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Short communication

Adoption of Integrated Pest Management (IPM) in chilli (*Capsicum annuum* L.): A case study from Guntur District, Andhra Pradesh

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ABSTRACT

An Integrated Pest Management (IPM) project was implemented in the cropping season 2006-07 in six villages of Guntur District. Survey was conducted in the six villages and all 150 chilli farmers participating in Crop Life India (CLI) sponsored IPM project were treated as a sample for the study. In the case of sucking pests, 56% of the farmers expressed that mites were an important pest. Among the fruit borers, a majority (83.33%) felt that *Spodoptera litura* was a serious problem and; among diseases, 56% opined die-back to be the major problem. More than two-thirds of the respondents adopted all components of IPM, with the exception of bioagents where adoption was just 46%. 44% felt leaf spot was a major disease. Over 80% adopted border crops, trap crops, scouting techniques and mechanical-control measures. All the respondents followed 10-15 day pre-harvest interval of pesticide application as a measure for obtaining quality produce and better price. Problems of post-harvest pests and diseases were not observed in the case of well-dried chillies.

Key words: Integrated Pest Management, Crop Life India, adoption

Chilli (*Capsicum annuum* L.) is an important spice crop and vegetable crop grown all over India. India is the largest producer of chillies, with annual production of 10.5 lakh tonnes from an area of about 9.6 lakh ha. Chillies constitute about 20% of Indian spice exports in quantity, and about 14% in value. Andhra Pradesh is the largest chilli producing state contributing a major share of total production where it is grown in an area of 2.37 lakh ha with production of 7.48 lakh tonnes and productivity of 3164 kg/ha. Within Andhra Pradesh, it is largely grown in Guntur, Khammam, Warangal, Prakasam and Krishna districts. From Guntur, chillies are exported to USA, UK, Japan, France, Sri Lanka, etc. earning Rs. 100 crore annually. Though the crop has great export potential (besides a huge domestic market), it suffers from low productivity. Occurrence of viral diseases and insect pests is significant (Gundannavar *et al*, 2007). The pest spectrum in chilli is complex, with more than 293 insect and mite species debilitating the crop both in the field and in storage (Anon., 1987). Among these, aphids: *Myzus persicae* Suler., *Aphis gossypii* Glover; thrips: *Scirtothrips dorsalis* Hood., yellow mite, *Polyphagotarsonemus latus* Banks, and the fruit borer, *Helicoverpa armigera* Hubner, are the most important. A total of 39 and 57 insect pests were recorded in chilli crop in Karnataka in the nursery and in the field, respectively (Reddy and Puttaswamy, 1983).

During the last two decades, insecticidal control of chilli pests especially in the irrigated crop has been characterized by high pesticides use, this has led to problems of residues in the fruits (Nandihalli, 1979; Joia *et al*, 2001). Besides pest resurgence, insecticide resistance and destruction of natural enemies (Mallikarjuna Rao and Ahmed, 1986), both domestic consumption and export of chilli necessitates production of quality chillies devoid of contamination by pesticides, industrial chemicals and afloatoxins.

Andhra Pradesh uses about 22.5% of the total amount of pesticides produced and marketed in India. Guntur District top the state in this, spending Rs. 450 crore and 500 crore during 2001-02 and 2002-03, respectively. Of this, major consumption was recorded for two major commercial crops, i.e., cotton and chillies (Crop Life India, 2005). Pesticide consumption is on the decline in cotton with introduction of Bt cotton, but this is not so in chilli. Dry chilli exports from Guntur market were rejected in several instances because

of pesticide residues. Hence, this study was undertaken in Guntur District.

An Integrated Pest Management (IPM) programme was implemented in Guntur District during the cropping season 2006-07 in six villages, viz., Mandapadu, Visadala, Bandarupalli, G.G. Palem, Ravipadu and Gogulamudi. The project was supported by Crop Life India (CLI). The project was initiated with a special objective of educating chilli farmers in selected villages on the rational use of crop protection chemicals through integrated pest management approach, thereby mitigating the problem of pesticide residues in harvested produce. With this background, the present study was conducted during September 2007 (after completion of one season) with an objective of gauging the extent of adoption of IPM practices by participating farmers in the project.

Study-area and sampling

Guntur, in Andhra Pradesh, is a major chilli growing district with an area of 56,000 ha and production of 2,74,000 tonnes in this crop (Table 2). The district accounts for 24% area and 37% production in the state. The six villages of Guntur District, viz., Mandapadu, Visadala, Bandarupalli, G.G. Palem, Ravipadu and Gogulamudi (where project activities carried out) were purposefully selected (Table 1). Twenty five practitioners of IPM in the project were selected from each village, adding up to a total of 150 farmers.

Table 1. Sample villages and respective *mandals* in Guntur district

S. No	*Mandal*	Name of the village	Sample size
1	Medikonduru	Mandapadu	25
2	Medikonduru	Visadala	25
3	Tadikonda	Bandarupalli	25
4	Pedanandipadu	G.G. Palem	25
5	Pedanandipadu	Ravipadu	25
6	Pedanandipadu	Gogulamudi	25

Note: Twenty five farmers from each village were interacted with.

Table 2. District-wise area and productivity of chillies in Andhra Pradesh

S.No.	District	Area (ha)	Productivity (kg/ha)
1	Guntur	56000	4900
2	Prakasam	20000	1789
3	Kurnool	17000	2030
4	Mahaboobnagar	10000	1977
5	Nalgonda	10000	1929
6	Warangal	27000	2665
7	Khammam	31000	4115
8	Karimnagar	10000	1505

Data collection and statistical analysis

A questionnaire was developed and translated into Telugu, to be used for collecting responses from project farmers. Data were collected from respondents by personal interview having drawn up an interview schedule. It was ensured that the questions in the schedule were unambiguous, direct, concise, complete and comprehensive. The respondents were contacted in person, mostly at a common meeting point in the village. Assistance of the local project-staff was availed to establish rapport with the respondents. Data collected for the study was tabulated, processed and analyzed using simple statistical tools of frequency and percentage.

