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AN INSECT SURVEY OF THE FEDERATED STATES OF MICRONESIA AND PALAU

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ABSTRACT

Surveys for insects and mites were carried out in the Federated States of Micronesia and Palau and the results documented, together with those previously recorded. To assist the reader, the data are presented in two ways. The pests are arranged alphabetically together with their classification, common names and distribution within Micronesia. Distribution is further divided into: newly present; confirmation of a previously doubtful record; and presence suspected, but not verified. In a second listing, the crops are arranged in alphabetical order together with the insects and mites that attack them. The common names of the pests are given, with their distribution (as in the first listing) and a note on the part or parts of the plant attacked. In total, more than 50 hosts are listed (some collectively by family), and 359 insects and mites are recorded as pests on them.

In addition to the survey and the documentation of all the insects and mites recorded in Micronesia, the paper gives detailed information on the biology and control of selected pests. In this section, the use of natural enemies as biological control is emphasised. A separate section deals with pesticides. It provides recommendations on formulation, concentration and withholding periods for the chemicals suggested for the control of particular pests.

Comments are made on the facilities and equipment in the two countries and the expertise available to carry out plant protection activities. Improvements are suggested, as well as the introductions of beneficial insects that should be given priority to control the major pests.

Numerous insects have entered the two countries in recent years, including beetles, bugs, butterflies, leafminers, moths, thrips, and many scale insects and mealybugs. Many are potentially very serious pests. Some are not yet widespread, but are likely to extend their range, as there are no controls preventing their movement between islands. In this connection, the survey shows which insects have extended their distribution from the time they were first introduced. No new species of fruit flies were found, however.

It is concluded that in order to halt the pace of new pests moving into the Federated States of Micronesia and Palau, revised quarantine regulations need to be enacted and applied equitably to all travellers. Also, quarantine personnel should be trained in pest recognition. They should be able to identify the major pests in their respective countries as well as those to which their countries (and states) are vulnerable.

RÉSUMÉ

Des études de prospection ont été réalisées pour répertorier les insectes et acariens présents dans les États fédérés de Micronésie et à Palau et les résultats obtenus ont été ajoutés à ceux des inventaires et recensements précédents. Pour en faciliter la lecture, les données ont été présentées selon deux modes différents de classification. Une première liste classe les ravageurs par ordre alphabétique en donnant les espèces, les noms usuels et les aires de répartition de ces espèces en Micronésie. La partie correspondant aux aires de répartition est subdivisée en trois catégories selon que le ravageur est nouvellement apparu, que sa présence est confirmée (après avoir précédemment fait l'objet d'observations non vérifiées) ou que sa présence est soupçonnée mais non confirmée. Dans la deuxième liste, les cultures sont classées par ordre alphabétique avec les noms usuels des ravageurs (insectes et acariens) qui les attaquent ainsi que leurs aires de répartition, comme dans le cas de la première liste, et une note concernant la partie ou les parties de la plante qui sont attaquées. Au total, plus de 50 plantes-hôtes (dont certaines collectivement, par famille) figurent dans ces listes et 359 insectes et acariens sont signalés comme ravageurs de ces cultures.

Outre les résultats de l'inventaire des insectes et acariens présents en Micronésie, l'auteur communique des données détaillées sur la biologie d'un certain nombre de ravageurs et les méthodes de lutte utilisées pour les combattre. Dans ce chapitre, l'accent a été mis sur la lutte biologique au moyen des prédateurs naturels de ces ravageurs. Un autre chapitre traite des pesticides; des recommandations pratiques y sont proposées sur la formulation chimique, les dosages et conditions d'emploi applicables aux produits utilisés dans la lutte contre des insectes spécifiques.

Des commentaires sont apportés sur les installations et le matériel ainsi que sur les services techniques dont disposent les deux pays pour mener à bien des activités de protection des végétaux. Dans le contexte des améliorations qui pourraient être apportées, mention est faite de la lutte biologique qui devrait constituer une priorité et, à ce titre, de l'introduction de faune auxiliaire pour lutter contre les ravageurs les plus importants.

De nombreuses espèces d'insectes sont apparues dans les deux pays au cours des dernières années, notamment des coléoptères, des punaises, des papillons, des mineuses, des thrips et une grande variété de cochenilles. Parmi ces ravageurs, il en est beaucoup qui présentent potentiellement de très graves risques phytosanitaires. Certains ne sont pas encore très répandus mais pourraient étendre leur zone d'activité en raison de l'absence d'un contrôle phytosanitaire sur les échanges interinsulaires. L'étude montre d'ailleurs l'évolution des aires de répartition des insectes depuis leur apparition sur les sites observés. On n'a toutefois signalé la présence d'aucune nouvelle espèce de mouche des fruits.

En conclusion, il est indispensable de procéder à la révision et à la mise en vigueur d'une réglementation phytosanitaire qui s'applique équitablement à tous les voyageurs si l'on veut ralentir le rythme de progression des nouveaux ravageurs dans les États fédérés de Micronésie et à Palau. Dans ces deux pays, les agents chargés du contrôle phytosanitaire devraient aussi suivre une formation leur permettant de reconnaître tant les ravageurs les plus importants qui sévissent dans leur pays respectif que ceux auxquels leur pays (et les différents États) sont vulnérables.

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CONTENTS

1. INTRODUCTION

1.1 Background

The former Trust Territory of the Pacific Islands (TTPI) is now composed of new countries which are assuming administrative responsibilities as befits their political status. The Federated States of Micronesia (FSM) is an independent country and is composed of four States, Yap, Chuuk, Pohnpei and Kosrae. Each State has a Division of Agriculture, with separate administrations. Palau is a Republic in a Compact of Free Association with the USA. It, too, has a Division of Agriculture as part of the Bureau of Resources and Development. Departments of plant and animal quarantine exist in both countries.

The FSM and Palau are seeking to develop their agricultural economies, both to increase internal production to promote self-sufficiency and to develop export markets. At the most recent national censuses, there were approximately 105,000 people in the FSM (1994) and 17,300 in Palau (1995).

The main food crops are bananas, breadfruit and taros. Cassava, coconuts, sweet potato and yams are also important staples. A variety of other vegetables and fruits are cultivated and eaten. Several crops, including bananas (Kosrae, Yap, Palau), breadfruit (Kosrae), citrus (Kosrae), papaya (Palau), taro and various vegetables are being grown for export to Guam or for trading with other islands within the region.

As part of their status as emerging nations, the FSM and Palau need to develop their own crop protection services. They need to be able to control their pest problems and to be able to supply information about which pests they have to countries interested in importing agricultural items from them. They also need to be able to identify and develop control strategies for new pests when they appear and to develop inter-island quarantine regulations to contain important pests which are not uniformly distributed throughout the islands. The aim of the mission was to help develop expertise to conduct routine pest surveys, and to identify pest problems and the methods to control them.

In each administrative centre the mission was discussed and plans formulated with the personnel of the Department of Resources and Development (in Palau, the Bureau of Resources and Development). Together with the local pest management specialists or extension agents, visits were made to agricultural areas chosen by them. Collection techniques, specific identification of pests and control measures were discussed with these specialists. Each crop was searched for pests and all insects found were collected. Where fruit was available, it was collected and dissected to search for fruit flies. Where possible, identifications and control procedures for the insects were discussed at the site. The severity of the pest problem was noted.

Information about the pests and control procedures is not included in the text for the most part, but is placed in Section 6 towards the end of the report. Insecticide dose recommendations for specific pests are presented in Table 1 (Section 7). A listing of all pests known to occur in Micronesia[1] is given in Section 9 (listed alphabetically) and Section 10 (listed by crop). Pests of the Northern Mariana Islands are included to facilitate quarantine decisions. The distribution of all pests for the various islands is given and species which are new to an island or for Micronesia are indicated.

1.2 Terms of reference

The terms of reference were as follows:

The consultant will spend a total of six weeks in the Federated States of Micronesia and Palau. His travel will be divided into two parts:

— Part I: Pohnpei (10 days), Kosrae (7 days), Chuuk (4 days);

[1] In the context of this report, the term 'Micronesia' refers only to the Republic of Palau, the Federated States of Micronesia, the Territory of Guam and the Commonwealth of the Northern Mariana Islands. Micronesia proper also includes Marshall Islands, Kiribati and Nauru.

Dialeurodes citrifolii should be monitored to see if it is likely to become a major pest.

Unaspis citri is a serious pest on citrus. Valuable trees can be treated with insecticides until better biological control agents are identified. To prevent the movement of *U. citri*, citrus should not be moved from Pohnpei to other islands.

The establishment of *Encarsia?haitiensis* for the control of the spiraling whitefly should be monitored to determine the degree of success.

The species of parasites of *Liriomyza trifolii* present on Pohnpei should be determined.

An extension programme to inform growers about cultural control methods for the banana root borer, *Cosmopolites sordidus*, should be initiated.

A quarantine facility to serve the Federated States of Micronesia should be developed. A quarantine room is needed to screen and sort biological control agents and host material. Plant/insect mass-rearing facilities should be considered, depending on biological control needs.

2.1.3 Kosrae State

Facilities and equipment are needed: space should be provided to rear insects, so that they can be sent for identification, and to work on field samples needing examination. An escape-proof box is required in which to open shipments of biological control agents. The station should maintain a small insect reference collection to assist in the recognition of pests that are present and those newly introduced. A binocular microscope, 6–40 times magnification, should be acquired, in addition to the compound microscope now present.

The increase in air traffic and associated movement of goods will increase the likelihood of new and major pests being introduced to the island. Quarantine needs to be rigorous and thorough. Aircraft boarding and inspection are necessary.

Lime fruit should be collected and dissected to see if *Bactrocera frauenfeldi* is present. Newly hatched fruit fly larvae should be placed in ripe limes and oranges to see if they are able to successfully develop in these fruits.

2.1.4 Chuuk State

Encarsia smithi should be introduced to control the orange spiny whitefly, *Aleurocanthus spiniferus*.

A survey of species of coccinellids and parasitoids attacking the coconut scale, *Aspidiotus destructor*, should be made. Additional species, effective elsewhere in Micronesia, should be introduced.

The wasp, *Anabrolepis oceanica*, should be imported from Yap or Ulithi to control *Furcaspis oceanica*, the coconut red scale.

Facilities and equipment are needed: space should be provided to rear insects, so that they can be sent for identification, and to work on field samples needing examination. An escape-proof box is required in which to open shipments of biological control agents. The station should maintain a small insect reference collection to assist in the recognition of pests present and new introductions. A binocular microscope, 6–40 times magnification, should be acquired in addition to the compound microscope now present.

2.2 Palau

Consideration should be given to biological control of *Nezara viridula* (southern green stink bug) by introduction of the tachinid parasitoids, *Trichopoda pennipes* and *T. pennipes pilipes*, and the egg parasite,

Another serious pest which has entered Palau recently is the diamondback moth, *Plutella xylostella*. It was found in cabbage and Chinese cabbage plantings on Babeldaob. This species can rapidly develop resistance to insecticides and requires careful pest management.

A number of species of scales and whiteflies have extended their distributions within the Caroline Islands or were found in Micronesia for the first time. In part, the movement is due to the lack of regulations concerning movements of plant material between islands. The orange spiny whitefly, *Aleurocanthus spiniferus,* has extended its range from Chuuk, where it was first reported prior to 1950, to Yap and Pohnpei. It has also been reported from Kosrae, where it was the target of a successful biological control programme. On Yap, Chuuk and Pohnpei, biological control efforts are needed to control the outbreaks. On Kosrae it continues to be under good control by *Encarsia smithi*. Two other whiteflies, *Aleurodicus dispersus* and *Dialeurodes citrifolii*, have also entered the Carolines. *A. dispersus* was abundant on Palau and Pohnpei, but has not reached the other islands. Biological control introductions have already been made on both these islands. *D. citrifolii* is new to Micronesia and, at the time of the survey, was present only in the Kolonia area on Pohnpei.

Some of the new records for scales and mealybugs are: *Asterolecanium bambusae* and *Parlatoria zizyphus* in Chuuk; *Ceroplastes rubens*, *Eucalymnatus tessellatus*, *Lepidosaphes gloverii* and *Vinsonia stellifera* in Yap; *Phenacoccus madeirensis* in Chuuk and Pohnpei; and *Saissetia neglecta* in Pohnpei. *V. stellifera* and *Coccus viridis* were previously reported as new records in Kosrae. A scale which may be *Lepidosaphes laterochitinosa* was found in Pohnpei and Yap. This scale is virtually identical to *L. similis* and D.J. Williams was unable to positively identify it as *L. laterochitinosa,* which previously has been reported only from the Mariana Islands and Palau.

Some other new records are: *Chrysodeixis chalcites*, the green garden looper, from Palau; *Agonoxena pyrogramma*, the coconut flat moth, from Chuuk and Pohnpei; *Badamia exclamationis*, the myrobalan butterfly, from Palau; *Brachyplatys insularis*, the black island stink bug, from Yap, Pohnpei and Kosrae; *Coptosoma xanthogramma*, the black stink bug, from Kosrae; *Othreis fullonia* from Palau, Pohnpei and Kosrae (on Kosrae the moth was previously reported by R. Muniappan in 1982); *Metriona circumdata*, the green tortoise beetle, from Yap and Pohnpei; *Penicillaria jocosatrix*, the mango shoot caterpillar from Chuuk and Pohnpei; *Pericyma cruegeri* from Palau; *Proutista moesta* from Pohnpei (collected by N. Esquerra); and *Selenothrips rubrocinctus* from Palau, Yap and Chuuk. *Oxya hyla,* the smaller rice grasshopper, was found on Yap, Chuuk, Pohnpei and Kosrae, and *O. japonica*, the Japanese grasshopper, was found on Palau. These grasshoppers have probably been on these islands for a long time, but have not been reported previously.

