

**Research Article****SURVEY OF BANANA STEM WEEVIL, *Odoiporus longicollis* (OLIV.)  
(COLEOPTERA : CURCULIONIDAE) IN NEPAL****S. Tiwari<sup>1</sup>, R. B. Thapa<sup>1</sup>, D. M. Gautam<sup>1</sup> and S. K. Shrestha<sup>2</sup>**<sup>1</sup>Institute of Agriculture and Animal Sciences, Rampur, Chitwan and <sup>2</sup>Department of Agriculture, Harihar Bhawan, Lalitpur, Nepal**ABSTRACT**

A survey was conducted randomly selecting 50 banana growers- ten each from Kailali, Morang, Tanahun, Nawalparasi, and Chitwan districts to identify banana farming practices. The semi-structured questionnaire was prepared, pre-tested, improved and data collected by face-to-face interview. The survey revealed that majorities were males (56.5%) with average family size of 5.74 under 15-59 years age, having landholding of 2.07 ha/family, over three-fourth of land with irrigation facility. The use of poor suckers, poor crop management practices and heavy uses of chemical pesticides were the causal factors for the weevil infestation in more than five months old banana orchard, particularly in summer seasons. For its management, agro-vet (74.0%) and neighborhood (44.0%) played a significant role in selling chemicals and information sharing. Majority of the farmers were familiar about pesticide label, precaution measures and harmful aspects of chemical pesticides with the least emphasis on clean cultivation and biological control. Based on the study, field sanitation and pseudostem trapping utilizing indigenous materials can be useful for the sustainable management of banana stem weevil.

**Key words:** *Odoiporus longicollis*, field survey, banana orchard**INTRODUCTION**

Banana (*Musa* spp.) is an important fruit commonly grown in tropical and subtropical parts of the world. In Nepal, banana is being grown since time immemorial in home yards for home consumption purpose (Gautam and Dhakal, 1994). It ranks the fifth in the area and the third in production among fruit crops grown in Nepal (ASD, 1996/97). It is estimated that the banana stem weevil (*Odoiporus longicollis* Oliv.) causes 10-90% yield loss depending on the growth stage of the crop and management efficiency (Padmanaban and Sathiamoorthy, 2001). The severity of the loss is greater when infestation occurs at the early vegetative stage (5 months old). Padmanaban *et al.* (2001) reported that total crop failure result in farms where the weevils are not managed efficiently. Simmonds (1966) reported 180 insect pests of banana with their worldwide distribution. Of them, *Odoiporus longicollis* Oliv. is the serious one in Nepal and India (Sripriya *et al.*, 2000; Singh, 1966; Shanmugavelu *et al.*, 1992; Thapa, 1993; Shrestha *et al.*, 1994). Therefore, management of this pest is necessary to sustain productivity and obtain higher economic return.

Good husbandry practices, such as weeding, manuring and mulching produce vigorous banana plants that have improved weevil tolerance (Feakin, 1971; Gowen, 2000). Most of the farmers are not aware of the chemical hazards and do not have adequate knowledge of safety measures. Because of this, there is high level of negligence and misuse, while handling chemical pesticides. Chemical causes the long term effects such as effect in soil environment, human health, ground water contamination, pesticide resistance, pest resurgence and other ecological effect but these effects are being neglected by the farmers (Thapa and GC, 2000). In simple term, IPM aims at combining all available methods or tools of insect pest control in a manner that minimizes insecticides use and disturbance to the ecosystem (Chatterjee, 1997). It requires a level of analytical skill and certain basic training in crop monitoring and ecological principles, where farmers have been trained as experts (Bentley *et al.*, 1993).

Past researches, so far in banana cultivation were mainly concentrated on the cultivation practices and key problems such as pest and diseases were neglected. The familiarity of farmers' knowledge is of prime importance for any scientific study (Gurung, 1985; Kutwal, 1998). Keeping this in mind, a field survey was conducted to see the severity of pest in the survey areas as well as to explore their attitude on pest management in banana orchard.

