

# FARMER'S KNOWLEDGE, PERCEPTION AND MANAGEMENT PRACTICE ON INSECT PESTS AND DISEASES OF MANDARIN (*Citrus reticulata* Blanco.) IN SYANGJA, NEPAL

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## Abstract

*A study was carried out to examine the farmer's knowledge, perception and management practices on insect pests and diseases of mandarin in Syangja district of Nepal. Random sampling techniques was used to select the household and interview with the semi-structured questionnaire was carried out. Descriptive statistics were used to analyze the data collected and the results were obtained. The study revealed that among the production constraints insect pests (index 0.79) was ranked first, diseases (index 0.69) ranked second and lack of irrigation (index 0.64) ranked third. Among insect pests perceived severe by the respondents, leaf miner was ranked first, green stink bug was ranked second while shoot borer was ranked third. Similarly among major diseases sooty mould (index 0.81) was ranked first, root rot (index 0.75) was ranked second and powdery mildew (index 0.54) was ranked third. On an average, farmers had knowledge score of 2.03 on insect pests while they could name only 1.67 diseases. Most of the farmers had knowledge on management practices (80.83 %). Cultural, physical, mechanical and chemical methods were in practice. Commonly used management methods were pruning (82.5 %), hand picking (71.7 %) and use of traps (25.8%). The use of chemical pesticides (21.7%) was found low. However, Bordeaux paste (89.1%) was majorly used for diseases control.*

*Key words: mandarin; perception; knowledge; insect pests; diseases*

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## 1 Introduction

Mandarin (*Citrus reticulata* blanco.) is a major fruit cultivated in mid-hill region of Nepal. The mid hill region of Nepal is best suited for mandarin cultivation (Shrestha & Verma, 1999). Commercial cultivation of mandarin has been started in 42 mid-hill districts with potential for further expansion in 18 more districts (NCDP, 2016).

Syangja is a mid-hill district of Nepal with favourable climate for mandarin cultivation. Citrus is the major cash crop of this district. Majority of the farmers in the district depend solely on mandarin cultivation. It stands first in terms of both production area and production of mandarin in Nepal (MoAD,2016/17). The productivity of mandarin in Syangja is 9 Mt/ha (MoAD,2016/17).

Citrus decline is major problem in Nepal. It is on the verge of spreading throughout the country severely affecting several orchards. FAO (2011) highlighted that the major factors contributing to citrus decline in Nepal are insect pests and diseases among others. Green stink bug was observed in most of the citrus orchard and resulted in loss of around 20% in the western region (Shrestha, Paudyal, & Subedi, 2008) whereas fruit fly is prominent in the eastern development region and estimated loss is 90% (NCRP, 2006). Insects like scale insects, green stink bug, citrus psylla, fruit fly, red spider mites, leaf miner, stem borer, citrus butterfly, whiteflies and thrips have been found in Nepal (Adhikari G. , 2014). Insect pests and disease has resulted in lower production and productivity.

Farmer's decision about crop protection depends on their knowledge of and experience with pests and diseases and the damage inflicted to the cultivated plants. It is widely accepted that pest management extension will be more robust when farmer's knowledge, perception and practices are taken into account (Heong et al., 2002). Research has been increasingly abundant on farmer's knowledge and perception of pests and diseases of annual and some perennial crops. Still much is lacking for mandarin despite it being a major cash crop of many people of midhill of Nepal. Therefore the present study intends for analysis of farmer's knowledge, perception and practices on insect pests and diseases of mandarin.

## Objectives of the study

The general objective of the study was to assess farmers' knowledge, perception and management practice on insect pests and diseases of mandarin in Syangja district whereas the specific objectives of the study were as follows:

- To identify the major production constraints of mandarin
- To find out the major insect pests and diseases of mandarin
- To assess the management practices adopted by farmers

## 2 METHODOLOGY

The survey was conducted purposively in Syangja district of Nepal; Putalibazzar municipality, Arjunchaupari rural municipality, Bhirkot municipality and Waling municipality. Based on the list obtained from mandarin super-zone, 120 farmers who had at least 25 mandarin trees were selected randomly. Data were collected using the semi-structured questionnaire through household survey, Key informant interview and Focus group discussions. Collected data were checked, reviewed and organized for completeness and accuracy for minimizing errors which were then stored safely. Data were then analyzed, edited and categorized on the basis of the objectives of the survey. They were then coded and entered in the computer and analyzed using SPSS and MS-Excel.

