

Traditional management of Red Pumpkin beetle, *Raphidopalpa foveicollis* Lucas in Cachar district, Assam

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The survey among the farmers of four villages, viz. Alenpur, Dargakona, Katigorah and Narsinghpur in Cachar district revealed that the maximum (80 %) farmers were engaged in cultivation of cucurbitaceous crops along with other crops in Katigorah and Narsinghpur whereas the minimum (65 %) was found in Dargakona. Total response in using traditional methods against *R. foveicollis* was found to be the maximum (77.50 %) with cow dung and fly ash followed by red chilly powder (50 %). The minimum (25 %) used material was *kala maati* powder (black soil). Out of total response of farmers from this district indicated that 80 % farmer were using chemical pesticides where 77.50 % used traditional methods along with chemical pesticides. The economic status indicated that the highest annual income (@ Rs.89, 275.00/family) was recorded from Alenpur followed by Dargakona area (@ Rs.34, 750.00/family) and the lowest was recorded from Narsinghpur (@ Rs.19, 625Rs/family). In this paper an attempt has been made to document and encourage the local farmers which are unique traditional practices of pest management (*R. foveicollis*) in Assam.

Keywords: Farmers' traditional belief, Pest management, *Raphidopalpa foveicollis*, Cucurbitaceous crops, *Kala maati*, ITK, Sustainable, Cachar district

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Traditional agriculture accumulated the experience provided by local farming practices through thousands of years. Adaptation and selection seem to be the major mechanisms for eventually obtaining the satisfactory or encouraging results in the management of natural resources¹. Structural and functional characteristics of traditional agro-ecosystems are the result of a consistent knowledge base that can guide the design of sustainable farming systems²⁻³.

Indigenous knowledge is unique to a given culture of society; this knowledge is the information base for a society. Indigenous practices play a vital role in sustainable agriculture. It has advantages over outside knowledge being the cost effective and readily available. Indigenous knowledge systems and technologies are found to be socially desirable, economically affordable, sustainable and involve minimum risk to rural farmers and products⁴.

Insect pest cause heavy losses to crops especially the production of vegetables. Curative control measures are practiced to protect them. Among them, synthetic insecticides have been used since long time,

but have serious drawbacks⁵, affect non-target organisms and environment⁶. The traditional pest control practices play an important role in the management of agriculture and it is an inevitable practice for sustainable agriculture. The proper control of pests minimizes economic losses and damage to the environment⁷.

Traditional system of pest management is an economic and environment friendly approach, as chemical pesticides have adverse effects on biotic and abiotic components of an ecosystem⁸.

The growth of cucurbit crops are severely affected by a number of insect pests among which, the red pumpkin beetle *Raphidopalpa (Aulacophora) foveicollis* Lucas) (Coleoptera: Chrysomelidae) are the most damaging and major pests⁹. The beetle causes heavy damage during early phase of plant growth in India, Greece, South Europe, Algeria, Egypt, Cyprus, Aden, Persia, Ceylon, Nepal and Burma¹⁰. The infestation by the pest on all the major cucurbitaceous crops is also noticed from Cachar district- one of the major district of Barak Valley which is situated in the southern part of Assam, North-East India. Local farmers of this region are

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practicing the management processes of this pest by their own way since time immemorial. Considering the importance of farmers' traditional knowledge based practices in pest management the present investigation was undertaken to explore, document and encourage the local farmers for these practices in this locality of Assam.

Methodology

Farmers' traditional belief for the management of *R. foveicollis* has been followed by questionnaire method. One hundred sixty farmers from four villages (Alenpur, Dargakona, Katigora and Narsinghpur) were interviewed during 2006-07. Constructs from the pest belief model and the theory of reasoned action¹⁴ were used to analyze farmers' pest management decisions. Draft of the questionnaire prepared in English, translated into *Bengali* or *Bhojpuri* at the time of interaction with the farmers was used.