There appeared to be no changes in the fruit fly fauna. *Bactrocera frauenfeldi* was found on all of the islands visited and *B. umbrosus* was found on Palau. No other fruit flies were found.

It is unlikely that the list of new introductions for Micronesia is complete. The visits to each island were not long enough to survey all crops thoroughly. The introduction of pests into Micronesia and their subsequent movement between islands of the region reflects the status of quarantine. Recently revised quarantine regulations need to be enacted and applied uniformly to all travellers. Improvements in quarantine procedures and the training of officers in the recognition and detection of scales and other small arthropods are essential. Some training in pest management was done during this consultancy, but no training was given to quarantine officers in pest recognition, and this is clearly needed. Photographs of pests of quarantine concern would enhance the training effort and should be considered a high priority by State officials.

A complete list of new pests and the crops they attack, as well as an island-by-island list of other insects previously recorded from the Carolines, are given in Sections 9 and 10. These lists will be helpful to the different islands and nations. They are considered to be incomplete, and local pest management officers should add to them by collecting pests with which they are not familiar and sending them for identification.

The pumpkin beetle, *Aulacophora similis*, is a serious problem in the southern and central part of Yap on various species of cucurbits. Severe damage to cucumber and some damage to pumpkin was observed. The adult beetles feed on the leaves, flowers, and surfaces of fruits of a wide variety of cucurbits, including cucumber, cantaloupe, watermelon, squash, gourds and pumpkin. The larvae live in the soil and feed on the roots of these plants, killing them before fruits are harvested. The larvae may also feed on fruits where they are in contact with the ground. The insecticide carbaryl is very effective for controlling these beetles. Weekly treatments, starting at the seedling stage, are needed.

An unknown species of bagworm was found feeding on the undersurface of banana leaves. No previous records of this species exist for Yap and as no adults were obtained, the pest remains unidentified. It is a large species, about 4 cm long, with a case constructed of pieces of banana leaf. The moth was heavily parasitised. Out of 12 cases opened, 10 had been attacked by a tachinid fly. The bagworm appeared similar to a species attacking banana on Pohnpei. Damage caused by the bagworm was minor. Less than 1–2 per cent of the leaf tissue was affected. Given the high rate of parasitisation, additional control is not warranted. Efforts should continue to obtain the identity of the species.

Aspidiotus destructor was abundant on a wide variety of plants, including banana, betel nut, coconut and papaya. Infestations were severe in many cases. This species is readily controlled by several coccinellids and is also attacked by several wasps, including *Aphytis chrysomphali*. Important coccinellids are *Telsimia nitida*, a species native to the Mariana Islands, *Pseudoscymnus anomalus* and *Chilocorus nigritus*. The combination of these three species is providing excellent control of *A. destructor* in the Mariana Islands. Other species are available elsewhere (see Section 6.6). None of these coccinellids were found on Yap during the visit. More intensive surveys to check for the presence of these natural enemies should be made. Serious consideration should be given to importing natural enemies.

The weevil, *Aclees porosus*, was found boring breadfruit twigs. This weevil has been present on Yap since at least 1947 (Pemberton, 1954). It is widespread, abundant and of concern to Yap officials, but whether or not it causes yield loss is uncertain. One of the breadfruit trees examined appeared to have significant damage, others did not. The pest status of this insect needs to be examined in more detail.

The only fruit fly found on Yap was *Bactrocera frauenfeldi*. No fruit flies were found in guava, orange or lemon. During the visit a single trap was hung under the eaves inside the airport terminal. More extensive trapping is needed. Traps need to be purchased or made and set up near fruit trees, on farms, as well as in the vicinity of the airport.

Sweet potatoes are widely grown and are an important staple on Yap. *Cylas formicarius* is present, but is not a serious problem. The two cultural practices in use—slash and burn and hilling-up—are maintaining populations of the weevil at low levels.

The green tortoise beetle, *Metriona circumdata,* is present on Yap. The adult is small and bright green. The larvae are green and carry their cast skins on their backs. Both the adults and the larvae feed on the leaves of the sweet potato. This beetle is a relative newcomer to Yap, but was not abundant at the time of the survey and was causing little damage.

(b) Weeds

There are three weeds of concern on Yap: *Lantana camara*. an unidentified vine and *Chromolaena odorata*. Lantana is widespread along roadways and in savanna areas. This weed has been successfully controlled by a variety of insects in the rest of Micronesia.

An unidentified vine was covering large areas of agricultural land in southern Yap. It was growing over banana, coconut and other crops. Yap officials should get this weed identified and determine if it is a suitable candidate for biological control.

At the College of Micronesia a small reference collection of local insects is being assembled. Proper storage facilities and equipment were lacking at the time of the visit, but were being obtained. Collecting equipment, other than nets and killing jars, was lacking. Additional collecting equipment, including black lights, and reference material for insect identification, would enhance the development of the reference collection and increase the ability of the station to detect insects new to the island.

At the Division of Agriculture a room has been designated for pest management. It is large enough to meet the needs of the station. Little equipment is present. Dissecting and compound microscopes are available, but they cannot be stored properly. Construction of a drying cabinet would help reduce mould growth on lenses and extend the useful life of the microscopes. No facilities for multiplication or post-entry quarantine of biological control agents are available. These need to be developed, since the Division of Agriculture and the College of Micronesia will have biological control responsibilities for the Federated States of Micronesia.

4.2.2 Personnel

Pest management activities are split between the College of Micronesia and the Division of Agriculture. Areas of responsibility were not well defined. The Division of Agriculture is engaged in extension activities in pest management, a role which is also being developed by the College of Micronesia. The College is also developing a research programme and has an entomologist, Dr Nelson Esquerra, on its staff. At the Division of Agriculture, Mr William William and Mr Aluis Ehpel share pest management responsibilities.

4.2.3 Major pests

Tarophagus proserpina was abundant on new varieties of taro being evaluated at the Agricultural Station for introduction to Pohnpei. In taro patches in villages, agroforestry areas and farms, the taro leafhopper was uncommon and not a problem. As part of the evaluation of any new crop or variety, the susceptibility of the plant to local pests should be tested, along with agronomic characteristics. *Aphis gossypii* was also abundant on taro at the station, but was uncommon elsewhere.

Mr. A. Ehpel found adults of the weevil, *Atactus deplanatus*, chewing irregular holes in the leaves of *Cyrtosperma* at one site near Kolonia. This weevil is native to Pohnpei. The level of damage was not sufficient to affect yield and control was not necessary.

At the same site, *Cyrtosperma* corms were reported to be damaged by an unknown pest. On corms, scalloped areas and holes were present, but no insect pests were found. The damage was consistent with that caused by a nematode, possibly *Radopholus similis*, reported from Yap by G.V.H. Jackson. More information is contained in his duty-tour reports (18 May –18 June 1986).

The only fruit fly found on Pohnpei was *Bactrocera frauenfeldi.*

Metriona circumdata was found infesting sweet potatoes in the area around Kolonia. On one farm, damage to the leaves was thought sufficient to cause yield loss of tubers. This insect is a new record on Pohnpei.

Scales, mealybugs and whiteflies were causing problems on several plants on Pohnpei. On citrus, *Aleurocanthus spiniferus*, *Dialeurodes citrifolii*, *Parlatoria zizyphus* and *Unaspis citri* were present. The leaves were coated with sooty mould growing on the honeydew excreted by these pests. *A. spiniferus* entered Pohnpei about 1980 and has now spread throughout the island. Many trees are severely infested with this whitefly. Biological control was successful on Kosrae using the wasp, *Encarsia smithi*, and it should be taken to Pohnpei.

At several locations the scale, *Unaspis citri*, was abundant on bark. It was heavily parasitised. This scale is present on Pohnpei, but not elsewhere in Micronesia.

Tetrastichus brontispae, has been used successfully to control related species of *Brontispa* on Guam and Chuuk. If this species is not already present on Pohnpei, it could be introduced.

4.2.4 Recommendations

Aleurocanthus spiniferus is damaging citrus throughout Pohnpei. Biological control of this species should be initiated using the wasp, *Encarsia smithi*.

The whitefly, *Dialeurodes citrifolii*, needs to be monitored to see if it is going to be a serious problem. If it is, biological control should be considered.

Unaspis citri is infesting and damaging citrus in some areas. Several biological control agents are known for this species, but none have been effective where they have been introduced. Additional research on biological control agents is needed. The effectiveness of parasites and predators already on Pohnpei should be investigated, since the scale is not a problem in all areas of the island. If there are effective natural enemies, management practices to conserve them should be developed.

Valuable trees can be treated with insecticides or oil until better biological control agents are identified. This scale is present only on Pohnpei, in Micronesia. Citrus should not be transferred from Pohnpei to other islands, to prevent the movement of this pest. The scale will sometimes occur on fruit, although it is normally found on bark and twigs.

The spiraling whitefly was a serious pest on guava and several other plants at the time of the visit. *Encarsia?haitiensis* has been released and is successfully controlling the whitefly. Its effect on the whitefly population should be monitored. Islands adjacent to the main island should be checked for the presence of the whitefly and the parasite introduced, if necessary.

Parasites of *Liriomyza trifolii* should be reared and sent for identification. The leafminer is currently not a serious pest because the preferred host plants are not yet extensively grown. Should the amount of beans or other leafminer-susceptible crops increase, additional biological control agents may be needed.

An education programme about cultural controls for the banana corm weevil, *Cosmopolites sordidus*, should be initiated. Farmers should be careful not to use infested material. Currently, the weevil is not widespread and the most likely method of dispersal will be infested planting material. Cultivation and maintenance practices should be improved.

Since Pohnpei is the seat of the Federated States of Micronesia National Government and an entomologist is stationed there, a national quarantine facility should be developed. The facility does not need to be elaborate or expensive. A room or set of rooms will be adequate to serve the needs of the country at this time. At a minimum, the facility should be capable of receiving biological control agents and screening them to ensure they are released without their hosts or hyperparasites. In addition to the room, sealed boxes for opening insect consignments and sealed rearing boxes would be needed. Screened biological control agents could then be transferred to other destinations in the Federated States of Micronesia or reared for mass release. Additional facilities to multiply natural enemies could also be considered (screen houses for growing plants and screened areas for rearing host insects).

4.3 Kosrae State

4.3.1 Facilities and equipment

There is a small experiment station in Lelu. No entomology facilities are available. Attempts to start a collection failed due to inadequate facilities to store insects. The department has a compound microscope, but does not have a binocular dissecting microscope. If pest management is to be done, a 6–40 times binocular dissecting microscope should be acquired and space for pest management should be allocated.

4.4 Chuuk State

Agricultural activities in Chuuk State are mostly for subsistence. A wide variety of starch crops, vegetables and fruits are grown. Banana, breadfruit, cassava, sweet potatoes and taro are staples. Farms on the outer islands supply Weno with fresh produce.

4.4.1 Facilities and equipment

There are no laboratory facilities.

4.4.2 Personnel

Mr Hermes Refit has been assigned pest management responsibilities.

4.4.3 Major pests

The orange spiny whitefly was first recorded in Micronesia from Chuuk. The whitefly was widespread on Weno and Fefan at the time of the mission. Counts of over 200 live nymphs and pupae per leaf were found. There was no evidence of parasitisation. *Encarsia smithi* should be introduced to control the outbreak.

The scale, *Parlatoria zizyphus*, was found infesting a citrus tree on Weno. This is the first record of this scale for Chuuk.

Aspidiotus destructor was infesting breadfruit in moderately high numbers. At the time of the visit, populations were not high enough to warrant control, but local officials reported that it is sometimes more abundant, particularly in the dry season. Efforts to import biological control agents, principally lady beetles, have been made in the past, but were apparently unsuccessful. Parasites would be imported or certain coccinellids re-imported. *Telesmia nitida*, *Pseudoscymnus anomalus* and *Chilocorus nigritus* have all been previously collected on Chuuk. *Azya trinitatis*, *Cryptogantha nodiceps* and *Rhizobius satelles* were released, but no information on their establishment is available. They were not found during the visit. The only coccinellid collected was *C. nigritus*. A more thorough survey of the coccinellids and parasites present on Chuuk should be done before attempts to re-import or import new species are made.

Metriona circumdata, a relatively new immigrant to Chuuk, was common on sweet potato, but was not found in damaging numbers. The garden flea hopper, *Halticus tibialis*, was also abundant on sweet potato.

Pulvinaria urbicola was found on hot pepper and on tomato. It was not present in high enough numbers to be damaging. On beans, the aphid, *Aphis craccivora*, was common.

Ischnaspis longirostris, the black thread scale, was abundant on mango on Weno. Although extremely numerous, it did not appear to be damaging the plants.

An unidentified bagworm was found feeding on taro near the dump. Damage was not high enough to affect yield. No adults were collected or reared, so it was impossible to identify the species. Local pest management specialists should rear the moth for identification.

Furcaspis oceanica, the coconut red scale, was abundant on many of the coconuts on Weno. The undersurfaces of leaves were encrusted with scales and the leaves were yellow. This species is native to Micronesia and is heavily parasitised by the wasp, *Anabrolepis oceanica*, in Yap and Ulithi, where the scale is very rare. The scale should be surveyed to determine if the parasite is present on Chuuk. If not, it should be imported. Care should be taken in doing this as a hyperparasite is present in Yap and Ulithi.

The hibiscus mealybug, *Maconellicoccus hirsutus*, was abundant and damaging on hibiscus on Chuuk. It can be controlled with malathion (see recommendations for *Ferrisia virgata*, Section 6.16).

5.3 Major pests

There are several major pest problems on Palau. Currently, the agricultural sector is dominated by subsistence agriculture, but commercial production is rapidly developing. A number of fresh fruits and vegetables are being grown and sold to hotels. These crops have several serious pest problems and new problems are continuing to appear. Important new pests, including the spiraling white fly, *Aleurodicus dispersus*, the diamondback moth, *Plutella xylostella*, and the melon thrips, *Thrips palmi*, have become established in Palau in the last five years.

