Serangga20(1): 43-53
ISSN 1394-5130 © 2015, Centre for Insects Systematic,
Universiti Kebangsaan Malaysia

BUNCH MOTH, *TIRATHABA RUFIVENA* (LEPIDOPTERA: PYRALIDAE) INFESTATION CENSUS FROM OIL PALM PLANTATION ON PEAT SOIL IN SARAWAK

Zulkefli Masijan, Norman Kamarudin, Ramle Moslim, Alindra Gerald Sintik, Siti Nurul Hidayah Ahmad and Siti Ramlah Ahmad Ali

Biological Research Division, Malaysian Palm Oil Board, No. 6, Persiaran Institusi, Bandar Baru Bangi, 43000 Kajang, Selangor
Corresponding email: zulmas@mpob.gov.my

ABSTRACT

Tirathaba rufivena is the major pest in oil palm plantation planted in peat soil in Sarawak. High infestation was reported in Miri, Mukah and Sibu. Censuses on the infestation of *T. rufivena* were conducted at three different locations, i.e. in Miri (young palm), Mukah (mature palm) and Sibu (ablation samples). Samples for census were taken from infested bunches, female and male inflorescences. The census was done by chopping the bunches and the female inflorescences while for the male inflorescences, the bottom of spikelets were cut to determine the number of live larvae and pupae. The census

reveiled that in Sibu, a high infestation of *T. rufivena* was found on male inflorescences compared to bunches of female inflorescences. The mean number of live larvae found in male inflorescences for the first and second day of census recorded 35.3 ± 15.7 and 14.0 ± 7.3, respectively. The highest number of live larvae recorded from male inflorescences was 207 and 65, respectively. Meanwhile, the mean number of live larvae from infested bunches and female inflorescences on the first day were 9.9 ± 3.5 and 19.4 ± 4.4, respectively. On the second day of census, the mean number of live larvae recorded on bunches and female inflorescences were 4.8 ± 1.5 and 12.7 ± 2.8, respectively. Census on infested area in Miri from three different stages of female inflorescence and bunches recorded 8.0 ± 1.9 and 4.8 ± 0.6 highest number of live larvae. Post anthesis female inflorescences recorded the highest mean number of live larvae compared to pre anthesis and anthesising female inflorescences. Population study at Mukah on highly infested area recorded 60 live larvae from young bunches and 50 live larvae from matured female inflorescences. Based on the samples, bunch moth larvae or pupae were absent in 10% of infested female inflorescences and 11.7% of infested bunches (males and females inflorescences).

Keywords: *Tirathaba rufivena*, bunch moth, oil palm inflorescences, peat soil.

ABSTRAK

Tirathaba rufivena merupakan perosak yang penting yang menyerang tanaman kelapa sawit tanah gambut di Sarawak. Kadar infestasi yang serius dicatat di Miri, Mukah dan Sibu. Pembancian terhadap penginfestasian oleh *T. rufivena* dijalankan di tiga lokasi yang berbeza-beza iaitu, di Miri (palma

muda), Mukah (palma matang) dan Sibu (palma ablasi). Sampel bunga jantan dan betina diambil daripada tandan yang berpenyakit. Bancian dijalankan dengan mencantas tandan dan bunga betina manakala dasar spikelet dikerat dari spesimen bunga jantan untuk mengenalpasti bilangan larva dan pupa yang hidup. Infestasi *T. rufivena* paling tinggi pada bunga jantan berbanding bunga betina di Sibu. Purata larva yang hidup pada bunga jantan pada hari pertama dan kedua ialah 35.3 ± 15.7 dan 14.0 ± 7.3. Bilangan larva hidup pada bunga betina yang paling tinggi direkodkan adalah sebanyak 207 dan 65. Manakala, purata bilangan larva yang hidup yang menginfestasi tandan dan bunga betina pada hari pertama ialah 9.9 ± 3.5 dan 19.4 ± 4.4. Pada hari kedua pula, purata bilangan larva yang hidup pada tandan dan bunga betina ialah 4.8 ± 1.5 dan 12.7 ± 2.8. Bancian di kawasan yang mengalami infestasi di Miri dari 3 fasa yang berbeza mencatat bacaan larva yang hidup pada tandan dan bunga betina yang tertinggi sebanyak 8.0 ± 1.9 and 4.8 ± 0.6. Bunga betina selepas fasa antesis mencatat purata bilangan larva hidup yang paling tinggi berbanding sebelum fasa antesis dan bunga betina yang sedang antesis. Kajian populasi di kawasan dengan infestasi paling teruk di Mukah dengan catatan 60 larva yang hidup daripada pokok yang muda dan 50 larva daripada pokok betina matang. Berdasarkan sampel, larva dan pupa tiada pada 10% bunga betina yang terinfestasi dan 11.7 % bunga jantan dan betina yang terinfestasi.

