

# Incidence of Aphid Pests in *Vicia faba* L. and Their Management in Bhaktapur Municipality, Nepal

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## Abstract

*Aphis fabae* Scopoli, *Aphis craccivora* Koch and *Aphis gossypii* Glover were noticed infecting the *Vicia faba* L. in Bhaktapur Municipality. Among these aphid species *Aphis fabae* Scopoli was found to be serious pest. Intensity of aphid infestation in pesticide used pocket fields of commercial and non commercial faba growers are significantly different. Washing aphids off from plants with a steady blast of water, pinching the tops of the plants off, sprinkling ash around the infected part, sprinkling flour powder or chillies (Khursani) powder in early morning in presence of dew, Sisnu (*Urtica dioica*) soaked solution, Titepati (*Artemisia vulgaris*) soaked solution, garlic soaked solution, a spray of shampoo with little kerosene, sprinkling cow urine, organic pesticide called “Jaibik bishadi” and trap cropping practices bring pests under control especially if infestation is in early stages. The farmers failed to get real benefits from the use of pesticides despite it has resulted an extra cost. Existing pest management practices proved to be less efficient. Most of commercial faba growers diverted towards other cash crops and the area of faba cultivation is decreasing year by year in Bhaktapur Municipality.

**Key words:** Cow urine, Infestation, Organic pesticide, Pest management, Pocket field

## Introduction

In today's socio-economic context, developing ecologically sound pest management strategies has become a major and urgent concern as the intensive use of agrochemical inputs is recognized to have detrimental impacts on the environment (Stoate et al. 2001). Technologies often have not been adopted or have failed with negative social consequences mostly because the research was conducted without adequate participation of farmers and with little consideration of farmers' own knowledge, practices, needs, and desires (Trutmann et al. 1996, Prudent et al. 2007).

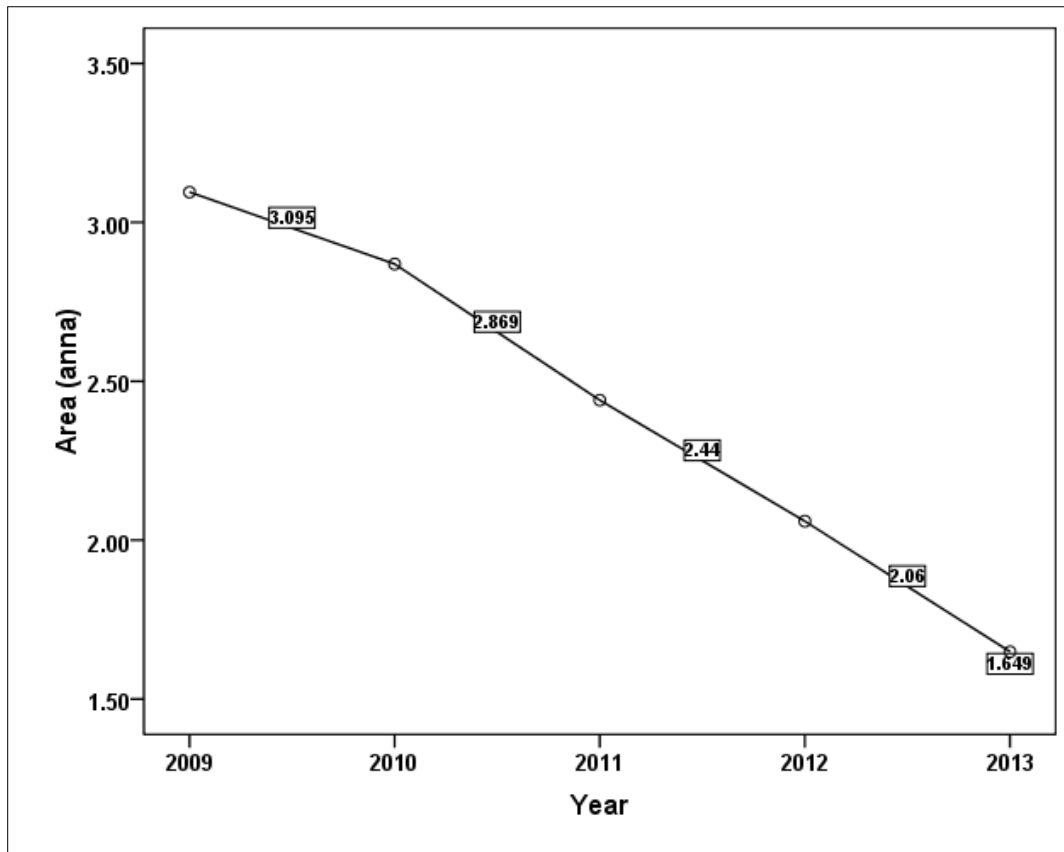
When pesticides are the selected method for pest control, it is important that the products are used properly to ensure maximum efficacy, personal and environmental safety, and legal compliance. Careless handling of pesticides by operators may be due to willful negligence, lack of information, or lack of training. This can reduce pesticide efficacy and may pose a serious health risk for farmers (Salameh et al. 2004, Recena et al. 2006, Polidoro et al. 2008). In the absence of pest attacks, pesticide use only results in extra costs and no real benefits (WRI 1998).

