THE CURRENT STATUS OF FRUIT FLIES (TEPHRITIDAE) IN PAPUA NEW GUINEA

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ABSTRACT

An account of the present economic status of pest species of fruitflies (Tephritidae) in PNG is given. The species covered in the paper all belong to the Genus Bactrocera. The paucity of information on natural enemies and non-chemical control measures is highlighted.

INTRODUCTION

Papua New Guinea (PNG) has a large fruit fly fauna compared with other South Pacific Island countries and Australia. Over one hundred and sixty fruit fly species (Tephritidae: Dacinae) have been described (Drew, 1989). This list is incomplete and many more species remain to be determined. This is due to the fact that the survey conducted in the 1970's did not cover all provinces and as well, collections were made largely from male attractant traps (Methyl eugenol, Cue-lure and Willison's lure), to which some species do not respond at all.

Beside the introduced melon fly, *Bactrocera cucurbitae* Coquillett, which is widespread in the country, two other exotic species are recorded as present. They are the Queensland fruit fly, *Bactrocera tryoni* (Froggatt), three specimens of which were recorded from the Western Province (Drew, 1989) and *Bactrocera dorsalis* (Hendel), which was recently collected from male traps by the North Australian Quarantine Service (NAQS) from locations along the border of PNG and Irian Jaya. It is reported that the species of *dorsalis* complex collected from the border is the same as that recorded in Malaysia and Indonesia (Hancock-pers. comm. 1992). We assume that it is *Bactrocera* Taxon B species. Drew (1989) expressed doubts as to whether *B. tryoni* is an integral part of PNG's fruit fly fauna as no other recording has been made since at the sites nor from elsewhere in PNG.

The current work programme on the Collection and Handling of Infested Fruit for Host Records started two years ago. It involves collecting wild and cultivated fruits to determine species of fruit flies, host ranges, seasonal abundance, species of parasitoids and parasitism rates. Because of the scarcity of funds and manpower much of the activities are restricted to sites within the Central Province. Attempts are also made to initiate laboratory colonies of the mango fruit fly, *Bactrocera frauenfeldi* (Schiner) and the banana fruit fly, *Bactrocera musae* (Tryon), for host tests.

Pest Species of Economic Significance In Papua New Guinea

A large number of fruit fly species have been collected over the two years. Many of these have been identified while others within certain complex groupings remain to be sent overseas for expert identification. A number of species have been identified as pests (Ismay, 1982; Drew, 1989) which pose a potential threat to the future of the fruit and vegetable export industry. These species are listed in Table 1.

The additional information gathered and provided on host range is based on the work done at Laloki. Therefore it does not reflect fully the status at national level.

Bactrocera frauenfeldi (Schiner) is abundant and widespread in PNG. So far the survey has recorded the species from fruits and nuts of eleven different plant families. Because it is polyphagous it poses serious threats to fruits with potential export status. Within the Port Moresby environs, guava appears to be a favourite host and any fruit which is not covered is vulnerable to attack. It attacks bananas, though not as abundantly as *B. musae*. It also attacks papaya, sapodilla (*Manilkara achras*), egg fruit (*Lucuma* sp.), star apple (*Chrysophyllum cainito*), bread fruit (*Artocarpus altilis*) and beetle nut (*Areca catechu*). It has been reared from the outer flesh of nuts of *Terminalia catappa*. *T. okari, Inocarpus edulis* and the fleshy apple fruit of cashew nut, *Anacardium occidentali*. Investigations are continuing to establish the species status on mango. Although it attacks clean, undamage fruit at ripening stage, anecdotal evidence indicates that female oviposits readily on