The knowledge score criteria for insect pest was as below

Score	Knowledge level	Criteria
0	No	Farmer couldn't mention a mandarin insect pest by a name, its description or the type of damage
1	Low	Farmer named one insect pest, one feature and one type of damage caused by the insect pest
2	Medium	Farmer named two insect pest, describe at least one feature of each pest and one type of damage caused by each of the two pests
3	High	Farmer named three or more insect pest, describe at least one feature of each pest and one type of damage caused by each of the three pests

Adapted from (Midega, et al., 2012)

### 3. RESULTS AND DISCUSSION

#### 3.1 Socio-economic Characters

##### Ethnicity of the respondents

The ethnicity of the household was analyzed. The result showed that majority of the household were Brahmin/Chettri (58%) which is higher than the National survey (2011) i.e. 28.78%. The household survey showed that Janajati (37%) in the study area was higher than National survey i.e. 30.25%. It also showed that 5% of them were dalit.

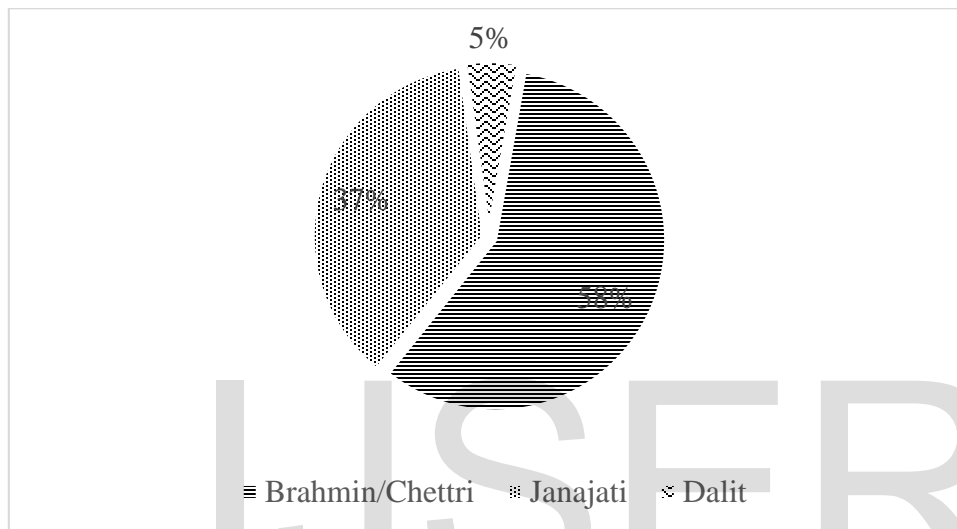


Figure 1 Ethnicity of the respondents in Syangja (2019)

##### Education level of Respondent in the Study area

The result revealed that most of the respondents in Syangja were literate. Only 9.2% of them were illiterate. Respondent of Brahmin/Chettri had attained higher education and had good knowledge on insect pests and diseases. Education level of the respondents would have significant impact on knowledge of farmers on insect, pests and disease of mandarin. Most of the respondents (48.3%) had education upto secondary level.