## MATERIALS AND METHODS

The survey was conducted in different banana growing pocket areas of Danghihat, Morang; Ratnanagar, Chitwan; Shivamandir, Nawalparasi; Aaboo and surrounding of Tanahun; and Tikapur, Kailali districts purposively selecting them based on area, coverage, production and road facility. The major lists of commercial banana producers were obtained from the District Agriculture Development Office (DADO) of the respective districts. A formal survey was conducted by interviewing 10 randomly selected commercial banana growers from each district and household (HH) survey was the basic sampling unit for collecting the necessary information. The semi-structured questionnaire was prepared, pre-tested, improved and administered to cover the socioeconomic conditions of farmers, general cultivation practices, general pest status etc. Field survey data were coded, tabulated, and analyzed by using suitable statistical packages of social science (SPSS), Micro-Soft EXCEL. Variables, like family size, occupational pattern, educational level, size of landholding etc. were analyzed by using simple descriptive statistics such as frequencies, percentage, mean and by indexing (ranking).

## RESULTS AND DISCUSSION

### General characteristics of the respondents

The household survey revealed that of the total population, the dominance of male population was higher (56.5%) with an average family size of 5.74. About two-third of the land was their own (70.6%) and irrigated (75.7%) with an average landholding of 2.07 ha, in which most of the area (63.9% of the total land) was occupied by banana cultivation (Table 1).

Table 1. General household information of the survey sites (N=50)

SN	Particulars	Survey finding
1	Population (No)	287
2	Male (%)	56.5
3	Average family size (No/HH)	5.74
4	Total land (ha)	103.61
5	Irrigated land (%)	75.7
6	Unirrigated land (%)	24.3
7	Average landholding (ha/HH)	2.07
8	Own land (%)	70.6
9	Rented (%)	29.3
10	Coverage by banana (%)	63.9

### Pest severity

Respondents reported that the major causes of severity of pest (*O. longicollis*) were due to source of sucker followed by poor crop management practices, and improved varieties, respectively (Table 2). They also expressed their opinions that uses of chemicals including environmental factors were other reasons of weevil infestation in the banana growing areas.

### Awareness of the respondents on pests and pesticides

About half of the respondents (46.0%) expressed their feelings that the susceptible stage of crop was nine month, while younger plants suffered less. Based on the responses, susceptible crop stage and harmful aspects of pesticides to pest attack is presented in Table 3. Majority of the respondents expressed that chemicals could affect on health and environment, whereas minority of the respondents expressed their view on negative consequence of chemical pesticide to pest outbreak, which could be due to their poor level of knowledge and awareness.

**Table 2. Perception of the respondents for the distribution of *O. longicollis*, 2005 (N=50)**

Problems	Score					Cases	Weighted Score	Index	Rank
	5	4	3	2	1				
Sources of sucker	24	9	11	3	3	50	198	3.9	I
Poor crop management	18	19	6	3	4	50	194	3.8	II
Improved variety	18	10	17	0	5	50	186	3.7	III
Use of chemical	9	8	11	10	12	50	142	2.8	IV
Environmental factor	3	11	9	13	14	50	126	2.5	V

**Table 3. Perception of the respondents on susceptible crop stage and negative consequences of pesticides, 2005 (N=50)**

Crop stage	Frequency	Negative consequences	Frequency
Three month	2 (4.0)	Health hazardous	29 (58.0)
Six month	3 (6.0)	Pest outbreak	3 (6.0)
Nine month	23 (46.0)	Environmental Effect	18 (36.0)
Twelve month	13 (26.0)	Total	50 (100.0)
Years	9 (18.0)	-	-

Figures in parentheses indicate percent

### Incidence of stem weevil

The survey results clarified that 70.0% of the respondents expressed that stem weevil mainly attacked on pseudostem followed by rhizome (30.0%), which clearly indicated that pest management practices should be concentrated to pseudostem protection. Respondents in survey sites with respect to severity season of pest attack indicated that majority of the respondents (62.0%) expressed summer season severe than the winter, however, 16.0% of the respondents were unaware about the season of pest attack (Table 4).

**Table 4. Perception of the respondents on plant part and season of attack by weevil, 2005 (N=50)**

Parts attacked	Frequency	Seasons of attack	Frequency
Pseudostem	35 (70.0)	Summer	31(62.0)
Rhizome	15 (30.)	Winter	11(22.0)
Total	50 (100)	Unknown	8 (16.0)

Figures in parentheses indicate percent

### Weevil management

The survey showed that weevil was controlled by different ways, such as use of chemical pesticides, botanicals, field sanitation, and crop rotation (Table 5). However, majority followed chemical methods followed by clean culture, botanical and crop rotation etc.

