

Dissemination of Pheromone trap technology for mass trapping of paddy Yellow Stem Borer in tribal belt of Tapi district in Gujarat

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A CASE STUDY

Introduction

In 1959 Karlson and Butenandt coined the term Pheromone, a chemical that is secreted into the external environment by an animal and that elicits a specific response in a receiving individual of the same species. Sex pheromone, a type of pheromones, released by one sex only triggers off a series of behaviour patterns in other sex of the same species and thus facilitates mating. The male insects respond to the odorous chemical released by the female. Pheromones have been successfully used in insect control. This is a behavioural method in which the insects positive anemotactic orientation is exploited in making it approach the trap laid. Population control is achieved by destruction of males within the pheromone baited trap.

The traditional use of insecticides continues to be practiced in the control of insect population; the newer methods such as the application of pheromones in the crop protection have gained prominence in the recent years. Since the pheromone have to be made available synthetically for the application in field, there synthesis has attracted considerable attention and played a vital role in their overall development in the integrated pest management. In the present era of organic farming, exclusive dependence on chemical pesticides is not likely to provide sustained solution to all our pest problems. Therefore, safer and effective alternatives to chemical control are needed as a part of interdisciplinary approach to insect pest management, resulting in emergence of new concept *i.e.*, **Integrated Pesticidal Management (IPM)** and pheromone trap is one of the effective components of IPM.

Intervention

The paddy crop is mainly grown in *kharif* as well as in summer season in Tapi districts of south Gujarat. Of the twenty insect pests recorded as major ones, five pests are of national significance. Among these, rice stem borers have been mainly responsible for keeping the crop under stress over the years and across rice ecosystems in Gujarat and also throughout the country. During PRA survey of adopted villages, it was found that, to manage *S. incertulas*, farmers usually opt chemical pesticide as a first line of defense. The massive overuse and frequent misuses of synthetic organic insecticides has led to problems of 3R's viz; Resistance, Resurgence and Residues as well as toxicity hazards to man, plants, domestic animals and wildlife resulting in environmental degradation (Dhaliwal and Arora, 1990). This is often beyond the capacity of the poor farmers. The biological control through natural enemies is an ideal method but it is yet not popular among the farmers and not easily applicable. Moreover, this pest is an internal feeder and so it is not much affected by insecticides. Under these circumstances, Krishi Vigyan Kendra, Vyara has been made an effort to disseminate pheromone trap technology through various extension activities in different villages of Tapi district.

Subsequently, **District Rural Development Agency (DRDA) Mission Mangalam**, Tapi district also planned one project entitled '**MARU KHETAR KARE SAT VAKHAT VAVETAR**'. Accordingly, in collaboration with DRDA we have planned to disseminate pheromone trap technology by giving technical guidance to paddy growing farmers of Tapi district. DRDA selected five villages from five blocks. Thirty farm women were selected from each village. By this way, total 150 farm women were selected from five blocks (Table 1). On and off campus training were also planned in collaboration with DRDA. Six funnel type pheromone traps with 18 *Scirpolures* were distributed to each farm women at free of cost. The total costing of pheromone trap with lures was Rs. 46,800/-.

Subject Matter Specialist (Plant Protection) gave technical guidance through training programmes (on/off) to increase awareness about "**Pheromone trap technology**" among farmers. During training programmes, he mainly emphasized on '**Pesticide Residues**' in different crops due to pesticide load and guide farmers about the different component of IPM viz., cultural practices, mechanical and physical practices; use of botanical pesticides, biological agents and lastly use of chemical pesticides. Consequently, method demonstration was also carried out for operation and installation of pheromone traps during training. Constant follow up visits, farmers meeting, visit to demonstrated plot and other extension activities have been concentrated. Initially, farmers were hesitating in adopting this technology but with constant encouragement, KVK scientists are successful in building up confidence

in them. SMS (Plant Protection) also guide farmers about the identification of insect pests of paddy, their bioagents, and also the life stages of both.

Table 1: Details of dissemination of pheromone traps in different villages of Tapi district in collaboration with DRDA

Sl. no.	Name of Block	Name of village	Total beneficiaries	No. of Pheromone traps distributed /beneficiary	Total no. of traps distributed	No. of <i>Scirpolure</i> distributed /beneficiary	Total no. of <i>Scirpolure</i> distributed
1	Valod	Ambach	30	6	180	18	540
2	Vyara	Raygadh	30	6	180	18	540
3	Songadh	Ukhalda	30	6	180	18	540
4	Ucchhal	Karod	30	6	180	18	540
5	Nizer	Toranda	30	6	180	18	540
Total			150		900		2700

Output: By adopting pheromone trap technology, grain yield of paddy was obtained higher in demonstrated field (40.4 Q/ha) than local check (36.88 Q/ha) (8.58 per cent increase in yield was obtained than local check) [Table 2].

Outcome: It was concluded that use of pheromone trap is an IPM component which attract maximum number of male moth of *Scirpophaga incertulas* and thereby less damage was observed in field. So, pheromone trap technology can be used as an alternative method to health hazardous chemical pesticides.

Table 2: Performance of pheromone trap technology

Sl. no	Name of Block	Name of village	Yellow stem borer infestation				Yield (Q/ha)		% Increase in yield
			% Dead Heart		% White earhead		Demo. Field	Local check	
			Demo. Field	Local check	Demo. Field	Local check			
1	Valod	Ambach	6.4	9.6	5.8	8.7	42.5	39.4	7.87
2	Vyara	Raygadh	5.8	9.0	6.0	9.4	40.3	36.8	9.51
3	Songadh	Ukhalda	4.5	8.5	5.2	7.9	38.5	35.8	7.54
4	Ucchhal	Karod	6.0	8.8	5.8	9.0	40.5	37.4	8.29
5	Nizer	Toranda	5.5	8.3	6.2	9.5	38.4	35.0	9.71
Average							40.04	36.88	8.58

Impact: By the principle '*Seeing is Believing*', other neighbouring farmers visited to demonstrated field. They also see the effectiveness of this technology and made enquiry about the pheromone traps and also its source of availability. The farmers from neighbouring villages were also attracted and associated with the KVK for adopting pheromone trap technology.

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On campus training on IPM in paddy



Off Campus Training



Method demonstration of installation of pheromone traps during off campus training



Distribution of pheromone traps during off campus training



General view of demonstrated field with farmer