QUEENSLAND DEPARTMENT OF PRIMARY INDUSTRIES

DIVISION OF PLANT INDUSTRY BULLETIN No. 834

LEPIDOPTEROUS PESTS OF THE LITCHI IN NORTH QUEENSLAND

by R. I. STOREY, B.Sc.; and D. J. ROGERS, M.Agr.Sc.

SUMMARY

A list is given of 34 species of Lepidoptera feeding on litchi in northern Queensland, including notes on type of damage and months of activity. Records from outside of Australia are also reviewed.

I. INTRODUCTION

The litchi (*Litchi chinensis* Sonner, family Sapidaceae) is a subtropical fruit tree originating in China. In Australia, it is found from the New South Wales–Queensland border to Cairns in northern Queensland, mainly in residential gardens. However, the last few years have seen the development of a small litchi industry centred in the Cairns–Atherton Tableland region. By 1977, commercial plantings of around 5 000 trees with 24 growers had been established, with further expansion predicted (Anon, 1977). Cull and Hams (1974) give a thorough discussion of litchi growing in Queensland with descriptions of the tree and fruit.

In northern Queensland, the litchi is susceptible to attack from a variety of insect species. The larvae of various Lepidoptera are common, and since 1974 records have been kept of all species found damaging the tree and fruit. This paper is the result of the surveys and observations involved.

II. METHODS AND MATERIALS

Collection sites ranged from single trees to plantings of up to 200 trees. Sites were visited at intervals throughout the year and all lepidopterous larvae collected were reared to the adult stage in the laboratory for identification. Glass crystallizing dishes covered with a petri dish to prevent desiccation were the most suitable containers. Food material was replenished as necessary, and pupae were placed in small plastic containers until emergence of the adults. In fruit feeding species, the outer portion of the fruit was removed from the seeds to reduce fermentation and growth of moulds.

III. RESULTS

Table 1 shows the species identified, grouped according to family, locality, month in which they were found and the part of the tree damaged.

In respect of feeding behaviour, the species are divided into three categories: leaf, flower and fruit feeders. Each category is discussed separately. Some species were taken damaging leaves and flowers, or flowers and fruit, but no species were taken on both leaves and fruit, or on all three.

Only larvae which were successfully reared to the adult stage are included in the results because of the difficulties in identifying immature stages. Thus, some species, for example, *Achaea janata* (L) are more widespread than apparent in table 1, because of low survival levels of the reared larvae. Adult identifications were obtained for all specimens.

TABLE 1

LEPIDOPTERA ATTACKING LITCHI IN NORTH QUEENSLAND

Locality Abbreviations: BAB: Babinda; BB: Bingal Bay; INFAIL: Innisfail; ING: Ingham; JUL: Julatten; KAIRI: Kairi Research Station, Kairi; KAM: Kamerunga Research Station, Cairns; KUR: Koah Road, Kuranda; MAR: Mareeba; SO: Southedge Research Station, Mareeba; T: Tully; WALK: Walkamin Research Station, Walkamin; WR: White Rock, Cairns.

