



## Bio-efficacy of Combination Formulation of Chlorantraniliprole+Thiamethoxam (SYN 15645 40 WG) Against Yellow stem borer, (*Scirpophaga incertulas* (Walker)) on Paddy

R Sunitha Devi and A Venkat Reddy

Regional Agricultural Research Station, Warangal – 506 007, Andhra Pradesh

### ABSTRACT

Four insecticides including new combination formulation of chlorantraniliprole + thiamethoxam (SYN 15645 40 WG), chlorantraniliprole, thiamethoxam and chlorpyrifos were evaluated in the field against yellow stem borer of rice during *kharif*, 2007 and *rabi*, 2008. Among the insecticide treatments, chlorantraniliprole + thiamethoxam (SYN 15645 40 WG) @ 50 and 60 g *a.i./ha*, new combination formulation proved significantly effective as compared to other insecticides resulting in 79.95, 85.89, 86.64 and 80.26% reduction of dead hearts over control, respectively during *kharif*, 2007 and *rabi*, 2008. Significantly lower Per cent white earheads were recorded in the treatments of chlorantraniliprole + thiamethoxam (SYN 15645 40 WG) @ 50 and 60 g *a.i./ha* with a per cent reduction of 95.48, 86.17, 75.89, and 80.24 over control, respectively during both seasons. The yield increase effect of the combination formulation at @ 50 and 60 g *a.i./ha* to the rice was also recorded and the yield was more than that of the individual treatments of two insecticides and the standard insecticide.

**Key words :** Chlorantraniliprole, Dead heart, Paddy, Thiamethoxam, White earheads, Yellow stem borer, Yield.

Paddy is mainly a tropical and subtropical crop grown in almost all states in India. The climate which is congenial for rice crop is also congenial for growth and multiplication of insect pests. More than 100 insects, have been reported to attack rice crop, among which 10-12 pose an economic threat to rice cultivation. Rice stem borers occupy the major status as pest and cause considerable damage to the rice cultivation in almost in all the seasons throughout the rice growing stages. Eight species of stem borers of rice are known to be significant important in Asia (Hattori, 1971). Among these stem borers, the yellow stem borer (YSB), (*Scirpophaga incertulas* (Walker)) has been found to be the predominant. It causes dead hearts at active tillering stage and white ears at harvest stage, which can sometimes lead to complete failure of the crop (Karthekyan and Purushothaman, 2000). Though rice compensates dead hearts infestation upto 10 percent, but cannot compensate for white ear loss.

Application of insecticides is the most commonly used measure for reducing pest population and sometimes the only practical solution to sudden outbreak of insect pests. But, the plant protection drive through age-old insecticides has not kept pace with the production potential of rice for which the growers at times suffer huge losses.

Under such circumstances, newer formulation of insecticides with selectivity needs to be evaluated for justification of chemical control as first line of defense.

The utility of newer molecules in rice stem borer management has been earlier elucidated by Suresh and Balasubramanian (2001) and Hugar *et al.*, (2009). The present study was conducted to evaluate the bio-efficacy of the combination formulation of chlorantraniliprole + thiamethoxam (SYN 15645 40WG) against rice stem borer (*S. incertulas*) on paddy.

### MATERIAL AND METHODS

A field trial was carried out at Regional Agricultural Research Station, Warangal, Andhra Pradesh, to evaluate new insecticides against yellow stem borer in rice. The variety selected was BPT-5204 during *kharif*, 2007 and Erramallellu during *rabi*, 2008. The experiment was laid out in a Randomized block design with eight treatments and 3 replications. The plot size was 25 sq. m with a spacing of 20 x 15 cm. Insecticides were sprayed when sufficient pest load was noticed with a hand compressor sprayer using 500 litres of spray fluid/ha. Observations were recorded on the total tillers and dead hearts in the vegetative stage and total ear heads and white ears (before harvest) in ten

Table 1. Bio-efficacy of chlorantraniliprole + thiamethoxam (SYN 15645 40 WG) against yellow stem borer in paddy during *kharif*, 2007