The diamondback moth was found infesting Chinese cabbage and head cabbage at two locations on Babeldaob, at OISCA and Imul. It was not present at any of the other sites visited. Damage was moderate, but reported to be severe at times.

Aulacophora similis (orange cucumber beetle) was causing severe damage on cucumber and melons on farms in Ochelochel, Babeldaob. At one farm, it was defoliating the cucumbers. This insect is a major problem and needs to be controlled with insecticides. Untreated, infested crops will often be completely destroyed. No biological control agents of importance are known.

Nezara viridula (southern green stink bug) was damaging tomatoes in Imul (a loss in yield of 50–75 per cent was estimated) and cucumbers were attacked on several farms on Babeldaob. Biological control of this insect is strongly recommended. This species is under excellent biological control in other areas, although the primary agents responsible, the tachinid parasitoids, *Trichopoda pennipes* and *T. pennipes pilipes*, are not host-specific. They are currently being reared by the Hawaii Department of Agriculture and could be obtained there. In addition to the southern green stink bug they also attack other species of pentatomids and coreids. The Hawaii Department of Agriculture is alert to the issue of their effect on native species and could give advice on this problem. The egg parasite, *Trissolcus basalis*, has provided excellent control in other areas and should also be considered as a biological control agent, but serious attention should be given to its impact on non-target, native, pentatomids. *T. basalis* is known to heavily parasitise several other species of pentatomids and it could potentially reduce or eradicate native species on Palau. In particular, this species attacks *Coleotichus* species, which are important members of the native stinkbug fauna in Micronesia. *T. basalis* can be obtained from the biological control unit at Davis, California. Local officials should contact Dr L.E. Ehler, Department of Entomology, University of California, Davis, CA 95616, USA, for a supply.

The spiraling whitefly is a new pest in Palau. The parasite, *Encarsia?haitiensis,* was sent to Palau and released in the Koror area. It has established, and at the time of the mission had reduced the whitefly population to non-significant levels in the release areas. The spiraling whitefly was still a problem, however, in surrounding areas and on outlying islands. Pest management specialists should check for newly established populations of the spiraling whitefly and should move the parasite to these areas to speed up the biological control process.

Helicoverpa sp. and *Spodoptera litura* were found feeding on tomato fruit and causing extensive damage on farms in Imul. Comments on the description and control of these species are given in Sections 6.17 and 6.31 respectively.

Two fruit flies, *Bactrocera frauenfeldi* and *B. umbrosus*, were found in Palau. *B. frauenfeldi* has been in Micronesia a long time and occurs on most of the islands, with the notable exception of Guam. *B. umbrosus* is found only on Palau. Both species are of quarantine significance. However, two fruit flies, *B. cucurbitae* and *B. ochrosiae*, are present on Guam and are of major quarantine significance to Palau.

The bean fly, *Ophiomyia phaseoli*, was found on farms in the Ochelochel area, but the damage was light and under control at the time of the visit. This insect has previously been recorded from Palau.

Chemical control is impractical, although malathion emulsion sprayed on the lower side of the leaf may give good results. Both moths are adequately controlled by parasites. Surveys in Fiji, for instance, have recorded 70 per cent parasitism in larvae and 50 per cent in pupae. On Guam, *A. pyrogramma* larvae are parasitised by *Macrocentrus pallidus*, and the pupae by *Brachymeria hammari*.

6.2 *Aleurocanthus spiniferus* – orange spiny whitefly

The adult has an orange-yellow body shaded with brownish-purple and sprinkled with white, waxy, powder. The outer wings are smoky coloured. The immature stages are the most conspicuous. They are found underneath the leaves of citrus, grape, pear, persimmon, rose and palm trees. They are black, spiny, insects which are egg-shaped and flat. There is a row of spines around the perimeter and several spines on top. A fringe of white, waxy, secretions extends outward from the edge of the body.

The immature stages feed on sap and reduce the vitality of trees. Honeydew accumulates on the upper surface of the leaves and sooty mould grows on it and blocks photosynthesis. Reduced fruit yield is common from heavy infestations.

The best method of control is with the parasitoids, *Encarsia smithi* and *Amitus hesperidum*. These have provided excellent control on Guam, and *E. smithi* has controlled the whitefly on Kosrae.

6.3 *Aleurodicus dispersus* – spiraling whitefly

The spiraling whitefly attacks over 100 plant species, including many fruit trees and ornamentals. Some preferred plants are coconut, guava, *Plumeria* and sea grape. The adult whitefly is a small, dusty-white insect resembling a tiny moth. Commonly, adults are found on the undersurface of leaves together with the immature stages. The nymphs are small, white insects covered with waxy secretions. Long, curving, white threads extend beyond the shining white wax. The eggs are laid on the undersurface of leaves in a characteristic spiral pattern which gives the whitefly its name.

Whiteflies can be extremely abundant and can cover the entire lower surface of leaves. They feed on sap, reduce plant vigour and on fruit trees may reduce yield. They also make the plants unsightly by secreting honeydew on which sooty mould forms a black crust.

The ladybird beetle, *Nephaspis oculatus*, and the wasp, *Encarsia?haitiensis*, give good control. Home owners can reduce damage from the whitefly by keeping their plants healthy (fertilizing and watering as needed) and by pruning dense foliage to lessen the amount of shelter for the whiteflies. If insecticides are necessary, malathion can be used. Care should be taken to prevent the spread of this insect. People should understand that taking plants from one island to another will spread the insect.

6.4 *Aphis craccivora* – cowpea aphid

This species is polyphagous, but is mainly found on legumes. The adult is large, up to 2 mm long, black or brown with dark cornicles. The nymphs are also dark and have a roundish body.

The aphid can be extremely numerous on yard-long and *Phaseolus* beans and in hot, dry weather plants may wilt. Plants can usually tolerate large numbers of aphids and treatment is rarely needed unless virus diseases are present. This aphid is known to transmit at least 14 viruses.

Populations are generally kept under control by natural enemies. Control can also be obtained with carbaryl or dimethoate insecticides.

6.5 *Aphis gossypii* – melon aphid

The melon aphid is polyphagous, commonly found on citrus, cucumbers, eggplant, numerous legumes, melons and taro. Adults are yellow to dark green with a black head and black cornicles. They occur on the

6.9 *Bactrocera umbrosus* – breadfruit fruit fly

This fruit fly is brown and yellow, but has more yellow than *B. frauenfeldi*. The thorax is black with two yellow stripes; the abdomen is predominantly brown. The wings have three broad, brown bands crossing them rather than the two, narrow dark bands of *B. frauenfeldi*. The larva is a yellow maggot which feeds inside the fruit of breadfruit, jackfruit and passionfruit. Hill (1983) lists it as a major pest of jackfruit and passionfruit in South-East Asia. Hardy (1973) also lists it from bitter melon (*Momordica charantia*). It is strongly attracted to methyl eugenol.

This fruit fly is not widely distributed in Micronesia, being found only in Palau. Elsewhere, it is found in Indonesia, Malaysia, New Caledonia, Papua New Guinea, Philippines, Solomon Islands and Vanuatu. It is not reported from Hawaii or the mainland USA and may be of quarantine significance there, and to those islands in Micronesia where it is absent.

6.10 *Brontispa chalybeipennis* – Pohnpei coconut leaf beetle

The adult is a slender, flattened, beetle about 10 mm long and 2 mm wide. It is metallic green with two brown spots at the tip of the elytra. The larva is white with a brownish cast. It is flattened and has a pair of pincer-like protuberances at the rear. Two other closely related species are found in Micronesia: *B. palauensis*, dark with a metallic blue sheen, and *B. mariana*, which is brown.

The larvae and adults feed on the unopened spear leaf, producing long, brown tracks parallel to the midrib. Heavily infested leaves dry out and have a ragged, scorched appearance. Young palms are more susceptible to attack, particularly those surrounded by dense undergrowth. Growth of young palms can be severely affected and, occasionally, they may be killed, as the stress from heavy infestations of *Brontispa* weakens them and makes them more susceptible to disease, drought or other stresses.

Young palms should be kept free of tall weeds, and before they are planted they should be inspected to make sure they are without infestations of the leaf beetle. The beetle does not disperse well, as it flies poorly, but it is frequently moved by people in seedlings or on cut fronds. Carbaryl can be applied to the crown to give control. Varieties differ in resistance: coconuts from South-East Asia, including Federated Malay States and Malayan red and yellow dwarf, are susceptible and should not be used. There may be some varieties from Yap which are resistant. A good planting practice is to use seedlings from coconuts which are free of damage. A parasite, *Tetrastichus brontispae*, has been widely used for control of related beetles and has recently been used against this species in Hawaii.

6.11 *Cosmopolites sordidus* – banana root borer

The weevil is brown or black with a pronounced curving snout. It is about 10 mm long. The larvae are large, white, legless grubs. Eggs are laid singly in small cavities in the pseudostem near the ground.

Adults feed on dead or dying banana plants and do not disperse readily, as they seldom fly. The larvae tunnel through the rhizomes, leaving a trail filled with brown or black debris. Infested plants are weak and growth is slow. Bunches are small or absent. Heavily infested plants are more likely to be blown over in storms. Susceptible or very young plants can be killed.

Most outbreaks start from planting infested suckers. Cultural control is important. Only rhizomes free of beetles should be used as propagating material. In order to achieve this, the pseudostem and rhizome should be cleaned of all old leaves, roots and debris, carefully inspected for tunnels made by larvae and then dipped in 5 per cent chlorox solution. Harvested stems should be removed, preferably by cutting them below ground, and the remaining portion of the stem covered with soil. It is important that the stems are not left as a source of food for adults, and to prevent this, they are best cut into 60 cm lengths so that they dry rapidly.

The predatory histerid beetle, *Plaesius javanus*, has been introduced as a biocontrol agent to several countries.

6.15 *Eudocima fullonia* – fruit-piercing moth

The fruit-piercing moth, *Eudocima* (*Othreis*) *fullonia*, is large, with brown, patterned, front wings and orange hind wings on which a crescent-shaped black spot is present. The hind wings are covered when the moth is resting, so the striking orange and black pattern is not visible. The larvae are black with red and yellow markings. They feed on *Erythrina* and are not pests of economic importance.

The adults suck juices from a wide variety of fruits, including citrus, eggplant, guava, mango, papaya, pomegranate and tomato. The moth makes a round, pinhead-size hole in ripe fruits; a small cavity is left, through which rot-causing organisms enter the fruit. The moth feeds at night.

The moth is difficult to control with insecticides because it spends only a short time on the fruit and does not breed on the crops attacked. Bagging the fruit shortly before it ripens is a solution, but this is costly. Destruction of *Erythrina* could reduce the moth populations, but is not likely to be a practical consideration. Fruit-piercing moths are repelled by strong lights. Lights should be placed at a height of 1.75 m, at 12–20 m intervals, downwind of plants to be protected. Kerosene pressure lamps may be used if electricity is not available.

6.16 *Ferrisia virgata* – striped mealybug

The adult female is covered with powdery-white wax and has a pair of purplish dorsal stripes. Long, glossy white, wax threads extend from the body and there are two long tails. The mealybug attacks a wide variety of hosts, including cocoa, cassava, citrus, coffee, guava and sweet potato. It is common on tomatoes and eggplants, particularly on water-stressed plants. It feeds on the leaves, shoots, fruits and will move on to the roots in dry weather. It can get under the calyx of fruits and cause scarring. This can be a serious problem in eggplant. Like most scales and mealybugs, it can occur in great numbers.

If chemical control is necessary, malathion can be used. The use of a sticker/spreader, at twice the normal rates, is very important when using insecticides, because of the need to penetrate the wax which covers the body.

6.17 *Helicoverpa armigera* – old world bollworm

The tomato fruitworm is a stout-bodied, brownish to brownish-green moth. The larvae are green or brown caterpillars with a dark stripe down the sides. There are no black spots above the stripe as in *Spodoptera litura*. The colour of the larva varies in response to that of the host plant.

The larvae feed on fruits of beans, bell peppers, corn, tomatoes or in the 'heads' of cabbage. They also eat cotton, sorghum, tobacco and many weeds. In corn, they feed on the kernels at the tip of the 'ear'. In tomato and bell pepper, they make holes in the fruit and rots develop. This moth is considered one of the world's most serious pests.

There are resistant varieties of cotton and corn. Corn varieties with tight sheaths suffer less damage. No resistance is known for bell peppers or tomatoes. Hot peppers are not attacked. Insecticides are used mostly for control. Carbaryl is often recommended, but is not very effective. Pyrethroids and acephate are useful. A large number of natural enemies are known, but they will not keep moth populations low enough to prevent economic loss in vegetable crops where appearance is a consideration. A baculovirus is known for this species.

It is unclear whether or not *H. zeae* is present in Micronesia. In recent years, only *H. armigera* has been found, although intensive searches have not been done.

6.22 *Metriona circumdata* – green tortoise beetle

This is a round beetle with an iridescent green and black pattern on the back. The larvae are green and carry their cast skins from previous instars curved above their backs. Both the adults and the larvae feed on the leaves of sweet potatoes and other related plants, such as morning glory. The feeding makes irregular holes in the leaves. Plants can be defoliated, but in most areas in Micronesia this pest is not very abundant and rarely causes appreciable damage. The beetles can be controlled with carbaryl, if necessary.

6.23 *Nezara viridula* – southern green stink bug

The adult is a green bug about 25 mm long. The nymphs are similar in shape to the adults, but are smaller, without wings, and black and red rather than green.

