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Field efficacy of bio-rational insecticides against major pestiferous insects of cabbage

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ABSTRACT

The major pestiferous insects during both crop seasons included aphids and diamond back moth; while, flea beetles and painted bug attained pest status during 2015-16; besides, tobacco caterpillar was noticed during 2016-17. Maximum reduction in aphid population (45.81 and 54.07%, respectively, at 1 and 3 DAS) was recorded for *A. indica* oil followed by Spinosad 45%SC; same schedule had maximum reduction of flea beetle population 1-DAS (50.03%); while, 3 and 7 days after spray Spinosad 45%SC followed by Spinosad 45%SC gave significantly higher reduction (75.21 and 64.62%, respectively). Maximum reduction of painted bug population (68.37% at 3DAS) was due to *A. incida* oil followed by SI-NPV. Treatment schedule of Spinosad 45%SC followed by Spinosad 45%SC was most effective against DBM during both crop seasons with significantly lowest pooled larval population per plant being 0.82 and 1.0, 3 and 7 days after first spray; likewise, 1.62, 0.92, and 0.90, 1, 3 and 7 days after second spray. Similarly, against tobacco caterpillar, treatment schedule Spinosad 45%SC followed by Spinosad 45%SC was most effective at 3 DAS (0.71 larvae/plant); while, schedules *A. indica* oil followed by Spinosad 45%SC and *A. indica* oil followed by SI-NPV were equally effective 7 DAS during crop season 2016-17 (0.90 larvae/plant).

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Introduction

Cabbage [*Brassica oleracea* var. *capitata* (Linn.): Cruciferae] is one among the abundantly consumed vegetables all over the world. It is cultivated extensively in the tropical and temperate regions of the world including India and has appreciable nutritional and economic value. Cabbage is used as boiled vegetable, in salad, curries and pickles. The total estimated area under cabbage cultivation in India is 399 thousand hectares with an annual production of 9049 thousand tonnes (NHB data base 2016-17). Insect pests are a serious menace in the profitable cultivation of cabbage; the more important being: tobacco caterpillar, *Spodoptera litura* (Fab.); diamond back moth, *Plutella xylostella* L.; cabbage semilooper, *Trichoplusia ni* (Hubner); painted bug, *Bagrada hilaris* (Burmeister); cabbage butterfly, *Pieris brassicae* L.; flea beetles, *Phyllotreta cruciferae* Goeze; aphids, *Lipaphis erysimi* (Kalt.); and the mustard saw fly, *Athalia lugens proxima* (Klug.) (Ayyar and Ramakrishna 1963; Lall 1964). These pests can cause damage to an extent of 80–100 per cent in the nurseries under favourable conditions (Chari et al. 1994) and 10–25 percent to the field crop (Rao and Sitaramaiah 2001). The pest losses due to insect infestation or merely their presence affect the quality and market value of the vegetables very adversely, which are more important than the yield loss. In India, insect pests alone cause field loss to about 15–20% which approximately amounts to Rs.150 crores, but in case of outbreaks, the losses increase up to 50–90%.

Control of insect pests by chemicals can be spectacular but it has its limitations such as high capital investment, non-remunerative, short term measures and also the ill effects of a chemical pesticides on human health and the environment; development of resistance in pests to pesticides and higher levels of pesticide residue in food items; hence there is crying need to develop suitable alternative to chemical pesticides for use in pest control. Use of pest avoidance tactics, enhancement of biological pest suppression and adoption of other nonchemical methods of pest management would certainly be able to improve our capabilities in solving much of the pest problems. So alternative strategies include the investigation for new type of insecticide, and the re-evaluation and use of traditional and these botanical pesticides, which are eco-friendly as well as economic to use. Annual growth rate in the consumption of pesticides was 9.5 percent in the last decade and more than 50 percent of the pesticides are common. Plant

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