# NOTES ON TWO MINOR INSECT PESTS IN THE HIGHLANDS REGION

E.S.C. Smith[1]


## ABSTRACT

*Notes on two minor pests in the Highlands Region of Papua New Guinea are presented. The distribution, life history and plant damage caused by* Ragwelellus festivus *(Miller) (Heteroptera: Miridae), a potential pest of several plant species and of* Omiodes indicata *(F.) (Lepidoptera: Pyralidae) a defoliator of field crop, garden and pasture legumes is briefly described.*


***Key words***: *Papua New Guinea, Entomology,* Ragwelellus, Omiodes, *legumes.*

## *RAGWELELLUS FESTIVUS*

### INTRODUCTION

*Ragwelellus festivus* (Miller) (Heteroptera: Miridae) was first described (Miller 1954) from specimens collected in 1953 on experimental plots of cinchona (*Cinchona calisava* var. *ledgeriana*). At that time, cinchona was being considered as a tree crop for the production of the anti-malarial drug quinine but after synthetic anti-malarial derivatives were developed, the pest status of *R. festivus* diminished. During 1976, breeding populations of this mirid were noted on guava (*Psidium guajava*) and non-plucking tea (*Camellia sinensis*) at the Highlands Agricultural Experiment Station (HAES), Aiyura and were also present on the old cinchona trees there.

### TAXONOMY AND DISTRIBUTION

*Ragwelellus festivus* (Miller, 1954)
*Eucerocoris festivus* Miller, 1954:703
*Eucerocoris* (*Eucerocoris*) *festivus* Odhiambo, 1962:314.
*Ragwelellus* (*Narinellus*) *festivus* Odhiambo, 1965:21.

The species was first described and the genitalia illustrated by Miller (1954) but further descriptions were given by Odhiambo (1962) when the latter proposed two subgenera for *Eucerocoris*. Later, *Ragwelellus* was raised to full generic rank (Odhiambo 1965) and Carvalho (1981) further described and provided illustrations of genitalia for the eight species of this genus in Papua New Guinea.

*R. festivus* is widely distributed within the mainland of Papua New Guinea (PNG) and has been collected from the four Highland Provinces in addition to the Morobe and Oro Provinces (Carvalho 1981) at elevations of below 150 m to 2250 m. It is probable that its range extends to other Provinces and into Irian Jaya.

### DESCRIPTION AND LIFE HISTORY

*R. festivus* is an elongate, fragile mirid, reddish-brown in colour. Adults are 7-8 mm long, 1.4-1.7 mm wide and have 4 segmented antennae longer than 11 mm. They are quite mobile but were easily collected on host trees while the nymphs attempted to escape by movement around or under a leaf. All stages were collected from guava, tea and cinchona. The eggs which were embedded in the mid-ribs of recently expanded leaves, had an incubation period of 24-25 days. Immature stages, all of which feed on soft flush tissue, passed through five nymphal stages over a five week period and the males developed slightly faster than females. Pre-oviposition pe-

[1] Highlands Agricultural Experiment Station, Aiyura, Eastern Highlands Province, Papua New Guinea.
Present address: Entomology Branch, Department of Primary Industry and Fisheries, P.O. Box 990, Darwin, Northen Territory, 0801, Australia.

riod was 6-8 days and the total generation time about 10 weeks under ambient conditions at Aiyura (6°19'S; 145°55'E; 1550 m elevation) (Table I). In cage studies, adults survived at least four weeks and females laid up to 15 eggs although natural fecundity was probably higher.

## PLANT DAMAGE AND ECONOMIC SIGNIFICANCE

On cinchona the damage to soft flush tissue appeared slight but damage to guava was occasionally severe and caused the death of tissue, leaf wrinkling and distorted growth. When feeding occurred on developing guava fruits, extensive scabbing, enough to make the fruit unmarketable, resulted. Attack to the soft flush leaves and young shoots of tea bushes frequently killed them or deformed subsequent growth. Caged adults readily fed on the mid-ribs and laminae of young leaves of avocado (*Persea americana*) but no natural infestation was observed.

The species was originally described as a pest of cinchona but has now emerged as a moderate-severe pest on guava and has been found to attack tea bushes. However, it is unlikely that *R. festivus* will develop into a significant pest of tea in the Highlands of PNG since the eggs and immature insects along with the flush tissue would be removed during the regular plucking rounds. The species undoubtedly feeds on the soft flush tissue of native host trees in the forest in the absence of cultivated hosts. One such unidentified shrub was located in the primary forest above Aiyura.