## Materials and Methods

The study was conducted in three phases: i) an initial survey to record the crop management practices followed by the farmers in 16 vegetable production pockets; ii) insects pest collection to identify them; and iii) individual questionnaires survey and focus group discussion (FGD) to find pest management practices and identify associated problems. In the 16 vegetable production pockets, 10 x 10 cm<sup>2</sup> quadrat (one quadrat on each vegetable production pocket) was taken for insect or pest sampling. With the regular interval of 15 days field sampling was done. Main road was considered as a transect point. At an intermediate spatial scale, sites were separated from one another by at least 300 m but no two sites were 1 km distant.

Section of aphid infected plants and stem were cut with knife and transferred with the help of brush in a transparent vial. Aphid pests were preserved in 70% ethanol. All aphids on faba are identified using the keys (Blackman and Eastop 2000) and species accounts with the help of expert and remaining

insect pests were identified with the different taxonomic literatures (Borrer et al. 1981, Bolton 1995, Fauske et al. 2003) and comparisons with preserved specimens and high resolution photos taken by NIKON COOLPIX S8100 with NIKKOR 10X WIDE OPTICAL ZOOM Ed VR 12.1 Megapixels camera. SPSS 16.0 statistical software was applied for student's t-test, and one way ANOVA.



**Figure 1.** Yearly average faba cultivated area in Bhaktapur Municipality

### Results and Discussion

*Aphis fabae* Scopoli was found as major pest while *Aphis craccivora* Koch and *Aphis gossypii* Glover were found as minor pests. Gyawali (1997) reported *Aphis fabae* Scopoli as a major pest of faba and *Aphis craccivora* Koch as a minor pest. Aphid infestations destroy an entire plant and if left untreated then they spread to surrounding plants, as well. The population of *Aphis fabae* Scopoli, *Aphis craccivora* Koch and *Aphis gossypii* Glover were found during February to April, March and March to April respectively. Minks and Harrewijn (1987) considered aphids to be one of the most devastating pests in both agriculture and horticulture. Tamrakar (2001) found heavy infestation of *Aphis craccivora* Koch in leaves, flower and pod of *Vicia faba* in Siraha, Janakpur and Chitwan from December to March and higher intensity of *Aphis gossypii* infestation in Fabaceae from many areas of Nepal during September to November and March to April.

Today the result-oriented traditional and eco-friendly techniques practiced by local farmers. The methods like washing aphids off from plants with a steady blast of water, pinching the tops of the plants off, sprinkling ash around the infected part, sprinkling flour powder or chillies (Khursani) powder in early morning in presence of dew, sisnu (*Urtica dioica*) soaked solution, titepati (*Artemisia vulgaris*) soaked solution, garlic soaked solution, a spray of shampoo with little kerosene, sprinkling urine of cow, organic pesticide called "Jaibik bishadi" and trap cropping practices were found to bring pests under control especially if the infestation is in its early stages. If the infestation is in late stages,

application of high dose pesticide against aphid at regular interval was reported to be desired. *In different vegetable production pocket, the population and intensity of infestation level of pests were found variable.* Population and intensity of infestation level of aphid were found to be less in the pocket field that have practice use of high dose pesticide than crop trapping, proper sowing date, and biological deterrents mixed solution spray. Shelton and Nault (2004) found trap cropping frequently failed to adequately reduce insect density without assistance from other management inputs, including pesticide treatments even when the pest shows a strong preference for the trap plant in laboratory or semi-field experiments too.