Treat. No.	Treatment	Dose (g a.i./ha)	% dead hearts		% reduction of dead hearts over control	% White earheads at harvest	% reduction of White earheads over control	Yield (t ha <sup>-1</sup> )	% increase of yield over control
			Pre Treatment	10 days after spray					
1	Chlorantraniliprole + Thiamethoxam (SYN 15645 40 WG)	40	7.84 (2.97)	7.87 <sup>cd</sup> (2.98)	11.87	8.38 <sup>c</sup> (3.06)	23.75	4.00 <sup>c</sup>	4.44
2	Chlorantraniliprole + Thiamethoxam(SYN 15645 40 WG)	50	5.25 (2.47)	1.79 <sup>a</sup> (1.67)	79.95	1.26 <sup>a</sup> (1.45)	95.48	5.29 <sup>a</sup>	38.12
3	Chlorantraniliprole + Thiamethoxam(SYN 15645 40 WG)	60	7.16 (2.8)	1.26 <sup>a</sup> (1.50)	85.89	1.52 <sup>a</sup> (1.45)	86.17	5.15 <sup>a</sup>	34.46
4	Chlorantraniliprole 25 SC	20	5.61 (2.43)	6.11 <sup>c</sup> (2.65)	35.58	7.83 <sup>c</sup> (2.96)	28.75	4.06 <sup>c</sup>	6.00
5	Chlorantraniliprole 25 SC	30	4.41 (2.25)	4.08 <sup>b</sup> (2.25)	54.31	4.85 <sup>b</sup> (2.42)	55.87	4.49 <sup>b</sup>	17.23
6	Thiamethoxam 25 WG	25	4.08 (2.23)	6.21 <sup>c</sup> (2.65)	30.45	6.56 <sup>bc</sup> (2.75)	40.31	4.32 <sup>b</sup>	12.79
7	Chlorpyrifos 20 EC	500		4.07 <sup>b</sup> (2.25)	54.42	4.27 <sup>b</sup> (2.29)	61.15	4.60 <sup>b</sup>	20.10
8	Untreated control	-		8.93 <sup>d</sup> (3.15)	-	10.99 <sup>c</sup> (3.46)	-	3.83 <sup>c</sup>	-
	F test			Sig.		Sig.		Sig.	
	C.D			0.38		0.65		0.51	
	C.V (%)			8.75		14.50		6.65	

- Figures in parenthesis are angular transformed values
- Means followed by a common letter in a column are not significantly different from each other by LSD

randomly selected plants per plot leaving the border rows at 1 day before spray and 10 days after spraying during both *kharif* and *rabi* seasons. Grain yield was also recorded from net plot area of each replication after harvest of the crop.

#### Analytical techniques

Analysis of variance was carried out by randomized block design using OPSTAT for the angular transformed values of the data. The mean values of treatments were compared using Duncan's Multiple Range Test (DMRT) (Gomez and Gomez, 1984).

#### RESULTS AND DISCUSSION

The results of studies on the efficacy of new combination formulation of chlorantraniliprole + thiamethoxam (SYN 15645 40 WG) against yellow stem borer in rice are presented in Table 1 and 2.

Data recorded on the stem borer damage before spraying (pre-treatment) showed that there was no significant difference in the infestation level of stem borer indicating uniform distribution of the pest. Post-treatment counts of dead hearts and white earheads revealed that significant differences were observed among the insecticide treatments and untreated control.

During both *kharif*, 2007 and *rabi*, 2008 the per cent dead hearts was significantly low in all the insecticidal treatments as compared to control.

