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EFFECT OF INSECTICIDES ON PARASITISM OF EGG PARASITOIDS OF THE RICE YELLOW STEM BORER

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ABSTRACT

Effect of insecticides on parasitism of egg parasitoids of the rice yellow stem borer. The research was carried out in the wet season of 2014 at Subang district of West Java, Indonesia. The selected insecticides of chlorantranilprole + thiamethoxam, pymetrozine, emamectin benzoate and deltamethrin were sprayed on the rice plots at 20 and 35 days after transplanted. Observation to parasitism of egg parasitoids of yellow stem borer (YSB) by YSB eggs trap method at 1 and 3 days after each application. The result showed that insecticides chlorantranilprole + thiamethoxam un-affected to parasitism of *Trichogramma japonicum* and *Telenomus* sp. (*T. dingus* + *T. rowani*), but little bit affected to *Tetrastichus schoenobii*. Insecticides pymetrozine and deltamethrin un-affected to parasitism of *T. schoenobii*, but little bit affected to *T. japonicum* dan *Telenomus* sp.. In the other hand insecticide emamectin benzoate un-affected to all parasitism of *T. schoenobii*, *T. japonicum* and *Telenomus* sp. In general the parasitism performance of all egg parasitoids of YSB was 91.7% un-affected by chlorantranilprole + thiamethoxam, and parasitism un-affected was 83.3% by pymetrozine and deltamethrin. The safety insecticide as well as control treatment un-affected to parasitism of all parasitoids was 100% by Emamectin benzoate. In the YSB control tactics as strategy in IPM programmes, the first safety insecticides compatibility to all egg parasitoids were emamectin benzoate and then chlorantranilprole + thiamethoxam. In the third level were pymetrozine and deltamethrin with performance higher effect to parasitism of YSB egg parasitoids, but is still safety insecticides because compatibility to parasitoid more than 70%.

Keywords: rice, insecticides, yellow stem borer, egg parasitoids, parasitism.

1. INTRODUCTION

The rice stem borer pests included to lepidoptera order from Noctuidae dan Pyralidae families, are widely distributed throughout Asia, Amerika, dan Australia. In Indonesia have five common species of rice stem borers namely yellow stem borer *Scirpophaga* (*Tryporyza*) *incertulas* (Walker), white stem borer *Scirpophaga* (*Tryporyza*) *innotata* (Walker), rice striped borer *Chilo suppressalis* Walker, dark-headed stem borer *Chilo polychrysus* (Meyrick), and pink stem borer *Sesamia inferens* (Walker).

The yellow stem borer (YSB) is the most famous borer on rice always attacks almost along rice season with various levels from light up to very heavy damaged. In the 2012, Directorate of Plant Protection of Indonesia reported that rice damage in the year of 2011 reached 146, 315 ha; and 391 ha among of them were puso (rice panicle unfilled and dried). The focus of the damage occurred in West Java and Central Java reached 26.9% and 18.4% respectively of the total damage borer in Indonesia. In the 2012, YSB attacks occurred in West Java, especially in Karawang district an estimated 15,000 ha rice damaged (Baehaki, 2013). In the other hand rice damage by white stem borer is very rare, because after 50 years in silent period only once time out breaks it was in the wet season 1989/1990. This pest causing an explosion in the rice crop in the northern coastal of West Java of 65,040 ha, among of them 15,868 ha were puso. The yield losses of rice as much as 31.68 kg grain harvested/ha for every 1% increase of dead heart and the yield losses of 1% for every 1% increase in white head for short-lived rice varieties, while in the long-lived rice varieties the yield losses of 0.8% for each 1% increase of white head (Baehaki, 2013). The damage in the tillering or vegetative stage is caused by larvae borer into the stem of rice plants, which results in death of terminal shoot, known as "dead heart", and in reproductive stage is caused panicles drying with unfilled grains, called "white head".