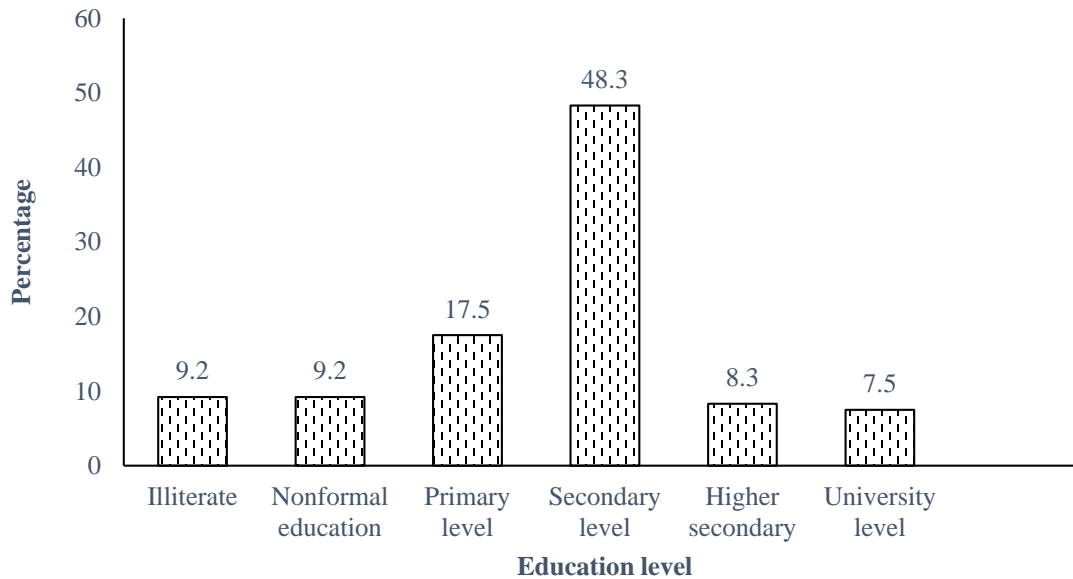


Figure 2. Education level of the respondents in Syangja (2019)

### Major source of household income of the respondents

The study showed that the major source of income of the respondent in the study area were agriculture, remittance, government services and pension. The percentage share of different income source in the study area is shown in figure 3. It showed that most of the respondents (64.2%) were dependent on agriculture, majorly mandarin cultivation.

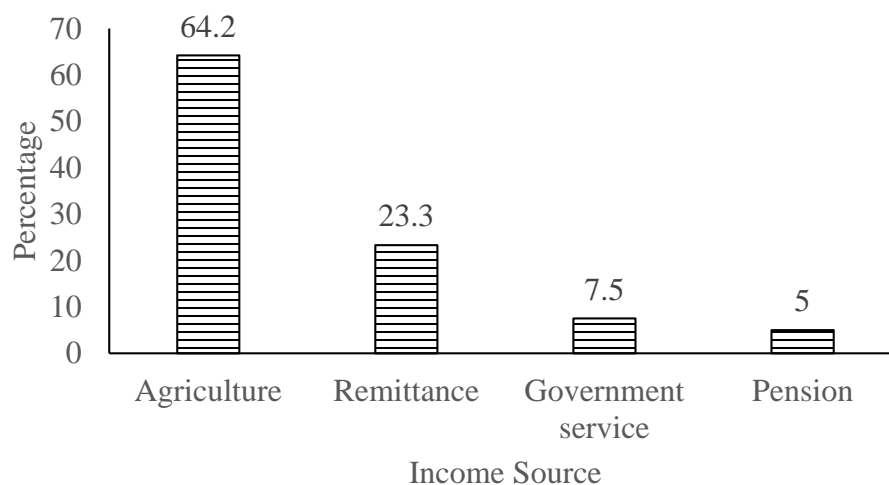


Figure 3. Income source of the respondents in Syangja (2019)

### 3.2 Farm characteristics

### Year of mandarin farming experience of the respondents

The study revealed that most of the household (55.8%) had farming experience of mandarin of greater than 20 years. The farmers with higher year of farming experience had higher knowledge on insect pests and diseases.

