QUEENSLAND DEPARTMENT OF PRIMARY INDUSTRIES
DIVISION OF PLANT INDUSTRY BULLETIN No. 557

LARVAL HABITS, HOSTS AND DISTRIBUTION OF ISOTENES MISERANA (WALKER) IN QUEENSLAND

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SUMMARY

The larvae of *Isotenes miserana* web together young terminal leaves of shoots and damage growing points. Potential pest status is shown on macadamia, on which leaves, flowers and fruit may be damaged.

The insect is native to Queensland and has a wide distribution in this State. A detailed list of native and introduced hosts is given.

I. INTRODUCTION

The moth of *Isotenes miserana* (Walk.) was described from Moreton Bay, Queensland, by Walker (1863). This insect has not previously been noted in literature as a pest in this State, although occurrences on various native timber species in forest plantations were recorded in 1937 by A. R. Brimblecombe in Departmental reports. In recent years, however, the insect has been common on species of *Macadamia* being grown commercially in south-eastern Queensland and on these potential pest status has been shown. Damage is caused to leaves, flowers and fruit.

II. LARVAL HABITS

On macadamia the larva of *I. miserana* web together young terminal leaves of shoots. By rolling these over each other the larvae provide themselves with shelter within their food.

Feeding occurs on the leaves and damage is also caused to the growing points. The terminal shoots of young trees thus may be killed and the plants become stunted and bunched in appearance due to the growth of side shoots. Injury to terminals on older trees is not of such serious consequence.

The larvae also attack macadamia inflorescences by feeding on buds drawn into a silken shelter. When the floral parts are spent the larvae continue to feed by gouging out the newly set fruit. As the fruit develop and while the testa is still soft the larvae may bore well into them and feed on the kernel. This kind of feeding, however, is no longer possible after the testa hardens to form the shell, and the larvae then either erode the outer surface of the perianth or tunnel into and feed on the internal fleshy white layer surrounding the shell. Damaged fruit usually fall but often these remain attached to the rachis or other fruit by the fine silken shelters constructed by the larvae.

Subsequent infestations from overlapping generations make use of these existing tunnels and numerous larvae of various instars may occur together on one raceme. These protective tunnels are distinct from those of other lepidopterous macadamia pests in being completely free of excreta.

Similar habits of terminal leaf rolling are shown on the other host plants of this insect, but the pattern varies with the size and shape of the young leaves and shoots—e.g. of such plants as *Agathis robusta, Araucaria cunninghamii* and *Grevillea robusta.*

Damage to citrus is caused by boring into the young fruit, usually on the basal part near the sepals or where two fruit are in contact. Damage can also occur in flower clusters and even well-grown fruit may be penetrated.

In southern Queensland specimens have been collected in every month of the year. Periods of most common occurrences appear to be March to May, October to November and in January. Adults have been reared from field-collected material on macadamia in every month, indicating that successive generations take place on this host throughout the year.

III. DEVELOPMENTAL STAGES

Egg.—The eggs of *I. miserana* are lime-green in colour, flattish in shape and laid overlying each other in a cluster.

Larva.—In early instars the larva of *I. miserana* is greyish white, with a brown head capsule and thoracic shield and a pair of light brown dorso-lateral longitudinal stripes.

The mature larva is up to 24 mm long. The head capsule is dark brown, with the front whitish grey. The prothoracic shield is dorsally yellow-brown in colour, with lateral dark brown suffusions and a light grey anterior margin. The general body colour of the larva is brown to greenish-brown dorsally and a light grey to cream ventrally. Two dorso-lateral longitudinal brown stripes extend from the mesothorax to the anal claspers and enclose a greyish brown mid-dorsal band. On both the mesothoracic and the metathoracic segments there is a dorsally situated, dark brown, transverse stripe. This stripe is usually more prominent on the mesothorax. In general, the setae are inconspicuous and a light brownish grey in colour. The larva has four pairs of whitish-grey abdominal prolegs and brown to dark-brown thoracic legs.

Pupa.—Pupation occurs in a cocoon within the protective silken shelter where the larva has been feeding. The pupa is up to 12 mm long and at first light yellow and greenish-brown, later changing to uniformly dark brown. When the moth emerges the pupal cocoon is left protruding from the silken larval shelter.