The selection and pesticides application are fundamentally required to suppress the rice pest complexes by enhancement of natural enemy population in modern IPM practices. Suppression of YSB population is effectively possible by encouraging the promising egg parasitoids together with the limited application of the insecticides. In the cases of natural enemies as bio-control agents is very importance in the steady of Bio-Intensive Pest Management, especially egg parasitoids. The role of egg parasitoids *Tetrasticus schoenobii*, *Telenomus rowani*, *Telenomus dignus*, and *Trichogramma japonicum* as biological control are widely distribute in the rice field. *Trichogramma* can survive into a wide range of temperature and gave successful control of lepidopteran pests in many crops (Nadeem and Hamed, 2011).

Application of selective insecticides as pests control could be useful in conservation of natural enemies associated with crops. Some new insecticides are potentially more toxic to the target pest but not to natural enemies, can play significant role in conservation of biological control agents in agricultural environments. In some pest management systems, pesticides that have been used as selective shown harmful effects on beneficial species (Hill and Foster, 2000), but it is not fully clear, whether insecticides are harmful for other non-target organisms.

Both chemical and biological methods are essential for control of insects on rice. Thus, it is important to know the effect of chemicals on the biological control agents. More understanding of pest-natural enemy-insecticide interaction is needed to formulate more effective integrated pest management strategies (Preetha *et al*., 2010). It is also most essential to safety guard these potential parasitoids existing in the nature, from toxic effect of pesticides. The objective of this research to study undertaken impact of insecticides on parasitism of egg parasitoids of YSB in rice field as a basal knowledge to use in IPM program.

2. MATERIALS AND METHODS

The research was carried out in the wet season of 2014 at Subang district of West Java; Indonesia used randomized block design with 5 insecticides treatment and 4 replications. Insecticides treatment were chlorantranilprole + thiamethoxam 300SC (200&100g/l), pymetrozine 50WG (500g /kg), emamectin benzoate 5WG (50g/kg) and deltamethrin 25EC (25 g/l), and control without insecticide, with amount insecticides concentrate were 750, 1500, 1000, 1500 and 0 ppm respectively.
Ciherang rice variety seedlings of 21 days old were planted 2 tillers per hole at a spacing of 25 cm x 25 cm on 5 m x 8 m (= 40 m^2) plot size. The recommended dose as basal fertilizer of 40 kg N/ha (from urea) and 40kg P_2O_5 (from TSP) and then 80 kg N/ha (from urea) were applied in two equal split doses at 25 and 50 days after transplanting. The each liquid insecticides application was 200 l/ha or 0.8 l liquid/40m^2 were sprayed on rice plots at 20 and 35 days after transplanting. Observation to parasitism of egg parasitoids of YSB at 1 and 3 days after each insecticides application.

The YSB eggs trap method to know parasitism of eggs parasitoid of YSB in the rice filed was started by the first collected YSB adult directly capture from rice plantations or using light trap. Activity in the laboratory planted rice seedling in pots to form one hill. After the rice in the pots were 20 and 35 days old is cleaned and selected five healthy stems. YSB from rice field were brought to laboratory and then placed five female inside pot of rice crops, caged for oviposition over night.

In the morning all female of YSB removed from cages, because the borer is already laying eggs masses on leaf of rice. The eggs masses very clearly covered with hairs and scales derived from the anal tuft. Rice plant hills in pot that have eggs of YSB were brought to the field, and put at random four pot/plot for 3 days in other the eggs of YSB infested by the field egg parasitoids of YSB. After that time, the plant was taken to the laboratory. Cutting each leaf that have eggs masses, enter to test tube and covered by cotton. In one test tube for one eggs mass and one bunch of test tube for one hill sample.

Eggs parasitoids hatched after 7 days and after all parasitoids dead remove to the petridish and put under microscope binocular. In one egg mass usually content two or three species of YSB egg parasitoids and rare in one egg mass infested by one species of YSB egg parasitoids. Counted YSB larva, adult of *Tetrasticus schoenobii*, *Telenomus rowani*, *Telenomus dignus*, *Trichogramma japonicum* and any of unhatched eggs will be observed. Sometimes parasitoid unhatch or unfully hatch and the parasitoid remained in the YSB eggs. On any unhatched eggs of YSB, there are several possibilities of parasitoids present. To examine the present of remain parasitoids, first the egg masses were filled with 70% alcohol to break down the wax coating and feathers that cover the egg masses so can be separated by using a needle. Egg masses can be opened to counted unhatch eggs and parasitoids that is still in eggs mass. Parasitism can be calculated using the formula of Baehaki (1995):