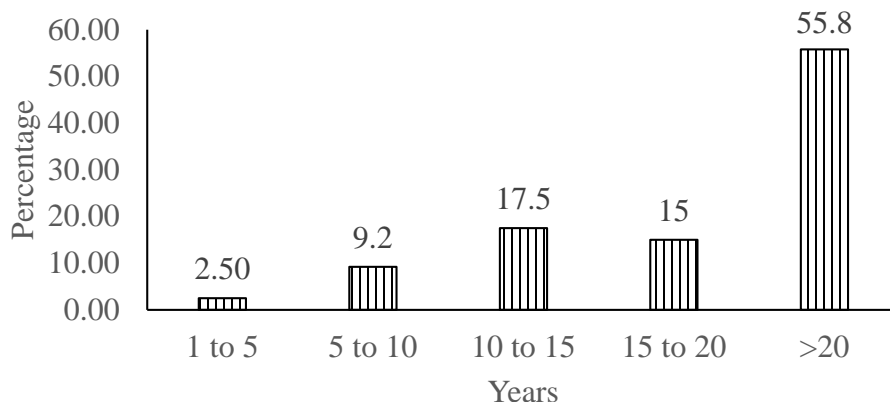


Figure 4. Farming experience of the respondents in Syangja (2019)

### Total land holdings and orchard size

The study revealed that most of the household in the study area had total land holding between 6 to 29 ropanies (78.3%) with an average of 17.79 ropanies. Among them majority of the respondents (79.17%) had the mandarin orchard of size 4 to 16 ropanies with an average of 10.13 ropanies.

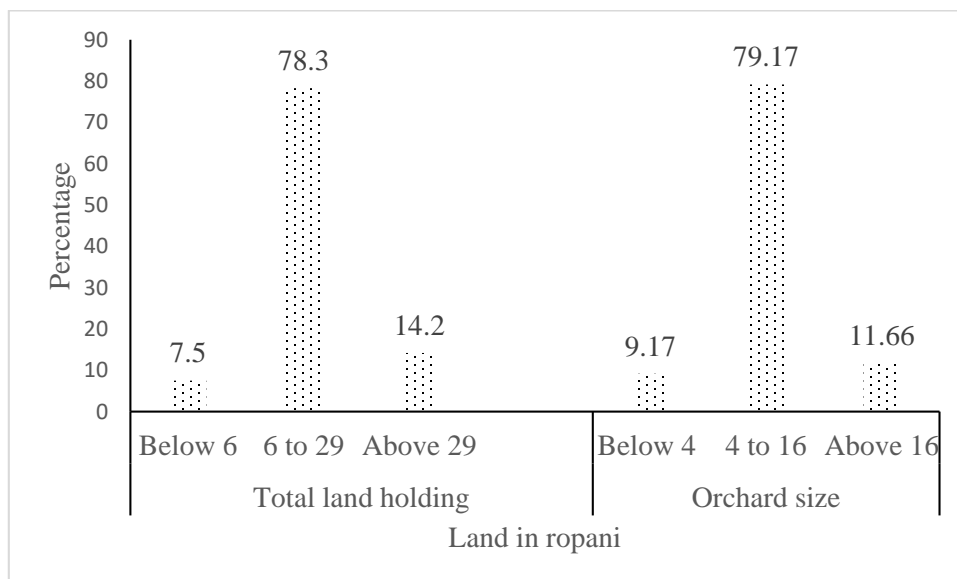


Figure 5. Total land holdings and orchard size of the respondents in Syangja (2019)

### Types of planting materials used

The study showed that most of the household used seedling from seed. The type of planting materials used affects the severity of insect pests and diseases. Most of the household (38.5%) had mixed planting materials of seedling from seed, air layering and grafted. Only seedling was used by 12% of the house hold as shown in the figure 6.

