



## Research Article

# Farmer's Management Practices Adopted Against Mustard Aphid, *Lipaphis erysimi* (Kalt.): A Survey of Chitwan, Nepal

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**Keywords:** Farmers' knowledge; Rapeseed; *Lipaphis erysimi* (Kalt.); Survey

### Abstract

Insect pests are the major constraints of crop production. Mustard aphid is the major problems of rapeseed contributing mustard decline in Chitwan, Nepal. Semi-structured questionnaire survey was conducted on randomly selected farmers of Chainpir Village Development Committee (VDC), Chitwan after a pre-testing in Mangalpur VDC to study the farmers' knowledge and management practices adopted against mustard aphid in Chitwan. Study revealed majority (60%) of the respondent suggested aphid as the major insect of rapeseed and moreover, 86% of the respondent experienced it to cause 25% loss to the crop yield. Much proportion of respondents (58%) also realized low temperature with high humidity at the time of flowering as a cause in higher aphid infestation. Farmers use 2-3 sprays of chemical insecticide to control aphid but was found to destroy natural enemies and bee population besides damaging natural environment and human health.

### Introduction

Oilseed crops have been an integral part of Nepalese farming system, much of which is subsistence type, and therefore a requirement of edible oil. The total area under oilseed crops in Nepal was 184,718 ha with the production of 161,927 t, with average productivity of 0.88 t/ha (MOAD, 2014). Among oilseed crops of *Brassica* species, rapeseed (*Brassica campestris* L. var. *toria*) is the number one oilseed crop and has the highest acreage among all the oilseed crops grown in the country. Low yield and high

population growth rate has turned the country into edible oil importing country from an exporting one from the early seventies (Pradhan, 2008). To satisfy the increasing domestic demand, Nepal is importing edible oil worth of 10.48 billion rupees on 2013/2014 (MOAD, 2014).

Rapeseed crop suffer heavy loss in yield due to various biotic and abiotic factors. Under the biotic constraints, the insect pests have the most detrimental effect on the yield.

Mustard aphid, *Lipaphis erysimi* (Kalt.) is considered one of the devastating insect pests for its successful production (Raj and Lakhanpal, 1998) causing 35.4 % to 91.3 % reduction in yield (Singh and Sachan, 1994). It not only reduced the yield but also reduced 5-6% of oil content of rapeseed and mustard (Shylesha *et al.*, 2006). Though chemical insecticides still remain the key tool for the control of mustard aphid (G.C., 2013) but the indiscriminate use of the chemicals has created many problems like infamous 3'Rs viz., resurgence, resistance and residue aspects besides the health hazards. Thus, a survey was conducted to study the farmer's perception, knowledge and management practices adopted against mustard aphid, *Lipaphis erysimi*.

## Methodology

A cross sectional, semi-structured survey was used as a research design. Chainpur VDC, which was one of the commercial pocket centres of rapeseed in Chitwan district was selected as the site of observation with the aim to dig out the information regarding the practice of mustard production and the farmer's knowledge on crop losses, extent of damage and management practices against *Lipaphis erysimi* (Kalt.). The survey site was selected upon consultation with District Agriculture Development Office, Chitwan. Semi-structured questionnaire was derived and a pre-testing was conducted in 20 household in the Manglapur VDC of Chitwan district. The modification on the schedule was made on the basis of pre-testing. Finally, survey was done on randomly selected 200 rapeseed growing household provided by DADO to collect necessary information during mustard cropping season of FY 2017.

## Results and Discussion

The results of the analysis of the information showed varied responses of the respondent regarding knowledge and perception about mustard aphid problems, its severity and adopted management practices as per the land area and the time of planting of the crop. The respondents of the survey were disintegrated on the basis of the education level. Majority of respondents were illiterate (40%) followed by primary level of education (36.7%), 13.3% had secondary level of education, whereas only 10% had acquired above secondary level of education.

Moreover, the respondents were also asked about the source of seed where the highest percentage (70%) of respondents used the seed stored of their own production and 6.7% of the respondents brought seed from their neighbors while 23.3% of respondent depended on agro-vets for the seed.

