#118

Effect of host plant diversity on abundance of turnip aphid, cabbage aphid and cabbage caterpillar infesting Indian mustard

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Background:

Indian mustard, *Brassica juncea*, is the predominant winter-season oilseed crop in India and occupies more than 80 per cent of the total rapeseed-mustard area in the country. A number of insect-pests are known to reduce mustard yield and quality. These pests are largely managed by synthetic chemical insecticides, which have many associated ill effects.

Objective:

In recent years, there has been growing interest in the use of host plant diversity to manage insect pests in agricultural systems. In the present work, we have attempted to study the effect of intercropping coriander, fennel, and chickpea with mustard on the abundance of two aphid species, turnip aphid *Lipaphis erysimi* (Kaltenbach), the cabbage aphid, *Brevicoryne brassicae* (L.), and one cabbage caterpillar, *Pieris brassicae* (L.).

Methods:

Study was carried out during the 2020–21 and 2021–22 crop seasons at Punjab Agricultural University, Ludhiana, India. *B. juncea* variety *Giriraj* was sown in the second week of November. There were four treatments: (i) mustard alone; (ii) mustard + fennel; (iii) mustard + chickpea; and (iv) mustard + coriander. In the intercropped treatments, four rows of the intercrop were sown after every four rows of mustard. The row to row and plant to plant spacings were kept at 30 and 15 cm, respectively. At the initiation of flowering, weekly data on insect population counts were recorded from 10 plants selected at random from each plot.

Results:

In the 2020–21 crop season, the turnip aphid, *L. erysimi*, remained active from the 4th Standard Metrological Week (SMW) to the 13th SMW. Among all the treatments, intercropping coriander with mustard resulted in a significantly lower *L. erysimi* population (mean population: 8.2 aphids per plant) than that on other treatments (22.2 to 46.9 aphids per plant). A similar trend was observed for the cabbage aphid, *B. brassicae*, with significantly lower development on the mustard-coriander treatment (7.5 aphids per plant) than other treatments (18.6 to 51.5 aphids per plant). Although cabbage caterpillar, *P. brassicae* remained active for only five weeks (7th-11th SMW), the population remained significantly lower on mustard+coriander treatment (7.3 larvae per plant) compared to other treatments (21.0–39.6 larvae per plant). The crop season 2021-22 also witnessed a trend similar to that observed in 2020–21, except that no population of *B. brassicae* was observed this year. The mustard equivalent yield in mustard + coriander (2453.5 kg ha-1) was also significantly higher than that in the mustard alone treatment (1423.6 kg ha-1). Coriander is known to produce many plant volatiles and insects tend to avoid such non-host+host volatile blends. These volatiles also have their effects at the third tropic level (predators and parasitoids). Role of these plant volatiles in insect-plant tritrophic interactions in *Brassica* systems will be discussed.

Conclusions:

Intercropping mustard with coriander resulted in a significant reduction in turnip aphid, cabbage aphid, and cabbage caterpillar populations on mustard compared to when mustard was grown alone. This study highlights the potential of host plant diversity in the natural suppression of pest populations without the need for chemical insecticides.