Confirmation of results with the respondents

To gather a more realistic opinion, a select group of 20 respondents, representing six villages (along with the coordinators of the project), were invited to the RARS, Lam. They were presented with analyzed results and concurrence was obtained from the respondents.

I. Profile of respondents

Literacy status of respondents

Literacy status of the respondents studied showed that over half of the respondents were educated to the elementary level, while one-fourth had completed high school education. Illiterates constituted about 15% and the college-educated constituted about 25% of the total number of respondents (Table 3).

Area allocation for chilli by respondents

It can be inferred from Table 4 that respondents allotted about 50% of their total agricultural land-area to chilli crop. This shows that chilli constituted the major crop.

II. Adoption of Integrated Pest Management (IPM)

Important pests and diseases of chilli crop as perceived by respondents

Opinion of the respondents differed on important pests and diseases of chilli crop (Table 5). As for sucking pests, 56% respondent expressed mites to be a major problem, while the rest of them mentioned thrips. They expressed that severity of thrips was higher, though manageable; but, control of mites was difficult, compared to thrips. As regard fruit borers, a great majority (83.33%) felt that *Spodoptera*

Table 3. Literacy status of respondents

S.No.	Literacy status	% of respondents
1	Illiterate	15.00
2	Elementary school	55.00
3	High school	5.00
4	College	25.00
	Total	100.00

Table 4. Chilli growing area out of the total land-area owned by respondents

S. No.	Village	Total area (ha)	Area under chilli (ha)	% Area under Chilli
1	Bandarupalli	3.896	2.08	53.38
2	Mandapadu	4.160	2.64	63.46
3	Visadala	3.064	1.96	63.94
4	G.G. Palem	3.440	1.12	32.56
5	Ravipadu	2.176	0.88	40.44
6	Gogulamudi	2.016	0.64	31.75
	Average	3.164	1.58	49.94

Table 5. Important pests and diseases on chilli crop perceived as a problem by respondents

S. No.	Type of pest/disease	Pest/disease	% Respondents reporting it to be a problem
1	Sucking pests	Mites	56.00
		Thrips	44.00
2	Fruit borers	*Spodoptera exigua*	16.67
		Spodoptera litura	83.33
3	Diseases	Dieback	56.00
		Leaf spot	44.00

Table 6. Status of adoption of different IPM components

S. No.	IPM component	% Adoption	
		2005-06	2006-07
1	Pheromone trap	6.00	66.00
2	Bird perch	0	67.33
3	Border crop	0.67	82.00
4	Trap crop	0.67	88.00
5	Scouting	4.67	82.33
6	Bio-agents	17.67	46.00
7	Bio-control agents	10.67	77.33
8	Chemical spray	100.00	100.00
9	Mechanical control	12.67	82.33

litura was a major problem. With reference to diseases, 56% felt die-back to be the major problem, while the rest felt it was the leaf spot.

Status of adoption of various IPM components

From Table 6 it is observed that adoption of various IPM components in 2006-07 was very high compared to that in 2005-06. More than two thirds of respondents adopted all the components, with the exception of bioagents where the adoption was only 46%. In the case of border crops, trap crops, scouting techniques and mechanical control measures, a great majority (> 80%) of adoption was observed. All the farmers agreed that they could identify beneficial insects like lady bird beetle, spiders and *crysopa*. Regarding pheromone traps the respondents expressed that CLI staff facilitated procurement of traps through Department of Agriculture (DOA) subsidized schemes. It can be inferred that project farmers adopted IPM practices to a greater extent in 2006-07 compared to that in the previous season.

Sources of advice on crop-production issues

Prior to the project inception, farmer-to-farmer transfer was the major source of advice (55%), followed by dealers (27%) and Agricultural Officers (17%). In farmer-to-farmer case too, the farmer may have received the information from the dealer, possibility of this trend was agreed to by several farmers. It was evident from the response that all respondents followed 10-15 days pre-harvest interval of pesticide application as a measure to realize quality produce and better price.

Productivity of dry chillies

Productivity of dry chillies during the project period, i.e., 2006-07 (5408 kg/ha) was slightly higher compared to that in 2005-06 (5153 kg/ha). Increase in productivity of was not considerable. However, considering that 2005-06 was a very good year for chilli crop, slight increment in productivity is also encouraging.

Storage of dry chillies

Regarding storage and post-harvest problems all the farmers cold-stored either part of the produce or the whole, as per their individual requirement and the prevailing price. All the respondents expressed that dry chilli could be safely cold-stored for two to three years. Problems of post-harvest pests and diseases were not encountered. But, whenever the produce was stored without adequate drying, rotting of produce was seen to occur. The cost of cold-storage was collected at a fixed price i.e., Rs 84/- (eighty four rupees) per tikky (thirty five kg) per season.

Issue of sustainability

During discussions, the following positive aspects on the need for sustenance of the project were brought forth:

- In one of the project villages, farmers have been purchasing trap crop (marigold) seedlings @ 2/- per seedling. This demonstrates the confidence of the farmer in a particular practice that will potentially

continue even after the project is withdrawn.

- In one of the villages farmers negotiated an agreement with a major export company for exporting chilli. This would help them get a premium price for their produce.

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