Table 1. **Some Fruit Fly Species of Economic Importance in Papua New Guinea.**

Fruit Fly Species	Fruit or Vegetable Attacked
Bactrocera (Bactrocera) frauenfeldi (Schiner)	Guava, Banana,Papaya, Egg fruit (*Lucuma sp.*), Sapodilla (*Manilkara acharas*), Bread fruit, *Terminalia catappa, T. okari, Inocarpus edulis, Eugenia* species, beetle nut (*Careca catechu*).
Bactrocera (Bactrocera) musae (Tryon)	Banana, Papaya
Bactrocera (Zeugodacus) cucurbitae (Coquillett)	Melon, Cucumber, Zucchini, Other cucrbits
Bactrocera (Paratridacus) atrisetosa (Perkins)	Tomato, Cucumber, Zucchini.
Bactrocera (Bactrocera) bryoniae (Tryon)	Birds eye chillie (*Capsicum minimum)*, Snake bean (*Phaseoulus unguiculata*), Capsicum (*Capsicum annumn*),Kongakongo (*Bryonopsis affinis*).
Bactrocera (Bactrocera) moluccensis Perkins	Aela or Tahitian chestnut (*Inocarpus edulis*)
Bactrocera (Bactrocera) trivialis Drew	Guava, *Capsicum frutescens*, grapefruit (*Citrus paradisi*), *Eugenia* sp.
Bactrocera (Paradacus) decipiens (Drew)	Pumpkin
Bactrocera (Bactrocera) umbrosa (Fabricius)	Bread fruit
Bactrocera dorsalis complex	A wide range of fruits are attacked in Malaysia and Indonesia
Tryoni complex *(? Bactrocera neohumeralis)* (Hardy)	Guava; Documentation of hosts range continues
Bactrocera (Bactrocera) (tryoni) (Froggatt)	Attacks a wide range of wild and commerical hosts in Eastern Australia

developing and mature fruits previously attacked by red banded caterpillar, *Noorda albizonalis* (Lepidoptera: Pyralidae). Female fruit fly oviposits either into a hole of *Noorda* caterpillars or adjacent to the hole if the surrounding tissues have softened and display premature ripening even though the rest of the fruit may still remain green.

Bactrocera musae (Tryon), the banana fruit fly, is a major pest of banana throughout PNG. It attacks all banana cultivars, wild, cooking and ripe bananas, with oviposition occurring on green fully mature banana fruits (Smith, 1977). In the subsistence gardens the pest status of *B. musae* is minimized due to the traditional cultural practice of wrapping the banana bunch during the developing stage which prevents female fruit fly access to oviposition sites. *B. musae* has been reared once from papaya at Laloki but not from other fruits.

Bactrocera cucurbitae (Coquillet), the introduced melon fly, is widespread in the lowlands and highlands

region and infests all cucurbits, wild and cultivated. Infestation of fruits can occur at the early fruiting stage as well as at the mature stage.

Bactrocera atrisetosa (Perkins) attacks tomato, cucumber and zucchini at Laloki. Drew (1989) reported the species attacking tomato and cucurbits at higher altitudes, (1200 m - 1650 m a.s.l.) in Oro Province. Observations show that attack on zucchini occurs at the early stage of fruit development, while tomato and cucumber fruits are attacked at mature and ripe stages.

Bactrocera bryoniae (Tryon) is continuously reared in large numbers from the birds eye chillie (*Capsicum minimum*). It also attacks snake bean, *Phaseoulus unguiculata*. The female oviposits on fully mature green bean pod which is about to change colour, much similar attack as on chillies. *B. bryoniae* was recently reared from fruits of kongakongo, (*Bryonopsis affinis*) (Cucurbitaceae), collected from the Gazelle Peninsula, East New Britain. We have yet to rear the species from bananas as Smith (1976) did at Popondetta.

Bactrocera umbrosa (Fabricius) is widespread in the lowlands and Islands. It infests breadfruit, *Artocarpus altilis*. Females have been observed to attempt oviposition on developing fruits, causing premature ripening and falling of fruits.

Bactrocera moluccensis (Perkins) infests Aela or Tahitian chestnut, *Inocarpus edulis*. The larva feeds on the fibrous tissue as well as the kernel compared to *B. frauenfeldi* larva which feeds only on the fleshy tissue of the nut.