The bug feeds on a wide variety of plants, including beans, corn, cucumbers, melons, passionfruit, soybeans, tomatoes and, occasionally, oranges. The softer parts of the plant are preferred, especially the seeds and fruits. Damage results from feeding punctures in the fruit or from the removal of seed contents. On corn, individual grains are emptied. On tomatoes, green fruits are punctured, resulting in rotten spots or fruit drop. On beans, the pods are punctured and the developing seeds are consumed. Feeding causes premature fruit drop, deformation, shrivelling or necrosis. Yield in soybeans and fresh beans can be seriously reduced. Pod fall, seed number, seed viability and pod size are affected. On cotton, the southern green stink bug is suspected of transmitting the fungus *Nematospora*, which causes the boll to rot.

Crop sanitation will help reduce pest numbers. Prompt removal of harvested crops will often destroy numerous bugs before they mature. Biological control can be very effective; for instance, the scelionid wasp, *Trissolcus basalis*, successfully controlled the bug in Australia and on several Pacific islands, including Hawaii, Fiji and New Zealand. The bug is readily controlled by a variety of chemicals, including carbaryl and malathion.

6.24 *Ophiomyia phaseoli* – bean fly

The bean fly is a small, black fly about 2–3 mm in length, often seen on bean leaves. It lays eggs singly on leaves near the petioles or leaf stalks of various bean species, including yard-long beans, pole beans and mung beans. The larvae are small, whitish, nearly transparent maggots with distinct, black mouth hooks. The larva tunnels in the stems or petioles, causing them to swell and crack and the leaves to drop prematurely. On seedlings, the larvae bore down the stem, sometimes as far as the tap root, and destroy the plants. Generally, these flies are more of a problem on seedlings than on mature plants.

When problems are experienced with this insect, overlapping crops of beans should be avoided and crop residues should be destroyed. Chemical control is effective and may be used, if necessary. Often, it is sufficient to spray just twice, 2 and 12 days after the seedlings emerge from the soil. The parasitoids, *Opius importatus* (Hymenoptera: Braconidae) and *O. phaseoli*, were released in Hawaii and Guam to control this fly. There is no record of them establishing on Guam.

6.25 *Pentalonia nigronervosa* – banana aphid

This is a distinctive aphid which is reddish or black. The winged forms have dark bands along the veins, a characteristic which makes the aphid relatively easy to identify. The aphid feeds on banana, taro, tomato and several ornamental plants. On banana, the aphids can be found between the sheaths of the petioles, on fruit and at the base of the pseudostems, below soil level. Large populations of the aphids can stunt or kill young plants and honeydew accumulated near the base of the petiole can ferment and cause leaves to rot. Colonisation of fruit can cause blemishes which reduce its market value.

The aphid is important as it is the vector of bunchy top virus, which produces a lethal disease in bananas. Infected plants are stunted with broken streaks of green on the veins, midribs and petioles. Progressively smaller leaves are produced so that they appear bunched; they are also brittle. Fruit production ceases or

This moth is resistant to many insecticides and this resistance develops rapidly. Since insecticide resistance is a serious problem, excessive or unnecessary use of chemicals must be avoided. Synthetic pyrethroids and the bacterial insecticide Dipel are currently recommended. Resistance to both these types of insecticides is possible and for this reason they should be used alternately. The caterpillars are located underneath the leaves, so the spray must be carefully applied to reach them. First instars mine the leaf and may escape treatment.

Harvested fields should be cleared of all cabbage plants. The old leaves on harvested plants should be removed, since these will support moth populations. All unharvested plants should be ploughed under or destroyed in other ways. On farms where the moth is a problem, cabbages and related crops should not be grown continuously or the field should be left fallow for a time.

6.29 *Prays* spp. – citrus flower and rind moths

It is as yet uncertain which species of *Prays* are present in Micronesia. *P. endocarpa* was identified by Pemberton (1954) from Guam. This is considered to be a misidentification by the author and should be removed from the list pending further review. Damage to citrus in Yap is, however, characterisitic of that caused by *P. endocarpa*, but no specimens have been found.

A note in the Distribution Maps of Pests no. 512 (1990) published by the International Institute of Entomology (previously the Commonwealth Institute of Entomology) sums up the situation. It states that there has been confusion over the identification in South-East Asia and Australasia of *P. endocarpa* and *P. citri,* and *P. endocarpa* and *P. pyri*. In map no. 443 (1982) of the same series no records for *P. citri* in South-East Asia and Australasia are given, since it is assumed that *P. citri* is not present. There is an urgent need, therefore, to discover what causes the damage to citrus in Yap, and to determine the species of *Prays* that are present in the Caroline and Mariana Islands.

6.30 *Selenothrips rubrocinctus* – red-banded thrips

The adults are dark brown, about 1 mm long. The nymphs are yellow or white with a bright red band around the abdomen. They often carry a drop of reddish excrement on the tip of their upturned abdomen. These drops are periodically deposited on the leaf, where they form shiny black spots. Mangoes are an important host for this insect, as well as avocado, cacao, cashew and guava.

The insects feed on the underside of the leaf and occasionally on fruits. The lower surface of heavily infested mango leaves has a dark, rusty appearance with numerous, small, shiny black spots of excreta. Leaf edges may be curled. Seedlings can be severely damaged or killed. Older trees may lose their leaves prematurely, although the thrips is usually not abundant on mature trees unless the trees are stressed.

Control is usually not necessary on adult trees. If mature trees are infested, phosphorus and potassium fertilizers are recommended to improve the health of the tree. Other control measures should not be needed. Seedling trees may be treated with carbaryl.

6.31 *Spodoptera litura* – rice cutworm

This is a brown moth with patterned forewings and white hind wings that are somewhat transparent. The larvae are medium-sized caterpillars and vary in colour at different times in their life cycle. Young larvae tend to be blackish-green. Older larvae are grey and blackish-green, with yellow stripes on the sides and top and black spots above the stripes on the sides. They have black heads.

The larvae feed on the leaves or fruits of cabbage, cotton, rice, taro, tomato and many other plants. Crops can be defoliated, but this is rare in Micronesia, although individual plants may suffer considerable damage since egg masses are laid in clusters and the larvae feed gregariously for a time. The larvae will bore into the heads of cabbage or into the fruit of tomatoes. They also feed on taro leaves.

6.34 *Unaspis citri* – citrus snow scale

The male scale is covered with a white, waxy, shell which has three distinct parallel ridges, resembling fingers pressed together. The female is grey, looks somewhat like a mussel shell and is inconspicuous even though it is larger than the male. The scale infests the bark of citrus, although it can be found on the leaves and fruit. If infestations are heavy, the tree may die from direct damage and from increased susceptibility to borers. In addition, infestations prevent normal expansion of the bark, causing it to split and pathogens to enter. Premature leaf drop occurs and fruits may be deformed and stunted. In Micronesia, the scale is found only on Pohnpei.

Various controls are possible. Carbaryl, diazinon or malathion with white oil are effective. Lime sulphur, sulphur or oils can also be used. Little attempt to use biological control for this scale has been made to date, but it should be possible as there are a large number of natural enemies. *Aphytis lingnanensis, Pentilia egena, Hyperaspis billoti, Chilocorus cacti* and *Exochomus jourdanii* have been introduced elsewhere. *A. lingnanensis* is the most commonly used, but its use has not resulted in any outstanding successes. Numerous other natural enemies exist, including predacious moths in Australia. An unknown parasite is present on the males in Pohnpei and most males examined had been attacked.

7. CHEMICAL CONTROL RECOMMENDATIONS

Suggestions for insecticide recommendations for pests are listed in the pest briefs above. Bjork and Bevacqua (1984) should be consulted for further advice. Some chemicals are not registered in the USA for the uses suggested because the crop or the pest does not occur in that country. The author cannot authorise or assume responsibility for the use of any of these chemicals in the Federated States of Micronesia or Palau. Country officials should review the suggestions and decide which ones they will allow. In Palau, it is suggested that operators undergo the EQPB Chemical Application Program.

Bacillus thuringiensis, carbaryl, malathion and permethrin are the least toxic chemicals and should be the chemicals of choice. Because most of the chemicals used in the Federated States of Micronesia and Palau are imported from the USA, spray rates are listed on the container labels in Imperial measurements and not in metric units.

To avoid confusion, the recommended doses are given in Table 2 in US gallons, tablespoons and teaspoons. Please note that tablespoons and teaspoons refer to US standard-volume measuring spoons and not to kitchen utensils. **Kitchen tablespoons and teaspoons are not standardised in volume and must not be used to measure volumes for pesticides.** A conversion chart which can be used by those who need to convert to metric can be found at the foot of Table 2.

8. RESULTS OF FRUIT DISSECTIONS

Table 1: Number of fruit dissected and important pests found

Island	Fruit type	Ripeness	Number	Pest
Yap	sweet orange	ripe	23	*?Prays endocarpa*; no fruit flies
Yap	guava	ripe	20	no fruit flies
Palau	sweet orange	ripe	100	no fruit flies
Pohnpei	none available			
Kosrae	lime	ripe, fallen	20	no pest of quarantine significance
Kosrae	tangerine	ripe	10	no pest of quarantine significance
Kosrae	sweet orange	ripe	6	no pest of quarantine significance
Chuuk	none available			

Pest	Chemical	Formulation (W.P.= wettable powder. E.C.= emulsifiable concentrate)	Amount chemical per 1 gal (US) of water	Min. days before harvest	Comments
Liriomyza trifolii	permethrin	3.2 E.C.	¼ tsp	3?	
	permethrin	2 E.C.	1/3 tsp	3?	
Maruca testulalis	carbaryl	50%W.P.	1–2 tbl	1	
	naled	8 E.C.	2 tsp	4	more effective than Sevin
	Bacillus thuringiensis	W.P.	2 tbl	0	
Metriona circumdata	carbaryl	50%W.P.	1–2 tbl	3	Not registered in U.S. for this use
Nezara viridula	malathion	50% E.C.	2–3 tsp	1	beans
	malathion	25% W.P.	2½–3 tbl	1	beans
	malathion	50% E.C.	2 tsp	1	tomato
	malathion	25% W.P.	2½ tbl	1	tomato
Ophiomyia phaseoli	diazinon	AG500	1 tsp	7	
	malathion	50% E.C.	2–3 tsp	1	
	malathion	25% W.P.	2½–3 tbl	1	
Phyllocnistis citrella	malathion	50% E.C.	2–3 tsp	7	
	malathion	25% W.P.	2½–3 tbl	7	
Plutella xylostella	*Bacillus thuringiensis*	W.P.	1 tbl	0	treat under leaves, use upturned nozzle
	permethrin	3.2 E.C.	¼ tsp	3?	
	permethrin	2 E.C.	1/3 tsp	3?	
Prays citri	dimethoate	2.67 E.C.	¾ tsp (30.5%)	15	do not use on seedlings; only use on orange and lemon; do not use on lime or sour orange or trees grafted with sour orange rootstock
Selenothrips rubrocinctus	carbaryl	50%W.P.	1 tbl	5	
Unaspis citri	malathion	50% E.C.	2–3 tsp	7	use extra sticker
	malathion	25% W.P.	2½–3 tbl	7	use extra sticker
	oil		4 tsp	0	
	oil+ethion	25% W.P	½–1 tbl + 4 tsp oil	21	
	carbaryl	50%W.P.	1 tbl	5	

For reference, some trade names of chemicals used in this table are: carbaryl (Sevin), naled (Dibrom), permethrin (Pounce 3.2 E.C., Ambush 2 E.C.), dimethoate (Cygon), and *Bacillus thuringiensis* (Dipel).

Note that tablespoons and teaspoons refer to US standard volume measuring spoons and not to kitchen utensils. **Kitchen tablespoons and teaspoons are not standardised in volume and must not be used to measure volumes for pesticides.** Listed below are conversion factors which can be used to convert to metric:

1 teaspoon	=	4.93 ml
1 tablespoon	=	14.78 ml
1 teaspoon/gallon	=	1.30 ml/l
1 tablespoon/gallon	=	3.9 ml/l

