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## Research Article

# FARMERS PERCEPTION ON EFFECT OF PESTICIDE ON INSECT POLLINATORS AT PADAMPUR AND JUTPANI VDCs, CHITWAN, NEPAL

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### Abstract

A survey was conducted to know the farmers perception on the effect of chemical pesticide on insect pollinators at Jutpani and Padampur VDCs, Chitwan, Nepal in 2013. Thirty households were randomly selected and semi-structured questionnaire was used to collect necessary information by face-to-face interview. Majority of the farmers (60%) applied pesticides on crops during mid day. Half of the farmers (50.00%) ranked population decline as effect of pesticide on pollinators, some farmers (16.67%) also observed dead pollinators in field and hives, affecting their distribution (13.33%) and repelling them from field as mentioned by the respondents (13.33%). Majority of respondents (56.67%) perceived that misuse and overuse of chemical pesticide was the major cause of declining insect pollinators, among other causes, 16.67% farmers replied deforestation, 10.00% environmental pollution and 6.67% less cultivated area responsible for the decline. Very few farmers (6.67%) could realise the incidence of disease on pollinator due to pesticidal effects.

**Key words:** Pesticide Effect; Insect Pollinators; Farmers Perception

### Introduction

Approximately 75% of major crops are animal pollinated (Klein *et al.*, 2007). Out of total pollination activities, over 80% is performed by insects and bees contribute nearly 80% of the total insect pollination (Robinson and Morse, 1989). Pollinators play important role in production of rapeseed (Pudasaini and Thapa, 2014; Dhakal, 2003). But natural insect pollinators population is declining rapidly due to the continuous use of pesticides and decline of pollinators habitat (Richards, 2001). In Ilam and Nuwakot districts of Nepal, it was reported that after the heavy use of chemical pesticides all domesticated bees wiped out and many colonies destroyed in Chitwan (Sharma, 1994; Thapa, 1994). The demand of pesticides increased in Nepal, which created multi-faced problems resulting in a large amount of crop losses and turning ecological sound farming into pest problems, crop loss and pesticide pollution (Thapa, 1994; Thapa *et al.*, 1995). In Chitwan, farmers recognize that the bee pollinators of mustard were affected by the high level use of pesticides to crops and pollinator deficit has been a serious problem (FAO, 2011). Considering the above problem, a survey was conducted to know farmers perception about the effect of chemical pesticide on insect pollinators in eastern Chitwan of Nepal.

### Methodology

A survey was conducted in rapeseed production pockets in Jutpani and Padampur VDCs of Chitwan district, which has tropical to subtropical type of climate, and cultivation of rapeseed is common during winter season after rice harvest. The list of rapeseed growers was obtained from the District Agriculture Development Office (DADO), Chitwan and randomly included thirty farmers for survey.

The semi-structured questionnaire was prepared, pre-tested and improved to cover the general household information, economic status, general cultivation practices, pest status and pesticide application pattern, change in insect pollinators' diversity, awareness on pollination and effect of chemical pesticide on insect pollinators. The data were collected by face-to-face interview using semi-structure questionnaire and data were subjected to statistical analysis.

### Results

Average family size with 6.2 family member having male dominance (51.06%) in surveyed area responded that more than half respondents (56.67%) received suggestion from the Agro-vet centre, from where they purchased pesticide, followed by Agro-service centre (20.00%) and neighbours (16.67%).

Among the respondent farmers, less than one-fifth (16.67%) participated on training of pesticide and about two-third (70.00%) followed the instruction written on pesticide bottle while applying pesticide on their field crops.

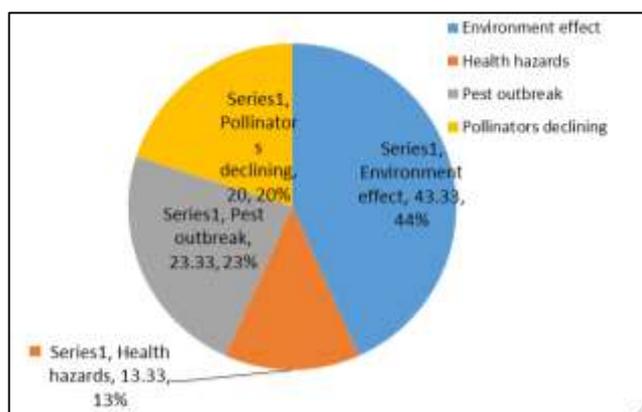
Nearly half of the respondents (46.66%) applied pesticides on rapeseed at peak blooming stage for control of aphid and effect was felt by one-fifth respondents (20%) as discomfort while applying pesticides.

Similarly, more than one-third (40.00%) respondents applied mono-fertilizer and less quantity of FYM, which resulted in low production followed by pollinators' deficit problem (26.67%) as presented on Table 1.

