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EFFECT OF SEVERAL INSECTICIDE AGAINST OIL PALM POLLINATOR'S WEEVIL, *ELAEIDOBIUS KAMERUNICUS* (COLEOPTERA: CURCULIONIDAE)

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ABSTRACT

Study on the effect of pesticide application against *Elaeidobius kamerunicus* population was carried out in lab scale. The study was divided into two parts which are the direct effect against the weevil and indirect effect against the eggs. Cypermethrin showed the highest toxicity level compared to the other types of pesticides as the application eliminate all weevil population after one day of application (DAA). The mortality rate of weevil was significantly different only on the first day after application ($F= 268.86$, $p<0.05$). Result of our field study indicate that there were significant different in the number of weevil resurgence between the pesticide application and control ($F= 93.75$ $p<0.05$) except for *Bacillus thuringiensis*. The application of cypermethrin, chlorantraniliprole and *Bacillus thuringiensis* had a negative effect on the weevil directly.

Meanwhile, the application of *B. thuringiensis* did not affect the eggs of *E. kamerunicus*.

Keywords: *Elaiedobius kamerunicus*, oil palm pollinator, *Bacillus thuringiensis*, pesticides, biopesticides

ABSTRAK

Kajian kesan penggunaan pestisid terhadap populasi *Elaeidobius kamerunicus* dijalankan dalam makmal. Kajian ini dibahagi kepada dua objektif iaitu mengkaji kesan langsung terhadap kumbang dan kesan tidak langsung terhadap telur kumbang. Cypermethrin menunjukkan paras ketoksikan yang paling tinggi berbanding dengan pestisid yang lain memandangkan penggunaannya menyingkirkan keseluruhan populasi kumbang dalam hanya satu hari penyemburan. Kadar mortaliti kumbang berbeza secara signifikan dengan semburan pada hari pertama ($F= 268.86$, $p <0.05$). Keputusan di lapangan menunjukkan terhadap perbezaan yang signifikan antara kemunculan semula bilangan kumbang dengan penyemburan pestisid dan kawalan ($F= 93.75$ $p<0.05$) kecuali untuk *Bacillus thuringiensis*. Penggunaan Cypermethrin, Chlorantraniliprole dan *Bacillus thuringiensis* direkodkan memberi kesan terhadap kumbang secara langsung. Namun begitu, penggunaan *B. thuringiensis* tidak memberi kesan terhadap telur *E. kamerunicus*.

Kata kunci: *Elaiedobius kamerunicus*, pendebunga buah sawit, *Bacillus thuringiensis*, pestisid, biopestisid

INTRODUCTION

The oil palm, *Elaies guineensis* Jacq. is an entomophilus crop and in West Africa, which is believed to be its native home, several insect species are responsible for its natural pollination. The major insect pollinators include four species of weevil,

which are *Elaeidobius kamerunicus* Faust, *E. subvittatus* Faust, *E. plagiatus* Faust and *E. singularis*. Among theses, *E. kamerunicus* is the most efficient and predominant species (Syed, 1979; Genty *et al.,* 1986). It was introduced into Malaysia in early 1982 to overcome the inconsistencies of oil palm pollination (Syed *et al.,* 1982). With the weevil carrying out the role of pollination, the previous practice of manually assisted pollination has been discontinued from oil palm management in most parts of the country.

Pollinator population in oil palm vary markedly over space and time depending on the climatic factors, resulting in fluctuation in fruit set (Genty *et al.,* 1986). Inefficient pollination can cause poor fruit set and result in bunch failure and a loss in yield. This was a problem in the early days of oil palm cultivation, especially in young palms that produce insufficient male inflorescences. Assisted pollination had to be practiced to overcome the poor fruit set (Gray, 1969; Hardon, 1973; Lawton, 1981).

