

Eco-friendly Traps to Control *Sexapa* sp.

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Abstract

The indigenous insect, *Sexava* sp. causes serious damage to coconut palms/plantations in some provinces of Indonesia. The objective of this study is to develop and evaluate the performance of three types of eco-friendly Balitka MLA-traps, standing alone and in combination with insect glue (fly glue and tangle foot).

Balitka MLA trap was designed to capture the *Sexava* spp. especially during the night when they move from one place to another through the coconut trunk. The traps made from black cloth, insect glue, metal wire, and yarn were fixed on the coconut trunks at 1 – 1.5 M height. Three different types of traps namely Balitka MLA Trap A, B, and C were developed and evaluated. The study found that trap type C captured nymphs and adult of 1 – 7 nymphs/palm/day or 30-210 nymphs/palm/month. The trap also enabled natural enemies such as spiders and lizards to catch the snared pests easily. A total of 106 to 131 nymphs were caught by tangle foot and insect glue respectively after 3 months of fixing the traps in the field. These traps could potentially be used together with a biological control method to replace the use of insecticides in *Sexava*-infested areas.

This study was conducted in Talaud District, North Sulawesi Province, Indonesia from 2006 to 2007. Based on the study results, and considering the simplicity and eco-friendliness of the trap type C, it is recommended that it be used in coconut plantations to bring down the population of this insect pest, *Sexava* sp. and thereby control its damage to coconut palms.

Keywords: *Sexapa* sp., Indonesia, biological control, eco-friendly traps, coconut

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Introduction

Sexava spp. (Orthoptera: Tettigoniidae), which is indigenous to Indonesia, causes serious damage to coconut plantations, especially in some provinces of Eastern Indonesia. Three *Sexava* species i.e. *nubila* Stal, *Sexava coriacea* Linnaeus and *Sexava karnyi* Leefmans are reported. *S. nubila* is found in Talaud Island (North Sulawesi), Moluccas and Papua (Irian Jaya), *S. coriacea* is found in Sangihe Island, in Dumagin Bolaang Mongondow (North Sulawesi) and in North Moluccas, while *S. karnyi* is found in some areas of Central Sulawesi, especially in Togean Island. Their eggs are flat in shape and have deep lateral slits (Fig. 1).

Figure 1. The newly laid eggs of *S. nubila* are very flat with deep lateral slits



The life cycle of *Sexava* insects are described in Figure 2. Figures 3 a, b and c explain the copulation process of *S. nubila*.

Nymph and adult of *Sexava* spp. attack the leaves, inflorescences and young nuts affecting coconut production both directly and indirectly. Several control strategies which mostly rely on the use of insecticides have been practiced since 1970. However, the use of pesticides in coconuts raises serious concern about the health risks of the farmers and consumers as well as the death of the natural enemies of the pest and livestock. The search for eco-friendly techniques to control the pest became a major concern before the invention of *Sexava* trap. The use of *Sexava* trap would replace insecticide application. The objective of

this paper was to assess the effectiveness of *Sexava* traps to control *Sexava nubila* in Talaud Island, North Sulawesi, Indonesia.

Materials and methods

The use of traps to control *Sexava nubila* was studied from January to December 2007 at coconut plantation in Moronge Sub District, Talaud District, North Sulawesi Province, Indonesia. Both Balitka MLA traps and insect glue traps were separately fixed on a coconut trunk at 1-1.5 M above the ground. The Balitka MLA trap was installed in *Sexava*-attacked coconut palm aged more than 10 years. The study covered 3 hectares coconut plantation where in each hectare 10 Balitka MLA traps and 20 traps using insect glue were fixed in selected palms. Insect glue was reapplied every two months. The effectiveness of the traps was assessed by counting the number of trapped nymphs and adults every day.

Results and discussions

Sexava trap of Balitka MLA type

Sexava trap of Balitka MLA type was first developed by Hosang Meldy Leonardy Anderson (MLA), an ICOPRI researcher at *Balai Penelitian Tanaman Kelapa dan Palma Lain (Balitka)* or Indonesian Coconut and Other Palmae Research Institute (ICOPRI). This trap was developed and installed in a *S. nubila* infested area at Talaud Island, North Sulawesi Province, Indonesia.

The trap was designed based on the behavior pattern of *Sexava* sp. which is more active during the night time. Nymphs and adults move from one place to another by walking on coconut trunks. *Sexava* trap of Balitka MLA type was designed with black cloth because *Sexava* prefers black colour for shelter.

The Balitka MLA Trap type A & B has been modified to get the best design type C (Fig 4).

In Figure 4a, the trap was made from black cloth, insect glue, a flat piece of wood, boards, plastic jars and yarn. A plastic jar was fixed at four corners of the trap and then filled

Figure 2. Life cycle of *Sexava* spp.