As traditional practices local farmers used major four types of treatments, viz. cow dung, *Kala maati* (black soil) powder, red chilly powder and fly ash to control the red pumpkin beetles. *Kala maati* dried under sunlight and grinded properly, then mixed with water (1:10 w/v) and sprayed on crops. Red chilly powder mixed with water (1:10 w/v) and sprayed on cucurbit crops. Raw cow dung was mixed with water (1:5 w/v) to prepare a suspended solution and sprayed on beetle infested field. Fly ash (wood ash after burning) was sprayed over the crop (100 % powder). *Kala maati*, one type of soil available in the local agricultural field situated near the Baluchari river of Alenpur study site. Lime water prepared by using 250 gm lime in 15 L of water, kept overnight and the suspended solution sprayed on next day to the canopy of cucurbit crops. Another mixture was prepared as 100 gm Tobacco leaves mixed with 250 gm of Turmeric powder and added to 15 L water, kept overnight. The suspended solution sprayed on next day. Tobacco lime water prepared by adding 100 gm

tobacco leaves to 10 L lime water, kept overnight. The suspended solution sprayed on next day by mixing with liquid soap as required.

Results

The survey among the farmers of four villages in Cachar district revealed that maximum respondents were involved in cultivation of cucurbitaceous crops along with other crops in Katigora and Narsinghpur. In these two sites 80 % of farmers were engaged in cultivation of cucurbitaceous crops followed by Alenpur (75 %) whereas minimum respondents were observed from Dargakona where 65 % farmers in the cultivation of cucurbitaceous crops (Table 1). The farmers' belief in infestation of *R. foveicollis* on cucurbit were recorded to be the highest from Alenpur and Narsinghpur where cent per cent farmers' believed the infestation caused on cucurbit by *R. foveicollis* followed by Katigora (85 %) whereas the least infestation (20 %) was recorded from Dargakona. Total response from the district revealed that 75 % farmers were involved in cultivating the cucurbits along with other crops whereas 76.25 % of farmers believed the incidence of the infestation by *R. foveicollis* on those crops (Table 1).

Studies of traditional practices along with chemical pesticides were recorded to be cent per cent from three villages, viz. Alenpur, Katigora and Narsinghpur. The minimum management practice was observed in Dargakona where 20 % farmers were using chemical pesticides and only 10 % of them practicing traditional methods (Table 1). Total response from this district revealed that 80 % of farmers were using chemical pesticides where 77.50 % used traditional methods along with chemical pesticides. No records of using bio-pesticides which are available in market for the management of the beetle had been observed from all over the district which might be because of ignorance and inaccessibility.

Table 1 —The percentage of farmers' participation and traditional practices in cultivation of cucurbit crops infested by *R. foveicollis*

Name of the site	Farmers' participation (%)	Pest present (%)	Chemical pesticides (%)	Bio – pesticides (%)	Traditional methods (%)
Alenpur	75*	100*	100*	0*	100*
Dargakona	65	20	20	0	10
Katigora	80	85	100	0	100
Narsinghpur	80	100	100	0	100
Total Response	75+	76.25+	80+	0+	77.5+

Note: '*': Based on 40 farmers, '+': based on 160 farmers

The farmers' respond in insect pest management by using various traditional practices against *R. foveicollis* revealed that cent per cent farmers of Alenpur were using *kala maati* powder, cow dung and fly ash as traditional methods. Cent per cent farmers in katigorah and Narsinghpur villages were using cow dung, fly ash and red chilly powder. The least participation (10 %) in practicing traditional methods was observed in Dargakona where cow dung and fly ash as traditional practice used. Total response in using traditional methods was observed to be the maximum, *i.e.* 77.50 % of cow dung and fly ash followed by red chilly powder where user was only 50 %. The minimum (25 %) use of *kala maati* powder was observed in this district (Fig. 1) compared to other practices.