Scientific name	Classification	Common name	Pa	Y	C	Po	K	M
Asterolecanium pseudomiliaris Green	Homoptera: Asterolecaniidae	bamboo scale				x		G
Asterolecanium pustulans (Cockerell)	Homoptera: Asterolecaniidae	oleander pit scale	x		x			G
Asterolecanium robustum Green	Homoptera: Asterolecaniidae	bamboo scale	x			x		G
Atactus deplanatus (Boheman)	Coleoptera: Curculionidae	weevil				x		
Atractomorpha psittacina Haan	Orthoptera: Pyrgomorphidae	grasshopper						G
Aulacaspis madiunensis (Zehntner)	Homoptera: Diaspididae	scale	x	x				
Aulacaspis tegalensis (Zehntner)	Homoptera: Diaspididae	scale		x				
Aulacophora flavomarginata Duvivier	Coleoptera: Chrysomelidae	black-back cucumber beetle	x					
Aulacophora marginalis Chapuis	Coleoptera: Chrysomelidae	blue-back cucumber beetle	x					
Aulacophora quadrimaculata (F.)	Coleoptera: Chrysomelidae	spotted cucumber beetle		x				x
Aulacophora similis (Olivier)	Coleoptera: Chrysomelidae	orange cucumber beetle	x	x				x
Bactrocera cucurbitae Coquillett	Diptera: Tephritidae	melon fly						x
Bactrocera frauenfeldi Schiner	Diptera: Tephritidae	mango fruit fly	x	x	x	x	x	S
Bactrocera ochrosiae Malloch	Diptera: Tephritidae	ochrosia fruit fly						x
Bactrocera umbrosus F.	Diptera: Tephritidae	breadfruit fruit fly	x					
Badamia exclamationis F.	Lepidoptera: Hesperiidae	myrobalan butterfly	n					x
Batrachedra sp.	Lepidoptera: Coleophoridae	moth						G
Batrachomorphus atrifrons (Metcalf)	Homoptera: Cicadellidae	leafhopper						x
Bemisia tabaci (Gennadius)	Homoptera: Aleyrodidae	sweet potato whitefly	x			?		x
Bolacidothrips orizae Moulton	Thysanoptera: Thripidae	thrips						G
Brachyplatys insularis Ruckes	Hemiptera: Plataspididae	black island stink bug	x	n	x	n	n	x
Brontispa chalybeipennis (Zacher)	Coleoptera: Chrysomelidae	Pohnpei coconut leaf beetle				x	x	
Brontispa mariana Spaeth	Coleoptera: Chrysomelidae	Mariana coconut beetle		x	x			C
Brontispa palauensis (Esaki & Chujo)	Coleoptera: Chrysomelidae	Palau coconut leaf beetle	x					G
Capelopterum punctatellum ? Melichar	Homoptera: Issidae	planthopper						x
Caroliniella aenescens Blair	Coleoptera: Cerambycidae	coconut long-horned beetle			x		x	
Cerataphis lataniae (Boisduval)	Homoptera: Aphididae	latania aphid		x		x		x
Ceresium unicolor (F.)	Coleoptera: Cerambycidae	longhorn beetle			x	x	x	x
Ceroplastes ceriferus Anderson	Homoptera: Coccidae	Mexican wax scale						G
Ceroplastes floridensis Comstock	Homoptera: Coccidae	Florida wax scale	x			x		x
Ceroplastes rubens Maskell	Homoptera: Coccidae	red wax scale	x	n				x
Chaetocnema confinis Crotch	Coleoptera: Chrysomelidae	sweet potato flea beetle						G
Chanithus gramineus (F.)	Homoptera: Dictyopharidae	grass snout hopper	x	x				x
Chloriona formosella (Matsumura)	Homoptera: Delphacidae	planthopper		x				x
Chlorophorus annularis (F.)	Coleoptera: Cerambycidae	bamboo longhorn						x
Chloropulvinaria psidii Maskell	Homoptera: Coccidae	green shield scale	x		x	x	x	x
Chrysobothris costata Kerremans	Coleoptera: Buprestidae	wood borer						G
Chrysodeixis chalcites (Esper)	Lepidoptera: Noctuidae	green garden looper	n					x
Chrysomphalus aonidum (L.)	Homoptera: Diaspididae	Florida red scale				x		
Chrysomphalus dictyospermi (Morgan)	Homoptera: Diaspididae	dictyospermum scale	x		x			x
Cicadulina bipunctella (Matsumura)	Homoptera: Cicadellidae	leafhopper	x	x				x
Coccus hesperidum L.	Homoptera: Coccidae	brown soft scale	x	x	x			x
Coccus longulus (Douglas)	Homoptera: Coccidae	long brown scale	x					x
Coccus mangiferae (Green)	Homoptera: Coccidae	mango soft scale	x					
Coccus moestus De Lotto	Homoptera: Coccidae	coccid scale	x		x			x
Coccus viridis (Green)	Homoptera: Coccidae	green scale	x	x	x	x	n	x
Coenobius glochidionis Gressitt	Coleoptera: Chrysomelidae	leaf beetle	x					
Colasposoma metallicum Lefevre	Coleoptera: Chrysomelidae	leaf beetle						x
Conocephalus longipennis (Haan)	Orthoptera: Tettigoniidae	long-horned grasshopper			x	x	x	x
Coptosoma xanthogramma (White)	Hemiptera: Plataspididae	black stink bug					n	n
Cosmopolites sordidus (Germar)	Coleoptera: Curculionidae	banana root borer				n		x
Creontiades pallidifer (Walker)	Hemiptera: Miridae	sweet potato yellow bug	x	x	x	x		x
Crocidolomia binotalis Zeller.	Lepidoptera: Pyralidae	cabbage cluster caterpillar	x					x
Cryptophlebia ombrodelta (Lower)	Lepidoptera: Tortricidae	litchi fruit moth	x					x
Cryptophlebia peltastica (Meyrick)	Lepidoptera: Tortricidae	tortricid moth						G
Cryptorhynchus mangiferae (F.)	Coleoptera: Curculionidae	seed weevil						G
Cylas formicarius (F.)	Coleoptera: Curculionidae	sweet potato weevil	x	x	x			x
Cyrtopeltis tenuis (Reuter)	Hemiptera: Miridae	tomato bug	x		x	x		x
Daealus sp.	Coleoptera: Curculionidae	weevil						C
Dialeurodes citrifolii (Morgan)	Homoptera: Aleyrodidae	cloudy-winged whitefly				n		
Dialeurodes kirkaldyi (Kotinsky)	Homoptera: Aleyrodidae	Kirkaldy whitefly	x	x		x		x
Diaphania hyalinata (L.)	Lepidoptera: Pyralidae	melonworm	x					x
Diaphania indica (Saunders)	Lepidoptera: Pyralidae	cucurbit leafroller	x					x
Diaspis boisduvalii Signoret	Homoptera: Diaspididae	Boisduval scale	x					
Diaspis bromeliae (Kerner)	Homoptera: Diaspididae	pineapple scale				x		x

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Lepidosaphes gloverii (Packard)	Homoptera: Diaspididae	glover scale		n	x	x		S
Lepidosaphes laterochitinosa Green	Homoptera: Diaspididae	armored scale	x	n?		n?		x
Lepidosaphes palauensis Beardsley	Homoptera: Diaspididae	Palau scale	x					G
Lepidosaphes similis Beardsley	Homoptera: Diaspididae	scale	x	x		x		x
Lepidosaphes tokionis (Kuwana)	Homoptera: Diaspididae	croton mussel scale	x	x	x			x
Lepidosaphes sp.	Homoptera: Diaspididae	scale						G
Leptocentrus taurus (F.)	Homoptera: Membracidae	eggplant horned planthopper						x
Leptocorixa acuta (Thunberg)	Hemiptera: Alydidae	rice bug	x	x	x			x
Leptoglossus australis (F.)	Hemiptera: Coreidae	leaf-footed plant bug	x			x		x
Leptynoptera sulfurea Crawford	Homoptera: Psyllidae	kamani psyllid	x	x		x	x	G
Lipaphis erysimi (Kaltenbach)	Homoptera: Aphididae	turnip aphid						x
Liriomyza brassicae (Riley)	Diptera: Agromyzidae	cabbage serpentine leafminer						x
Liriomyza sativae Blanchard	Diptera: Agromyzidae	vegetable leafminer						G
Liriomyza trifolii (Burgess)	Diptera: Agromyzidae	serpentine leafminer		n		n		GS?
Locusta migratoria manilensis (Meyen)	Orthoptera: Acrididae	migratory locust						x
Lophothetes hirsuta Zimmerman	Coleoptera: Curculionidae	short-nosed weevil						G
Lophothetes inusitata Zimmerman	Coleoptera: Curculionidae	short-nosed weevil						G
Lophothetes vulgaris Zimmerman	Coleoptera: Curculionidae	short-nosed weevil						x
Lophothetes sp.	Coleoptera: Curculionidae	short-nosed weevil	x?					
Lophothetes sp.	Coleoptera: Curculionidae	short-nosed weevil						G
Lophothetes sp.	Coleoptera: Curculionidae	short-nosed weevil	x	x	x	x		x
Lophothetes sp.	Coleoptera: Curculionidae	short-nosed weevil	x	x	x	x		C
Lophothetes sp.	Coleoptera: Curculionidae	short-nosed weevil						C
Lophothetes sp.	Coleoptera: Curculionidae	short-nosed weevil						x
Lophothetes sp.	Coleoptera: Curculionidae	short-nosed weevil	x	x	x	x		
Lophothetes sp.	Coleoptera: Curculionidae	short-nosed weevil						C
Lygus kusaiensis Carvalho	Hemiptera: Miridae	Kosrae lygus bug					x	
Lygus trukensis Carvalho	Hemiptera: Miridae	Truk bean bug			x			
Maconellicoccus hirsutus (Green)	Homoptera: Pseudococcidae	Egyptian hibiscus mealybug	?		?			G
Marasmia trapezalis (Guenée)	Lepidoptera: Pyralidae	maize leafroller	x					x
Marasmia venilialis (Walker)	Lepidoptera: Pyralidae	grass leaf-folder						G
Maruca testulalis (Geyer)	Lepidoptera: Pyralidae	bean pod borer	n					x
Megacrania batesii Kirby	Orthoptera: Phasmatidae	pandanus stick insect					x	
Megymenum affine Boisduval	Hemiptera: Pentatomidae	Truk stink bug			x			
Melanagromyza sojae (Zehntner)	Diptera: Agromyzidae	soybean fly	x					
Melanaspis bromeliae (Leonardi)	Homoptera: Diaspididae	brown pineapple scale				x		G
Melanitis leda (L.)	Lepidoptera: Satyridae	evening brown butterfly	x	x	x	x	x	x
Mesohomotoma hibisci (Froggatt)	Homoptera: Psyllidae	hibiscus psyllid	x	x		x	x	x
Metriona circumdata (Herbst)	Coleoptera: Chrysomelidae	green tortoise beetle	x	n	x	n		x
Myndus bifurcatus Metcalf	Homoptera: Cixiidae	planthopper						x
Myndus dibaphus Fennah	Homoptera: Cixiidae	planthopper			x			x
Myndus irreptor Fennah	Homoptera: Cixiidae	planthopper						x
Myndus palawanensis Muir	Homoptera: Cixiidae	planthopper						x
Mythimna loreyi (Duponchel)	Lepidoptera: Noctuidae	rice armyworm						G
Myzus persicae (Sulzer)	Homoptera: Aphididae	green peach aphid						S
Nanyozo viridilineatus Kono	Coleoptera: Curculionidae	three-green-lined weevil			x			
Nanyozo viridipictus (Blair)	Coleoptera: Curculionidae	five-green-lined weevil			x			
Neomaskellia bergii (Signoret)	Homoptera: Aleyrodidae	sugarcane whitefly	x	x	x	x	x	G
Neosimmondsia esakii Takahashi	Homoptera: Pseudococcidae	mealybug				x		
Neotermes connexus Snyder	Isoptera: Kalotermitidae	forest tree termite						x
Neotermes kanehirae (Oshima)	Isoptera: Kalotermitidae	kanehira termite	x					
Nephotettix apicalis (Motschulsky)	Homoptera: Cicadellidae	green rice leafhopper	x	x				x
Nesophrosyne argentatus (Evans)	Homoptera: Cicadellidae	leafhopper	x	x				x
Nesorhamma chalcas Fennah	Homoptera: Derbidae	derbid planthopper	x					
Nezara viridula (L.)	Hemiptera: Pentatomidae	southern green stink bug	x	x	x	x		x
Nilaparvata lugens (Stål)	Homoptera: Delphacidae	brown rice planthopper	x	x				
Nymphula fluctuosalis Zeller	Lepidoptera: Pyralidae	rice caseworm						G
Nysius pulchellus (Stål)	Hemiptera: Lygaeidae	lygeid bug			x		x	x
Odonaspis saccharicaulis (Zehntner)	Homoptera: Diaspididae	scale	x					
Ophiomyia phaseoli (Tryon)	Diptera: Agromyzidae	bean fly	x	x	x			x
Orthotylellus pallescens Usinger	Homoptera: Miridae	mirid	x			x		x
Oryctes rhinoceros (L.)	Coleoptera: Scarabaeidae	coconut rhinoceros beetle	x					