### Time of Sowing

The result revealed that most of the respondents sowed rapeseed during the month of October (76.5%) followed early planting before the month of October (13.5%). However, 10% of respondents sowed their mustard after the month of October (Table 1). Saeed and Razaq, 2014 suggested that early sown crops (mid- October) crops had

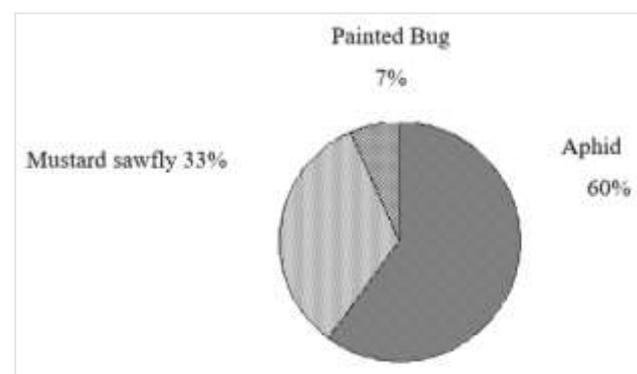
significantly lowest numbers of aphids as compared to late sown crop (early to mid-November). Early and timely sowing was recommended to escape aphid severity (Joshi *et al.*, 1989; Shafiq *et al.*, 1999). Though about 90 % of the respondents of surveyed area sowed the rapeseed within October almost all of them faced aphid problems.

**Table 1:** Date of sowing of rapeseed by respondents in study area in 2017

Date of sowing	Frequency	Percent
Before October	20	10.00
October	153	76.50
After October	27	13.50
Total	200	100.00

### Farmer's Knowledge of Pest and Natural Enemies

Majority of respondents (60%) ranked aphid as the major insect pest of the crop followed by mustard sawfly (33.3 %) and painted bug (6.7%) as shown in Fig. 1. Rouf and Kabir (1997) also said that among the insect pests, *Lipaphis erysimi* (Kalt.) is the most destructive one of mustard crop.



**Fig. 1:** Major insect pests of rape seed identified by farmers in Chitwan in 2017

All respondents (100%) said that aphids appear each year at damaging level and more than 75% yield was reduced by aphids in the absence of timely control measures. However, 86.5% respondents believed that yield loss could not be avoided even if timely control measures were taken (Table 2).

**Table 2:** Farmer's estimation on yield loss even after application of pesticides for Aphid control, 2017

Amount of losses	Frequency	Percent
<25%	173	86.50
26-50%	27	13.50
51-75%	0	0.00
>75%	0	0.00
Total	200	100.00

All the respondents said that environmental factors were responsible for aphid infestation. Majority of respondents (56.5%) considered low temperature and high relative humidity as the factors for aphid infestation, while 40% respondents considered low temperature, high relative humidity with light shower influenced aphid infestation. Remaining 3.5 % believed high relative humidity was only the factor which triggered the aphid infestation as shown in Table 3. Many findings also support the climatic factors influence on mustard aphid population and incidence phenomenon. Rao *et al.* (2013) said that aphids on mustard seems to be largely controlled by temperature and in warm humid locations aphid attained peak population levels earlier compared to relatively cool climates. Hasna *et al.* (2009) said that high cloudiness, relative humidity, dew point favored the aphid incidence and slight rainfall quickly declined the aphid population from the field.

**Table 3:** Farmer’s Knowledge on environmental factors affecting aphid infestation in study area 2017

Environmental factors	Frequency	Percent
High relative humidity	7	3.50
Low temperature, high relative humidity and low rainfall	80	40.00
Low temperature and high relative humidity	113	56.50
Total	200	100.00

Most of the respondents (76.5%) believed that more yield loss occurred in case of aphid infestation during flowering period, while 17% believed higher infestation after flowering period and remaining 6.5% believed aphid infestation before flowering as more detrimental for the production of mustard (Table 4).

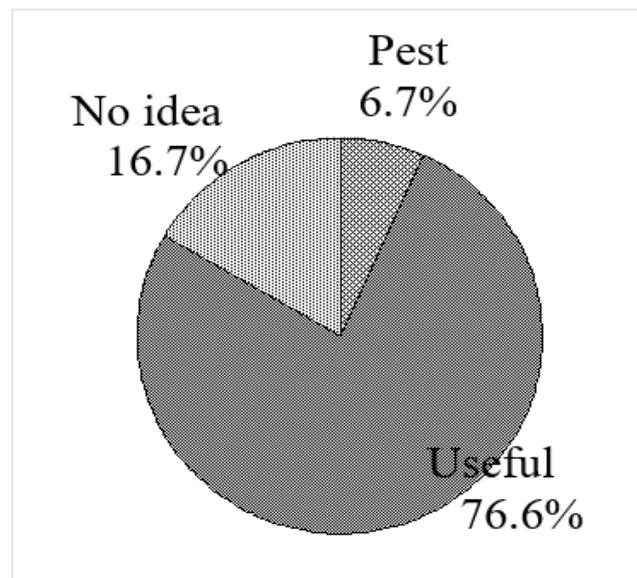
Similar result was found by Patel *et al.* (2014) that the critical period of mustard exposure to aphids was found to be at the third week after aphid appearance when the crop was in flowering stage then they suggested to apply control measure before flowering to reduce the loss incurred by aphid.