Table 2. Bio-efficacy of chlorantraniliprole + thiamethoxam (SYN 15645 40 WG) against yellow stem borer in paddy during *rabi*, 2008

Treat. No.	Treatment	Dose (g a.i./ha)	% dead hearts		% reduction of dead hearts over control	% White earheads at harvest	% reduction of White earheads over control	Yield (t ha <sup>-1</sup> )	% increase of yield over control
			Pre Treatment	10 days after spray					
1	Chlorantraniliprole + Thiamethoxam (SYN 15645 40 WG)	40	10.66 (3.41)	8.63 <sup>cd</sup> (3.10)	15.22	8.45 <sup>c</sup> (3.07)	8.25	3.41 <sup>bc</sup>	4.20
2	Chlorantraniliprole + Thiamethoxam (SYN 15645 40 WG)	50	10.17 (3.33)	1.36 <sup>a</sup> (1.51)	86.64	2.22 <sup>a</sup> (1.79)	75.89	4.81 <sup>a</sup>	47.09
3	Chlorantraniliprole + Thiamethoxam (SYN 15645 40 WG)	60	8.50 (3.08)	2.01 <sup>a</sup> (1.72)	80.26	1.82 <sup>a</sup> (1.67)	80.24	4.90 <sup>a</sup>	49.85
4	Chlorantraniliprole 25 SC	20	8.22 (3.03)	5.46 <sup>b</sup> (2.53)	46.36	6.04 <sup>b</sup> (2.64)	34.42	3.94 <sup>b</sup>	20.49
5	Chlorantraniliprole 25 SC	30	8.55 (3.08)	5.37 <sup>b</sup> (2.51)	47.24	5.31 <sup>b</sup> (2.51)	42.35	4.07 <sup>b</sup>	24.46
6	Thiamethoxam 25 WG	25	10.57 (3.40)	7.29 <sup>c</sup> (2.88)	28.39	4.82 <sup>b</sup> (2.39)	47.66	3.87 <sup>b</sup>	18.35
7	Chlorpyrifos 20 EC	500	9.70 (3.29)	4.94 <sup>b</sup> (2.43)	51.47	5.66 <sup>b</sup> (2.58)	38.55	4.00 <sup>b</sup>	22.32
8	Untreated control	-	11.13 (3.48)	10.18 <sup>d</sup> (3.34)	-	9.21 <sup>c</sup> (3.19)	-	3.27 <sup>c</sup>	-
	F test		NS	Sig.		Sig.		S	
	C.D		-	0.40		0.41		0.71	
	C.V (%)		6.25	8.97		9.39		9.82	

- Figures in parenthesis are angular transformed values
- Means followed by a common letter in a column are not significantly different from each other by LSD

Among the insecticide treatments, chlorantraniliprole + thiamethoxam (SYN 15645 40 WG) @ 50 and 60 g a.i./ha, new combination formulation proved significantly effective as compared to other insecticides resulting in 79.95 and 85.89% reduction of dead hearts over control followed by chlorpyrifos 20 SC @ 500 g a.i./ha and chlorantraniliprole 25 SC @ 30 g a.i./ha with 54.42 and 54.31% reduction of dead hearts, respectively during *kharif*, 2007. During *rabi* 2008, chlorantraniliprole + thiamethoxam (SYN 15645 40 WG) @ 50 and 60 g a.i./ha registered significantly lowest per cent dead hearts as compared to other insecticides resulting in 86.64 and 80.26% reduction over control, respectively.

Same trend was seen in the observations recorded for white ear heads before harvest, chlorantraniliprole + thiamethoxam (SYN 15645 40 WG) @ 50 and 60 g a.i./ha, recorded significantly

lowest per cent white earheads as compared to other insecticides resulting in 95.48, 86.17, 75.89, and 80.24% reduction over control, respectively during both seasons. Next best chemical was chlorpyrifos 20 SC @ 500 g a.i./ha which resulted 61.15 and 38.55 per cent reduction of white earheads over control followed by chlorantraniliprole 25 SC @ 30 g a.i./ha with 55.85 and 42.35 per cent reduction over control and were at par with each other. Lowest per cent reduction of white earheads was noticed in chlorantraniliprole + thiamethoxam (SYN 15645 40 WG) at lower dose of 40 g a.i./ha (23.75 and 8.25%) during both the seasons and was at par with untreated control.