# *OMIODES INDICATA*

## INTRODUCTION

The cosmotropical pest, Omiodes indicata (F.) (=*Hedyleptaindicata*) (F.) (Lepidoptera: Pyralidae) is a minor pest of field crop, garden and pasture legumes in the highlands, Markham Valley and Wau areas of PNG. In lowland areas, the pest is usually adequately controlled by parasites (Young 1984) but the insect has recently increased both in importance and range within the country. After moderate damage to soybean, a crop which has been promoted as a high protein food for institutions (Bourke 1978), observations on the life history, damage and control of this pest were conducted at HAES, Aiyura during 1976-77.

## TAXONOMY AND DISTRIBUTION

***Omiodes indicata*** (Fabricius, 1775)
*Phalaena indicata* Fabricius, 1775:640.
*Hedylepta vulgalis* Guenee,1854:202, pl.6, fig.8.

*Omiodes indicata* is a widely distributed species of the large pyralid subfamily Pyraustinae and is currently placed in the Spilomelini. The species has been named independently by several authors but the species-group names *indicata Fabricius* and *vulgalis* Guenee are the most widely used names. The species has until recently been placed in the genus *Hedylepta* Lederer, 1863, by almost all authors but Munroe (1983: 74) has placed *Hedylepta* in synonymy with *Omiode* Guenee, 1954. Munroe (1983) provides a detailed list of both genus-group synonyms of *Omiodes indicata*. No modern taxonomic account is available for this group.

## DESCRIPTION AND LIFE HISTORY

Adults are medium sized moths, yellow-orange in colour with three black bands on the forewings and two on the hindwing. Females may lay over 300 eggs on the lower leaf surfaces and these hatch in 3-5 days (Kapoor *et al.* 1972, Bortoli *et al.* 1982 a). The larvae, which are green with blackish head capsules, passed through four instars over an 18-24 day period under ambient conditions at HAES, Aiyura. Pupation took 7-14 days (mean 10.21 ± 1.12 for females; 10.34 ± 1.18 for males) and the pre-oviposition period 4-5 days. The generation time occupied 5-6 weeks at Aiyura and the sex ratio was very close to 1:1. The adults survived for 7-10 days when offered 5% sucrose solution.

## HOST AND PLANT DAMAGE

The moth was reared from nine pasture species, five garden legumes and four grain legume species grown as field crops (Table 2).The feeding sites were readily noticeable as silvery

*Table 1.* **Duration of life history stages of *R. festivus* on tea bushes at Highlands Agricultural Experiment Station, Aiyura.**

| STAGE | NUMBER OF SPECIMENS RECORDED | RANGE (days) | MEAN (days) | STANDARD DEVIATION |
|---|---|---|---|---|
| Egg | 38 | 17-31 | 24.55 | 3.93 |
| 1st instar | 19 | 3-9 | 5.95 | 1.50 |
| 2nd instar | 30 | 4-9 | 6.40 | 1.65 |
| 3rd instar | 12 | 5-8 | 6.75 | 0.97 |
| 4th instar | 9 | 5-7 | 5.67 | 0.85 |
| 5th instar | 5 | 9-12 | 10.40 | 1.14 |

areas on host plants. Larvae webbed the leaves of host plants together with silk threads and within the shelters so constructed, fed on the parenchyma layers of the leaves leaving only the epidermal membranes. In heavily infested soybean crops, every plant had at least one *O. indicata* larvae and some had 20 or more feeding sites, but the loss of photosynthetic area was rarely significant.

## CONTROL

**Parasites.** Larvae and pupae of *O. indicata* were collected from soybeans between October and December 1976. These were held in a laboratory at 15-28°C for pupation, parasite or moth emergence. The results, tabulated in Table 3, show that 69.1% of the 529 *O. indicata* collected emerged as moths, 18.7% were parasitised and 12.1% failed to produce adult organisms.

***Apanteles iulis*** Nixon (Hymenoptera: Braconidae) was by far the most numerous parasite. It attacked *O. indicata* larvae and as the host pupated, the parasite emerged to spin white silken cocoons beside the remains of the host pupa. On each host 2-11 *A. iulis* pupae were produced (mean 6.90 ± 1.90) and the adults emerged after a pupal period of 6-12 days (mean 8.70 ± 2.11 for females; but significantly longer ($p < 0.001$) at 8.87 ± 1.10 for males). Similarly, *Bracon* sp. (Hymenoptera: Braconidae) parasitised the larval hosts and emerged as adults from the host pupae. These parasites emerged 10-12 days (mean 11.6; N=5) after the *O. indicata* larvae pupated.

One specimen of *Compsilura concinnata* Meigen. (Diptera: Tachinidae) was also reared from a moth pupa collected as a larva.