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Pseudococcus solomonensis Williams	Homoptera: Pseudococcidae	mealybug	x	x	x	x		
Pseudococcus trukensis Beardsley	Homoptera: Pseudococcidae	mealybug			x	x		
Pseudoloxops bifasciatus (Usinger)	Hemiptera: Miridae	mirid						RG
Pseudonapomyza spicata (Malloch)	Diptera: Agromyzidae	maize leafminer	x	x		?		x
Radionaspis indica (Marlatt)	Homoptera: Diaspididae	mango scale	x					
Rhabdoscelus asperipennis (Fairmaire)	Coleoptera: Curculionidae	coconut trunk weevil borer	x					
Rhabdoscelus obscurus (Boisduval)	Coleoptera: Curculionidae	New Guinea cane weevil borer	x					x
Rhopalosiphum maidis (Fitch)	Homoptera: Aphididae	corn leaf aphid	x	x	x	x		x
Rhyparida carolina Chujo	Coleoptera: Chrysomelidae	mango leaf beetle			x	x	x	
Saccharicoccus sacchari (Cockerell)	Homoptera: Pseudococcidae	pink sugarcane mealybug	x	x	x	x		x
Saissetia coffeae (Walker)	Homoptera: Coccidae	hemispherical scale	x	x	x	x		x
Saissetia miranda (Cockerell & Parrott)	Homoptera: Coccidae	Mexican black scale						G
Saissetia neglecta DeLotto	Homoptera: Coccidae	Caribbean black scale	x			n		G
Saissetia nigra (Nietner)	Homoptera: Coccidae	nigra scale	x	x	x		x	x
Saissetia ?oleae (Bernard)	Homoptera: Coccidae	black scale	x		x			x
Segestes unicolor Redtenbacher	Orthoptera: Tettigoniidae	coconut long-horned grasshopper	x					
Selenothrips rubrocinctus (Giard)	Thysanoptera: Thripidae	redbanded thrips	n	n	n	x?		x
Semelaspidus mangiferae Takahashi	Homoptera: Diaspididae	scale	x					
Sitophilus oryzae (L.)	Coleoptera: Curculionidae	rice weevil						G
Sogatella furcifera (Horváth)	Homoptera: Delphacidae	grass planthopper	x			x		G
Sphaeropterus sp.	Coleoptera: Curculionidae	Palau sweet-potato weevil	x					
Sphenarches caffer Zeller	Lepidoptera: Pterophoridae	plume moth						G
Spodoptera litura (F.)	Lepidoptera: Noctuidae	rice cutworm	x	?	x	x	?	x
Spodoptera mauritia Guenée	Lepidoptera: Noctuidae	lawn armyworm						x
Steatococcus samaraius Morrison	Homoptera: Margarodidae	steatococcus scale	x	x				G
Stenocatantops splendens (Thunberg)	Orthoptera: Acrididae	white-banded grasshopper						G
Sternochetus mangiferae (F.)	Coleoptera: Curculionidae	mango seed weevil						C
Strepsicrates ejectana (Walker)	Lepidoptera: Tortricidae	guava bud moth						x
Sundapteryx biguttula (Ishida)	Homoptera: Cicadellidae	Indian cotton jassid	?					GS
Susumia exigua (Butler)	Lepidoptera: Pyralidae	rice leafroller						x
Swezeyaria viridana Metcalf	Homoptera: Tropiduchidae	planthopper			x	x	x	G
Swezeyia zephyrus Fennah	Homoptera: Derbidae	derbid hopper	x		x	x	x	x
Tarophagus proserpina (Kirkaldy)	Homoptera: Delphacidae	taro leafhopper	x	x	x	x	x	x
Teleogryllus oceanicus (Le Guill.)	Orthoptera: Gryllidae	oceanic field cricket						G
Tetranychus cinnabarinus (Boisd.)	Acari: Tetranychidae	carmine spider mite						x
Tetranychus neocaledonicus André	Acari: Tetranychidae	vegetable mite						G
Tetranychus sp.	Acari: Tetranychidae	spider mite						C
Tetranychus sp.	Acari: Tetranychidae	spider mite						x
Tetranychus truncatus Ehara	Acari: Tetranychidae	spider mite						G
Tetranychus tumidus	Acari: Tetranychidae	spider mite						x
Theretra nessus (Drury)	Lepidoptera: Sphingidae	yam hawk moth	x	x	x			
Theretra pinastrina (Martyn)	Lepidoptera: Sphingidae	narrow-winged sphinx moth	x	x				x
Thrips palmi Karny	Thysanoptera: Thripidae	melon thrips	n					G
Thrips tabaci Lindeman	Thysanoptera: Thripidae	onion thrips	x	x				x
Tiracola plagiata (Walker)	Lepidoptera: Noctuidae	cacao armyworm						x
Toxoptera aurantii (Boyer de Fonscolombe)	Homoptera: Aphididae	black citrus aphid			x			x
Trioza vitiensis Kirkaldy	Homoptera: Psyllidae	eugenia psyllid	x		?	x		
Trissodoris guamensis Busck	Lepidoptera: Cosmopterigidae	moth						x
Trochorhopalus strangulatus (Gyllenhal)	Coleoptera: Curculionidae	strangulate weevil	x					
Turbinococcus pandanicola (Takahashi)	Homoptera: Pseudococcidae	mealybug	x					
Ugyops annulipes (Stål)	Homoptera: Delphacidae	delphacid planthopper						x
Unaspis citri (Comstock)	Homoptera: Diaspididae	citrus snow scale				x		
Valanga excavata Stål	Orthoptera: Acrididae	large short-horn grasshopper						x
Valanga nigricornis (Burmeister)	Orthoptera: Acrididae	Javanese grasshopper	x	x	x			
Vinsonia stellifera Westwood	Homoptera: Coccidae	stellate scale	x	n		x	n	
Xenaleyrodes artocarpi Takahashi	Homoptera: Aleyrodidae	breadfruit whitefly	x					
Xyleborus ferrugineus (F.)	Coleoptera: Curculionidae	black twig borer			x	x	x	x
Xyleborus fornicatus Eichhoff	Coleoptera: Curculionidae	tea shot-hole borer	x	x		x		
Xyleborus morigerus Blandford	Coleoptera: Curculionidae	black twig borer			x	x		x
Xyleborus perforans (Wollaston)	Coleoptera: Curculionidae	coconut shot-hole borer	x	x	x	x	x	x

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Pseudococcus longispinus	long-tailed mealybug			?				on leaves
Stenocatantops splendens	white-banded grasshopper						G	eat leaves
Teleogryllus oceanicus	oceanic field cricket						G	eat fruit, leaves
Thrips tabaci	onion thrips	x	x				x	vector of pineapple yellow spot virus
Annona	**Soursop, sweetsop**							
Aspidiotus destructor	coconut scale	x	x	x	x		x	on leaves, fruits
Chloropulvinaria psidii	green shield scale	x		x	x	x	x	on leaves
Coccus longulus	long brown scale	x					x	on leaves
Coccus viridis	green scale	x	x	x	x	n	x	on leaves
Dysmicoccus brevipes	pineapple mealybug	x	x	x	x		x	on leaves
Eucalymnatus tessellatus	tessellated scale	x	n	x	x	x		on leaves
Ferrisia virgata	striped mealybug	x	x	x	x		x	infest fruits
Kallitaxila crini	green tropiduchid						G	cause leaf distortion
Lepidosaphes palauensis	Palau scale	x					G	on bark
Lepidosaphes similis	scale	x	x		x		x	on leaves
Planococcus citri	citrus mealybug	x	x	x	x	x	x	on leaves, roots
Planococcus lilacinus	lilac mealybug						G	on leaves, fruit
Saissetia coffeae	hemispherical scale	x	x	x	x		x	on leaves, twigs
Saissetia nigra	nigra scale	x	x	x		x	x	on leaves
Saissetia ?oleae	black scale	x		x			x	on leaves
Semelaspidus mangiferae	scale	x						on leaves
Areca catechu	**Betel nut**							
Agonoxena sp.	moth						G	scarify leaves
Aspidiotus destructor	coconut scale	x	x	x	x		x	on leaves
Batrachedra sp.	moth						G	web flowers
Cerataphis lataniae	latania aphid		x		x		x	on leaves
Chrysomphalus dictyospermi	dictyospermum scale	x		x			x	on leaves, fruit
Coccus mangiferae	mango soft scale	x						on leaves
Diocalandra frumenti	coconut weevil	x		x			G	larvae bore in leaves and fruit stalks
Dysmicoccus brevipes	pineapple mealybug	x	x	x	x		x	on leaves
Eucalymnatus tessellatus	tessellated scale	x	n	x	x	x		on leaves
Heliothrips haemorrhoidalis	greenhouse thrips						G	scarify leaves
Hemiberlesia palmae	palm scale	x	x	Y	x	x	x	on leaves
Icerya aegyptiaca	Egyptian fluted scale	x	x	x	x		x	on leaves
Lepidosaphes laterochitinosa	armored scale	x	n?		n?		x	suck sap
Lepidosaphes similis	scale	x	x		x		x	on leaves
Oryctes rhinoceros	coconut rhinoceros beetle	x						bore in bud
Palmicultor palmarum	palm mealybug	x	x	x	x	x		on leaves, fruit
Parlatoria proteus	proteus scale	x	x	x	x	x	G	on stems, leaves
Phenacaspis inday	inday scale	x	x				G	on leaves
Pinnaspis aspidistrae	fern scale	x			x			on leaves, flowers
Pinnaspis buxi	ti scale				x		G	on leaves
Protaetia orientalis	oriental flower beetle						G	adults eat flowers
Pseudococcus solomonensis	mealybug	x	x	x	x			on leaves, fruit stalks
Rhabdoscelus obscurus	New Guinea cane weevil borer	x					x	bore in trunk and petiole
Xyleborus perforans	coconut shot-hole borer	x	x	x	x	x	x	bore in trunk
Artocarpus altilis	**Breadfruit**							
Aclees porosus	breadfruit twig borer weevil	x	x					larvae bore in twigs
Andaspis punicae	scale	x					G	on stems
Aonidiella aurantii	California red scale	?		?			?	on leaves
Aonidiella inornata	inornate scale	x	x	x	x	x	G	on leaves
Aphis craccivora	cowpea aphid		x	x	x	x	x	on leaves
Aphis gossypii	cotton or melon aphid	x	x	x	x	x	x	on leaves
Aspidiotus destructor	coconut scale	x	x	x	x		x	on leaves, fruits
Aspidiotus excisus	scale	x					C	on leaves
Asterolecanium pustulans	oleander pit scale	x		x			G	on leaves
Bactrocera frauenfeldi	mango fruit fly	x	x	x	x	x	S	larvae bore in fruit

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Calophyllum inophyllum	**Kamani**							
Hemiberlesia palmae	palm scale	x	x	Y	x	x	x	on leaves
Lamenia caliginea	derbid planthopper	x	x	x	x	x	x	on leaves
Leptynoptera sulfurea	kamani psyllid	x	x		x	x	G	on leaves
Lophothetes inusitata	weevil						G	on leaves
Capsicum	**Red and bell pepper, etc.**							
Aphis gossypii	cotton or melon aphid	x	x	x	x	x	x	on leaves
Chloriona formosella	planthopper		x				x	suck sap
Epilachna 26punctata philippensis	Philippine lady beetle			?			x	adults & larvae eat leaves
Helicoverpa armigera	old world bollworm						x	in fruit
Helicoverpa zea	corn earworm or tomato fruitworm	x?					x?	in fruit
Liriomyza sativae	vegetable leafminer						G	larvae mine leaves
Liriomyza trifolii	serpentine leafminer		n		n		GS?	larvae mine leaves
Lophothetes sp.	weevil						C	eat leaves
Myzus persicae	green peach aphid						SG?	suck sap of leaves
Nezara viridula	southern green stink bug	x	x	x	x		x	leaves, stems, fruit
Ostrinia furnacalis	Asian corn borer	x					x	bore in fruit
Phytorus lineolatus	phytorus leaf beetle						x	eat leaves
Polyphagotarsonemus latus	broad mite						x	scar leaves, fruits
Pseudaulacaspis pentagona	white peach scale	x		x			x	on stems
Pulvinaria urbicola	scale			n			SG	on leaves
Spodoptera litura	rice cutworm	x	?	x	x	?	x	larvae eat leaves
Thrips palmi	melon thrips	n					G	scar leaves
Carica papaya	**Papaya**							
Adoxophyes fasciculana	orange tip moth					x		web & bore tips
Aonidiella comperei	false yellow scale	x	x	x			x	on leaves
Aphis gossypii	cotton or melon aphid	x	x	x	x	x	x	on leaves
Aspidiotus destructor	coconut scale	x	x	x	x		x	on leaves, fruits
Aspidiotus excisus	scale	x					C	on leaves
Coccus longulus	long brown scale	x					x	on leaves
Eudocima fullonia	fruit-piercing moth	n			n	n	x	pierce fruit
Euphranta lemniscata	lemniscate papaya fruitfly						C	larvae bore in fruit
Ferrisia virgata	striped mealybug	x	x	x	x		x	infest fruits
Fulvius angustatus	mirid						x	suck sap
Hendelina bisecta	bisect papaya fruitfly						x	bore in fruit
Icerya aegyptiaca	Egyptian fluted scale	x	x	x	x		x	on leaves
Icerya purchasi	cottony cushion scale						G	on leaves, twigs
Icerya seychellarum	Seychelles scale	?	x					on leaves, fruits
Myzus persicae	green peach aphid						SG?	suck sap of leaves
Parasaissetia nigra	nigra scale	x	x	x		x	x	on leaves
Planococcus citri	citrus mealybug	x	x	x	x	x	x	on roots
Polyphagotarsonemus latus	broad mite						x	scar leaves, fruits
Protaetia orientalis	oriental flower beetle						G	adults eat flowers
Selenothrips rubrocinctus	redbanded thrips	n	n	n	x?		x	scarify leaves
Tetranychus cinnabarinus	carmine spider mite						x	under leaves
Tetranychus truncatus	spider mite						G	under leaves
Casuarina	**Ironwood**							
Icerya purchasi	cottony cushion scale						G	on leaves, twigs
Lepidosaphes similis	scale	x	x		x		x	on leaves
Steatococcus samaraius	steatococcus scale	x	x				G	on leaves
Citrus	**Lemon, etc.**							
Abgrallaspis palmae	scale					x		on leaves
Adoxophyes fasciculana	orange tip moth					x		web and bore tips
Agrilus occipitalis	citrus bark borer						x	in dead twigs
Aleurocanthus spiniferus	orange spiny whitefly		n	x	n	n	x	on leaves
Aleurodicus dispersus	spiraling whitefly	n			n		x	on leaves