Adult.—The moth is light grey with grey flecks and has a wing span of 15–25 mm.

IV. DISTRIBUTION

In addition to Queensland, *I. miserana* is known to occur in New South Wales (Moore 1963; Hely 1968) and some other parts of Australia (Common 1963). This insect is also recorded from Java and Assam (Meyrick 1910) and from Formosa and India (Fletcher 1920). Queensland records are as follows:—

Agathis palmerstoni F. Muell., feeding on nursery seedlings, Wongabel, June 1933, and Wongabel and Gadgarra, Oct. 1938, A. R. Brimblecombe; Beerwah, 1.iii.1961; reared, Danbulla, 3.i.1964, G. W. Saunders; reared from larvae damaging terminals of first and second year plantation trees, pupal period 10 and 11 days, adults emerged 15 and 16.v.1941, Wongabel, 29.iv.1941, A. R. Brimblecombe. *Agathis robusta* C. Moore, reared from larvae damaging terminals of first and second year plantation trees, Imbil, May 1937, A. R. Brimblecombe; reared from larvae damaging terminals of first and second year plantation trees, pupal period 10 days, Wongabel, 30.iv.1941, A. R. Brimblecombe. *Ageratum conyzoides* L., reared, Nambour, 24.iii.1959, T. H. Kirkpatrick. *Araucaria cunninghamii* D. Don, reared larvae damaging terminals of first and second year plantation trees, Imbil, May 1937, A. R. Brimblecombe; reared larvae damaging terminals of first and second year plantation trees, pupal period 10 and 12 days, Wongabel, 30.iv.1941, A. R. Brimblecombe. *Callistemon viminalis* (Soland. ex Gaertn.) Cheel, reared larva on terminal foliage, Beerwah, 2.xii.1966, D. A. Ironside. *Camellia japonica* L., reared larvae damaging flowers, Nambour, 1.xi.1956, W. A. Smith. *Carya illinoinensis* (Wagenh.) Koch, reared larvae, Nambour, 11.iii.1966, J. J. Davis. *Cedrela toona* Roxb. var. *australis* C.DC., reared larvae damaging terminals of first and second year plantation trees, pupal period 9 and 10 days, adults emerged 18.v.1941, Wongabel, 30.iv.1941, A. R. Brimblecombe; Imbil, 5.i.1944, A. R. Brimblecombe. *Citrus limon* Burm.f., rolling leaves of tree, Toowong, Sept. 1947, H. Jarvis. *Citrus sinensis* Osbeck, attacking fruit, Maryborough, Burrum and Howard, May 1950, A. R. Brimblecombe; Caboolture 16.i.1962, B. R. Champ; reared from larva damaging fruitlet, Palmwoods, 12.x.1963, H. G. Greening; reared from larva on young damaged fruitlets, Palmwoods, 12.x.1959, W. A. Smith. *Citrus* sp., larva on mature fruit, Palmwoods, 21.viii.1958, W. A. Smith; larvae on young fruit, Palmwoods, 24.x.1958, W. A. Smith; reared larvae damaging fruit, Palmwoods, 29.x.1963, J. J. Davis; reared larvae in fruit from shop, Toowong, 20.ix.1941, H. Jarvis; reared larvae on young fruit, Palmwoods, 29.x.1963, D. A. Ironside; reared larva, Nambour, 31.xi.1964, D. A. Ironside. *Eriobotrya japonica* Lindl., reared larvae in fruit, Bardon, 20.x.1954, E. M. Exley. *Eugenia uniflora* L., larva in fruit, Forest Glen, 25.ix.1960, H. G. Greening. *Ficus obliqua* Forst. f. var. *peteolaris* (Benth.) Corner, reared larva on terminal shoot, Burnside, Nambour, 18.iii.1966, D. A. Ironside. *Flindersia brayleyana* F. Muell., larvae damaging nursery seedlings, Gadgarra, Oct. 1938, A. R. Brimblecombe; reared larvae damaging terminals of first and second year plantation trees, pupal period 10 days, Wongabel, 30.iv.1941, A. R. Brimblecombe. *Fragaria* x *ananassa* Duchesne, reared from larva damaging fruit, Palmwoods, 27.vi.1956, W. A. Smith. *Grevillea robusta* A. Cunn. ex R. Br., reared larvae damaging terminals of first and second year plantation trees, pupal period 10 days, Wongabel, 30.vi.1941, A. R. Brimblecombe. *Ligustrum sinense* Lour., reared larvae feeding on foliage, rolling leaves, Nambour, July 1965, D. A. Ironside. *Macadamia integrifolia* Maiden & Betche, rolling young tip leaves, Nambour, 14.vii.1965, D. A. Ironside; rolling young leaves, Maroochy Horticultural Research Station, 16.vii.1965, D. A. Ironside; on terminal foliage, Maleny, 5.i.1966, J. J. Davis; on terminal foliage, Maleny, 20.v.1966, D. A Ironside; on young terminal foliage, Maroochy Horticultural Research Station, 3.v.1966 and 10.v.1966, D. A. Ironside; on flowers, Nambour, many collections, 1963-1966, D. A. Ironside; on flowers, Maroochy Horticultural Research Station, many collections, 1965-1966, D. A. Ironside; on flowers, Buderim, 2.viii.1965, D. A. Ironside; on flowers, Montville, 18.viii.1965, D. A. Ironside; reared from flowers, Palmwoods, 6.xii.1965, D. A. Ironside; on flowers, Mapleton, 8.iii.1966, D. A. Ironside; on flowers, Montville, 8.iii.1966, D. A.