$$\text{Parasitism of } \textit{Tetrastichus schoenobii} = \frac{3a}{3a + 0.5b + c + d + e + f} \times 100\%$$

$$\text{Parasitism of } \textit{Trichogramma japonicum} = \frac{0.5b}{3a + 0.5b + c + d + e + f} \times 100\%$$

$$\text{Parasitism of } \textit{Telenomus rowani} = \frac{c}{3a + 0.5b + c + d + e + f} \times 100\%$$

$$\text{Parasitism of } \textit{Telenomus dignus} = \frac{d}{3a + 0.5b + c + d + e + f} \times 100\%$$

Note: a = *Tetrastichus schoenobii* (hatch+ Unhatched), b = *Trichogramma japonicum* (hatch+ Unhatched), c = *Telenomus rowani* (hatch+ Unhatched), d = *Telenomus dignus* (hatch+ Unhatched), e. YSB larvae, f. Unhatched eggs YSB

All data were analyzed by analysis of variance (ANOVA) and differences in the value being tested by Duncan's Multiple Range Test = DMRT) in 5% least significance different (LSD) level.

3. RESULTS AND DISCUSSIONS

The egg parasitoids of YSB that captured by YSB eggs trap were *T. japonicum*, *T. dignus*, *T. rowani* and *T. schoenobii*. The number of *T. dingus* was smaller, so to calculate the number of parasitism occurred *T. dingus* and *T. rowani* is grouped as *Telenomus* sp.. At one day after application, almost egg masses was 56% infested by two species parasitoids and 38% was infested by three species, and only 6% infested by one species. At three days after application, common egg masses was 60% infested by three species parasitoids and 28% was infested by two species, and only 12% infested by one species. In the case numbers of egg masses infested by one parasitoid lonely, generally was 65% caused by *T. schoenobii*, while by the *T. japonicum* and *Telenomus* sp. only 22.2 and 11.1%.

Observation parasitism level at 1 day after first application (1 daa-1) of *T. japonicum*, and *T. schoenobii* on the control treatment reach 6.7 dan 1.7% respectively and insignificantly different with parasitism of eggs YSB on all insecticides treatment. Parasitism of *Telenomus sp* on control was 12.7% insignificantly different with insecticides chlorantranilprole + thiamethoxam, pymetrozine, and emamectin benzoate treatment, but significantly different and higher than insecticide treatment of deltamethrin. The total parasitism of three egg parasitoids on the control treatment was 21% and significantly different compared to eggs parasitism on all insecticides treatment. Parasitism on chlorantranilprole + thiamethoxam treated is low, but on deltamethrin is the lowest (Table-1).

Table-1. Effect of insecticides to parasitism of egg parasitoids of YSB in 1 day after first application

Treatments	**Dose** (ppm)	**Parasitism of egg parasitoids of YSB in 1 day after first application** (%)			
		Tricho	**Tele**	**Tetra**	**Total**
Chlorantranilprole + Thiamethoxam	750	3.7a	5.5ab	1.3a	10.5 cd
Pymetrozine	1500	6.5a	7.4ab	0.2a	14.1 bc
Emamectin benzoate	1000	6.1a	9.1ab	0a	15.1 b
Deltamethrin	1500	6.4a	2.5 b	1.0a	9.9 c
Untreated	-	6.7a	12.7a	1.7a	21.0a

Remarks: Mean values in each column followed by the same letter are not significantly different at the 5% level base on Duncan's Multiple Range Test = DMRT. Tricho =*T. japonicum*, Tele = *Telenomus* sp. (*T.dignus*+*T.rowani*, Tetra=*T. schoenobii*

Observation at 3 daa-1, the parasitism level of *T. japonicum* and *T. schoenobii* on control treatment reach 19.1 dan 4.1% respectively and insignificantly from all insecticides treatment. Parasitism level of *Telenomus* sp. on control treatment was 7.8% insignificantly different with insecticides treatment chlorantranilprole + thiamethoxam, deltamethrin and emamectin benzoate, but significantly different and higher than insecticide treatment of pymetrozine. The total parasitism of three egg parasitoids on control treatment was 31% and insignificantly different compared to all insecticides treatment, except for emamectin benzoate was the lowest parasitism (Table-2).