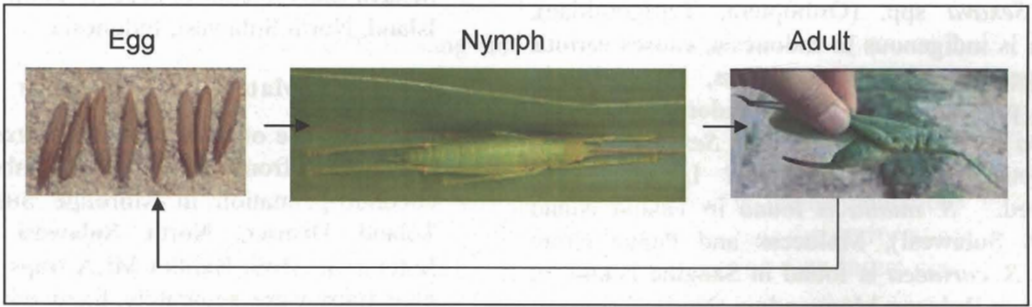
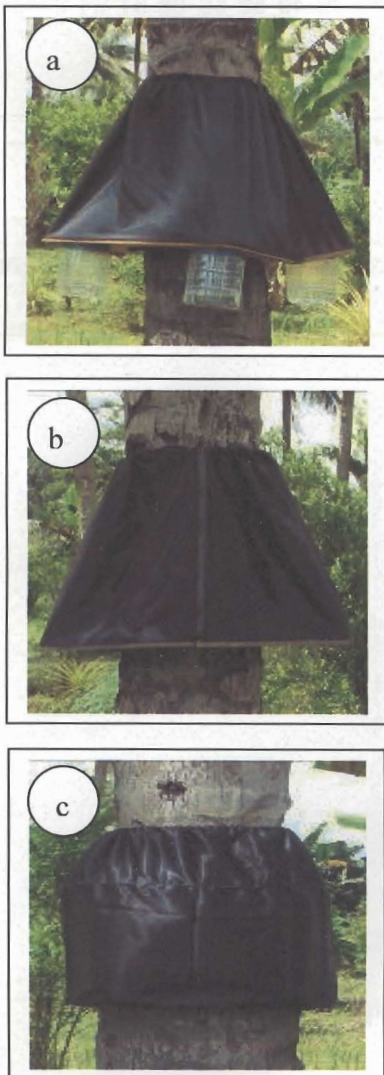


Figure 3. Copulation process of *S. nubila*. Abdomen of male was inclined towards female (a), male abdomen was positioned under female abdomen (b) and copulation gland was attached at the tip of female abdomen (c)



with diluted detergent. Holes were made in the plastic jars at a height of about 5 cm from the base to release rainwater. Few *Sexava* pests were caught in this trap. Type B is similar to type A, but it does not use a plastic jar. Trap type C was made from black cloth, cloth glue, metal wire and a rope. The results indicated that there were no significant differences in the number of *Sexava* caught by each trap type. However, *Sexava* trap of Balitka MLA type C (Figure 4c) is recommended to farmers due to its low cost. This trap can be used for more than one year in a field and could be combined with an insect glue trap or other control techniques.

Figure 4. *Sexava* traps of Balitka MLA type were fixed on the coconut trunks



The trap was fixed on a selected coconut trunk at 1 – 1.5 m above the ground. The trap prevents nymphs and adults of *Sexava* from climbing back to the coconut crown. The collection of trapped pest can be easily done even by children. Due to its simple use it could also support the local government program that encourages the participation of the entire society including elementary schools students in the effort to control *Sexava* attacking young and old coconut palms. The use of *Sexava* trap of Balitka MLA type for one month catches 1.0 – 7 nymphs/palm/day or 3 nymph/palm/day. The percentage of male and female caught by the trap was 60% and 40% respectively. This result showed that males and females are mobile during night time. The longer the trap installed in the field, the lesser the number of *Sexava* that can be caught. One month after the installation, the number of *Sexava* caught was very low i.e. 1 nymph/palm/day after two months installation. It could be assured that six months after installation, pest population in the field could be controlled well. The number of *Sexava* caught in the trap was affected by the pest population in the field (Table 1). In addition, the use of the trap could facilitate some natural enemies such as spider and lizard to catch the snared pests easily.