Ironside; on flowers, Maleny, 15.iv.1966, D. A. Ironside; bred on flowers, Maleny, 6.v.1966, D. A. Ironside; on young nuts, Montville, 30.x.1964, D. A. Ironside, on newly set nuts, Maleny, 29.iii.1966, D. A. Ironside; reared pupa on young nuts, Montville, 25.v.1966, D. A. Ironside. *Macadamia tetraphylla* L. A. S. Johnson, young terminal foliage, Maroochy Horticultural Research Station, 27.i.1966, D. A. Ironside; reared larvae on flowers, Maleny, 18.ix.1963, D. A. Ironside; from nuts, Maroochy Horticultural Research Station, several collections, 1965-66, D. A. Ironside; on husk rind, Maroochy Horticultural Research Station, 10.i.66, D. A. Ironside; bred on nuts, Mapleton, 24.i.1966, D. A. Ironside. *Macadamia* species either *integrifolia* or *tetraphylla,* reared larvae damaging nuts, Toowong, Oct. 1939, A. R. Brimblecombe; in flower spikes, H. Jarvis; in flowers, Amamoor, 25.ix.1956, W. A. Smith; nuts, Maroochy Horticultural Research Station, 10.ii.1964, D. A. Ironside; on spent raceme, Beerwah, 17.xi.1964, J. J. Davis; mining young nuts, Nambour, 6.i.1965, D. A. Ironside. *Mangifera indica* L., stripping flowers, Eumundi, 7.xi.1958, W. A. Smith. *Melodorum leichhardtii* Benth., reared larva in fruit, Bunya Mts., 26.iv.1950, A. W. S. May; from fruits, Gregor's Creek, 10.ii.1950, 26.iv.1950, A. W. S. May. *Musa* spp. banana varieties Lady Finger and Mons Mari, reared larvae on fruit, Mapleton, 31.viii.1964, D. A. Ironside; eroding fruit rind, Tanawha, 21.ii.1966, J. J. Davis. *Persea americana* Mill., reared larvae tunnelling under and feeding on surface of fruit rind, Nambour, 1.vii.1965, D. A. Ironside. *Pinus khasya* Royle, reared larvae on nursery seedlings, Beerwah, November 1941, A. R. Brimblecombe. *Pinus patula* Schl. & Cham., reared larvae on nursery seedlings, Pechey, 5.vi.1941, A. R. Brimblecombe. *Prunus persica* (L.) Batsch., Pinkenba, 31.x.1955, R. Cannon; reared larva in fruit, Nambour, 21.xi.1966, J. J. Davis. *Vitex lignum-vitae* A. Cunn., reared larva from fruit, Yarraman, 24.iv.1950, A.W.S. May.

V. ACKNOWLEDGEMENTS

The author acknowledges the assistance of the Commonwealth Institute of Entomology, and of Dr. I. F. B. Common, C.S.I.R.O. Division of Entomology, in making identifications.

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(Received for publication May 26, 1970)

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