Kata kunci: *Tirathaba rufivena*, kupu-kupu, kelapa sawit tanah gambut.

INTRODUCTION

Tirathaba rufivena (Lepidoptera: Pyralidae) or commonly known as oil palm bunch moth is occasional pest of oil palm that seriously attacks the fresh fruit bunches especially in areas where the pollination is poor (Basri *et al*, 2003). The infestation

of oil palm bunch moth is characterized by the presence of long tubes of silk and frass constructed by the larvae. The larvae feed on both male and female inflorenscences of oil palm (Wood and Ng, 1974; Turner and Gillbanks, 2003). The life cycle of the pest is short, about 30 days (eggs 4 days, larvae 16 days and pupae 10 days), and therefore it spreads rapidly (Lim, 2012). The female lays eggs, either singly or in batches of 4 to 20 in the fibrous sheath surrounding the base of the flower spike (Khoo *et al*., 1991).

Infestation of bunch moth causes abortion to young inflorescences female flowers, fruit bunches and may cause fruit deformation (Basri *et al*., 1991). A visual inspection on the infested bunches and the percentage of the infested palms could not represent the actual bunch moth population in the infested area. Therefore, the infested bunches should be harvested and chopped to count the actual number of live larvae and pupae (Zulkefli *et al*., 2012).

High infestation of bunch moth was reported in oil palm planted on peat soil in Mukah, Sibu and Miri in Sarawak during the rainy season. The common suggestion for bunch moth control is by using *Bacillus thuriengiensis*, cyfluthrin and diflubenzuron (Basri *et al*., 1991). Various insecticides have been used to control the bunch moth but these chemicals are hazardous to beneficial insects such as pollinating weevil *Elaeidobius kamerunicus*, parasitoids and predators.

MATERIALS AND METHODS

Bunch moth populations were studied at three different locations in Sarawak based on the methods described by Zulkefli *et al*. (2012). Because of time constrains, the sampling periods were not done the same time however, most of them were conducted at the end of the year during high rainfall while one sampling conducted during dry period.

Samples of male inflorescences (post anthesis - moist), female inflorescences (post anthesis) and young bunches with

fresh frass (moist and reddish) were selected from the infested oil palm plantation. These visual inspections served as the basic indicator of the infestation stage before the actual counts of larvae on the specific samples were conducted. Samples of male inflorescences were only included during the census at Sibu because on a few observations a high population of early stages was detected on the post anthesis spikelets. Each male inflorescence was cut at the bottom of the spikelet to facilitate the collecting and counting of bunch moth larvae on aluminium tray. Each larva was sorted to its stage of development.

The female inflorescences and young bunches (<I month) were collected from the infested area. Samples with less frass and damage on the fruit surface were eliminated from the sampling. In the areas where the infestation was low, shiny fruitlets gave indication that the number of live bunch moth larvae in the samples would also be low. Later, the samples were chopped to determine the live bunch moth larvae and pupae. All the inflorescences or fruitlets were placed on the aluminium trays to facilitate the collecting and finding of the live larvae and pupae. Care was taken to check at the bottom of each fruitlet or flower.

