APRIL 2010

AAR NEWSLETTER

A palm that died from termite attack

In this issue

Whodunnit, Howdunnit, and What-to-do-with-it

Pests are inevitable. Even the most well-tended gardens will be at the mercy of pests at certain periods. A minor caterpillar nuisance in your backyard, however, is much like a pesky mosquito buzzing in your ear at night - annoying, but hardly a cause for worry in terms of your finances and home economics.

But if you have pests in an oil palm estate, then the magnitude of its impact is much greater. That caterpillar nuisance could now mean hectares of palms affected, with a subsequent loss in yield. And if the problem is not only caterpillars, but other pests included, then the impact is truly alarming.

In this issue of the newsletter, we will take a look at the different types of common pests, how they affect oil palm, with a review on the importance of carrying out a proper census to allow us to accurately gauge the problem so that we can deal with it accordingly.

Happy Reading!

Marianne Loong Hsieu Yen

WHODUNNIT

HOWDUNNIT

WHAT-TO-DO-WITH-IT

Major Pests of Oil Palm

1. Leaf eating caterpillars

a. Nettle caterpillars

In this group are the larvae of moths that belong to Limacodidae family. They are generally polyphagous (eating a variety of food sources) and characterized by the menacing spines on their body that can be quite painful to touch. Younger larvae of these pests eat oil palm leaflets by scraping their surfaces, causing holes. The older larvae strip the leaflets of the host plants and when an outbreak occurs, these pests can defoliate the canopy leaving only the skeletons. Common species of nettle caterpillar that attack oil palm are *Darna trima*, *Setora nitens*, and *Setothosea asigna*.

THESE PESTS CAN DEFOLIATE THE CANOPY LEAVING ONLY THE SKELETONS.

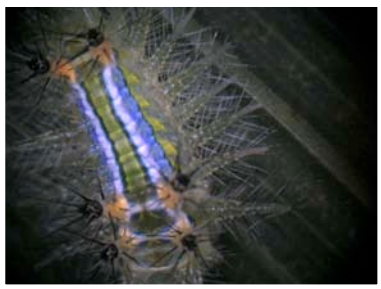
Darna trima

Eggs of this species are laid singly or in groups on leaflets. Eggs will hatch after 5-7 days. The larval stage lasts for 17-30 days. A full grown larva at the later stage is about 15-16 mm long. Larvae then pupate on lower sides of leaflets or petioles. The pupa is brown and oval, which is about 7 mm long. After 10-12 days, adult moths will emerge from the pupae. Total life cycle of this species is 32-60 days. This species is normally kept in check by a variety of predators and parasitoids. They are also commonly subjected to viral disease. Therefore, biological control using viruses is quite promising to control this pest.

PESTS

RHINOCEROS BEETLE

SETORA NITENS



LEAF-EATING CATERPILLAR

METISA PLANA LARVAE

Setora nitens

This is a serious pest of oil palm, as the caterpillars can strip the canopy bare due to their voracious feeding habits. Eggs of this pest are laid in a mass on the underside of leaflets. Incubation period for the eggs is 10-18 days. The eggs then hatch and the larval period will last for about 42-55 days. A fully grown larva at the latter stage can measure up to 35 mm. Larvae then enter the pupal period that lasts for about 17-31 days. The spherical brown cocoons of this pest are usually found at the base of the host plant. This pest is also generally kept in check most of the time by natural enemies.

Setothosea asigna

The total life cycle of this pest is 115 days, much longer than other species. The larval period is 61-75 days and a full-grown caterpillar can reach up to 35 mm long. Pupation occurs in a brown color cocoon in the soil near the base of the oil palm stem. This pest is also subjected to natural control by natural enemies and viral disease.

b. Bagworm

Bagworms belong to the Psychidae family. The larvae construct a case surrounding their bodies which remain until adult stage, hence the name. Adult males resemble typical moths and after emerging from the cocoon, they will fly and search for females in bags to mate. Females, on the other hand, remain inside the bag throughout their lifetime. Adult females look like larvae and mostly are unable to fly. They will mate and lay eggs inside the bag. The young larvae produce very fine silk threads for dispersal by wind (ballooning). Common bagworm species that attack oil palms are *Metisa plana*, *Mahasena corbetti*, and *Pteroma pendula*.

Metisa plana

The incubation period for eggs of this pest is 14-15 days. The larval period for males is 80 days, whereas for females, it lasts for 113 days. Males will pupate and the cocoons are characterized by a crook-shaped attachment to the leaf. Pupal period lasts for about 27 days. The males then emerge from the cocoon as adult male moths with wings, whereas females remain in the bags. Total life cycle of this species is about 4-5 months.

