



Research Article

ASSESSMENT OF PHEROMONE BASE IPM MODULE AGAINST YELLOW STEM BORER, *Scirpophaga incertulas* WALKER IN PADDY CROP

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Abstract- Assessment of integrated pest management (IPM) modules against yellow stem borer (*Scirpophaga incertulas* Walker) in paddy cv. Rajendra Bhagawati was carried out at ten farmer's field in Manjhi block, Saran district, Bihar in Kharif 2014 and 2015. Two IPM modules (M₁ and M₂) were conducted and compared with farmer practice. Components of module-1 were summer ploughing, timely transplanting, recommended dose of fertilizer (100N:60P:40K), spacing (20 cm x 10 cm), use of pheromone traps @ 20 traps/ha and module-2 summer ploughing, timely transplanting, recommended dose of fertilizer (100N:60P:40K) and spacing (20 cm x 10 cm), pheromone traps @ 20 traps/ha and single dose of cartap hydrochloride 4G (750g a.i./ha) at economic threshold level showed their superiority over farmer practices. The Mean IPM modules-1 and 2 resulted increased grain yield 34.05 q/ha and 36.37 q/ha respectively over farmers practices i.e. 23.48 q/ha. The result also proved that benefit cost ratio of tested M₁ and M₂ over farmer's practice i.e., 1.04, 1.06 and 0.98, respectively.

Keywords- Pheromone, IPM, *Scirpophaga incertulas*, Paddy

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Introduction

Yellow stem borer (YSB), *Scirpophaga incertulas* (Walker) is a monophagous pest and considered as the major rice pest of either deep/semi deep or irrigated ecosystem [1] the indiscriminate use of insecticides in may times is only application with occurrence of active stage of the pests. In recent years, mass trapping of YSB male moths by using sex pheromones is becoming an important component of integrated pest management due to its eco-friendly nature [2]. Keeping these in mind, an attempt was made to evaluate the assessment of pheromone based IPM module against this serious pest to improve the productivity of paddy crop in Saran District, Bihar.

Materials and Methods

The field experiments were carried out in randomized block design with ten replications at Nandpur Village Manjhi block, Saran district, Bihar. The two pheromone based IPM module (M₁ and M₂) were evaluated as compared to farmer's practices on farmer's field of paddy crop variety Rajendra Bhagawati during kharif 2014 and 2015. Twenty five days old seedlings were transplanted on 2000 sqm area for each IPM module and farmer's practice. Under the module-1 (M₁) different components were used viz., summer ploughing, timely transplanting, recommended dose of fertilizer (100N:60P:40K), spacing (20 cm x 10 cm), use of pheromone traps @ 20 traps/ha and module-2 (M₂) all component of M₁ and single dose of cartap hydrochloride 4 G (750g a.i./ha) at economic threshold level were scheduled. Under farmer's practice, the plot had neither applied pesticides nor adopted any other protection measures to control the infestations. Observations of YSB incidence as dead hearts (DH) and white ear heads (WEH) were taken from 20 randomly selected hills in each block at weekly intervals after

the installation of pheromone traps (20 days after transplanting). Yield data was also recorded after crop harvest in both the fields and compared with each others.

Results and Discussion

The silent findings of impact of pheromone based IPM module as compared to farmer's practice [Table-1 and 2]. The mean populations of YSB male moths trapped by pheromone traps ranged between 0.60-19.80 male moths in module-1 and 0.40-15.80 male in module-2 per trap per week in 2014 and 1.00-20.80 male in module-1 and 0.20-17.80 male in module-2, respectively. Maximum number of male moth 19.80 in M₁ and 15.80 moths in M₂ attract by pheromone at 39 and 38 standard weeks respectively during 2014. Similarly, 20.80 male moths in M₁ and 17.80 male moths in M₂ attract by pheromone at 39 and 38 standard weeks respectively during 2015. The incidence of YSB at the vegetative stage ranged from 1.40% to 6.80% DH in IPM module-1 and 0.80 to 5.60% in module-2 during 2014 and 1.80% to 8.80% DH in M₁ and 1.20% to 6.60% DH in M₂ during 2015 as compared to farmer's practice range from 1.80% to 11.00% and 2.80% to 13.00%, respectively in 2014 and 2015. However, during the maturity stage, the damage range between 1.80% to 4.00% in M₁ and 1.40 to 3.20% in M₂ in 2014 and 3.00% to 3.80% in M₁ and 2.20% to 3.00% in M₂ with compared to non IPM (farmer's practice) range from 2.40% to 9.20% in 2014 and 5.40% to 9.40% in 2015 were observed white ear head [Table-1]. The yield data indicated that the validated modules gave increase 34.56 q/ha (M₁) and 36.93 q/ha (M₂) in 2014 and 33.54 q/ha (M₁) and 35.80 q/ha (M₂) in 2015 over farmer's practice 24.30 q/ha and 22.65 q/ha, respectively during 2014 and 2015 [Table-2]. The result revealed the IPM module II not only increased the rice grain yield but also gave high net return with 1.11 and 1.02 benefit cost ratio over farmers' practices 1.03