The first sampling was conducted in Miri, Sarawak. Sampling was conducted on 18 month- old palms planted on peat soil. This area was chosen because no treatment to control the bunch moth was done in the area. Three developmental stages of female inflorescences (pre, at and post anthesis) and young bunches were selected for the study. The same procedures as mentioned above were applied to determine the bunch moth population.

The second sampling was conducted at Mukah, Sarawak. The sampling was conducted on 5 year-old palms at five different plots. In each plot, four female inflorescences and twelve bunches were selected to determine the levels of infestation. A total of 20 female inflorescences and 60 young bunches were selected to determine the bunch moth population in the area.

The final sampling was conducted in Sibu, Sarawak on young palms from ablation carried out by the plantation. Bunches, female and male inflorescences were collected. Two censuses were conducted during the sampling. The first census was carried out on the first day of ablation, and the second census on samples of second day after ablation which were left by the road side. The same procedures were applied in determining the infestation number of bunch moth larvae.

RESULTS AND DISCUSSION

Census on three different stages of female inflorescences and young bunches in Miri, Sarawak recorded the highest mean number of live bunch moth larvae found on post anthesis female inflorescences, with mean number of 8.0 ± 1.91 (Table 1). The mean number of live bunch moth larvae on young bunches recorded was 4.79 ± 0.55 (Table 1).

Table 1. Mean live bunch moth larvae from infested female inflorescences and bunches from 18 months old palm in Miri, Sarawak

Inflorescencestage	n	Live bunch moth larvae Mean ± SE	Range
Pre - anthesis	17	5.20 ± 1.35	0 - 23
Anthesising	16	7.56 ± 1.97	0 - 27
Post - anthesis	14	8.0 ± 1.91	1 - 21
Bunch	70	4.79 ± 0.55	0 - 18

Population study at Mukah on highly infested area recorded 60 live larvae as the highest number of live bunch moth larvae from young bunch and 50 live larvae from female inflorescences (Table 2). High numbers of live bunch moth larvae were detected from young bunches in plots 2 and 4.

Based on 80 samples, 10% of infested female inflorescences and 11.7% of infested bunches were absent of bunch moth larvae. Two days of census on ablation bunches and inflorescences recorded high number of bunch moth larvae on male inflorescences. A total of 207 live bunch moth larvae were recorded as the highest number from 23 samples (Tables3 and 4). Census at Sibu, Sarawak showed that the highest infestation number of *T. rufivena* found in male inflorescences at both first and second day of ablated samples with mean densities were 35.3 ± 15.7 (Table 3) and 14.0 ± 7.3 (Table 4).The number of live larvae found in male inflorescences ranged from 1 – 207 per inflorescence (Table 4) and 0 – 65 per inflorescence (Table 4). The infested bunches and female inflorescences on the first day recorded the mean density of 9.9± 3.5 and 19.4 ± 4.4, respectively.

On the second day of ablation, samples of infested female inflorescences still had a high infestation with bunch moth larvae recording the mean density of 12.7 ± 2.8 with the live larvae ranging from 3 – 34 per inflorescence (Table 4). Meanwhile, lower infestation number was found on bunches with the mean density of 4.8 ± 1.5 and live larvae ranging from 0 – 15 per bunch (Table 4).

Table 2. Mean live bunch moth larvae from infested female inflorescences and bunches from Mukah, Sarawak.

Location	Female inflorescence			Young Bunch		
	n	Mean ± SE	Range	n	Mean ± SE	Range
Plot 1	4	27.0 ± 8.93	11 - 49	12	12.25 ± 2.99	0 - 35
Plot 2	4	18.75 ± 6.29	0 - 27	12	21.25 ± 5.06	2 - 60
Plot 3	4	6.50 ± 4.63	0 - 20	12	6.08 ± 2.09	0 - 22
Plot 4	4	11.25 ± 6.03	2 - 29	12	18.50 ± 5.37	0 - 60
Plot 5	4	25.25 ± 10.30	1 - 50	12	12.50 ± 3.67	0 - 41

Table 3 Mean live bunch moth larvae on day one at Sibu, Sarawak (ablation).