In addition, a single specimen of the hyperparasite *Stictopisthus* sp. (Hymenoptera: Ichneumonidae) emerged from an *O. indicata* pupa but it is not known which of the above parasites it attacked.

During February 1977, three larvae of *O. indicata* were collected from wing bean plants at Aiyura. All were parasitised by *A. iulis.*

**Chemical.** Although *O. indicata* must be regarded as only a minor pest of legumes in the highlands region, a small unreplicated spray trial was conducted. Results showed that a 0.15% trichlorfon spray at 7-10 day intervals, beginning a week before flowering, would give satisfactory control and that yields of soybeans were not reduced by the feeding damage. It was also shown that 0.10% carbaryl sprays had a phytotoxic effect on soybeans of the NG 4661 variety.

*Table 2.* **Recorded host plants of *O. indicata* at Aiyura.**

| SPECIES | COMMON NAME |
|---|---|
| *Arachis hypogaea** | Peanut |
| *Cajanus cajan* | Pigeon pea |
| *Centrosoma pubescens* | butterfly pea |
| *Desmodium intortum* | Green leaf desmodium |
| *Desmodium uncinatum* | Silver leaf desmodium |
| *Galactia tenuiflora* | - |
| *Glycine max* * | Soy bean |
| *Glycine wightii* | Vars. Copper, Tinaroo |
| *Macrotyloma axillare* | Archer Dolichos |
| *Mucuna pruriens** | Velvet bean |
| *Phaseolus lanatus* | Lima bean |
| *Phaseolus vulgaris* | String bean |
| *Pisum sativum** | Pea |
| *Psophocarpus tetragonolobus** | Winged bean |
| *Rhynchosia minima* | – |
| *Vigna parkeri* | Vigna |
| *Vigna radiata** | Mung bean |
| *Vigna unguiculata* | Cowpea |

* The species ( as *Diaphania indica* (F.) ) has also been reported from these host plants at low or mid-altitude regions by Young (1984).

*Table 3.* **Fate of 529 *O. indicata* collected as larvae or pupae at Highlands Agricultural Experiment Station, Aiyura.**

| | NUMBER COLL. | % OF TOTAL | TOTAL NO. PARASITES | % FEMALE MOTHS |
|---|---|---|---|---|
| Emerged as adult *O. indicata* | 366 | 69.1 | | 49.4 |
| Failed to develop | 64 | 12.1 | | |
| Parasitised by *A. iulis* | 96 | 19.1 | 662 | 41.2 |
| Parasitised by *Bracon* sp. | 2 | 0.4 | 5 | _ |
| Parasited by *C. concinnata* | 1 | 0.2 | 1 | _ |

## DISCUSSION

The *O. indicata* life cycle recorded was similar, although slightly longer, to that found elsewhere (e.g. Bortoli *et al.* 1982 a) probably due to the cooler temperatures experienced at the (0.3 m altitude of Aiyura. In India, Rawat and Singh (1980) reported that although the pest was active throughout the year, soybeans were more heavily infested during the cooler season.

It is certain that many other legumes, of which about 500 species are known from PNG (Verdcourt 1979), are utilised as hosts (for example, (Young 1984) recorded *Medicago sativa* from the lowlands).

In subsistence farming systems, the rates of parasitism may be higher than those recorded here because the plant hosts and pests may be more widely distributed in space and time. It is also possible that the sampling conducted may have underestimated parasitism because some larvae, collected unparasitised, may have been stung if they had remained in the field. Similarly, rates may have been higher at times other than this due to seasonal conditions.

In addition to the natural enemies of *O. indicata* listed in Table 3, *Aphanogmus* sp. nr. *fijiensis* Ferriere (Hymenoptera: Ceraphronidae) has been reared from a pupa collected in the lowlands of Papua New Guinea. It is possible that this species is a hyperparasite of *C. concinnata* or of *Peribaea* spp. (Diptera: Tachinidae) since many of this family are thought to be parasitic on Diptera (CSIRO 1970) and *P. aegyptia* has been reared from *O. indicata* and is found, along with *P. alternata* in the highlands region (Shima 1981). Worldwide, the level of parasitism varies widely, with rates ranging from 1.7-11.9% in the Philippines (Litsinger *et al.* 1978), 8.7% in Brazil (Bortoli *et al.* 1982 b) and over 85% by a single species in Colombia (Garcia 1975). If parasitism rates are high, chemical control is seldom justified (Schoonhoven 1978), but since several workers have conducted spray trials (e.g. Garcia 1971, Rawat and Singh 1980), it is obvious that (as at Aiyura), effective biological control does not occur in all crop growing areas.