Scientific name	Common name	Pa	Y	C	Po	K	M	Comments
Cocos nucifera	Coconut palm							
Acanthograeffea denticulata	denticulate stick insect						x	eat leaves
Acanthograeffea modesta	coconut stick insect			x	x			eat leaves
Agonoxena pyrogramma	coconut flat moth			n?	n?	x	G	scarify leaves
Aleurocanthus palauensis	Palau coconut whitefly	x						on leaves
Aleurodicus dispersus	spiraling whitefly	n			n		x	on leaves
Aonidiella comperei	false yellow scale	x	x	x			x	on leaf, flower stalk
Aonidiella eremocitri	scale	x						on leaves, trunk
Aonidiella inornata	inornate scale	x	x	x	x	x	G	on leaves
Aspidiotus destructor	coconut scale	x	x	x	x		x	on leaves
Aspidiotus excisus	scale	x					C	on leaves
Astegopteryx rhapidis	aphid	x						suck sap
Brontispa chalybeipennis	Pohnpei coconut leaf beetle				x	x		scour new leaves
Brontispa mariana	Mariana coconut beetle		x	x			C	scour new leaves
Brontispa palauensis	Palau coconut leaf beetle	x					G	scour new leaves
Caroliniella aenescens	coconut long-horned beetle			x		x		
Cerataphis lataniae	latania aphid		x		x		x	on leaves
Chrysomphalus aonidum	Florida red scale				x			on leaves
Coccus hesperidum	brown soft scale	x	x	x			x	on leaves
Coccus longulus	long brown scale	x					x	on leaves
Cryptophlebia ombrodelta	litchi fruit moth	x					x	larvae eat seeds
Diocalandra frumenti	coconut weevil	x		x			x	larvae bore in leaves, fruit stalks
Dysmicoccus brevipes	pineapple mealybug	x	x	x	x		x	on leaves
Dysmicoccus saipanensis	Saipan mealybug		x	x	x	x	x	on trunk, flower, leaves
Eucalymnatus tessellatus	tessellated scale	x	n	x	x	x		on leaves
Exitianus plebeius	leafhopper						Gn	on leaves
Flaccia dione	derbid hopper						Gn	on leaves
Furcaspis oceanica	coconut red scale	x	x	x	x	x	x	on leaves, fruit
Hemiberlesia lataniae	latania scale	x	x	x	x	x	x	on leaves
Hemiberlesia palmae	palm scale	x	x	Y	x	x	x	on leaves
Icerya aegyptiaca	Egyptian fluted scale	x	x	x	x		x	on leaves
Icerya seychellarum	Seychelles scale	?	x					on leaves, fruit
Ischnaspis longirostris	black thread scale	x					G	on leaves
Lallemandana phalerata	spittlebug				x		x	on leaves
Lamenia numitor	derbid planthopper		x				x	on leaves
Lepidosaphes esakii	armored scale			x	x	x	x	on leaves
Lepidosaphes similis	scale	x	x		x		x	on leaves
Leptynoptera sulfurea	kamani psyllid	x	x		x	x	G	on leaves
Neotermes kanehirae	kanehira termite	x						in trunks
Oryctes rhinoceros	coconut rhinoceros beetle	x						bore in bud, through coconut frond petioles
Palmicultor guamensis	Guam mealybug						G	
Palmicultor palmarum	palm mealybug	x	x	x	x	x		on leaves, fruit
Parasaissetia nigra	nigra scale	x	x	x		x	x	on leaves
Parlatoria proteus	proteus scale	x	x	x	x	x	G	on stems, leaves
Phenacaspis inday	inday scale	x	x				G	on leaves
Pinnaspis aspidistrae	fern scale	x			x			on leaves, flowers
Pinnaspis strachani	lesser snow scale	x	x	x	x		x	on leaves
Protaetia orientalis	oriental flower beetle						G	adults eat flowers
Protalebrella braziliensis	leafhopper						Gn	on leaves
Pseudococcus microadonidum	mealybug			x	x			on leaves
Rhabdoscelus asperipennis	coconut trunk weevil borer	x						bore in trunk and petioles
Rhabdoscelus obscurus	New Guinea cane weevil borer	x					x	bore in trunk and petioles
Segestes unicolor	coconut long-horn grasshopper	x						eat leaves
Steatococcus samaraius	steatococcus scale	x	x				G	on leaves, small branches
Swezeyia zephyrus	derbid hopper	x		x	x	x	x	on leaves
Trochorhopalus strangulatus	strangulate weevil	x						
Valanga excavata	large short-horned grasshopper						x	eat leaves
Valanga nigricornis	Javanese grasshopper	x	x	x				eat leaves
Vinsonia stellifera	stellate scale	x	n		x	n		on leaves
Xyleborus ferrugineus	black twig borer			x	x	x	x	bore in trunk
Xyleborus perforans	coconut shot-hole borer	x	x	x	x	x	x	bore in trunk
Xyleborus similis	shot-hole borer	x		x	x	x	x	bore in trunk

Scientific name	Common name	Pa	Y	C	Po	K	M	Comments
								fruits; larvae eat roots, fruits touching soil
Aulacophora similis	orange cucumber beetle	x	x				x	adults eat leaves, flowers, fruits; larvae eat roots, fruits touching soil
Bactrocera cucurbitae	melon fly						x	bore in fruit
Chrysodeixis chalcites	green garden looper	n					x	eat leaves
Diaphania hyalinata	melonworm	x					x	larvae eat leaves
Diaphania indica	cucurbit leafroller	x					x	larvae eat leaves
Ferrisia virgata	striped mealybug	x	x	x	x		x	on leaves, stems
Halticus insularis	island fleahopper						G	white spots on leaves
Halticus tibialis	black garden fleahopper	x	x	x	x	x	x	white spots on leaves
Icerya aegyptiaca	Egyptian fluted scale	x	x	x	x		x	on leaves
Lepidosaphes beckii	purple scale			x	x		G	on leaves
Leptoglossus australis	leaf-footed plant bug	x			x		x	suck sap, fruit
Liriomyza sativae	vegetable leafminer						G	larvae mine leaves
Liriomyza trifolii	serpentine leafminer		n		n		GS?	larvae mine leaves
Lophothetes sp.	weevil						C	
Megymenum affine	Trnk stink bug			x				suck stem, leaves, fruit
Myzus persicae	green peach aphid						SG?	suck sap, leaves
Nanyozo viridilineatus	three-green-lined weevil			x				
Nezara viridula	southern green stink bug	x	x	x	x		x	on leaves, stems, fruit
Physomerus grossipes	large spined-footed bug	n					x	suck sap
Planococcus citri	citrus mealybug	x	x	x	x	x	x	on leaves, roots
Saissetia coffeae	hemispherical scale	x	x	x	x		x	on leaves, twigs
Sphenarches caffer	plume moth						G	larvae eat leaves
Spodoptera litura	rice cutworm	x	?	x	x	?	x	larvae eat leaves
Stenocatantops splendens	white-banded grasshopper						G	pest of vegetables
Thrips palmi	melon thrips	n					G	scars leaves
Thrips tabaci	onion thrips	x	x				x	scars leaves
Cycas	**Cycads**							
Alciphron glaucus	pentatomid bug						x	suck sap
Anaballus amplicollis	weevil						G	eat seeds
Aonidiella comperei	false yellow scale	x	x	x			x	on leaf, flower stalk
Ceroplastes floridensis	Florida wax scale	x			x		x	on leaves
Ceroplastes rubens	red wax scale	x	n				x	on leaves
Lallemandana phalerata	spittlebug				x		x	on leaves
Lepidosaphes carolinensis	Caroline scale	x	x					on leaf blade and petiole
Lepidosaphes similis	scale	x	x		x		x	on leaves
Parlatoria proteus	proteus scale	x	x	x	x	x	G	on stems, leaves
Phytorus lineolatus	phytorus leaf beetle						x	eat new leaves
Cynodon	**Bermuda grass**							
Spodoptera mauritia	lawn armyworm						x	larvae eat leaves
Antonina graminis	rhodesgrass mealybug	x		x			x	on stems
Marasmia venilialis	grass leaf-folder						G	eat leaves
Cyrtosperma	**Taro**							
Planococcus lilacinus	lilac mealybug						G	on leaves, fruit
Pseudococcus macrocirculus	mealybug	x	x					on leaves
Pseudococcus orchidicola	orchid mealybug			x		x	C	on leaves
Tarophagus proserpina	taro leafhopper	x	x	x	x	x	x	sap-sucker on leaves, virus vector
Desmanthus virgatus	**Royal poinciana**							
Pericyma cruegeri	poinciana looper	n					GR	larvae eat leaves
Dioscorea	**Yams**							
Adoxophyes melia	melia tortricid						x	roll leaves
Aspidiotus destructor	coconut scale	x	x	x	x		x	on leaves

Scientific name	Common name	Pa	Y	C	Po	K	M	Comments
Chaetocnema confinis	sweet potato flea beetle						G	chew tunnel-like tracks in leaves
Chrysodeixis chalcites	green garden looper	n					x	eat leaves
Colasposoma metallicum	leaf beetle						x	eat leaves
Creontiades pallidifer	sweet potato yellow bug	x	x	x	x		x	suck sap
Cylas formicarius	sweet potato weevil	x	x	x			x	larvae bore tubers
Daealus sp.	weevil	x	x	x			x	
Euscepes postfasciatus	West Indian sweet potato weevil	x	?	?	x		x	larvae bore stems, tubers
Exitianus capicola	leafhopper		x	x	x	x	x	suck sap
Gryllotalpa sp.	mole cricket						G	eat tubers
Halticus insularis	island fleahopper						G	white spots on leaves
Halticus tibialis	black garden fleahopper	x	x	x	x	x	x	white spots on leaves
Hippotion swinhoei	hawk moth						G?	larvae eat leaves
Hypolimnas bolina	blue moon butterfly	x	x	x	x	x	x	eat leaves
Lepidosaphes sp.	scale						G	on stems
Lophothetes sp.	weevil	x	x	x	x		C	
Metriona circumdata	green tortoise beetle	x	n	x	n		x	larvae, adults eat leaves
Nanyozo viridilineatus	three-green-lined weevil			x				
Nanyozo viridipictus	five-green-lined weevil			x				
Nysius pulchellus	lygeid bug			x		x	x	suck sap
Pachyzancla nipponalis	Nippon sweet potato moth	x						
Physomerus grossipes	large spined-footed bug	n					x	suck sap
Precis villida	meadow argus	x		x	x			larvae eat leaves
Sphaeropterus sp.	Palau sweet potato weevil	x						
Zanchius fragilis	bug						x	suck sap
Lycopersicon esculentum	**Tomato**							
Anomis flava	hibiscus caterpillar	x	x				x	eat leaves
Aphis gossypii	cotton or melon aphid	x	x	x	x	x	x	on leaves
Aspidiotus destructor	coconut scale	x	x	x	x		x	on leaves
Bactrocera cucurbitae	melon fly						x	bore in fruit
Bemisia tabaci	sweet potato whitefly	x			?		x	on leaves, vector of virus
Chrysodeixis chalcites	green garden looper	n					x	eat leaves
Cyrtopeltis tenuis	tomato bug	x		x	x		x	distort leaves
Empoasca pitiensis	green leafhopper						?	suck sap of leaves
Epilachna 26punctata philippensis	Philippine lady beetle			?			x	adults and larvae eat leaves
Epitrix hirtipennis	tobacco flea beetle						G	chew pit-like holes in leaves
Eudocima fullonia	fruit-piercing moth	n			n	n	x	pierce fruit
Ferrisia virgata	striped mealybug	x	x	x	x		x	on leaves, stems
Helicoverpa armigera	old world bollworm						x	eat fruit, leaves
Helicoverpa zea	corn earworm or tomato fruitworm	x?					x?	eat fruit
Icerya aegyptiaca	Egyptian fluted scale	x	x	x	x		x	on leaves
Icerya seychellarum	Seychelles scale	?	x					on leaves, fruits
Leptoglossus australis	leaf-footed plant bug	x			x		x	suck sap, fruit
Lipaphis erysimi	turnip aphid						x	suck sap of leaves
Liriomyza sativae	vegetable leafminer						G	larvae mine leaves
Liriomyza trifolii	serpentine leafminer		n		n		GS?	larvae mine leaves
Nesophrosyne argentatus	leafhopper	x	x				x	suck sap
Nezara viridula	southern green stink bug	x	x	x	x		x	on leaves, stems, fruit
Pentalonia nigronervosa	banana aphid	x	x	x	x	n	x	on leaves
Phenacoccus madeirensis	mealybug			n	n		G	on leaves
Planococcus citri	citrus mealybug	x	x	x	x	x	x	on leaves, roots
Polyphagotarsonemus latus	broad mite						x	scar leaves, fruits
Spodoptera litura	rice cutworm	x	?	x	x	?	x	larvae eat leaves
Tetranychus tumidus	spider mite						x	under leaves
Thrips tabaci	onion thrips	x	x				x	scar leaves
Mangifera indica	**Mango**							
Aleurodicus dispersus	spiraling whitefly	n			n		x	on leaves
Anisodes illepidaria	mango shoot looper						G	larvae eat new leaves
Aphis craccivora	cowpea aphid		x	x	x	x	x	on leaves
Aspidiotus destructor	coconut scale	x	x	x	x		x	on leaves

Scientific name	Common name	Pa	Y	C	Po	K	M	Comments
Aspidiotus destructor	coconut scale	x	x	x	x		x	on leaves
Aspidiotus excisus	scale	x					C	on leaves
Chrysomphalus dictyospermi	dictyospermum scale	x		x			x	on leaves, fruit
Coccus hesperidum	brown soft scale	x	x	x			x	on leaves
Coccus viridis	green scale	x	x	x	x	n	x	on leaves
Cosmopolites sordidus	banana root borer				n		x	bore in corm, pseudostem
Diaspis boisduvalii	Boisduval scale	x						on leaves
Dysmicoccus neobrevipes	grey pineapple mealybug						x	on leaves
Erionota thrax	banana leafroller						x	larvae roll up & eat leaf
Eucalymnatus tessellatus	tessellated scale	x	n	x	x	x		on leaves
Eudocima fullonia	fruit-piercing moth	n			n	n	x	pierce fruit
Ferrisia virgata	striped mealybug	x	x	x	x		x	infest fruits
Hemiberlesia lataniae	latania scale	x	x	x	x	x	x	on leaves
Icerya aegyptiaca	Egyptian fluted scale	x	x	x	x		x	on leaves
Ischnaspis longirostris	black thread scale	x					G	on leaves
Lamenia caliginea	derbid planthopper	x	x	x	x	x	x	on leaves
Leptoglossus australis	leaf-footed plant bug	x			x		x	suck sap, fruit
Lophothetes sp.	weevil	x	x	x	x		x	
Pentalonia nigronervosa	banana aphid	x	x	x	x	n	x	on leaves, between leaf sheaths; vector of bunchy top virus
Planococcus citri	citrus mealybug	x	x	x	x	x	x	on leaves, roots
Polytus mellerborgi	banana corm weevil						x	feed in corm
Proutista moesta	erect-winged blue planthopper	x			n		x	suck sap
Pseudococcus microadonidum	mealybug			x	x			on leaves
Pseudococcus orchidicola	orchid mealybug			x		x	C	on leaves
Saissetia coffeae	hemispherical scale	x	x	x	x	'	x	on leaves, twigs
Spodoptera litura	rice cutworm	x	?	x	x	?	x	larvae eat leaves
Steatococcus samaraius	steatococcus scale	x	x				G	on leaves
Valanga excavata	large short-horn grasshopper						x	eat leaves
Valanga nigricornis	Javanese grasshopper	x	x	x				eat leaves
Oryza sativa	**Rice**							
Aiolopus thalassinus dubius	brown-winged short-horned grasshopper						x	eat leaves
Bolacidothrips orizae	thrips						G	
Conocephalus longipennis	long-horned grasshopper			x	x	x	x	eat leaves
Euconocephalus nasutus	grasshopper		x				x	eat leaves
Grammarodes geometrica	geometric noctuid						G	larvae eat leaves
Leptocorixa acuta	rice bug	x	x	x			x	suck sap
Leptoglossus australis	leaf-footed plant bug	x			x		x	suck sap, fruit
Locusta migratoria manilensis	migratory locust						x	eat leaves
Melanitis leda	evening brown butterfly	x	x	x	x	x	x	larvae eat leaves
Mythimna loreyi	rice armyworm						G	eat leaves
Nephotettix apicalis	green rice leafhopper	x	x				x	suck sap
Nezara viridula	southern green stink bug	x	x	x	x		x	suck sap
Nilaparvata lugens	brown rice planthopper	x	x					sap sucker, virus vector
Nymphula fluctuosalis	rice caseworm						G	eat leaves
Orthotylellus pallescens	mirid	x			x		x	suck sap
Oxya hyla	smaller rice grasshopper		n	n	n	n		eat leaves
Oxya japonica	Japanese grasshopper	n					C	eat leaves
Phaneroptera furcifera	Philippine katydid				x		x	eat leaves
Proboscidocoris malayus	mirid						G	on rice seedlings
Saccharicoccus sacchari	pink sugarcane mealybug	x	x	x	x		x	on stems
Sogatella furcifera	grass planthopper	x			x		G	on stems
Spodoptera litura	rice cutworm	x	?	x	x	?	x	larvae eat leaves
Spodoptera mauritia	lawn armyworm						x	larvae eat leaves
Susumia exigua	rice leafroller						x	eat leaves
Thrips tabaci	onion thrips	x	x				x	scar leaves
Pandanus	**Screw pine**							
Acanthograeffea denticulata	denticulate stick insect						x	eat leaves
Aonidiella aurantii	California red scale	?		?			?	on leaves