Source	n	Live bunch moth larvae Mean ± SE	Range
Female inflorescence	13	19.4 ± 4.4	0 – 39
Male inflorescence	12	35.3 ± 15.7	1 – 207
Bunch	10	9.9 ± 3.5	1 – 30

Table 4 Mean live bunch moth larvae on day two at Sibu, Sarawak (ablation).

Source	n	Live bunch moth larvae Mean ± SE	Range
Female inflorescence	10	12.7 ± 2.8	3 – 34
Male inflorescence	10	14.0 ± 7.3	0 – 65
Bunch	12	4.8 ± 1.5	0 – 15

CONCLUSION

Early detection and regular census are important to prevent severe infestation of *T. rufivena*. Once the pest has established infestation, various stages of development of the palm will be attacked. Visual observation of infested bunches, based on pitted fruitlets and bunches covered with fresh frass, sometimes does not reflect the actual number of live larvae of bunch moth. A high number of early stage bunch moth larvae were detected

on post anthesis male inflorescences. The current practice does not consider the male inflorescences in the management of

bunch moth; this may have to change. The common method is to treat the female inflorescences and the infested bunches only. Selective treatment is recommended at this stage because the male flowers also harbours the breeding sites for the pollinating weevil. Treatment with biological agents (i.e. *Bacillus thuringiensis*) is needed to control the population especially at the early stage.

Good sanitation practices are important in reducing the bunch moth infestation. The census done at Sibu has shown that the infestation number of live *T. rufivena* was still high even after two days of leaving the infested materials along the road side. Infested bunches, male and female inflorescences should be destroyed to reduce the infestation. Reducing their breeding sites will correspondingly reduce their chances of infesting new inflorescences that will eventually lead to abortive bunches.

ACKNOWLEDGEMENTS

The authors wish to thank the Director- General of MPOB, Datuk Dr. Choo Yuen May for her permission to publish this paper. They also would like to thank the Entomology staff at MPOB Lahad Datu, MPOB Research Station Sessang and Mr Siaw Ting Chuan for their assistance in conducting this study. Finally, to the managers of Tinbarap 9 Estate, Zumida Estate and Ta Ann Pelita Igan, Sarawak for permission to conduct this study in their plantations.

REFERENCES

Basri, M.W., Norman, K., Idris, A.S., Ariffin, D., Shamala, S., Ramle, M. & Ramlah, S.A.A. 2003. *Handbook of Pest and Diseases of Oil Palm*. Bandar Baru Bangi: MPOB.

Basri, M.W., Mukesh, S. & Norman, K. 1991. Field evaluation Khoo, K.C., Peter, A.C.O. & Ho, C.T. 1991. *Crop Pest Management in Malaysia*. Kuala Lumpur: Tropical Press Sdn. Bhd.

Lim, K.H. 2012. *Integrated pest management of Tirathaba bunch moth on oil palm planted on peat*. *The Planter* 88 (1031): 97-104

Turner, P.D. & Gillbanks, R.A. 2003. *Oil Palm Cultivation and management*. Edisi ke-2. Kuala Lumpur: The Incorporated Society of Planters.

Wood, B.J. & Ng, K.W. 1974. Studies on the biology and control of the oil palm bunch moth, *Tirathaba mundella* (Walker) (Lepidoptera: Pyralidae). *Malaysian Agricultural Journal* 49(3): 310-311.

Zulkefli, M., Norman, K., Ramle, M. & Basri, M.W. 2012. Integrated pest management of termite and bunch moth in oil palm planted on peat in Malaysia. *Proceeding of the Fourth MPOB-IOPRI International Seminar: Existing and Emerging Pests and Diseases of Oil Palm Advances in Research and Management*.