Family and Species	Localities	Months of Activity	Part of Plant Damaged
Tortricidae			
Acropolitis canana (Walker)	JUL	Nov.	Leaves
Adoxophyes templana (Pagenstecher)	WR	Nov.	Fruit
Cryptophlebia ombrodelta (Lower)	ING, MAR, KAIRI, SO, WR	Sep., Nov., Dec.	Fruit
Epiphyas postvittana (Walker)	T	Sep.	Leaves
Homona coffearia (Nietner)	JUL	Sep.	Flowers
Homona sp.	JUL	Sep.	Leaves
Isotenes miserana (Walker)	T, KAIRI, WALK, JUL, SO	Aug., Sep., Oct., Nov.	Leaves, flowers
Lobesia physophora Lower	WALK	Sep.	Flowers
Lobesia sp. 1	WR	Nov.	Fruit
Lobesia sp. 2	KAIRI, WALK, SO	Sep.	Flowers
Merophyas divulsana (Walker)	KAM, KAIRI	Jul.	Leaves, flowers
Platypeplus aprobola (Meyrick)	KAM, WALK, KUR, T	Jan., Mar., Jun., Jul., Sep.	Leaves, flowers
Cosmopterigidae			
Pyroderces dendrophaga (Meyrick)	KUR	Sep.	Fruit
Gelechiidae			
Anarsia sp.	WR	Nov.	Fruit
Hypatima ? baliodes (Lower)	JUL	Sep.	Leaves
Hypatima sp.	KAM, WALK	Jan., Jul., Mar.	Leaves
Pyralidae			
Cateremna quadriguttella Walker	WR, WALK	Mar., Nov., Dec.	Fruit
Dichocrocis punctigeralis (Guenée)	SO	Dec.	Fruit
Homoeosoma vagella Zeller	WR, MAR	Sep., Nov.,	Fruit, flowers
Phycita leucomilta Lower	SO, MAR, JUL	Sep. Nov.	Fruit, flowers
Tirathaba rufivena Walker	WR	Nov.	Fruit
Lycaenidae			
Anthene lycaenoides godeffroyi (Semper)	MAR	Aug.	Flowers
Deudorix epijarbas dido Waterhouse	JUL	Nov., Dec.	Fruit
Prosotas dubiosa (Semper)	MAR, SO	Aug., Sep.	Flowers
Prosotas nora alutes (Waterhouse and Lyell)	SO	Sep.	Flowers
Rapala varuna simpsoni (Miskin)	MAR	Aug.	Flowers

TABLE 1—continued

Family and Species	Localities	Months of Activity	Part of Plant Damaged
Geometridae			
Gymnoscelis lophopus Turner	KAIRI, SO	Sep.	Flowers
Prasinocyma albicosta (Walker)	WALK	Mar.	Leaves
Lymantriidae			
Orgyia australis Walker ..	WALK	Aug.	Leaves
Porthesia sp.	WALK	Apr., Aug.	Leaves
Noctuidae			
Achaea janata (L).	KUR	Mar.	Leaves
Eublemma versicolor (Walker)	SO	Sep., Nov.	Flowers, fruit
Hydrillodes lentalis Guenée	WR	Nov.	Fruit
Zalaca paurograpta (Butler)	SO, WALK, KAIRI, JUL	Sep., Nov., Mar.	Flowers

Leaf feeders

Ten species were taken feeding on the foliage. Young growth is preferred with very little or no feeding apparent on older leaves. A few species, such as *A. janata,* feed openly on the leaves. Most, however, fold or roll one or more leaves together, fastening the edges with silk, thus forming a shelter. The larva then feeds on the leaves of this shelter, moving on to fresh leaves as necessary. Leaf feeders are active throughout the year.

The most widespread species were *A. janata, Isotenes miserana* (Walker), *Platypeplus aprobola* (Meyrick), and *Hypatima* spp.

Flower feeders

The species which attack the flowers feed in a similar manner to leaf feeding species and some (for example, *I. miserana* and *P. aprobola*) have been found damaging both leaves and flowers. Each larva webs the florets of one or more flower spikes together, feeding from within this enclosure.

In northern Queensland, time of flowering varies with locality and also with tree variety. Flowering may occur from late June to late November, with flower feeding species active throughout this period.

The most common of the 15 species of flower feeders are *Phycita leucomilta* Lower, *Zalaca paurograpta* (Butler), and species of the genus *Lobesia.*

Fruit feeders

Thirteen species have been taken feeding on the litchi fruit. All feed on the large seed contained within each fruit by burrowing through the outer edible flesh. This causes the fruit to drop if young, or makes it unmarketable. Other insects (for example, *Protaetia fusca* (Herbst) and *Xylotrupes gideon* L. (Coleoptera:Scarabaeidae)) are often attracted by the exudate of an infested fruit and can cause further damage to the clusters. At least one of the species recorded (*Deudorix epijarbas dido* Waterhouse) is capable of damaging several fruit during its lifetime, moving from one to another as the seed is partially or completely eaten out. The most common species is *Cryptophlebia ombrodelta* (Lower). *P. leucomilta* and *Homoeosoma vagella* Zeller feed on both the flowering and fruit stages.

In addition, damage typical of fruit sucking moths (*Othreis* spp. and other Noctuidae) has been observed on many occasions. As the species involved has not been determined the record has been omitted from table 1.