The occurrence of oil palm pest such as leaf eating caterpillar leads to the use of chemical application in the oil palm area. This is because the sole use of biological control may not always be sufficient to manage insect pest populations (Medina *et al.,* 2003). Unfortunately, almost all chemical insecticide used to fight against the pest insects can give negative impact on beneficial insect such as pollinator population. Consequently, there are many type of bio pesticide product in the market and there are claimed to be safe to non target insect such as beneficial insect. Therefore, the effect by using chemical and biopesticide toward the pollinators and non-targeted organism should be evaluated for their significant.

MATERIALS AND METHODS

Direct effect of pesticide application on weevil

Elaiedobius kamerunicus adults were obtained from male infloresences of DxP palms collected from PPPTR. The spikelets were sprayed with pesticides at the proposed rate using hand sprayer and placed into the small container (about 2ml solution/spikelet). Twenty live and healthy weevils were placed into the container consisted with the sprayed spikelet. The number of live and dead weevils were counted and recorded every day for six days consecutively.

Indirect effect of pesticide application on egg

Male inflorescences were taken to the lab to collect the spikelet with weevil eggs. The middle spikelets were cut and were sprayed with pesticide. The spikelet was placed into small container to observe the emergence of weevil .The number of weevil emergence were counted and recorded daily.

Table 1. List of treatment

Active Ingredient	Trade Name	Dosage (/liter)	Total Mixture/spikelet
Bacillus thuringiensis subsp. kurstaki 17,600i.u/mgl	Dipel Es	3.4ml	2ml
Chlorantraniliprole	Prevathon	1ml	2ml
Cypermethrin	Contest	3.27ml	2ml

RESULT AND DISCUSSION

Figure one showed the mortality of *E. kamerunicus* after application of *B. thuringiensis*, cypermethrin and chlorantraniliprole. Application of cypermethrin showed the highest mortality rate which is achieving 100% mortality on a very first day after application. Meanwhile, chlorantraniliprole

and Bt reduced respectively 65% and 66.25% of *E. kamerunicus* after one day application.

On the second day of application, mortality of *E. kamerunicus* for Chlorantraniliprole application highly increased up to 93.75% followed by Bt (91.25%). The mortality of *E. kamerunicus* for chlorantraniliprole application reaches 100% mortality on third days after application. But, Bt application did not show any increasing percentage of *E. kamerunicus* mortality on the third day after application. *Elaeidobius kamerunicus* mortality for Bt application reach 97.5% on five days after application. Statistically, the significant different between the three treatment can be seen on the first day after application (F= 268.86, p<0.05) (Figure 2).

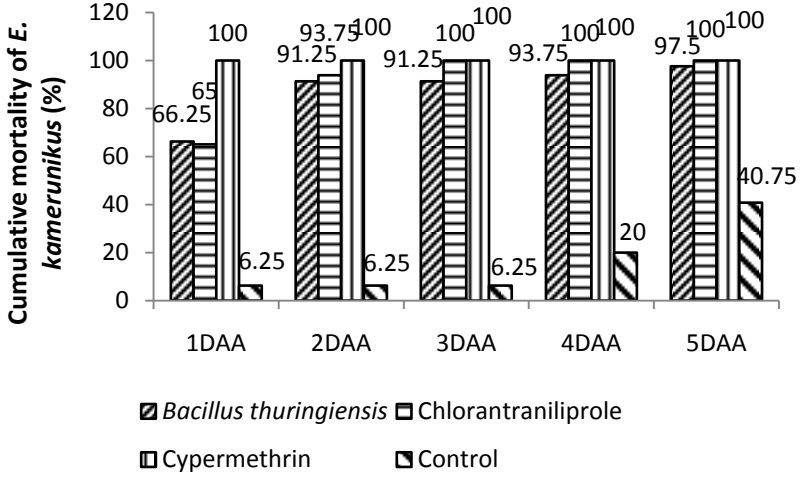

Figure 1. Cumulative mortality of *E. kamerunicus* after several pesticide application