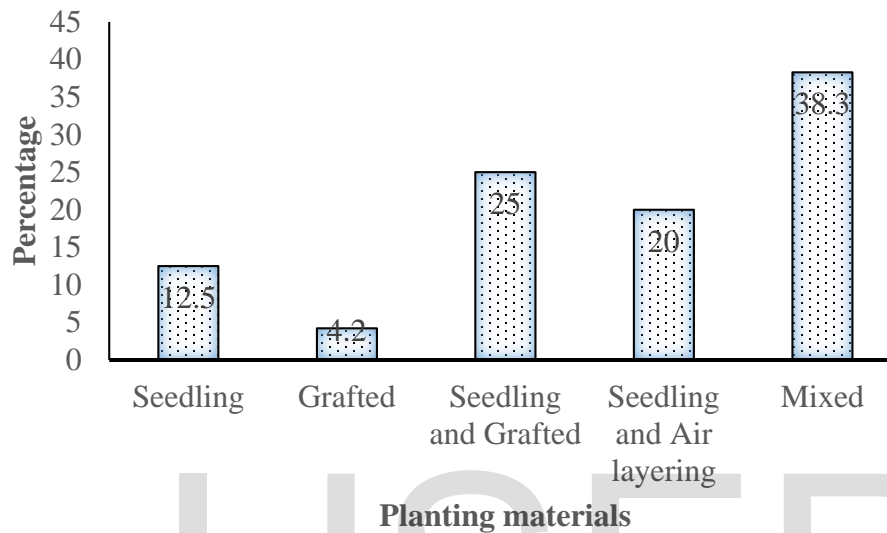


Figure 6. Distribution of different types of planting materials used in Syangja (2019)

### 3.3 Ranking of the problems in mandarin production

The major problem in mandarin production was found to be insect pests with index value of 0.79 followed by diseases with index value 0.69. It was found from the table 1 that lack of irrigation facility was ranked third with index 0.64 followed by monkey attack (index 0.53) on rank fourth and labor shortage (index 0.3) at rank fifth.

Table 1. Ranking of production problems in mandarin in Syangja (2019)

Problems	Index value	Rank
Insects	0.79	I
Diseases	0.69	II
Monkey attack	0.53	IV
Lack of irrigation facility	0.64	III
Labor shortage	0.30	V

Source: Field Survey, 2019



### 3.4 Farmers' knowledge and perception on insect pests and disease of mandarin

#### Knowledge on insect pests of mandarin

Overall, several insect pests known to attack mandarin were mentioned by farmers. These includes leaf miner, shoot borer, fruit fly, green stink bug, scale insect, aphid, lemon butterfly, whitefly and mites. On an average farmers could name 3.21 insect pests. However it was found that farmer had knowledge score of 2.03.

Table 2. Knowledge level of respondent on insect pests in Syangja (2019)

Knowledge level	Score	Frequency	Percentage
No knowledge	0	1	0.8
Low	1	28	23.3
Medium	2	57	47.5
High	3	34	28.3

Source: Field Survey, 2019

#### Ranking of major insect pests

Respondent farmers' of the study site were asked to rank the major insect pests in their orchard. Table 3 reveals that leaf miner was ranked first (index 0.79) followed by green stink bug at second (index 0.73). Shoot borer was ranked third with index 0.71 while fruit fly was ranked fourth with index 0.65 followed by aphid and scale insect respectively.

Table 3. Ranking of major insect pests commonly found in Syangja (2019)

Insect pests	Index	Rank
Leaf miner	0.79	I
Shoot borer	0.71	III
Fruit fly	0.65	IV
Green stink bug	0.73	II
Scale insect	0.28	VI
Aphid	0.34	V

Source: Field Survey, 2019

### Knowledge on diseases of mandarin

Overall, several diseases known to attack mandarin were mentioned by farmers. Those includes root rot, sooty mould, powdery mildew, foot rot, citrus greening and citrus canker. However, average number of disease name known was 1.67.

### Ranking of major diseases in the study area

Respondent farmers of the study site were asked to rank the major disease in their orchard as perceived by them. Table 4 reveals that sooty mould was ranked first with index 0.81, root rot was ranked second with index 0.75 followed by powdery mildew in third rank. Foot rot was on fourth and citrus canker was on fifth rank.

