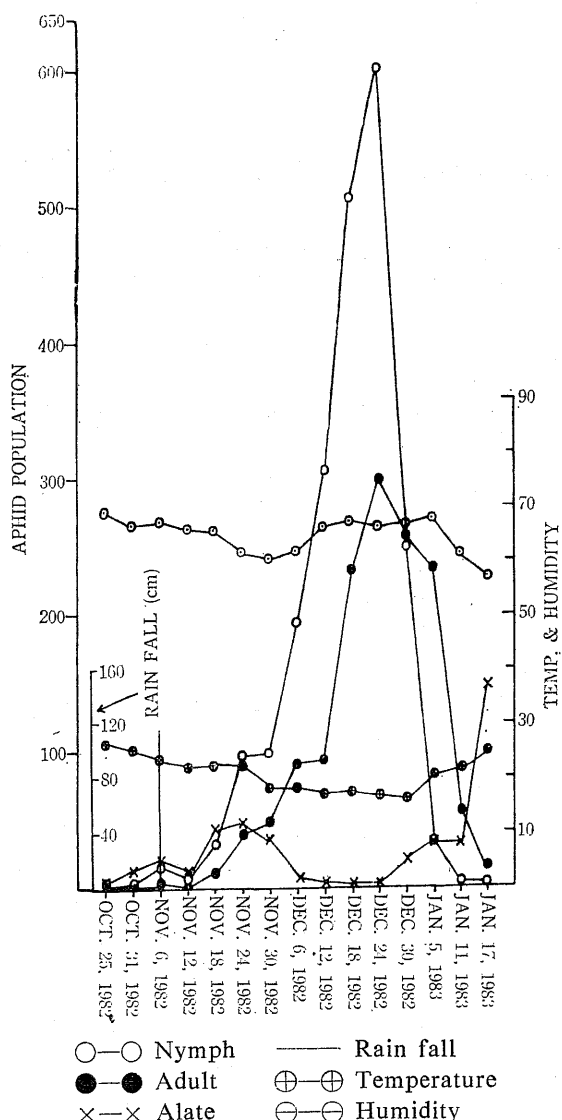


Fig. 1. Graphic representation of the population growth of different forms of *L. erysimi* during the season 1982-83.

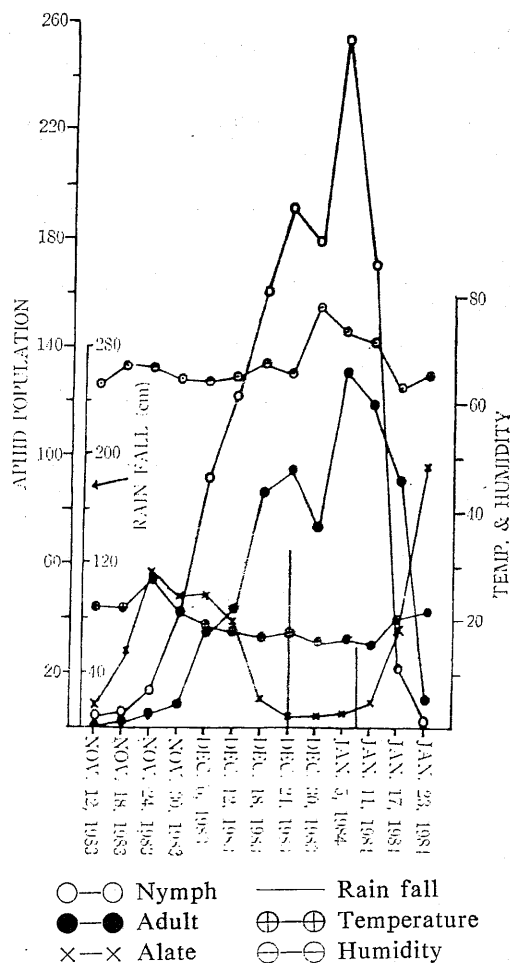


Fig. 2. Graphic representation of the population growth of different forms of *L. erysimi* during the season 1983-84.

significantly (Fig. 2). The population of alate forms increases up to November 24th and then it decreases up to December 30th, 1983. After this, the population shoots up till the harvest due to unfavourable conditions (Fig. 2).

During both the year it was noticed that throughout the experimental set-up the orientation of the aphid colonies on the *Brassica campestris* plants remained associated with succulent region which was vegetatively active part.

DISCUSSION

The observations reveal that in the beginning of the season the alate forms appeared more as compared to nymph and adults. This is possibly because the initiation of the population of aphid is by the immigrant alates (Ghosh and Mitra, 1982). Later on, the nymph and adults became abundant than the alate forms, further due to the rain fall during the first week of November 1982-83 and last week of December 1983-84 the population of aphids decreases. This decrease in the population of aphids is because of washing effect of the rains which dislodged the aphid colonies (Atwal *et al.*, 1971) and increases the rate of mortality of the aphid population (Mochida and Dyck, 1976). In the present investigation the peak population of aphid during 1982-83 and 1983-84 were in the third week of December and first week of January respectively. It might be due to the variations in the climatic conditions (Atwal and Sethi, 1962; Sidhu and Singh, 1964; Atwal *et al.*, 1971; Sachan and Srivastava, 1972), because irrigation is an important factor in the relative abundance of the aphids (Kamran and Raros, 1968). The present finding also shows that the most favourable temperature for the population build-up of aphid in eastern U. P. was 15 to 20°C and the relative humidity between 60 to 70%.

In the season 1982-83, the temperature on October 25th, 1982 was 26.54°C and the relative humidity 69%, whereas in 1983-84 the

temperature on October 25th, 1983, was 30°C and the relative humidity was 66.33%. This is a probable cause of late appearance of aphids in the second year because of high temperature, high rain fall and ample irrigation water favours outbreak of the population of aphids (Mochida and Dyck, 1976).

The occurrence of parasitoids, predators and hyperparasitoids was more in the second year (1983-84) than in the first year (1982-83). The *Pachyneuron aphidis*, a hyperparasitoid of *Diaeretiella rapae* causes the extent of damage of 30 to 40% (Pandey *et al.*, 1985). Due to this, population reduces in the year 1983-84 (Atwal *et al.*, 1971).

The sharp decline in the population of nymph and adult in late January during both the year is probably due to the maturation of crops, the ecology, biology and mass production of parasitoids and predators, and/or existence of some sort of photoperiod—induced resting period (Yasumatsu, 1967). During the off season, a population may survive on some alternate host plants but it does not multiply a great deal other than *B. campestris* (Mochida and Dyck, 1976). This suggests the advantage of maintaining a fallow or on mustard crop period every year. During the reproductive phase of the plant the nymphs and adults migrate to the inflorescence part due to non-availability of succulent leaves and finally the alate forms became predominant. The alate forms actually enables the aphid to form new colonies on the other host plant. This is in conformity with the observations of Ghosh and Mitra, (1983).

The results discussed so far reveal that the physical environmental factors like growth of host plants, exposure of host plants to the rains, temperature, humidity and natural enemies affect the population build-up of *L. erysimi* in the field.

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偽菜蚜在大白菜上之棲羣生態

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在 1982 到 1984 年間，我們在印度 Gorakhpur 地區，對大白菜上之偽菜蚜棲羣建立作了連續兩年的觀察。季節一開始時，有翅型較多，然後，無翅型和幼蟲逐漸增多，這種趨勢一直持續到下雨才停止。雨後，幼蟲和無翅成蟲又急劇增加，棲羣之高峯，在 1982-83 年間為 12 月之第三週，在 1983-84 年間則為元月的第一個禮拜。