As regards the land holding status of per vegetable growers which indicated maximum agricultural land (0.19ha/family) was occupied by the farmers in Alenpur followed by Dargakona (0.15ha/family) whereas the lowest in Narsinghpur. Area of cucurbit land occupied by the farmers in three villages, *viz.* Alenpur, Katigorah and Narsinghpur was same (0.06 ha/family) followed with Dargakona (0.05 ha/ family) (Table 2). The economic status indicated that the highest annual income (@ Rs.89, 275.00/family) was recorded in

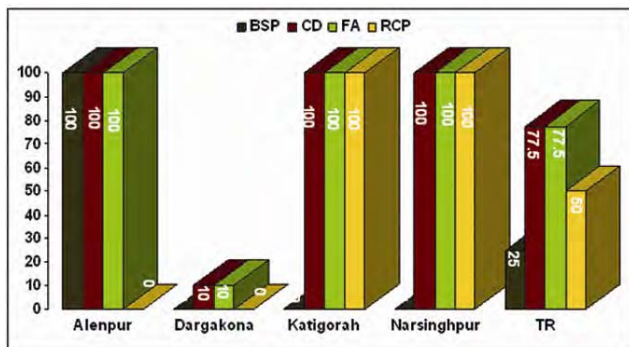


Fig. 1—The farmers response for insect-pest management by using various traditional practices against *R. foveicollis*. Note: TR=Total response in the district, BSP=Black soil powder, CD=Cow dung, FA=Fly ash, RCP=Red chilly powder.

Alenpur followed by Rs.34, 750.00/family in Dargakona and Rs.19, 625Rs/family in Narsinghpur. Income on per cent basis from vegetable was indicated that the highest (50.75 %) was obtained in Katigorah followed by Narsinghpur (43.50 %) as compared to lowest in Dargakona (21.20 %). Interestingly, per cent income from cucurbits only indicated the highest (24.75 %) in Katigorah followed by Narsinghpur (19.00 %). Dargakona farmers were having s the lowest income (7.10 %).

Other practices were also followed by them but with a very low intensity. One of such method was the lime water which repelled the insects (Table 3). Another such method was tobacco and turmeric mixture acted as antifeedant. Tobacco lime water decreased the infestation rate may be due to repellency.

Discussion

The chemicals cause severe problems to their human users, to beneficial insects, and to the biosphere at large. In spite of them, pests are not being increasingly controlled but, become increasingly more difficult to control¹¹. Traditional practices are eco-friendly, technically feasible, compatible with existing farming system and international resources of the household, simple and easy to prepare, controls insect pests. Moreover, it also enhances crop productivity¹².

As regards the use of traditional methods are concerns by the local farmers for pest management it indicates that on an about 77.50 % farmers practices these methods all over the district. These traditional practices are unique in nature although various other types of practices are also followed in different parts of the country¹³.

Here, it is observed that the farmers of this district use tobacco, turmeric, cow dung, wood ash, chilly powder, etc. as traditional practices for insect pest control. Except lime water all ingredients are originated from biological world. All the unique methods of traditional practices by the local farmers

Table 2—Economic status of per vegetable grower in Cachar district

Name of the site	Area of agriculture land (ha)	Area of cucurbit land (ha)	Annual income (Rs)	% income from vegetable	% income from cucurbit
Alenpur	0.19*	0.06	89,275.00	35.50	10.00
Dargakona	0.15	0.05	34,750.00	21.20	7.10
Katigorah	0.14	0.06	27,475.00	50.75	24.75
Narshingpur	0.13	0.06	19,625.00	43.50	19.00

Note: '*': Mean based on 40 farmers

Table 3—Farmers' traditional belief in management of *R. foveicollis* among four study sites