**Table 1:** Farmers responses regarding lower production of rapeseed production in Jutpani and Padampur VDCs Chitwan, 2013 (n=30)

Reasons for lower production	Frequency	Percentage
Fertilizer used pattern	12	40.00
Pollinators deficit	8	26.67
Increase in pest problem	4	13.33
Decrease in fertility status of soil	4	13.33
Unavailability of inputs	2	6.67
Total	30	100

Figure 2 clearly showed that majority of the respondents (43.33%) expressed their views that chemical pesticide could adversely affect on environment followed by nearly one-fourth (23.33%) expressed pest outbreak and one-fifth replied pollinators decline, whereas minority of the respondents (13.33%) viewed negative consequence of chemical pesticides on health hazards too.



**Fig. 1:** Perception of the respondents on adverse consequences of pesticides on Jutpani and Padampur VDCs Chitwan, 2013.

As shown in Table 2, the majority of respondent farmers (60.00%) applied pesticides during mid-day on rapeseed followed by one-third (33.33%) during evening, whereas

some respondents (6.67%) applied in the morning hours. Half of the respondents (50.00%) threw empty containers everywhere in the field followed by nearly one-fourth farmers (23.33%) collected and burned them. Only one-fifth respondents (20.00%) collected and buried the pesticide containers but few farmers (6.67%) also threw them on water canals.

**Table 2:** Application time of chemical pesticides by farmers in Jutpani and Padampur VDCs Chitwan, 2013 (n=30)

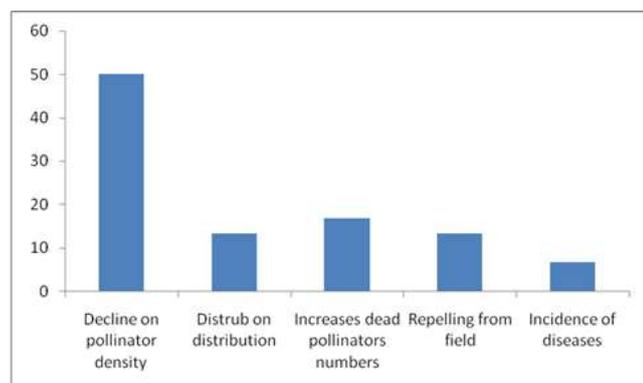
Application time of chemical pesticide	Frequency	Percentage
Morning	2	6.67
Mid-day	18	60
Evening	10	33.33

Likewise, all respondents agreed on decreasing of insect pollinators' population at present as compared to ten years ago. Majority of respondents (56.67%) perceived that misuse and overuse of chemical pesticide was the major cause of declining insect pollinators, where as deforestation (16.67%), environmental pollution (10.00%) and less cultivated land (6.67%) were other causes of declining (Table 3).

**Table 3:** Perception of farmers on reason for decreasing insect pollinators in Jutpani and Padampur VDCs in Chitwan, 2013 (n=30)

Reason of decreasing insect pollinators	Frequency	Percentage
Misuse of chemical pesticide	17	56.67
Deforestation	5	16.67
Environmental pollution	3	10.00
Less cultivated land	2	6.67
<i>Apis mellifera</i> L. replace other insect pollinators	1	3.33
Killing <i>Apis dorsata</i> by burning for honey	1	3.33
Increase in incidence of pest and diseases	1	3.33
Total	30	100

The detail of farmers' response on effect of chemical pesticide on insect pollinators is presented in Figure 2. Half of the farmers (50.00%) ranked decline on density as effect of pesticide on pollinators, some farmers (16.67%) also observed dead pollinators in field and hives, affecting their distribution (13.33%) and repelling them from field as mentioned by the respondents (13.33%). Very few farmers (6.67%) could realise the incidence of disease on pollinator due to pesticidal effects.



**Fig. 2:** Farmers' responses regarding effect of chemical pesticide on insect pollinators in Jutpani and Padampur VDCs Chitwan, 2013

## Discussion

The gender proportion of surveyed households was dominated by male (51.06%), which slightly higher in national scenario (CBS, 2012). Majority of respondents agreed that the lower production of rapeseed was due to mono-fertilizer (urea) use, i.e. imbalanced use, less use of FYM and other nutrient containing fertilizers. Similar reasons were pointed out by Ghimire *et al.* (2000) for declining rapeseed yield. In the past, sufficient farm yard manure was used in rapeseed field, while at present, excessive use of urea caused deficiency of other macro-nutrients and micro-nutrient in rapeseed field. Pollinators' deficit problem was also another important reason of decreasing rapeseed (FAO, 2011; Dhakal, 2003). The result revealed that the natural pollinator population was decreasing which is in agreement with FAO (FAO, 2011). Survey showed that farmers were not aware of the negative effect of chemical pesticide on insect pollinators. Majority of farmer received information about selection of pesticide, formulation, application time and other required information from Agro-vets, pesticide buying shop. Overuse and misuse of chemical pesticide affect and kill the pollinator, which caused decline of pollinators' population.

## Conclusion

Surveyed reports showed that farmers were not aware on negative effect of chemical pesticide on insect pollinators. But, majority of farmers agreed on declining of insect pollinators. For this, misuse of chemical pesticide was the major cause on decline of insect pollinators. Majority of respondents threw pesticide container anywhere. Very few respondents received training on pesticide. Hence, to

overcome this problem, training and awareness program are necessary at farmers' field.

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