Mahasena corbetti

Larvae of this species construct cases made of large pieces of leaflet that give them their characteristic "shaggy" appearance. The eggs hatch after about 16 days. The larval stage lasts for 75 days (male) and 82 days (female). Female larvae can reach up to 5 cm in length, whereas the males are about 3 cm. The larvae will pupate and this period lasts for about 26 days. This species is kept in check by a wide range of natural enemies, including several species of flies and wasps.

Pteroma pendula

The total larval period for this pest is 145 days. Pupation takes 17-18 days to complete. Cocoon size is about 6 mm for males and 8 mm for females. The cocoons are suspended from leaves by a fine thread of about 10 mm in length.

2. Rhinoceros beetles (*Oryctes rhinoceros*)

Rhinoceros beetle is one of the most destructive pests of oil palm, especially on young oil palm. Life cycle of the beetle is 4-9 months from egg to adults. Eggs will hatch after about 12 days. Larvae eat organic matter and spend the entire stage in the breeding site for about 2.5-6 months depending on the environmental condition. Larvae then enter a pre-pupal stage

that lasts for about 8 to 13 days. They then pupate inside a cocoon made of soil or organic matter. About three weeks later adult beetles will emerge from the cocoon and fly to the oil palms to eat and mate. The adult beetles bore spears or young fronds and feed on soft tissue causing frond/spear fracture and may kill the palm if they damage the meristem tip. They may stay in the tunnel for about one week and then move to another food source. Adult beetles may live up to 2-7 months, thus one beetle can cause damage to several palms throughout their lifetime. After mating, the females will then find a breeding site to lay eggs. The breeding sites are decomposing organic matter including EFB heaps, decomposing tissues in replant areas, rotting palm trunk, etc. Control of this pest may be achieved by chemical (insecticide) application, and by sanitation, i.e. avoiding heaps of organic matter that can become a beetle breeding site.

3. Termites (*Coptotermes curvignathus*)

Termites are a major pest of oil palm, especially in peat areas. The abundance of organic matter, such as timber residue, is said to contribute to the high number of termite population in peat areas. One species of termites that commonly attacks and is considered as a serious threat to oil palm is *Coptotermes curvignathus*. This species can be recognized by the pear shaped head of the soldiers and the sticky white liquid they produce when disturbed. They are classified as subterranean termites and need constant contact with the soil. This termite species builds mudwork around the trunk, frond base, and spears. They attack and enter the young palms from the spear region, damaging the meristem and killing the palms. In mature palms, the termites usually kill the palms by eating the living tissue and nesting inside the oil palm trunk. The palms generally die after about 6-7 months.

4. Rats (*Rattus spp.*)

This is a non-insect pest that is commonly found attacking oil palm. There are many species of rats, the common ones being *Rattus argentiventer* (rice field rats), *Rattus rattus diardii* (house rat), and *Rattus tiomanicus* (wood rat). These pests feed on oil palm fruitlets as well as the base of frond petioles and palm buds in immature palms. The difference between these species is that *R. argentiventer* gnaws the fruitlets to the kernel, whereas the other two species only damage the mesocarp and often leave the kernel intact. Natural control of these pests is by using their natural enemies, such as the snake and owl.

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Census for Pest Monitoring in Oil Palm Plantations: Some Basic Concepts

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In an agricultural system with a perennial crop, such as in an oil palm plantation, pest problems can occur throughout the year. The abundance of food sources that is available all year long provides a very suitable habitat for many species including potential pests. However, with a proper pest management program, the pest population can be regulated so that they remain below a specified threshold, where the level of damage is tolerable and does not cause significant economic loss.

Pest monitoring is the cornerstone of a pest management program. It is the first defense for successful pest control in an agricultural system. The idea of pest monitoring is to monitor the pest population over time so we can detect and predict the onset of a pest outbreak and take action before the problem worsens. A proper and detailed census that is conducted regularly is of utmost importance because it ensures early detection, rapid response to pest attack and provides us with information about the distribution and life stages of the pest. Thus we can implement not only a more site and pest specific treatment, but also with proper timing to the most vulnerable stage of the pest life cycle. This will help improve the success of pest control and at the same time reduce the amount of chemicals used to control the pest, which is the main concern of the integrated pest management concept (Buntin, 1994; Metcalf & Luckmann, 1994).

One of the monitoring methods is by conducting a census of pest population and/or damage by the pest. There are basically three objectives of a census program, which will determine the intensity and design of the census itself (Buntin, 1994). They are:

1) Detecting presence of a target species, to prevent the spread of the species and pests with zero tolerance or very low threshold, such as rhinoceros beetle on young plantings. This type of census is an extensive program and covers a widespread area.