Methods	Results
Alenpur:	
1) <i>Kala maati</i> powder: One type of soil locally known as <i>kala maati</i> . The soil firstly dry up under sunlight then mixed with water (1: 10 w/v) and spray on crop.	1) Affects as antifeedant against the beetle.
2) Fly ash powder sprayed over the crop randomly.	2) Also affects as antifeedant.
3) Red chilly powder sprayed on the Cucurbit crop.	3) Affects as antifeedant. Also it is believed that because of inflammation on the insect body the beetle avoid the crop.
Dargakona:	
1) Fly ash powder sprayed over the crop randomly.	1) Affects as antifeedant.
2) Cow dung in water solution sprayed over the crop (1: 5).	2) It acts as repellent against <i>R. foveicollis</i> .
Katigorah:	
1) Fly ash powder sprayed over the crop randomly.	1) Affects as antifeedant.
2) Red chilly powder sprayed on the cucurbit crop.	2) Affects as antifeedant and anti-inflammatory effect on the insect body.
3) Cow dung in water solution sprayed over the crop (1: 5).	3) It acts as repellent against <i>R. foveicollis</i> .
Narsinghpur:	
1) Fly ash powder sprayed over the crop randomly.	1) Affects as antifeedant.
2) Red chilly powder sprayed on the cucurbit crop.	2) Affects as antifeedant. Also it is believed that because of inflammation on the insect body the beetle avoid the crop.
3) Cow dung in water solution sprayed over the crop (1: 5).	3) It acts as repellent against <i>R. foveicollis</i> .
4) Lime water: 250 gm lime poured in 15lit of water, kept overnight and sprayed on next day in the canopy of cucurbit crops.	4) Insect pest could not visit the field may be because of repellent action.
5) ¥Mixed 100 gm of tobacco leaf with 250 gm turmeric powder in 15 lit of water and kept for overnight. Sprayed the mixture on next day to cucurbit crops.	5) Due to antifeedant activity beetles cannot infest.
6) ¥100 gm of tobacco leaf mixed with 10lit lime water, kept for overnight and sprayed on next day by mixing the liquid soap.	6) Infestation rate decreased due to repellency.

Note: ¥: rarely used method by the farmers.

are discussed in Table 3. Use of *kala maati* powder is a more unique method which affects as antifeedant to red pumpkin beetle.

Almost 75.00 % farmers in this study area cultivating cucurbit crops that indicate wide cultivation practices in this district¹⁴⁻¹⁵. In present findings it is clear that the cucurbits occupy an important status among vegetable in this district and considered as a major economic source. The high infestation by red pumpkin beetle (75.26 %) corroborates the earlier findings of India^{9,16} and abroad¹⁴ including this part of Assam¹⁷⁻¹⁸, where it is evident that red pumpkin beetle is a major and serious insect pest of all the cucurbitaceous crops.

Kala maati, red chilly powder, fly ash, cow dung, lime water, tobacco & turmeric powder mixture, tobacco & lime water have an ethnic importance among the local farmers of this district

which are frequently practiced by the farmers. These methodologies are to be documented and encouraged as a part of sustainable pest management practices. However, the use of traditional practices may help to a great extent to check an increasing pest problem because these practices are eco-friendly.

Conclusion

Total 75 % farmers were involved in cultivating the cucurbits along with other crops in the four study sites of Cachar district whereas 76.25 % of farmers believed the incidence of the infestation by *R. foveicollis* on those crops. Overall study indicated that 80 % of farmers were using chemical pesticides where 77.50 % used traditional methods along with chemical pesticides. No records of using bio-pesticides although few of these are available in

local market for the management of the beetle had been observed in the district which might be because of ignorance and inaccessibility. 77.50 % farmers used cow dung and fly ash which was maximum followed by red chilly powder (50 %) and the minimum (25 %) used materials were *kala maati* powder. Other practices were found to be used as lime water (repelled the insects), tobacco and turmeric mixture (acted as antifeedant) and tobacco lime water (repelled the insects).

The land holding status of per vegetable growers were indicated that the farmers of Alenpur occupied maximum agricultural land (0.19ha/ family) followed by Dargakona (0.15ha/ family) whereas the lowest in Narsinghpur. The farmers of three villages, viz. Alenpur, Katigorah and Narsinghpur have same (0.06 ha /family) cucurbit land followed by Dargakona (0.05 ha/ family). The economic status indicated that the highest annual income (@ Rs.89, 275.00/family) was recorded in Alenpur followed by Dargakona (Rs.34, 750.00/family) and lowest in Narsinghpur (Rs.19, 625Rs/family). Income on per cent basis from vegetable indicated that the highest (50.75 %) was obtained in Katigorah followed by Narsinghpur (43.50 %) but lowest was in Dargakona (21.20 %). Interestingly, per cent income from cucurbits only indicated the highest (24.75 %) in Katigorah followed by Narsinghpur (19.00 %). Dargakona farmers earned the lowest income (7.10 %). This study envisaged that the community-wise traditional practices for *R foveicollis* management are unique, eco-friendly for the society which needs documentation and encourage the farmers as a whole.

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