Table-2. Effect of insecticides to parasitism of egg parasitoids of YSB in 3 days after first application.

Treatments	**Dose** (ppm)	**Parasitism of egg parasitoids of YSB in 3 days after first application** (%)			
		Tricho	**Tele**	**Tetra**	**Total**
Chlorantranilprole + Thiamethoxam	750	17.2a	6.5ab	4.5a	28.2ab
Pymetrozine	1500	19.3a	3.2 b	3.3a	25.7ab
Emamectin benzoate	1000	12.7a	5.7ab	3.3a	21.6 b
Deltamethrin	1500	15.9a	10.0a	1.7a	27.5ab
Untreated	-	19.1a	7.8ab	4.1a	31.0a

Remarks: Mean values in each column followed by the same letter are not significantly different at the 5% level base on Duncan's Multiple Range Test = DMRT. Tricho =*T. japonicum*, Tele = *Telenomus* sp. (*T.dignus*+*T.rowani*, Tetra=*T. schoenobii*

Observation at 1 daa-2 the parasitism level of *T. japonicum*, *Telenomus* sp. and *T. schoenobii* on control treatment reach 1.8, 0.5 and 24.7% respectively and insignificantly different from all insecticides treatment. The total parasitism of three egg parasitoids on control was 27% and not significantly different compared to all insecticides treatment (Table-3).

Table-3. Effect of insecticides to parasitism of egg parasitoids of YSB in 1 day after second application.

Treatments	Dose (ppm)	Parasitism of egg parasitoids of YSB in 1 day after second application (%)			
		Tricho	Tele	Tetra	Total
Chlorantranilprole + Thiamethoxam	750	2.6a	1.0a	21.6a	25.2a
Pymetrozine	1500	3.0a	1.3a	19.2a	23.5a
Emamectin benzoate	1000	6.2a	0.8a	17.7a	24.8a
Deltamethrin	1500	2.0a	0.2a	21.9a	24.0a
Untreated	-	1.8a	0.5a	24.7a	27.0a

Remarks: Mean values in each column followed by the same letter are not significantly different at the 5% level base on Duncan's Multiple Range Test = DMRT. Tricho =*Trichogramma japonicum*, Tele = *Telenomus* (*T.dignus*+*T.rowani*), Tetra=*Tetrastichus schoenobii*

Observation at 3 daa-2, the parasitism level of *Telenomus* sp. on control was 4.7% insignificantly different from all insecticides treatment. Parasitism level of *T. japonicum* in the control treatment was 2.5% insignificantly different from chlorantranilprole + thiamethoxam and emamectin benzoate treatment, but significantly higher than pymetrozine and deltamethrin treatment. Parasitism level of *T. schoenobii* on the control treatment was 25.6% insignificantly different to all insecticides treatment except on chlorantranilprole + thiamethoxam. The total parasitism of three egg parasitoids on control treatment was 32.8% and insignificantly different compared to all insecticides treatment, except for pymetrozine was the lowest parasitism (Table-4).

Table-4. Effect of insecticides to parasitism of egg parasitoids of YSB in 3 days after second application.

Treatments	Dose (ppm)	Parasitism of egg parasitoids of YSB in 3 days after second application (%)			
		Tricho	Tele	Tetra	Total
Chlorantranilprole + Thiamethoxam	750	10.2a	5.1a	16.7 b	31.9ab
Pymetrozine	1500	0.9 b	0.4a	25.3a	26.7 b
Emamectin benzoate	1000	3.0ab	8.5a	18.8ab	30.3ab
Deltamethrin	1500	0.4 b	8.9a	22.0ab	31.3ab
Untreated	-	2.5ab	4.7a	25.6a	32.8a