**Table 4:** Farmer’s knowledge on aphid attack based on cropping stages of Mustard. 2017

Crop stage	Frequency	Percent
Before flowering	13	6.50
During flowering	153	76.50
After flowering	34	17.00
Total	200	100.00

About natural enemies, majority of respondents (99.5%) had no idea in this regard but one respondent (0.5%) had little idea about natural enemies. Regarding honeybee, 76.6% of respondents mentioned as a useful agent for pollination, which helped increase in production of mustard, whereas 16.7 % had no idea. Unfortunately, 6.7% of respondents considered honeybees as pest, which sucked

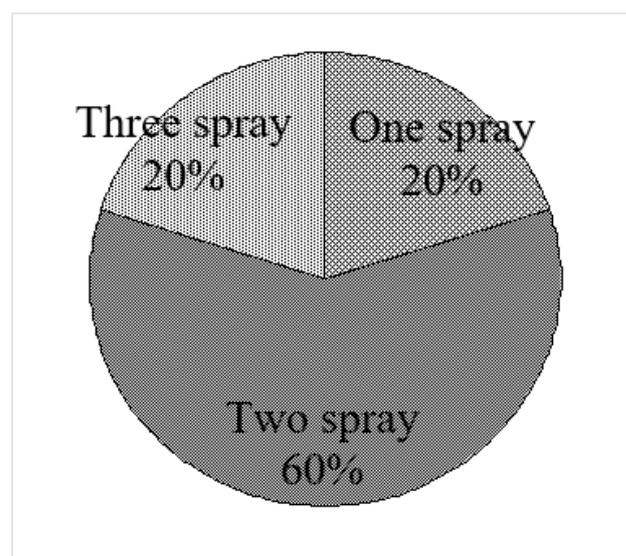
the nutrient from the flowers and lower the production as shown in Fig. 2.



**Fig. 2:** Farmers’ idea on honeybee based on its usefulness in study area, 2017

**Aphid Management Practice**

Survey revealed that all the respondents (100%) used chemicals as ultimate and only means for controlling aphid population. G.C. in 2013 also mentioned that the chemical insecticides are still remaining the key tool for the control of this pest. None of the respondents had used alternative control measures for aphid management. They used insecticides one to three times during the crop period. Figure 3 shows that maximum respondents (60%) used insecticides two times where as 20% respondents used insecticides one time and remaining 20% used three times for the protection of mustard crop from aphid infestation.



**Fig. 3:** Frequency of insecticides use based on the application in study area, 2017

**Table 5:** Growing stage and insecticide application, 2017

Crop stage	Frequency	Percent
Before flowering	20	10.00
During flowering	100	50.00
After flowering	20	10.00
Before and during flowering	20	10.00
Growing and flowering	27	13.50
Before, during and after flowering	13	6.50
Total	200	100.00

All the respondents were aware of adverse effects of insecticides, as harmful to human health and also to animal, bird and aquatic life. Only one respondent knew the harmful effect of insecticide on natural enemies. But all the respondents experienced that the population of honeybees has been decreasing in the rapeseed fields over the past years and 50% respondents said that insecticides killed the honeybees and remaining 50% said that insecticides killed the honeybees and honeybees will not visit the insecticide applied field as well. Even though all of them are aware of negative effect of insecticides none of them had shown eagerness in using the alternative measures of chemical insecticides for the management of mustard aphid.

#### Reasons for Declining Area of Mustard in Chitwan

Survey showed that there were five reasons for declining the area of rapeseed crop in Chitwan. Out of those reasons, increase in insect-pest attack was ranked first, followed by availability of alternative profitable crops especially fresh vegetables, unavailability of quality seed, delay in planting time and decline in soil fertility, respectively.

**Table 6:** Farmers' idea on the reasons for declining of rapeseed crop area in Chitwan district, 2017

Reasons	Index	Rank
Delay in planting time	0.56	IV
Availability of alternative profitable crops	0.81	II
Decline in soil fertility	0.37	V
Increase in insect-pest attack	0.87	I
Unavailability of quality seed	0.68	III

#### Conclusion

Aphid is one of the most damaging insect of rapeseed. This insect was one of the prominent reasons for the decline of rapeseed production in Chitwan. The occurrence of insect was found to be comparably higher during January and February, when low temperature and higher relative humidity exist during the flowering time of rape seed. Farmers used to control aphid using 2-3 sprays of chemical insecticide. Though all of them are aware of negative effect of insecticides and ranked insect pest as number one reason for rapeseed decline in Chitwan but none of them had shown eagerness in using the alternative measures of chemical insecticides for controlling aphid. So, farmers have to make aware about the using of alternative control measures for

aphid instead of chemical pesticide and increase of rapeseed.

#### Author's Contribution

Both authors contributed equally in all stages of research work and manuscript preparation. Final form of manuscript was approved by both authors.

#### Conflict of Interest

The authors declare that there is no conflict of interest with present publication.

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