Majority of respondents are found using pesticide since a decade. But the knowledge about pest biology, types of pesticide, and their mode of action, safety gears are still lacking. Almost all the time the pesticides are recommended by agro-vet owners and technician (mainly agro-vet owners). Most of farmers are using pesticide on the basis of their own experience, hit and trial method too. Detailed and valid information about many factors are still in needy condition with most of farmers. This complexity is further compounded by the fact that farmers usually have little or incomplete information about both the problem and the potential techniques to manage it. When pesticides are the selected method for pest control the products are not used properly to ensure maximum efficacy, personal and environmental safety, and legal compliance. Improper handling of pesticides by farmers due to negligence, lack of information and training were seen the most. This have reduced pesticide efficacy and pose a health risk to farmers also. Prudent et al. (2007) reported that the farmers may not be able to utilize the information properly due to the lack of necessary background knowledge about pest management practices and recommended training program that plays a crucial role to make appropriate pest management decisions and provides farmers with the technical knowledge.

Proper proportionate combinations of several pesticides, skill on pesticide formulation are still in needy condition with farmers. Due to this the intensity of aphid infestation in pesticide used pocket fields of commercial and non commercial faba growers are significantly different ( $t = 2.634, P \geq 0.05$ , and  $df = 23$ ). Beside some of commercial young farmers, most of farmers of Bhaktapur Municipality are not clear on pest biology, types of pesticide, and their mode of action. Efficacy of pesticide in commercial and non commercial faba growers' pocket fields are also different. The ANOVA was not significant,  $F(2, 45) = 3.981, p = 0.26$  suggesting efficacies of pesticide in commercial and non commercial faba growers' pocket fields are different. Efficacy of pesticide at young trained commercial farmers was more than that of others. Awareness and training programs which can play a crucial role in pest management decisions are needed in the floor of farmers. Polidoro et al. (2008) reported handling of pesticides by operators due to willful negligence, lack of information, or lack of training reduces pesticide efficacy and pose a serious health risk for farmers.

Atreya (2007) reported the poor knowledge of pest biology and pest management practices, violation of the recommended rate of a pesticide, erroneous beliefs about safety practices required during pesticide use, and poor maintenance of spraying equipment reduce pesticide performance in the field and several characteristics of farmers including personal beliefs, perceptions, and objectives plays a vital role in decisions on pest management programs.

Today the trend of incidence of this pest was increasing day by day. It was found that commercially faba growing farmers diversified to other cash crops due to heavy loss by insect pests as their income was not proportional to their effort and investment in growing faba beans. Area of *V. faba* cultivation is decreasing year by year (Figure 1). Nowadays only non- commercial farmers are following plantation of *V. faba* so as to preserve ancillary benefits of nitrogen fixation produced by this plant, and to preserve seed as well to have faba as meal sometime.

Crews and Peoples (2004) reported the area sown to faba bean declining in the main countries of production such as China, and reflect a general trend since the 1960s for an increasing reliance by farmers upon N fertilizers rather than legume systems as a source of N input.

## Conclusion and Recommendations

The study shows three aphid species *Aphis fabae* Scopoli, *Aphis craccivora* Koch and *Aphis gossypii* Glover were noticed infecting *Vicia faba* L. in Bhaktapur Municipality. In Bhaktapur Municipality, pesticide use only results in extra costs but no real benefits to the farmers. Current pest management practices are found less efficient and economically feasible and bio-friendly. Most of commercial faba growers diverted towards other cash crops and the area of *V. faba* cultivation is decreasing year by year.

Based on the findings of this research, the following recommendations have been made:

1. Awareness and training programs which can play a crucial role in pest management decisions, providing farmers with the technical knowledge necessary for the selection of appropriate pest control methods and also for safe and effective pesticide use are needed for farmers.
2. Practice of efficient and sustainable economically feasible and bio-friendly pest management technique that focuses on long-term prevention with the least amount of human and environmental health impacts by manipulating the entire ecosystem with the survey of insect pests and their natural enemies should be done.
3. To make technologies adopt or have success with positive social consequences mostly any research work related to pest management shall be done with adequate participation of farmers and with adequate consideration of farmers' own knowledge, practices, needs, and desires.

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