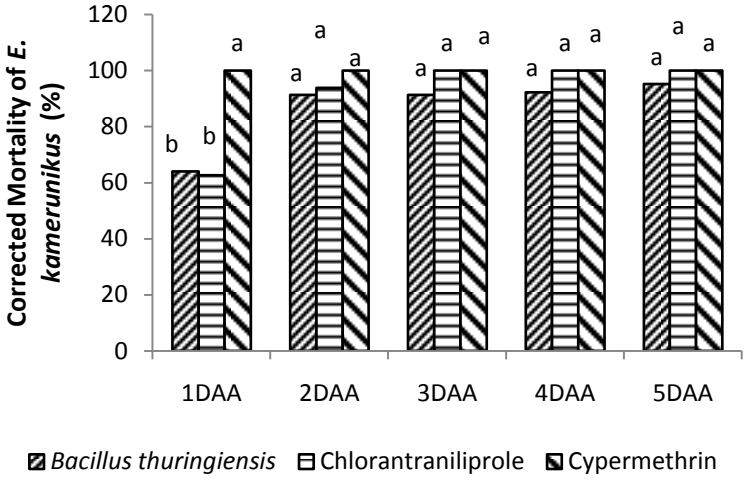

Figure 2. Corrected mortality of *E. kamerunicus* after several pesticide application

The mean of resurgence number of weevil pollination *E. kamerunicus* is shown in figure 3. Control spikelet (tab water application) showed the highest number of resurgence weevil (mean 185.2) followed by Bt (mean 179.75). Meanwhile chlorantraniliprole showed low number of resurgence of weevil (15.5b) and no resurgence weevil were recorded on the cypermethrin spikelet. Statistically, the resurgence number of weevil on Bt spikelet were significantly different between the other pesticide (Chlorantraniliprole and cypermethrin) and its belong in the same group with the control.

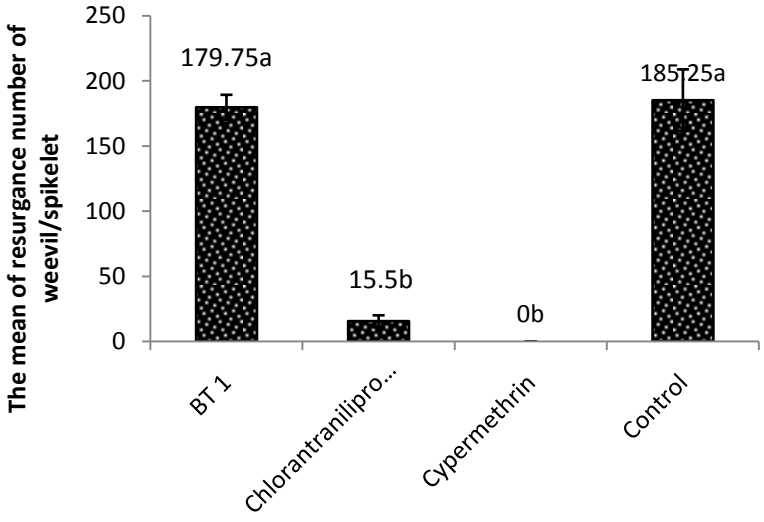

Figure 3. The resurgence number of weevil per spikelet after several pesticide application

Cypermethrin showed the most toxic pesticide which is eliminated 100% of weevil population on the very first day. Cypermethrin is a broad-spectrum insecticide. In addition to killing the insects that are the target of a particular treatment, it can also reduce the populations of insects and other arthropods that are economically desirable such as pollinator and natural enemies (Insecticide Factsheet, 1996). Chemical insecticides have been increasingly critizied because of their environmental persistance, toxicity to non target organisms and for the frequency with which insect population have developed resistance to them (MPOA, 2006). Consequently, attention has been directed towards alternative compounds called bio-pesticides such as Bt. Eventhough Bt seem to be dangerous on weevil directly, but it did not affect the egg of this pollinators. Despite of the application of Bt were apply periodically, weevil can still establish their population in the plantation.

CONCLUSION

The application of cypermethrin and chlorantraniliprole directly can reduce the weevil population. Due to this, Bt is a better choice of biopesticide in controlling bagworm population

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