IV. DISCUSSION

Table 2 lists all previous records obtained from the literature of Lepidoptera feeding on litchi. Five of these species were also recorded in this study and five more are different species of genera recorded in this study.

Many of the species recorded in Australia have been taken on other crops. The yellow peach moth *Dichocrocis punctiferalis* (Guenée), and the light brown apple moth, *Epiphyas postvittana* (Walker) are found on a variety of fruit and vegetable crops, while the lucerne leaf roller, *Merophyas divulsana* (Walker), is a pest of lucerne. *Homona coffearia* (Nietner), and the orange fruit borer, *I. miserana* are pests of citrus and a large number of pests of macadamia are recorded from litchi: macadamia flower caterpillar (*H. vagella*); macadamia nut borer (*C. ombrodelta*); *D. epijarbas; I. miserana, Cateremna quadriguttella* Walker; *Orgyia australis* Walker; *A. janata; Anarsia* sp; *Gymnoscelis lophopus* Turner; *P. aprobola; Lobesia* sp.; *Porthesia* sp. (Ironside, 1973 and unpublished D.P.I. records).

TABLE 2

RECORDS OF LEPIDOPTERA ON LITCHI FROM OUTSIDE AUSTRALIA (FROM LITERATURE)

Family and Species	Locality	Source
Tortricidae		
Adoxophyes cyrtosema Meyrick ..	China	Liu (1958; 1964)
Argyroploce leucaspis Meyrick ..	China, India	Liu (1964)
		Mishra and Pandey (1965)
Cacoecia tabescens (Meyrick) ..	China	Liu (1964)
Cryptophlebia illepida (Butler) ..	USA (Hawaii)	Popenoe (1920)
Cryptophlebia leucotreta (Meyrick) ..	South Africa	Marloth (1947)
**Cryptophlebia ombrodelta* (Lower) ..	China	Liu (1964)
	India	Popenoe (1920)
Cryptophlebia peltastica (Meyrick) ..	South Africa	Marloth (1947)
		Bradley (1952)
Eboda cellerigera Meyrick	China	Liu (1964)
**Epiphyas postvittana* (Walker) ..	USA (Hawaii)	Higgins (1917)
**Homona coffearia* (Nietner)	China	Liu (1964)
Lobesia aeolopa Meyrick	Taiwan	Sonan (1939)
Platynota stultana Walsingham ..	USA (Florida)	Dekle (1954 a; 1955)
**Platypeplus aprobola* (Meyrick) ..	China	Liu (1964)
	India	Singh (1971)
Tineidae		
Homosetia sp.	USA (Florida)	Dekle (1954 b)
Gracillariidae		
Acrocercops cramerella Snellen ..	China	Chang (1961); Liu (1964)
Lycaenidae		
**Deudorix epijarbas* Moore	China	Fullaway (1927); Djou (1938)
		Liu (1964)
Virachola isocrates F.	India	Pruthi (1936)
Geometridae		
Racheospila gerularia (Hubner) ..	USA (Florida)	Dekle (1954 a, 1955)
Saturniidae		
Automeris sp.	USA (Florida)	Dekle (1954b)
Notodontidae		
Schizura opomeae Doubleday ..	USA (Florida)	Dekle (1955)
Arctiidae		
Utethesia bella L.	USA (Florida)	Dekle (1954b)
Noctuidae		
Plotheia celtis Moore	India	Popenoe (1970)

* Species recorded from Australia in this survey.

Other alternative hosts are found in the native flora of the region, and include some of the most common Australian bush trees. *H. vagella, G. lophopus* and *Eublemma versicolor* (Walker) have been bred from *Grevillia* spp. (Proteaceae) in the Mareeba area and *G. lophopus* also from *Melaleuca* sp. (Myrtaceae) (Unpublished D.P.I. records).

The majority of the species listed in table 1 are of minor importance in an economic sense. The species which could require further study for control purposes are: *Hypatima* sp., *P. aprobola, I. miserana* and *Z. paurograpta* of the leaf and flower feeders, and *D. epijarbas dido* and *C. ombrodelta* of the fruit feeders. No significant damage by leaf feeders has been observed by the authors, so study should initially be concentrated on protecting the developing fruit and to a lesser extent the flowers.