Remarks: Mean values in each column followed by the same letter are not significantly different at the 5% level base on Duncan's Multiple Range Test = DMRT. Tricho =*Trichogramma japonicum*, Tele = *Telenomus* (*T.dignus*+*T.rowani*), Tetra=*Tetrastichus schoenobii*

Insecticides chlorantranilprole + thiamethoxam un-affected to parasitism of *T. japonicum* and *Telenomus* sp., but little bit affected to *T. schoenobii*. Insecticides pymetrozine and deltamethrin un-affected to parasitism of *T. schoenobii*, but little bit affected to. *T. japonicum* dan *Telenomus* sp.. In the other hand insecticide emamectin benzoate un-affected to all parasitism of *T. schoenobii*, *T. japonicum* and *Telenomus* sp. In general performance parasitism of all egg parasitoids of YSB was 91.7% un-affected frequencies by chlorantranilprole + thiamethoxam, and 83.3% for pymetrozine and deltamethrin. Whereas parasitism of all parasitoids un-affected by emamectin benzoate was 100% safety as well as control treatment (Table-5).

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Table-5. Frequency of insecticides affected to parasitism of egg parasitoids of YSB.

Treat*	Insecticides affected to parasitism of egg parasitoids of YSB (%)												Freq. no* (%)
	T. japonicum				Telenomus sp.				T. schoenobii				
	1daa1	3daa1	1daa2	3daa2	1daa1	3daa1	1daa2	3daa2	1daa1	3daa1	1daa2	3daa2	
1	no	no	no	no	no	no	no	no	no	no	no	yes	91.7
2	no	no	no	yes	no	yes	no	no	no	no	no	no	83.3
3	no	no	no	no	no	no	no	no	no	no	no	no	100
4	no	no	no	yes	yes	no	no	no	no	no	no	no	83.3
5	no	no	no	no	no	no	no	no	no	no	no	no	100

Remarks: Treat=treatment, Freq. no = Frequency un-affected. 1= Chlorantranilprole + Thiamethoxam, 2= Pymetrozine, 3= Emamectin benzoate, 4= Deltamethrin, 5=untreated. no=insignificantly different with control, yes=significantly different with control.

In the North coastal of West Java, the performance egg parasitoid of stem borer is very good, because the field parasitoid in maximum works as well when the explosion of white rice borer showing egg parasitism in the field on March 8, 1990 reached 82.8% and on March 12 in that year reached 100%.

The parasitism increased in linear with the increased eggs mass at the white stem borer (WSB) population increased, this indicate the highest parasitism of parasitoids to be pressure against egg of rice stem borer in many heavily damaged of rice. In the times of WSB unexplosion, the parasitism of *T. rowani*, *Telenomus dingus*, *Trichogramma schoenobii* and *Trichogramma* decreased to reach 44.4% in the dry season and 46.8% in the rainy season (Baehaki, 2010). Therefore, the ability of these parasitoids in naturally inadequate, this meaning the parasitoid too slow to follow the development of white rice stem borer to be caused an explosion. From this experience the expected ability of parasitism of egg parasitoid can be enhanced by various techniques, including by inundation method (Baehaki, 2013).

In the kharif season during the south-west monsoon (July-October as rainy season) of three consecutive years of 2003-2006 at west Bengal-India, activities of *Trichogramma* sp., *Telonomus* sp., and *Tetrastichus* sp. were the most important numerically abundant egg parasitoids of YSB in untreated pesticide. The maximum rate of parasitism by the parasitoids taken together was 74.6 and 44.1% in untreated and treated pesticides (metil parathion in seedbed, endosulfan in vegetative and forat in generative) (Chakraborty, 2010). Between 2008-2010 was assessed in rice field free insecticide at the same location the incidence of parasitism by *Trichogramma* sp., *Telonomus* sp. and *Tetrastichus* sp. was 6.12%, 9.53% and 48.44% respectively (Chakraborty, 2012). In the other location Andhra Pradesh -India between 2009-2012 were assessed in the rice field free insecticide the hymenopteran parasitoids, *Telenomus dignus* (Gahan) (Scelionidae), *Tetrastichus schoenobii* Ferriere (Eulophidae) and *Trichogramma japonicum* Ashmead (Trichogrammatidae) were the three important egg parasitoids regulation to YSB. The peak parasitism ranging from 75.29 to 97.56% during kharif and 42.60% to 69.79% during rabi cropping (October-March as winter) (Varma *et al*., 2013).