Scientific name	Common name	Pa	Y	C	Po	K	M	Comments
Aphis gossypii	cotton or melon aphid	x	x	x	x	x	x	on leaves
Bactrocera cucurbitae	melon fly						x	bore in pods
Bemisia tabaci	sweet potato whitefly	x			?		x	on leaves
Brachyplatys insularis	black island stink bug	x	n	x	n	n	x	suck sap of flowers
Chrysodeixis chalcites	green garden looper	n					x	eat leaves
Coptosoma xanthogramma	black stink bug					n	n	on stems, etc.
Cryptophlebia ombrodelta	litchi fruit moth	x					x	larvae eat seeds
Empoasca pitiensis	green leafhopper						x	suck sap of leaves
Etiella zinckenella	lima-bean pod borer						x	larvae bore in pods
Exitianus capicola	leafhopper		x	x	x	x	x	suck sap
Ferrisia virgata	striped mealybug	x	x	x	x		x	infest fruits
Halticus tibialis	black garden fleahopper	x	x	x	x	x	x	white spots on leaves
Helicoverpa armigera	old world bollworm						x	eat fruits
Lampides boeticus	bean butterfly	x	x	x			x	larvae eat flower pods
Lamprosema diemenalis	bean leaf-roller						G	larvae roll leaves
Leptocentrus taurus	eggplant horned planthopper						x	on stems, leaves
Leptoglossus australis	leaf-footed plant bug	x			x		x	damage pods
Liriomyza sativae	vegetable leafminer						G	larvae mine leaves
Liriomyza trifolii	serpentine leafminer		n		n		GS?	larvae mine leaves
Lygus trukensis	Truk bean bug			x				suck sap
Maruca testulalis	bean pod borer	n					x	larvae eat flowers, bore in pods
Melanagromyza sojae	soybean fly	x						larvae bore in stems and petioles
Myzus persicae	green peach aphid						SG?	suck sap of leaves
Nezara viridula	southern green stink bug	x	x	x	x		x	on leaves, stems, fruit
Nysius pulchellus	lygeid bug			x		x	x	suck sap
Ophiomyia phaseoli	bean fly	x	x	x			x	mine stems, petioles
Pagria signata	leaf beetle						G	eat leaves
Phaneroptera furcifera	Philippine katydid				x		x	eat leaves
Piezodorus hybneri	shield bug	x	n?				x	suck sap
Planococcus citri	citrus mealybug	x	x	x	x	x	x	on leaves, roots
Polyphagotarsonemus latus	broad mite						x	scar leaves, fruits
Sphenarches caffer	plume moth						G	larvae in flowers, pods
Spodoptera litura	rice cutworm	x	?	x	x	?	x	larvae eat leaves
Spodoptera mauritia	lawn armyworm						x	eat leaves
Tetranychus tumidus	spider mite						x	under leaves
Tetranychus sp.	spider mite						x	under leaves
Thrips palmi	melon thrips	n					G	scar leaves
Thrips tabaci	onion thrips	x	x				x	scar leaves
Psidium guajava	**Guava**							
Aleurodicus dispersus	spiraling whitefly	n			n		x	on leaves
Aleurothrixus floccosus	woolly whitefly						G	on leaves
Anua tongaensis	moth						G	eat leaves
Aonidiella aurantii	California red scale	?		?			?	on leaves
Aphis gossypii	cotton or melon aphid	x	x	x	x	x	x	on leaves
Aspidiotus destructor	coconut scale	x	x	x	x		x	on leaves
Bactrocera frauenfeldi	fruitfly	x	x	x	x	x	S	larvae bore in fruit
Ceroplastes rubens	red wax scale	x	n				x	on leaves
Chloropulvinaria psidii	green shield scale	x		x	x	x	x	on leaves
Chrysomphalus dictyospermi	dictyospermum scale	x		x			x	on leaves, fruit
Coccus hesperidum	brown soft scale	x	x	x			x	on leaves
Coccus viridis	green scale	x	x	x	x	n	x	on leaves
Dudua aprobola	tortricid moth					x	x	
Eucalymnatus tessellatus	tessellated scale	x	n	x	x	x		on leaves
Eudocima fullonia	fruit-piercing moth	n			n	n	x	pierce fruit
Ferrisia virgata	striped mealybug	x	x	x	x		x	on leaves, stem, fruit
Hemiberlesia lataniae	latania scale	x	x	x	x	x	x	on leaves
Hemiberlesia palmae	palm scale	x	x	Y	x	x	x	on leaves
Kilifia acuminata	acuminate scale						GR	on leaves
Kilifia deltoides	scale	x						on leaves
Lepidosaphes laterochitinosa	armored scale	x	n?		n?		x	
Lepidosaphes similis	scale	x	x		x		x	on leaves

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Proutista moesta	erect-winged blue planthopper	x			n		x	suck sap
Rhabdoscelus obscurus	New Guinea cane weevil borer	x					x	bore in stem
Saccharicoccus sacchari	pink sugarcane mealybug	x	x	x	x		x	on stems
Spodoptera litura	rice cutworm	x	?	x	x	?	x	larvae eat leaves
Spodoptera mauritia	lawn armyworm						x	larvae eat leaves
Trochorhopalus strangulatus	strangulate weevil	x						
Ugyops annulipes	delphacid planthopper						x	on leaves
Solanum melongena	**Eggplant**							
Adoretus sinicus	Chinese rose beetle	x					x	eat leaves
Andaspis punicae	scale	x					G	on stems
Aonidiella orientalis	oriental scale		x				x	on leaves
Aphis gossypii	cotton or melon aphid	x	x	x	x	x	x	on leaves
Aspidiotus destructor	coconut scale	x	x	x	x		x	on leaves
Bemisia tabaci	sweet potato whitefly	x			?		x	on leaves
Chrysodeixis chalcites	green garden looper	n					x	eat leaves
Chrysomphalus dictyospermi	dictyospermum scale	x		x			x	on leaves, fruit
Epilachna vigintisexpunctata	Philippine lady beetle			?			x	adults and larvae eat leaves
Epitrix hirtipennis	tobacco flea beetle						G	chew pit-like holes in leaves
Ferrisia virgata	striped mealybug	x	x	x	x		x	on leaves, stem, fruit
Helicoverpa armigera	old world bollworm						x	on leaves
Helicoverpa zea	corn earworm or tomato fruitworm	x?					x?	leaves
Icerya seychellarum	Seychelles scale	?	x					on leaves, fruits
Leptocentrus taurus	eggplant horned planthopper						x	on stems, leaves
Leptoglossus australis	leaf-footed plant bug	x			x		x	suck sap
Liriomyza trifolii	serpentine leafminer		n		n		GS?	larvae mine leaves
Lygus kusaiensis	Kosrae lygus bug					x		on leaves
Myzus persicae	green peach aphid						SG?	suck sap of leaves
Nezara viridula	southern green stink bug	x	x	x	x		x	on leaves, stems, fruit
Parasaissetia nigra	nigra scale	x	x	x		x	x	on leaves
Physomerus grossipes	large spined-footed bug	n					x	suck sap
Pinnaspis strachani	lesser snow scale	x	x	x	x		x	on stem
Planococcus citri	citrus mealybug	x	x	x	x	x	x	on leaves, roots
Polyphagotarsonemus latus	broad mite						x	scar leaves, fruits
Protoparce sp.	hornworm						C	larvae eat leaves
Saissetia coffeae	hemispherical scale	x	x	x	x		x	on leaves, twigs
Spodoptera litura	rice cutworm	x	?	x	x	?	x	larvae eat leaves
Spodoptera mauritia	lawn armyworm						x	eat leaves
Sundapteryx biguttula	Indian cotton jassid	?					GS	burn leaves
Tetranychus cinnabarinus	carmine spider mite						x	under leaves
Tetranychus tumidus	spider mite						x	under leaves
Thrips palmi	melon thrips	n					G	scar leaves
Solanum tuberosum	**Potato**							
Aphis craccivora	cowpea aphid		x	x	x	x	x	on leaves
Aphis gossypii	cotton or melon aphid	x	x	x	x	x	x	on leaves
Bemisia tabaci	sweet potato whitefly	x			?		x	on leaves
Epilachna vigintisexpunctata	Philippine lady beetle			?			x	adults and larvae eat leaves
Epitrix hirtipennis	tobacco flea beetle						G	chew pit-like holes in leaves
Ferrisia virgata	striped mealybug	x	x	x	x		x	on leaves, stem, fruit
Helicoverpa armigera	old world bollworm						x	on leaves
Lipaphis erysimi	turnip aphid						x	suck sap leaves
Liriomyza sativae	vegetable leafminer						G	larvae mine leaves
Liriomyza trifolii	serpentine leafminer		n		n		GS?	larvae mine leaves
Myzus persicae	green peach aphid						SG?	suck sap of leaves
Nezara viridula	southern green stink bug	x	x	x	x		x	on leaves, stems
Planococcus citri	citrus mealybug	x	x	x	x	x	x	on leaves, roots
Polyphagotarsonemus latus	broad mite						x	scar leaves, fruits
Rhopalosiphum maidis	corn leaf aphid	x	x	x	x		x	suck sap
Thrips tabaci	onion thrips	x	x				x	scar leaves

Scientific name	Common name	Pa	Y	C	Po	K	M	Comments
Bemisia tabaci	sweet potato whitefly	x			?		x	on leaves
Chrysodeixis chalcites	green garden looper	n					x	eat leaves
Cicadulina bipunctella	leafhopper	x	x				x	suck sap
Conocephalus longipennis	long-horned grasshopper		?	x	x	x	x	eat leaves
Creontiades pallidifer	sweet potato yellow bug	x	x	x	x		x	sap-sucker
Ferrisia virgata	striped mealybug	x	x	x	x		x	on leaves, stem
Helicoverpa armigera	old world bollworm						x	on leaves, flower, ears
Helicoverpa zea	corn earworm or tomato fruitworm	x?					x?	on leaves, flower, ears
Locusta migratoria manilensis	migratory locust						x	eat leaves
Marasmia trapezalis	maize leafroller	x					x	web and eat leaves
Melanitis leda	evening brown butterfly	x	x	x	x	x	x	larvae eat leaves
Nezara viridula	southern green stink bug	x	x	x	x		x	on leaves, stems, fruit
Ostrinia furnacalis	Asian corn borer	x					x	eat leaves, tassel, bore in ear, stalk
Oxya hyla	smaller rice grasshopper		n	n	n	n		eat leaves
Oxya japonica	Japanese grasshopper	n					C	eat leaves
Peregrinus maidis	corn delphacid	x	x				x	in whorl, leaf; vector virus
Phyllophaga bipunctata	Mindanao June beetle						G	larvae eats roots
Protaetia fusca	mango flower beetle						G	in silk
Protaetia orientalis	oriental flower beetle						G	adults eat silk & kernels
Pseudonapomyza spicata	maize leafminer	x	x		?		x	larvae mine leaves
Rhopalosiphum maidis	corn leaf aphid	x	x	x	x		x	on flower, leaves, stems
Saccharicoccus sacchari	pink sugarcane mealybug	x	x	x	x		x	on stems
Sitophilus oryzae	rice weevil						G	damage seed
Spodoptera litura	rice cutworm	x	?	x	x	?	x	larvae eat leaves
Spodoptera mauritia	lawn armyworm						x	larvae eat leaves
Valanga excavata	large short-horn grasshopper						x	eat leaves
Valanga nigricornis	Javanese grasshopper	x	x	x				eat leaves
Zingiber officinale	**Ginger**							
Aspidiotus destructor	coconut scale	x	x	x	x		x	on leaves
Ostrinia furnacalis	Asian corn borer	x					x	bore in rhizomes
Parasaissetia nigra	nigra scale	x	x	x		x	x	on leaves
Pentalonia nigronervosa	banana aphid	x	x	x	x	n	x	on leaves

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