Table 4. Ranking of major diseases found in Syangja (2019)

Disease	Index	Rank
Root rot	0.75	II
Foot rot	0.46	IV
Sooty mould	0.81	I
Citrus canker	0.44	V
Powdery mildew	0.54	III

Source: Field Survey, 2019

### 3.5 Farmers' knowledge on management practices of insect pest and diseases

Respondent farmers in the study site were asked about the management practices (cultural, physical, mechanical, chemical) of insect pest and diseases. The research study revealed that majority of the farmers had got knowledge on either of the methods of management practices of insect pests and disease. Table 5 shows that 80.83% of the farmers were aware of either of cultural, physical, mechanical or chemical method of management practices of insect pests and disease.

Table 5. Knowledge of the farmers on management practices of insect pests and diseases in Syangja (2019)

Knowledge on management practices	Frequency	Percentage
Yes	97	80.83
No	23	19.17
Total	120	100.0

Source: Field Survey, 2019

### 3.6 Management practices adopted on insect pests and diseases

The study revealed that 82.5% of the respondent prune the affected parts due to insect pests and disease, 71.7% practice hand picking of insect pests, 25.8% of the respondent were found to use traps, 3.3% of them said to have used bio-pesticides, 21.7% of them were found to apply chemical pesticides and 80.1% of them use fungicide. The only fungicide use was bordeaux paste/mixture.

Table 6. Different management practices adopted in Syangja (2019)

Management practices	Frequency	Percentage
Pruning of affected parts	99	82.5
Hand picking of insects	86	71.7
Use of traps	31	25.8
Bio-pesticides use	4	3.3
Chemical pesticide use	26	21.7
Fungicide use	107	89.1

Source: Field Survey, 2019

## 4 CONCLUSION

The major production constraints in mandarin production were insect pest and diseases followed by lack of irrigation facilities in Syangja. The major insect pests in the area were leaf miner, green stink bug, shoot borer, fruit fly and scale insect while the major diseases were sooty mould, foot rot and citrus canker. Most of the farmers were found to adopt non chemical measures. Bordeaux paste was the most use chemical for disease control and pruning of affected parts was done to remove the insect infestation as well as disease

control. Pesticides were used by fewer farmers. Traps were used by substantial number of farmers. This shows that the farmers are well aware other harmful impact of chemical pesticides. The area could be developed into organic mandarin production with little extra effort from the concerned stakeholders by facilitating the farmers with alternate methods. The farmers were found to have good knowledge on management practices. But the negligence of them to adopt proper management has led to increase in insect pests and disease severity in Syangja.

## **5 Acknowledgement**

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## 6 REFERENCES

- Adhikari, G. (2014). *Citrus Disease and Pest*. National Citrus Development Program.
- FAO. (2011). Extension Bulletin: Steps for Rejuvenating Declined Mandarin Orchards. Pulchowk, Kathmandu: Government of Nepal, Food and Agriculture Organizations.
- Heong, K.L., M.M. Escalada, V. Sengsoulivong and J. Schiller (2002). Insect management beliefs and practices of rice farmers in Laos, *Agric. Ecosyst. Environ.* 92:137-145.
- Midega, C.A.O., Nyang'au, I.M., Pittchar, J., Birkett, M.A., Pickett, J. A., Borges, M. & Khan, Z.R. (2012). Farmers' perceptions of cotton pests and their management in western Kenya. *Crop Protection*, 42, 193–201.
- MoAD. (2016/17). Statistical information on Nepalese agriculture. Kathmandu, Nepal: MoAD.
- NCDP. (2016). A Glance at Annual Program and Statistics. Kritipur, Kathmandu: NCDP.
- NCRP. (2016). *Annual Report*. Dhankuta: National Citrus Research Program, Nepal Agriculture Research Council.
- Shrestha, P., & Verma, S. (1999). Development and Outlook of citrus industry in Nepal. *In Proceedings of National Horticulture Workshop*. Kathmandu, Nepal: Nepal Horticulture Society.
- Shrestha, R., Paudyal, K., & Subedi, H. (2008). Citrus fruit drop problem in the Far and Mid western Development region of Nepal. A survey report of Kailali, Dailekh, Baitadi and Salyan district of Nepal. NCRP, Report No.3/2008.