**Table 5. Method of weevil management practiced by the respondents, 2005 (N=50)**

Farmer's practice	Frequency	Percent
Use of chemical pesticides	28	56.0
Use of botanical pesticides	6	12.0
Clean culture	10	20.0
Crop rotation	6	12.0
Total	50	100

### Pesticide use

Nearly 50.0% of the respondents received suggestions from the farmers followed by agro-vet (28.0%), JT/JTA (24.0%) and radio (4.0%), respectively, on pesticide formulation and application (Table 6).

**Table 6. Information sources of the respondents for pesticides, 2005 (N=50)**

Districts	Information sources				Total
	JT/JTA	Neighbor	Radio	Agro-vet	
Morang	4 (40.0)	4 (40.0)	0 (0.0)	2 (20.0)	10 (100.0)
Chitwan	3 (30.0)	3 (30.0)	0 (0.0)	4 (40.0)	10 (100.0)
Kailali	3 (30.0)	5 (50.0)	0 (0.0)	2 (20.0)	10 (100.0)
Nawalparasi	0 (00.0)	5 (50.0)	2 (20.0)	3 (30.0)	10 (100.0)
Tanahun	2 (20.0)	5 (50.0)	0 (00.0)	3 (30.0)	10 (100.0)
Total	12 (24.0)	22 (44.0)	2 (4.0)	14 (28.0)	50 (100.0)

Figures in parentheses indicate percent

Of the total population in survey districts, male constituted 56.5 % and female 43.5% with average family size of 5.74, but the national figure is 50.05% male and 49.95% female with an average family size of 5.45 (CBS, 2004). Pest incidence year after year was associated with poor sucker management, poor crop management, improved varieties and improperly used chemical fertilizers. Farmers reported that weevil could be controlled using chemicals, clean culture, botanicals and crop rotation. Similar reporting, such as good husbandry practices, weeding, manuring and mulching resulted vigorous banana plants that improved weevil tolerance (Feakin, 1971; Hoffmann, 1933; Shanmugavelu *et al.*, 1992; Shrestha, 1998). The survey results about preferable banana plant stage by weevil attack agrees to other researchers (Thapa, 1993; Sherif and Thomas, 1988), and incidence of weevil was seldom observed in young plants below five months. The chemical pesticides have several disadvantages to human health, wildlife and the ecosystem as a whole (Thapa, 2003). They are expensive and need sophisticated equipments for their application; however, the use of such chemicals has been increasing in Nepal (Neupane, 2003). In spite of these, farmers knowingly or unknowingly used banded chemical pesticides without considering the frequency of use and dose.

## CONCLUSIONS

The use of poor suckers and poor crop management were the major causal factors for the weevil infestation in the banana orchard that caused significant crop loss. The weevil infestation was observed prominently in poorly managed and old orchard particularly in summer months. Majorities of the respondents were aware about harmful aspect of chemical pesticide, pesticide label, precaution measure, management strategies etc. Neighbors played a significant role for creating awareness about formulation and method of application of pesticides followed by agro-vets at the local level. Over 50% of the respondent controlled the pest by using chemical pesticides followed by clean culture, botanical pesticides, and crop rotation, while all the respondents expressed their unawareness about biological control. From this survey study the conclusions drawn are: i) before establishments of any scientific study, it is wise to incorporate farmer's general practices of crop cultivation to explore their indigenous knowledge, ii) clean culture and pseudostem trapping of weevil were very popular method of weevil management in survey area and other banana growers can be made aware of the fact to reduce weevil infestation in the orchard, and iii) most of the farmers in the survey sites were familiar about chemical pesticides and their negative consequences; hence, searching alternative weevil management is worthwhile.

## ACKNOWLEDGEMENTS

The authors express sincere thanks to DADO, Nawalparasi and NARDF Project No. 201/2004/05 for partial financial support and helps received from various commercial growers from various districts are also appreciated.