## ACKNOWLEDGEMENTS

I am grateful for the assistance of Mr. B. Keoro in these studies and acknowledge the comments on the leguminous host plants and *Peribaea* spp. from Dr. B. Verdcourt (Kew Gardens) and Dr. H. Shima (Kysushu University) respectively. I am also indebted to Dr. E. S. Nielsen (Australian National Insect Collection) who very kindly explained the nomenclature of *O.indicata.*

**REFERENCES**


BORTOLI, S.A.de, PARRA, J.R.P. and LARA, F.M. (1982a). Aspects of the biology of *Hedylepta indicata* (Fabricius, 1775) (Lepidoptera-Pyralidae) on soybean (*Glycine max* (L.) Merrill), under laboratory conditions. *Anais da Sociedade Entomologica do Brazil* 11(1):23-32. (Sighted as an abstract in RAE A 71(10):7090).

BORTOLI, S.A.de, PARRA, J.R.P. and LARA, F.M. (1982b). Parasitism in *H. indicata* (Fabricius, 1775) (Lepidoptera-Pyralidea) in the region of Jaboticabal, SP. *Anais da Sociedade Entomologica do Brazil* 11(1):167-168. (Sighted as an abstract in RAE A 71(10:7094).

BOURKE, R.M. (1978). Growing food in the Lowlands. *Harvest* 4(3):132-147.

CARVALHO, J.C.M. (1981). The Bryocorinae of Papua New Guinea (Hemiptera, Miridae). *Arquivos do Museo Nacional, Rio de Janeiro* 56:35-89.

CSIRO. (1970). The insects of Australia. Melbourne University Press, Melbourne, 1970. 1029 pp.

GARCIA, C. (1971). Control del pegador de hojas y de la mosca de los brotes del pallar. *Boletin de Menestras* 19, Min Agric.Y Pesqueria, Peru, 5 pp. (Cited from SCHOONHOVEN 1978).

GARCIA, F. (1975). Plagas de la soya. in... El cultivo de la soya en Colombia. *Inst. Colomdiano Agrop. (ICA) Compendio.* p. 37-67. (Cited from SCHOONHOVEN 1978).

KAPOOR, K.N, GUJRATI, J.P. and GANGRADE, G.A. (1972). Bionomics of *Lamprosema indicata* Fabricius (Lepidoptera: Pyralidae), a pest of soybeans in Madhya Pradesh. *Indian Journal of Entomology* 34:102-105.

LITSINGER, J.A., QUIRINO, C.B., LUMABAN, M.D. and BANDONG, J.P. (1978). The grain legume pest complex of rice based cropping systems at three locations in the Philippines. pp.309-320 in ... SINGH, S.R., VAN EMDEN, H.F. and AJIBOLA TAYLOR, T. (Eds.) Pests of Grain Legumes: Ecology and Control. Academic Press, London. 1978. 454 pp.

MILLER, N.C.E. (1954). Two new species of Miridae (Hemiptera: Heteroptera). *Bulletin of Entomological Research* 45(4):703-705.

ODHIAMBO, T.R. (1962). Review of some genera of the subfamily Bryocorinae (Hemiptera: Miridae). *Bulletin of the British Museum (Natural History) Entomology* 11(6):247-331.

ODHIAMBO, T.R. (1965). A new interpretation of Westwood's genus Eucerocoris (Hemiptera, Miridae). *Proceedings of the Royal Entomological Society of London.* Series B. 34(1-2):20-22.

RAWAT, R.R. and SINGH, O.P. (1980). Studies of the seasonal activity, host-plants, damage and chemical control of *H. indicata*. *Indian Journal of Plant Protection 8(2):133-136.*

SCHOONHOVEN, A. VAN. (1978). Pests of beans in Latin America and their control. p.151-165 in...SINGH, S.R., VAN EMDEN, H.F. and AJIBOLA TAYLOR, T. (Eds.) Pests of Grain Legumes: Ecology and Control, Academic Press, London. 1978. 454 pp.

SHIMA, H. (1981). Description of a new species of *Peribaea* from New Guinea, with notes on *Peribaea orbata* (Diptera: Tachinidae). *Pacific Insects* 23 (3/4):445-450.

VERDCOURT, B. (1979). A manual of New Guinea legumes. *Botany Bulletin* No. 11. Office of Forests, Division of Botany, Lae, Papua New Guinea. 645 pp. 1979.

YOUNG, G.R. (1984). A checklist of mite and insect pests of vegetables, grain and forage legumes in Papua New Guinea. *Papua New Guinea Journal of Agriculture, Forestry and Fisheries 33* (1-2):13-38.