V. CONCLUSION

Litchi is susceptible to attack by a wide variety of lepidopterous larvae in northern Queensland. These attack the trees at all stages of growth and reproduction. The species involved also occur on a variety of alternative hosts, including native trees and shrubs.

Thus it can be expected that as commercial plantings increase the incidence and extent of damage by lepidopterous larvae will also increase. Further studies on the biology of the various species involved, especially the major fruit and flower feeding species (*C. ombrodelta, D. epijarbas dido, Z. paurograpta, P. aprobola* and *I. miserana*), would be warranted if a viable industry is to develop.

VI. ACKNOWLEDGEMENTS

Mr K. H. Halfpapp, Dr I. C. Cunningham and Mr A. Blair, Department of Primary Industries, Mareeba, helped in the collection of the specimens.

Dr I. F. B. Common, C.S.I.R.O., Canberra and Mr B. K. Cantrell, Department of Primary Industries, Indooroopilly, identified specimens.

REFERENCES

BRADLEY, J. D. (1952).—Some important species of the genus *Cryptophlebia* Walsingham 1899, with descriptions of three new species (Lepidoptera, Olethreutidae). Bulletin of Entomological Research 43:679-689.

CHANG, C. C. (1961).—Studies of fruit shedding of lychee. *Journal of the Agricultural Association of China* 35:43-50.

CULL, B. W., and HAMS, F. D. (1974).—Litchi finds a new home in Queensland. *Queensland Agricultural Journal* 100 (12):579-603.

DEKLE, G. W. (1954a).—Insects on lychee. *Citrus Industry* 35 (8):4.

DEKLE, G. W. (1954b).—Some lychee insects of Florida. *Florida State Horticultural Society Proceedings* 67:226-228.

DEKLE, G. W. (1955).—Insects on lychees during the past year. *Florida Lychee Growers' Association Yearbook and Proceedings* 1955:29-30.

DJOU, Y. W. (1938).—Lychee fruits destroyed by *Deudorix epijarbas* (Lepidoptera: Lycaenidae). *Lingnam Science Journal* 17 (3):401-405.

FULLAWAY, D. T. (1927).—Notes on litchee insects. *Lingnam Agricultural Review* 4 (2): 173-174.

HIGGINS, J. E. (1917).—The litchi in Hawaii. *Hawaii Agricultural Experiment Station Bulletin* Number 44.

IRONSIDE, D. A. (1973).—Insect pests of macadamia. *Queensland Agricultural Journal* 99 (5):241-250.

LIU, S. K. (1958).—Life history and control of the citrus leaf roller (*Adoxophyes cyrtosema* Meyr) in Canton, China. *Acta Entomologia Sinica* 8 (4):293-316.

LIU, S. K. (1964).—Note on nine litchi flower and fruit borers in Kwangtung province. *Acta Entomologica Sinica* 13 (2):145-158.

MARLOTH, R. H. (1947).—The litchi in South Africa. *Bulletin of the Department of Agriculture, South Africa* Number 286.

MISHRA, S. C., and PANDEY, N. D. (1965).—Studies on the bionomics of *Argyroploce leucaspis* (Eucosmidae, Lepidoptera) (Summary) Review of Applied Entomolgy (1966) 54:216. *Labdev Journal of Science and Technology* 3 (2):126-127.

PAPENOE, W. (1920).—*Manual of Tropical and Subtropical Fruits.* Macmillan.

PRUTHI, H. S. (1936).—Report of the Imperial entomologist. Scientific Report, Institute of Agricultural Research, Pusa 1934–35:141-152.

SINGH, M. P. (1971).—Occurrence of *Platypepla aprobola* Meyr (Tortricidae, Lepidoptera on litchi (Litchi chinensis) in North Bihar. *Indian Journal of Entomology* 33 (1):98.

SONAN, J. (1939).—Insects injurious to the seeds of tea plants. (Summary Review of Applied Entomology (1939) 27:339 *Formosan Agricultural Review* 35 (1):38-45.

(Received for publication 31 August 1979)

The authors are officers of Entomology Branch, Queensland Department of Primary Industries. Mr Storey is stationed at Mareeba and Mr Rogers is stationed at Kingaroy.

1536—S. R. HAMPSON, Government Printer, Queensland