## REFERENCES CITED

- ASD. 1996/1997. Statistical profile of Nepal. Statistical Division, Ministry of Population and Statistics. 890 p.  
 Bentley, J. W., G. Rodriguez and A. Gunzalez. 1993. Science and the people: Honduran compensations and natural pest control invention. Honduras. 7 p.

- CBS. 2004. Statistical pocket book of Nepal. National Planning Commission Secretariat, Central Bureau of Statistics, Ramsahapath Kathmandu, Nepal. 294 p.
- Chatterjee, P. B. 1997. Plant protection techniques. Bharati Bhawan Publishers. Patana, India. pp. 277-291.
- Feakin, S. D. 1971. Pest control in bananas. PANS Manual no. 1. Centre for Overseas Pest Research, 2<sup>nd</sup> (ed.), College House. UK. 128 p.
- Gautam, D. M. and D. D. Dhakal. 1994. Fruit and industrial crops (Nepali). Pabitra tatha Rupa Publication, Chitwan. 324 p.
- Gowen, S. 2000. CABI- bio-control news and information. Available on: <http://www.pest.Cabweb.org/Journals/INIBAP.ipm>. (Retrieved; September 5, 2006)
- Gurung, J. D. 1985. Participatory approaches to agricultural technology promotion with women in the hills of Nepal. Mountain Farming System, Discussion Paper, ICIMOD, Kath, Nepal.
- Hoffman, W. E. 1933. Observations on weevil injuries to banana. Hong Kong Nat. 4: 48-54.
- Kutwal, S. P. 1998. Farmers are the key sources of research feedback: A case study of year round maize production at Badhe lower belt. Dhankuta, PAC, Working Paper, Nepal.
- Neupane, F. P. 2003. Status of botanical pesticides in Nepal. *In*: F.P. Neupane (ed.) Proceedings of National Seminar on Integrated Pest Management in Nepal, September 25-26, 2002. Himalayan Resources Institute, Kathmandu, Nepal. pp. 77-100.
- Padmanaban B., P Sundararaju., K. C. Velayudhan and S. Sathiamoorthy. 2001. Evaluation of Musa germplasm against banana weevil borers. Info Musa 10:26-28.
- Padmanaban, B. and S. Sathiamoorthy. 2001. International network for the improvement of banana and plantain, Montpellier Cedex 5.
- Shanmugavelu, K. G., K. Arindakshan and S. Sathiamoorthy. 1992. Banana: Taxonomy, breeding and production technology. Metropolitan Book. New Delhi, India. 459 p.
- Sherif, A. K. and M. J. Thomas. 1988. Pseudostem borer threat to banana. The Hindu. May 11, 1988. 24 p.
- Shrestha, G. K. 1998. Fruit development in Nepal- Past, present and future. Technica Concern. Delta Printing Press, Kathmandu. 213 p.
- Shrestha, G. K., R. B. Thapa, D. R. Baral and R. R. Pokharel. 1994. Banana research in Chitwan, Phase-I: Observation and establishment of banana nursery at IAAS, Rampur *In*: F.P. Neupane (ed.), IAAS Res. Rep. (1992-1993). IAAS, Rampur, Chitwan, Nepal. pp. 88-98.
- Simmonds, N. W. 1966. Bananas (2<sup>nd</sup> ed.). Longmans, Green, London. 512 p.
- Singh, S. S. 1966. Observation on *Odioparus longicollis* (Coleoptera : Cruculionidae) in Kathmandu valley and its suburbs. Indian J. Ent. 28: 410.
- Sripriya, C., B. Padmanaban and S. Uma. 2000. Evaluation of banana (*Musa* sp.) germplasm against insect pests. Indian J. Ent. 62 (4): 382-390.
- Thapa, R. B. 2003. Pesticide pollution and integrated pest management. *In*: F. P. Neupane (ed.) Proceeding of National Seminar on Integrated Pest Management in Nepal, September 25-26, 2002. Himalayan Resources Institute/Care Nepal/ FAO. pp. 175-197.
- Thapa, R. B. 1993. Survey and identification of major insect pest problems in banana in the Chitwan valley, Nepal. *In*: F.P. Neupane (ed.), IAAS Res. Rep. (1985-1991). pp. 66-69.
- Thapa, R. B. and Y. D. GC. 2000. Integrated management of soil insect pests in the mid hill of Nepal. SSMP Documents No. 44:1-61.