Table 1. Mean number of *Sexava* caught by *Sexava* traps of Balitka MLA type A, B and C

| Treatments | Mean number of <i>Sexava</i> caught |
|--|-------------------------------------|
| <i>Sexava</i> trap of Balitka MLA type A | 6.88 |
| <i>Sexava</i> trap of Balitka MLA type B | 6.63 |
| <i>Sexava</i> trap of Balitka MLA type C | 5.38 |

Sexava trap of Balitka MLA type can be combined with insect glue (fly glue) to make it more effective and efficient, especially to control the first instars nymph of *Sexava*. It was found that last instar nymphs and adults were also snared in this insect glue. The advantage of using insect glue is that predatory lizard can easily catch snared pests; while the weakness is it will be more time consuming to collect the snared pests.

Time of observation (day)

Figure 5. Mean number of *Sexava* nymphs caught per palm

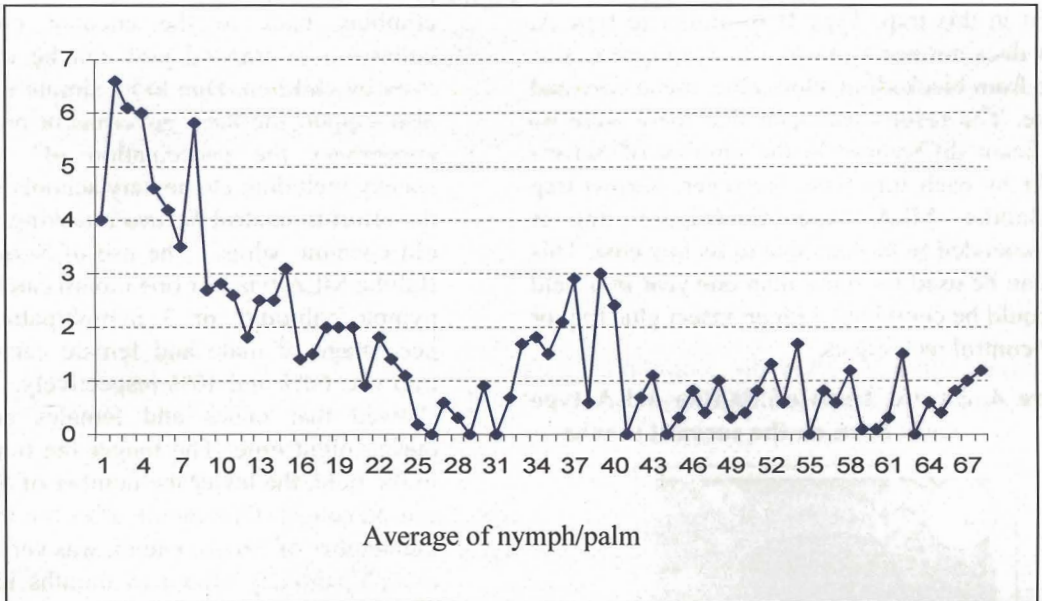
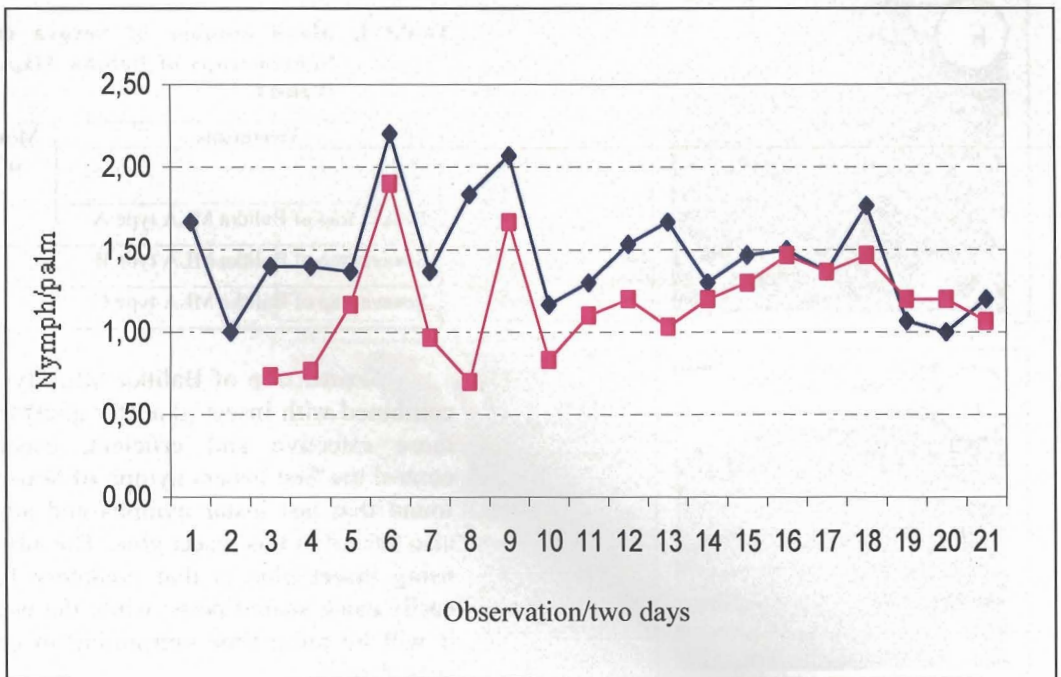


