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New mite species associated with certain plant species from Guam

Abstract - Several new mite species have been reported from certain plants from Guam. Most remarkably, the spider mite, *Tetranychus marianae* (Prostigmata: Tetranychidae) and the predatory mite *Phytoseius horridus* (Mesostigmata: Phytoseiidae) (*Solanum melongena*) have been found on eggplant. The non-economically important species of *Brevipalpus californicus*(Banks) Prostigmata: Tenuipalpidae),*Eupodes* sp. (Acarina: Eupodidae) and predator *Cunaxa* sp. (Prostigmata: Cunaxidae) have been reported on guava (*Psidium guajava* L.). Also, the non-economically important species *Brevipalpus californicus*Prostigmata: Tenuipalpidae), *Lepidoglyphus destructor* (Astigmata: Glycyphagidae) and a predator *Amblyseius obtusus*, species group*Amblyseius* near *lentiginosus* (Mesostigmata: Phytoseiidae), have been recorded on cycad (*Cycas micronesica*).

Key words - *Tetranychus marianae,* new mite species, eggplant, cycad, guava, pepper, Guam

INTRODUCTION

Spider mites are common pest problems on many plants around yards and gardens in Guam and other parts of the USA. Guam has been a transportation hub for several major airlines and shipping companies, with extensive connections to other Pacific islands in Micronesia, Asia, and the continental USA. There are numerous direct flights from Guam to Cairns (Australia), Seoul (South Korea), Manila (Philippines), Osaka/Tokyo (Japan), Taipei (Taiwan), Hawaii, and to other Micronesian islands, that raise concern about the possibility of introducing mite species to Guam from other areas of current infestation. The introduction of mite species reported in the above Asian countries to Guam would increase the probability of their introduction into other areas of the USA. Perhaps of most concern is the presence of various spider mites and broad mites in Japan, Taiwan and Korea, which greatly increases the probability of their introduction to Guam, the Commonwealth of the Northern Mariana Islands, and other islands of Micronesia given the high flow of civilian, military and cargo traffic between these areas by direct air and sea routes. Additionally, some of Guam's food supply is directly imported from Asian countries including, but not limited to the Philippines, Korea and Japan. While no such

work on mites in Guam has been done thus far, there is a possibility that mites may have come in with such food shipments. Local farmers and producers have already brought to our knowledge information about the occurrence of mites on vegetables and other such crops. Because there have been no studies conducted on mites locally, we have no knowledge as to what mites may be present in this region. Consequently, surveillance of phytophagous mites will allow local authorities in Guam, the CNMI, and elsewhere in non-infested areas of the Pacific to take immediate action upon their discovery, thereby lessening the chance of successful establishment and spread of the mites throughout the region. Therefore, surveillance work was initiated on Guam to record the incidence of mites on various crop plants.

MATERIAL AND METHODS

The mites provided in vials were prepared by the following method. Leaves were collected from the various agricultural plants, and taken back to the laboratory where they were examined under a microscope. All mites occurring on a leaf were collected with a small paint brush moistened with 70% ethanol, placed in a vial containing 5 ml of 70% ethanol, labeled, and prepared for shipping. The vials with mites were sent to Angela Marmont Centre for UK Biodiversity, Natural History Museum, London for identification.

RESULTS

Several new mite species, both of economically, and non-economically important plants have been identified, and the presence of a predatory mite species confirmed. These are shown in Table 1.

1. Eggplant, (*Solanum melongena)*

Specimen-1: The spider mite, *Tetranychus marianae*McGregor, 1950 (Prostigmata: Tetranychidae) was the dominant mite species recorded from the samples collected from eggplant. The form of the aedeagus is an important character for confirming species identity. However, the females conform to the redescription of *T. marianae* given in Moraes et al. (1987).

Distribution: Widespread in the Pacific islands, e.g., the Marianas, from where it was first described. It has previously been recorded from eggplant on Guam (De Moraes *et al*., 1987) but disappeared until recently. Other distribution records include Australia, Bahamas, Central, South and North (Mexico, Florida) America, West Indies and Southeast Asia.