The mixture of insecticides, which contains 200 g/lt chlorantraniliprole (= rynaxypyr) + 100 g/lt thiamethoxam as Virtako 300 SC in Indonesia is recommended against the YSB and BPH. Efficacy of two newly used insecticides Virtako 40 WG and Prevathon 5 SC (a.i chlorantraniliprole) to YSB was highest when applied twice, thus that use of Virtako 40 WG or Prevathon 5 SC should be of the highest economic effectiveness (Ho *et al*., 2013). Futher more Ho et al. (2013) reported that removal of egg mass twice, spraying Virtako 40 WG once or Prevathon 5 SC once with and without removal of egg mass compared to Regent 800 WG is still good to reduced white heads. A combination of removing egg masses + spraying Regent 800 WG once provided a better result than spraying Regent 800 WG twice. The thiamethoxam insecticide exerted little impact on the parasitism of *Trichogramma chilonis* Ishii (Hymenoptera: Trichogrammatidae), this insecticide recorded 93.81 per cent adult emergence compare to control untreated was 98.73% (Preetha *et al*., 2010). In the other hand the risk quotient analysis showed that phenylpyrazoles, pyrethroids, insect growth regulators, neonicotinoids (with the exception of thiamethoxam), and antibiotics (with the exception of abamectin) are classified as safe agents to the parasitoid, while organophosphates and carbamates are classified as slightly, moderately, or highly toxic agents to the parasitoid. The data as useful information on the compatibility of insecticides with T. japonicum (Zhao, 2012).

Application insecticides of rynaxypyr, fipronil, dinotefuran, pymetrozine, imidacloprid, and BPMC on rice give a highly affected to *Telenomus rowani* that heavy to very heavy hampered recolonized index (HRI) with parasitoid recolonization at 7 days after application (DAA). On the other hand, all insecticides especially rynaxypyr showed low influence on the recolonization of *Tetrastichus schoenobii* with HRI from unhampered to light hamper (Baehaki *et al*., 2016).

The Emamectin benzoate was found safe to *Trichogramma* and it could be included in IPM strategies in combination with *Trichogramma* releases owing to its safety (Giraddi and Gundannavar, 2006). In the other hand, the survival of adult *Trichogramma* that exposure to insecticides of imidachloprid, abamectin, emamectin benzoate were 70.02, 32.19, 25.98 % respectively after 4 hours but after 24 hours none of the insecticides were safer for *Trichogramma chilonis* adult (Hussain *et al*., 2010). Zhao (2012) reported that the chemicals dry film residue tested of organophosphates and carbamates exhibited the highest toxicity to *T. japponicum*, followed the moderate toxicity by abamectin, emamectin benzoate and thiamethoxam), moreover the insect growth regulator insecticides (chlorfluazuron, fufenozide, hexaflumuron and tebufenozide) exhibited the lowest toxicity to the *T. japonicum* parasitoid. Reaction of hexaflumuron, emamectin benzoate and thiamethoxam were selective insecticides, where as hexaflumuron was harmless to pupae, emamectin benzoate was harmless to eggs and pupae, and thiamethoxam was harmless to egg parasitoid *T. japonicum* (Chao *et al*., 2008). Actually the insect growth regulators buprofezin, was not directly or indirectly harmful to *T. japonicum*, suggesting that these insecticides are compatible to this parasitoid when being used for control of rice pests.

Some workers conducted experiments with varying insecticides to observe their effects on egg parasitism. Among them, Prem *et al*. (2001) reported highest parasitism of 48.14% in acephate 0.05%, while lowest in endosulfan 0.05%, deltamethrin 0.0028% and Malathion 0.05% were 2.90%, 4.54%, 5.13% respectively compared to 69.80 % in control.