2) Providing information on the status of a target pest. This type of census basically is to know whether the population is below or above the threshold. Although the mean density of the pest is not really necessary, detailed information on the estimate of population intensity and stage of the pest is important to help us make a decision whether or not and when to do the treatment. Leaf eating caterpillars and rats fall into this category.

3) Providing accurate density estimate with high degrees of precision, so changes in population density of pests can be measured. This type of census needs intensive work and can also be implemented to measure the spread of pest and diseases that attack individual palms, such as termites and *Ganoderma*. In this case, the exact number of infested or diseased palms is needed.

Techniques used in the census will depend on the nature of the pest species. Different pest species have different mobility, habits and behaviour, especially in search for food, mates, and breeding sites, which will affect their distribution in an agricultural system. Some pests are relatively immobile, such as the leaf eating caterpillar, and they are therefore easily spotted. This type of pest can be monitored by direct census, i.e. by counting the number of the pest per sampling unit (e.g. per frond). Other pests are either very mobile, or burrow underground and inside trunks, etc. (rhinoceros beetle, rats, termites, for example), thereby making census by direct method very difficult. Therefore, for this kind of

pest the census is done by indirect method, i.e. by counting or assessing the "product" of the pests, such as nests, frass, etc., or plant damage (Metcalf & Luckmann, 1994).

Distribution of pests is also an important factor to be considered in determining the intensity of the census. Leaf eating caterpillars, for example, are mostly present in patches or localized, as the females lay eggs in clusters. When the caterpillars become adult moths, they may disperse in search for breeding sites in a suitable habitat (e.g. the presence of large amount of food supplies such as in a healthy agricultural system), but they will not move too far from the site where they emerged from pupation (Mo *et al*., 2003). Moreover, the limited duration of the larval period, which is the most vulnerable stage for treatment, makes information about the pest's stage very important. In this case, a high intensity census with more census points is needed to give a more detailed picture regarding the spread and stages of the pest within a given area thereby allowing a more site specific, or localized, treatment.

The unique characteristics of pests require each major pest of oil palm, i.e. leaf eating caterpillar, rhinoceros beetle, termites, and rats, to have a specific census system. Although it may seem complicated at times, this could actually save us from doing unnecessary things that is quite useless for decision making.

For example, the fast dispersal of adult rhinoceros beetles and their ability to move from one palm to another for food has made direct census very difficult. Thus, for this insect, the census is done extensively over a wide area and indirectly by visual method to count the percentage of damaged palms in every census point. This is a simple and effective method to meet the objective of conducting a rhinoceros beetle census, i.e. to determine whether the percentage of damage over a certain area is below or above the threshold for treatment. The emphasis here is to make a quick decision for treatment, thus there is no point of doing a tedious, laborious census by, say, counting the exact number of adult or larva population, when the information is not really necessary. On the other hand, doing an extensive census by merely checking the percentage of damaged palms is not enough for leaf eating caterpillar control, because we need additional information on larval density per frond and the stages of the pest.

The above illustration emphasizes the point that we cannot apply a census system for one pest to other pests because they have different characteristics and we require different information to control the pests. We cannot do one census for all just to save time, because the information we get might not necessarily be the one we need. Simply going through the motions of doing a census is not good enough for pest control. Each major pest species needs a specific census system, which must be implemented properly and regularly if we want successful and effective pest control in the long run.

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2. Mo, J., Baker, G., Keller, M., & Rick, R. 2003. Local Dispersal of the Diamondback Moth (Plutella xylostella (L.)) (Lepidoptera: Plutellidae). Environmental Entomology 32(1):71-79.
3. Buntin, G. D. 1994. Developing a Primary Sampling Program. Handbook of Sampling Methods for Arthropods in Agriculture. CRC Press, Inc.

PEST AND DISEASE TRAINING

AAR Pest and Disease team has successfully held three P & D Seminars and Field Days in Indonesia and Malaysia. The seminars and field days in Indonesia were held in Nilo Complex Estate, Riau on 26-27 February 2008 and in PT. Steelindo Wahana Perkasa (SWP) Estate, Belitung Island on 19-20 May 2009, whereas in Malaysia it was held in Paloh on February 3rd, 2009. The events were jointly held with the estates and were attended by Assistant Managers, Managers, Senior Managers, General Managers and the Regional Director. The seminar consisted of a class lecture and field demonstration that covered all aspects of pests and diseases of oil palm, such as pest and disease identification, census, and control.