Table-1 Effect of pheromone based IPM modules on yellow stem borer on paddy during 2014 and 2015

Standard weeks	Population of male moth (No./trap)						Percent damage /hill DH/WEH								
	IPM module I			IPM module II			Farmers practice			IPM module I			IPM module II		
	2014	2015	Mean	2014	2015	Mean	2014	2015	Mean	2014	2015	Mean	2014	2015	Mean
31	0.60	1.00	0.80	0.40	0.20	0.30	1.80	2.80	2.30	1.40	1.80	1.60	0.80	1.20	1.00
32	1.60	1.80	1.70	1.20	1.00	1.10	2.00	3.00	2.50	1.80	2.00	1.90	1.40	2.00	1.70
33	2.40	2.80	2.60	1.80	2.40	2.10	3.40	4.00	3.70	2.40	2.40	2.40	1.80	2.20	2.00
34	4.40	4.80	4.60	3.60	4.00	3.80	5.20	5.40	5.30	3.80	4.40	4.10	3.00	2.80	2.90
35	7.60	8.60	8.10	5.00	5.40	5.20	6.00	6.80	6.40	5.00	5.80	5.40	4.00	4.00	4.00
36	10.40	11.60	11.00	7.00	8.40	7.70	9.20	10.20	9.70	5.60	7.00	6.30	2.80	4.60	3.70
37	11.00	12.40	11.70	10.20	10.40	10.30	10.80	13.60	12.20	6.80	8.80	7.80	5.60	6.60	6.10
38	17.40	19.00	18.20	15.80	17.80	16.80	11.00	13.00	12.00	4.40	5.40	4.90	3.80	4.60	4.20
39	19.80	20.80	20.30	14.00	15.40	14.70	(2.40)	(9.40)	(5.90)	(1.80)	(3.80)	(2.80)	(1.40)	(2.20)	(1.80)
40	9.20	14.40	11.80	7.40	9.00	8.20	(3.20)	(8.60)	(5.90)	(2.20)	(3.80)	(3.00)	(1.80)	(2.20)	(2.00)
41	7.80	9.20	8.50	4.80	4.80	4.80	(6.40)	(8.60)	(7.50)	(3.20)	(3.60)	(3.40)	(2.60)	(3.00)	(2.80)
42	5.20	7.00	6.10	3.20	3.80	3.50	(5.20)	(6.00)	(5.60)	(3.60)	(3.20)	(3.40)	(2.80)	(2.80)	(2.80)
43	4.20	5.00	4.60	1.60	2.20	1.90	(9.20)	(5.40)	(7.30)	(4.00)	(3.00)	(3.50)	(3.20)	(2.60)	(2.90)

Values within parentheses are white ear head (WEH) and mean population of male moths/trap of 10 replications.

Table- 2 Effect of pheromone based IPM module on paddy grain yield

Treatments	Yield (q/ha)			Gross return (Rs./ha)			Cost of cultivation(Rs./ha)			Net return(Rs./ha)			Benefit: Cost ratio		
	2014	2015	Mean	2014	2015	Mean	2014	2015	Mean	2014	2015	Mean	2014	2015	Mean
Farmers practice	24.3	22.65	23.48	34020	36543	35281.50	16758	18852	17805.00	17262	17691	17476.50	1.03	0.93	0.98
IPM module I	34.56	33.54	34.05	43200	52433	47816.50	22558	26053	24305.50	24442	26380	25411.00	1.08	1.01	1.045
IPM module II	36.93	35.8	36.37	46163	56060	51111.50	23658	27740	25699.00	26405	28320	27362.50	1.11	1.02	1.065

Grain sale @ ₹1250/q in 2014 and ₹1450 in 2015 and by product @ Rs. 400/1000 bandal both year.

and 0.93 during 2014 and 2015 respectively. This is due to combined effects of IPM module-2 in reducing the YSB infestation as well as yield losses. These results are in conformity with [3-5], which reported that the IPM module involving installation of pheromone traps @ 20/ha reduced the YSB infestation significantly as well as increased the grain yield in rice field.

Conclusion

The result concluded that pheromone based IPM module for YSB management in rice on farmer's field is relevant with feasibility not due to low infestation and high grain yield but also due to high net return with better BC ratio.

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Conflict of Interest: None declared

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