The insecticides use in pre-treated Corcyra eggs was disturbing parasitism of *T. japonicum*. The results revealed that significantly highest egg parasitism of 92.33% was recorded in control (water spray) followed by cypermethrin recorded 82.67, where as the emamectin benzoate treatment was 61.67%, but Malathion supported minimum parasitisation of 0.67% (Bhargavi, 2016). Samantha *et al*. (2006) evaluated the residues effect of different insecticides on *T. chilonis* and *T. japonicum* base on the retention period of the toxicant, they recommended to release both the parasitoids in the cropping ecosystem after 3 to 5 days of alpha cypermethrin, 4 to 6 days of methomyl and 6 to 7 days after quinalphos spray. Snehmar (2011) found that endosulfan (94 g a.i./ha) was comparatively safe to the parasitoid with least effect on the emergence and parasitism of parents as well as their progeny, while malathion (1250 g a.i./ha) and chlorpyriphos (175 g a.i./ha) were highly deleterious and the toxic effects of immidachloprid (20 g a.i./ha) and triazophos (600 g a.i./ha) were in between endosulfan and malathion.

The effective of YSB management tactics were discussed above on used insecticides and safety effect to parasitoids. According to the objective of this research to study undertaken impact of insecticides on parasitism of egg parasitoids of YSB, the first safety insecticide to parasitoids (*T. japonicum*, *Telenomus* sp, and *T. schoenobii*) were emamectin benzoate and then chlorantranilprole + thiamethoxam with performance un-affected parasitism in this treatments were 100 and 91.7% respectively. In the third safety insecticides were pymetrozine and deltamethrin with performance un-affected parasitism in this treatment were 83.3%, higher effect to YSB egg parasitoids. All insecticides were compatible with biological control in strategy IPM programmes, because compatibility to parasitoids more than 70%.

Alignment between insecticides and parasitoids above do not common applicable, because depending on the location of the country, localities place, habitats, seasons, and abundance of rice stem borer. However the parasitism was positively correlated with parasitoid richness and abundance, as well as the interaction of rainfall and altitude influenced to the presence and absence of parasitoids. Parasitism was positively and negatively correlated with temperature in cultivated and natural habitats, respectively, but natural habitats is important for refugia to sustaining parasitoid diversity, which in turn can affect stem borer parasitism in the cropping system (Mailafiya *et al*., 2010).

4. CONCLUSIONS

The egg parasitoids of YSB that captured by YSB eggs trap were *T. japonicum*, *T. dignus*, *T. rowani* and *T. schoenobii*. The number of T. *dignus* was smaller than the other parasitoids. At one day after application, common egg masses was 56% infested by two species parasitoids and 38% was infested by three species, and only 6% infested by one species. At three days after application, common egg masses was 60% infested by three species egg parasitoids and 28% was infested by two species, and only 12% infested by one species. In the case numbers of egg masses infested by one parasitoid lonely, generally was 65% caused by *T. schoenobii*, while by the *T. japonicum* and *Telenomus* sp. only 22.2 and 11.1%.

Mixed insecticide chlorantranilprole + thiamethoxam un-affected to parasitism of *T. japonicum* and *Telenomus* sp, but little bit affected to *T. schoenobii*. Insecticides Pymetrozine and deltamethrin un-affected to parasitism of *T. schoenobii*, but little bit affected to. *T. japonicum* dan *Telenomus* sp. In the other hand insecticide emamectin benzoate un-affected to all parasitism of *T. schoenobii*, *T. japonicum* and *Telenomus* sp. In general performance parasitism of all egg parasitoids of YSB was 91.7% un-affected frequencies by chlorantranilprole + thiamethoxam, and un affected parasitism was 83.3% for pymetrozine and deltamethrin. Whereas parasitism of all parasitoids un-affected by emamectin benzoate was 100% safety as well as control treatment.

In YSB control tactics as strategy in IPM program, the first safety insecticides to parasitoids (*T. japonicum*, *Telenomus* sp, and *T. schoenobii*) were emamectin benzoate and then chlorantranilprole + thiamethoxam. In the third safety insecticides were pymetrozine and deltamethrin with performance more higher effect to YSB egg parasitoids, but is still safety insecticides because compatibility to parasitoid more than 70%.

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