The yield increase effect of the combination formulation, chlorantraniliprole + thiamethoxam (SYN 15645 40 WG) at @ 50 and 60 g a.i./ha to the rice was also recorded and the yield was more

than that of the individual treatments of two insecticides and the standard insecticide. Chlorantraniliprole + thiamethoxam (SYN 15645 40 WG) @ 50 and 60 g *a.i./ha* recorded significantly highest grain yield of 5.29, 4.81, 5.15, and 4.90 t  $ha^{-1}$ , respectively during *kharif* and *rabi* seasons and were at par with each other followed by chlorpyrifos 20 SC @ 500 g *a.i. ha*<sup>-1</sup> (4.60 and 4.00 t  $ha^{-1}$ ) which was on par with chlorantraniliprole 25 SC @ 30 g *a.i. ha*<sup>-1</sup> (4.49 and 4.07 t  $ha^{-1}$ ) and thiamethoxam 25 WG @ 25 g *a.i. ha*<sup>-1</sup> (4.32 and 3.87 t  $ha^{-1}$ ), respectively. The lowest yield was recorded with chlorantraniliprole + thiamethoxam (SYN 15645 40 WG) at lower dose of 40 g *a.i. ha*<sup>-1</sup> (4.0 and 3.41 t  $ha^{-1}$ ) and was at par with untreated control (3.83 and 3.27 t  $ha^{-1}$ ). In the similar lines, Tang Tao *et al.*, (2010) reported that 40% chlorantraniliprole+thiamethoxam WG showed perfect control and excellent persistent effect of two rice stem borers could be achieved with this insecticide. Zhang Wu-jun *et al.*, (2009) reported that chlorantraniliprole 18.5% was effective in suppressing *chilo suppressalis*. Thus, it may be concluded that the new combination formulation of chlorantraniliprole+ thiamethoxam (SYN 15645 40 WG) @ 50 and 60 g *a.i. ha*<sup>-1</sup> was the most effective insecticide in controlling the yellow stem borer of rice and followed by chlorpyrifos 20 SC @ 500 g *a.i. ha*<sup>-1</sup> and chlorantraniliprole 25 SC @ 30 g *a.i. ha*<sup>-1</sup> among the other insecticides tested.

#### LITERATURE CITED

- Gomez K A and Gomez A A 1984** Statistical procedure for agricultural research (2<sup>nd</sup> Edn.). A Wiley Interscience Publication, John wiley and sons, Singapore.pp.302-307.
- Hattori I 1971** Stem borer of gaminaceous crops in South-East Asia. In Proceedings of the Symposium on Rice insects. *Tropical Agriculture Research Centre. Japan Minist. Agriculture Forest*, Tokyo pp: 143-153.
- Hugar S V, Mohan I N and Manjunatha M 2009** Evaluation of new molecules for the management of *Scirpophagha incertulas* (Walker) in aerobic rice. *Karnataka Journal of Agricultural Sciences*, 22 (4) : 911-913.
- Karthekayan K and Purushothaman S M 2000** Efficacy of Carbosulfan against rice yellow stem borer, *Scirpophagha incertulas* (Walker) in *rabi* rice. *Indian Journal of Plant Protection*, 28 (2): 212-214.
- Suresh S and Balasubramanian G 2001** Granular insecticide against Rice Pests. Paper presented in the National Symposium on Emerging Trends in Pests and Diseases and their Management" held at TNAU, Coimbatore pp. 18.
- Tang Tao, Peng Mengjun, Li Zhongliang, Liu Xueyuan, Liu Ducai, Wei Changgui 2010** Impacts of Insecticide-spraying Instrument, Usage Volume of Water and Adjuvant: Control Efficacies of Chlorantraniliprole + Thiamethoxam against Rice Stem Borers. *Chinese Agricultural Science Bulletin*, 13: 355-338.
- Zhang Wu-jun, Zhang Hui, Zhang Wei, Wang Chao-bin, NIE Guo and Zhang Yong-yang 2009** Effect of Chlorantraniliprole 18.5% SC against *Chilo suppressalis* Walker. *Agro chemicals*, 3: 230-232.

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