Bactrocera trivialis (Drew) has been recorded from guava fruit at Laloki. Other host records from PNG include *Capsicum frutecens* from Sogeri and grapefruit, *Citrus paradisi* at Mt. Hagen (Dew 1989).

Bactrocera dicipiens (Drew) was recorded infesting pumpkin at Keravat, East New Britain (Ismay, 1982; Hooper and Drew, 1989).

A number of specimens of *Bactrocera dorsalis* complex were recorded from male traps at locations along the border of PNG and Indonesia in 1992 by NAQS. The species is reported to be a serious pest of a wide range of fruits in Malaysia (Drew, 1992). It is a new record for PNG. At this stage it is not known whether the *dorsalis* complex is a recent incursion from across the border or whether it is endemic to the border areas. Only time and an intensive trapping system coupled with a broad survey programme will confirm the status of the species.

A species of fruit fly of the *tryoni* complex and similar to *Bactrocera neohumeralis* (Hardy) attacks guava fruit.

Bactrocera tryoni (Froggatt) has been recorded from Western Province (Drew, 1989). Despite the doubts expressed by Drew (1989), it may not be established in PNG, *B. tryoni* will remain included in the list because it has been detected in PNG and further more, because of its economic importance in Australia as a serious pest of a wide range of fruits.

ECONOMIC SIGNIFICANCE

While little is known of the fruit fly fauna of PNG, in particular the number of endemic economic species and their hosts range, the prospects of negotiating a successful bid for fruit export at this stage will be difficult.

PNG's geographical location and sharing of the same land mass with a Southeast Asian country will be a continuing concern with regard to introduction of exotic species. The fruit fly problem has been magnified with the incursion of two species, *B. cucurbitae* and *B. dorsalis* complex species. *B. cucurbitae* is now extensively present in large populations in the highlands, lowlands and islands. There appears to be no plan in place within the system to monitor the spread of *B. dorsalis* complex from the border areas into the other parts of the country. Also the proximity of Australia's Torres Strait Islands to the Western Province poses similar risk through the occasional incursion of *B. tryoni* into PNG.

With regard to bananas, two species of fruit fly, *B. musae* and *B. frauenfeldi* are considered important with the former the more dominant pest of the two. Although there are other *musae* complex species in existence, *B. prolixa* and *B. bancroftii* (Tryon) in the Western Province and Torres Strait (Australia) respectively, only *B. musae* is recorded to attack bananas (Drew, 1989). *B. frauenfeldi* is reared frequently from field collected ripe cooking and eating bananas.

NATURAL ENEMIES

A number of species of parasitoids have been reared from fruit flies. Parasitism rates are low and their prospect as beneficial biological control agents do not

appear promising. There are other natural enemies including birds, fruit bats, rodents and wild pigs which feed on infested fruits and indirectly kill fruit fly larvae. It is not known what degree of control these have on the fruit fly fauna overall. Other biological control agents that have been recorded are earwigs (*Chelisoches morio*), commonly found on banana (Ismay, 1982).

CONTROL

Ismay (1982) discussed some remedial control measures that can be adopted in order to reduce fruit fly infestation. The recommendations are general and advised on the different control techniques that can be applied to minimise fruit fly infestation at preharvest stage. The chemical insecticides recommended for prophylactic sprays are to be replaced with those less hazardous to beneficial species. As well, spraying technique and the use of protein bait spray which have been adopted in some parts of the Pacific and Asias will be investigated and tested under Papua New Guinea conditions.

At this stage it is important to highlight that, traditionally, subsistence farmers in most parts of PNG have practiced physical and cultural control measures against pests in general on commodities such as bananas, by wrapping banana fruits with leaves at the early stage of fruit development, which is very effective against *B. musae* and *B. frauenfeldi*. In the Central Province it has become a necessity to bag or cover guava fruits with paper or plastic bags in order to stop fruit fly infestation.

CONCLUSION

It will be necessary to update information on the status of fruit fly as the survey is extended to the other parts of the country and as further details become available. The most urgent requirement now is to provide a complete and comprehensive list of the range of hosts of cultivated and non cultivated plants.

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