CONQUERING MOUNT KINABALU

FROM THE 21ST - 24TH APRIL 2009, MEMBERS OF THE AAR FAMILY AND FRIENDS SCALED UP MOUNT KINABALU AND CONQUERED THE PEAK. THE CLIMB TOOK TWO DAYS AND MONTHS OF PREPARATION BEFOREHAND. IT WAS ALL WORTH IT, HOWEVER, TO STAND ON TOP OF THE HIGHEST PEAK IN SOUTHEAST ASIA.

PROMOTIONS 2010

Principal Research Officer	:	Mr Tey Seng Heng
Senior Research Officer	:	Mr Patrick Ng Hong Chuan
		Dr Shahrakbah Yacob
Research Officer	:	Madam See Choon Mooi
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Laboratory Assistant (SG)	:	Madam Norimah Mohd Amin
Laboratory Assistant (SG)	:	Madam Mahizan Mohamad
Research Clerk (I)	:	Madam Desirayarani Srinivasan
		Madam Aminah Othman
Research Assistant (II)	:	En Sakari Musa
		En Azman Talip
		En Taliu Mudah
		En Mohd Faizul Ibrahim
		En Rahman Sihing
Research Clerk (II)	:	Madam Salniza Seali

CONGRATULATIONS!

It was certainly an eventful year

for our AAR Sports Club. Helmed by Mr Sim C.C., numerous events were organized here in Peninsular Malaysia - a bowling and badminton tournament, a trip-cum-family day to Malacca, a Durian festival, a Tissue Culture Laboratory Sports Day, a trip to Gunung Ledang, and an Urban Party.

Bowling and Badminton

For the first time, AAR bowlers had the opportunity to show off their skills in a Bowling Tournament held at the Perfect Bowl Selayang, Selayang Mall on 23/5/09. Thirty-one members turned up to support this event. The club also received a trophy from the Selayang Bowling Management for our participation. The badminton match was held at Dewan Serbaguna, MPPJ in Kota Damansara, where many badminton enthusiasts turned up to watch players smash their way to emerge champions. Congratulations to all the winners!

Durian Festival

Under huge and shady angsana trees and marble table-tops, members including our French students from ISTOM savoured some of the best durians, along with succulent mangosteens and langsat. Even the biggest durian fan was awed at the sight of the truckload of durians!

Malacca Trip & Family Day

A day trip to Malacca was organized in conjunction with our annual Family Day. The Family Day was itself held at the A'Formosa Resort, where members of the AAR family stayed the night at comfortable apartments. It was a truly memorable experience as members got to visit the heritage sights in Malacca and become spectators at the cowboy town and animal safari of the resort. During the sports activities, members had fun challenging each other for the top spot.

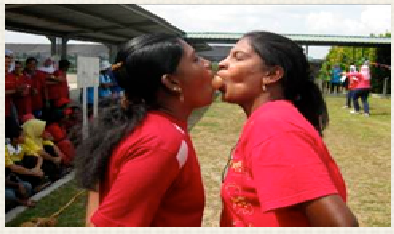
Climbing Up Gunung Ledang

A small group from the Field Section trekked up Gunung Ledang and made camp there from 9 - 11/10/2009.

Urban Party

This year, instead of having an annual dinner, the club decided to have a high-tea at the Atrium Café in Sunway. It was an Urban Party with a choice of well over a hundred main courses and desserts. Awards for long service, innovation, initiative, and dedication were given out to deserving staff and workers. Awards were also given to children of members who excelled in their studies. For many, it was their lucky day when they walked away with hampers, a home theatre system and electrical items from the lucky draws.

Tissue Culture Laboratory Sports Day



It was great in Sabah too!

Kayaking, flying-fox, fishing, sepak takraw, a deer and horse farm visit - it was heaven for adventure lovers!

Borneo Paradise Eco Farm

About twenty of the AAR Sports Club members from Nak, Sri Kunak and KDC had an adventurous trip to Borneo Paradise Eco Farm Resort. Right smack in the middle of the rainforest, Borneo Eco Resort is blessed with natural beauty - a great place for recreation and to enjoy the many outdoor activities such as visiting the deer & horse farm, fishing, kayaking, flying-fox, and sepak takraw among others.

Annual Dinner and Hari Raya Celebrations

Sports Day

WELCOME TO THE NEW COMMITTEE 2010!

NEWSLETTER COMMITTEE

1. DR TASREN N MAHAMOOTH (ADVISOR)
2. MARIANNE LOONG (EDITOR)
3. LYSSA LIEW YEE ROW
4. SITA ASTARI
5. LEE TECK FAH
6. SUREE CHUAH

THANK YOU TO EVERYONE WHO HELPED TO MAKE THIS ISSUE A SUCCESS!