Figure 6. Average number of nymphs caught by fly glue and tangle foot during November and December 2005



Note: fly glue (—◆—); Tangle foot (—■—)

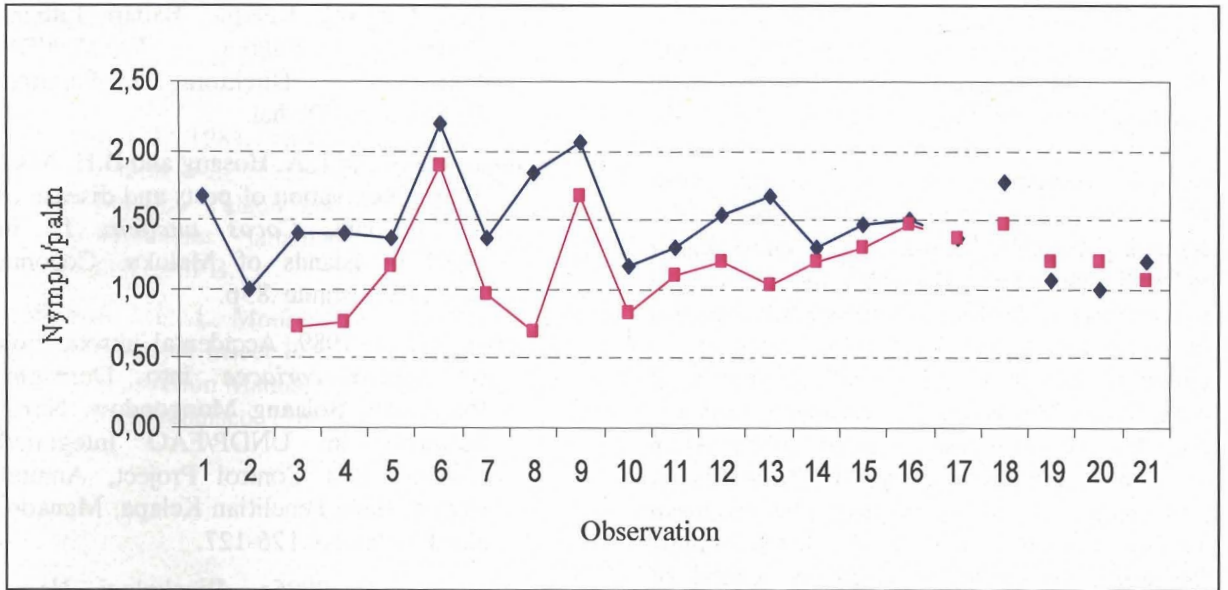


Figure 7. Insect glue (fly glue) fixed on coconut trunk (a) and *Sexava* nymph caught on the glue (b)



Note: Insect (fly) glue (—); Tangle foot (—)

Insect Glue

Two types of insect glue, fly glue and tangle foot have been evaluated to control *S. nubila* in *Sexava*-attacked areas in Talaud Island. Figure 6 indicated that the population of nymphs hatching from the eggs fluctuated during the observation time. There were two peaks of nymph population (in sixth and ninth observation) during the period of observation. Nymph population fluctuation was quite similar in both glue types. However, the number of nymphs caught by fly glue was higher than that of tangle foot in the earlier observation and it tended to decrease overtime until the number of nymphs caught was lower as compared to tangle foot. The use of fly glue and tangle foot fixed on a coconut trunk gives new possibility in *Sexava* pest control. The results showed that the mean number of nymphs caught by fly glue and tangle foot was 2 and 1 nymph respectively. A total of 106 to 131 nymphs were caught by tangle foot and fly glue respectively for 3 months exposure provided the adhesive power of the glue remained good (Figure 6).

Figure 6 shows decreasing trend in *Sexava* pest population. In the beginning the average numbers of caught nymphs increased up to > 2 nymphs/palm and after 6 months the nymph's population snared < 1 nymphs/palm. The trap suppressed the growth of the pest population in the field continuously. The glue can be combined with systemic insecticides, a *Sexava* trap of Balitka MLA type and other control techniques.

Conclusion

Balitka MLA trap in combination with insect glue are efficient technologies to control *Sexava* spp. in coconut plantations. These control methods are safe to the environment and human beings. The trap is also compatible with other control techniques, and is effective and efficient. The implementation of this technology has good prospects and might lead to zero use of insecticide in coconut areas infested by *Sexava* spp.

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