Table 1 - Mite species recorded on different host plants on Guam

Scientific name	Associated with Host plants / prey species	Pest or Predatory	Location with GPS points
Tetranychus marianae McGregor, 1950 (Prostigmata: Tetranychidae)	Eggplant (*Solanum melongena* L.)	Pest	Mangilao (13.43°N, 144.80°E)
*Phytoseius horridus*Ribaga, 1904 (Mesostigmata: Phytoseiidae)	Eggplant (*Solanum melongena* L.)	Predatory	Mangilao (13.43°N, 144.80°E)
Brevipalpus californicus(Banks) Prostigmata: Tenuipalpidae)	Guava (*Psidiumguajava* L.)	Feed on higher plants	Yigo (13.54°N, 144.89°E)
Cunaxa sp. (Prostigmata: Cunaxidae)	Guava (*Psidium guajava* L.)	Predatory	Yigo (13.54°N, 144.89°E)
Eupodes sp. (Acarina: Eupodidae)	Guava (*Psidium guajava* L.)	Many live in soil and leaf litter (not regarded as pests)	Yigo (13.54°N, 144.89°E)
Brevipalpus californicus(Banks) Prostigmata: Tenuipalpidae)	Cycad (*Cycas micronesica* K.D. Hill)	feed on higher plants	Dededo (13°30.700' N, 144°51.173' E)
Lepidoglyphus destructor (Schrank) (Astigmata: Glycyphagidae)	Cycad (*Cycas micronesica* K.D. Hill)	Mites of this genus are common inhabitants of house dust and stored food	Merizo (13°15.058' N, 144°43.071' E)
Amblyseius obtusus species group, *Amblyseius* near *lentiginosus*Denmark &Schicha (Mesostigmata: Phytoseiidae)	Cycad (*Cycas micronesica* K.D. Hill)	predatory	Tamuning (13°30.109' N, 144°46.939' E)

Significance: *Tetranychus marianae* is known as a pest of tomato and cotton, but also occurs on a wide range of other plants, e.g., castor bean (*Ricinus communis*), passion flower (*Passiflora edulis*), squash (*Cucurbita maxima*), *Centrosema pubescens*, sweet potato (*Ipomoea batatas*), *Merremia vitifolia* and Orchidaceae. Spider mites feed on leaf cell contents and feeding activity is indicated by the appearance of pale areas on the upper leaf surface as chlorophyll is removed.

Biology: The egg to adult life span lasted 10.73 ± 0.18 days, with a 92% survival. The sex ratio was 81% females. The mean female longevity was 24.53 days and the daily mean oviposition was 3.69 eggs / female. The intrinsic rate of increase (rm) was 0.172; the finite rate of increase (X) was 1.187 individuals / female / day; the mean time span of one generation (T) was 22.81 days; and the net rate of reproduction (R0) was 50.14 (Noronha, 2006).

Specimen-2: *Phytoseius horridus* species group (Mesostigmata: Phytoseiidae):
Phytoseius horridus, most probably *P. mayottae* Schicha, were identified from adult females.
Phytoseiids are predominantly predators of other small arthropods, including pest species. *Phytoseius mayottae* was originally described from specimens collected in Mayotte Island (near Madagascar), but has also been recorded in Sri Lanka, the Seychelles, Vanuatu, New Caledonia and Australia. Host plants include *Acalypha* sp., *Curculigo* sp., *Flemingia strobilifera*, *Glycine javanica*, *Macroptilium atropurpureum*, *Psidium guajava*, *Turnera* sp. and *Solanum melongena* (De Moraes *et al*., 2004). No information is available on its biology and feeding preferences.

2. Guava (*Psidium guajava*)

Spicemen-1: False spider mites, flat mites, *Brevipalpus californicus* (Banks) (Prostigmata: Tenuipalpidae):

Description: Tenuipalpids have been collected in most parts of the world. They feed on higher plants, usually on the under surface of the leaves. They have long, needle-like cheliceral digits with which they pierce the epidermis and feed on the contents of the underlying cells. Some species are of economic importance. *Brevipalpus* spp. have been identified as pests of watermelons in Guam (Yudin, 1999). The submitted specimen is morphologically close to *B. californicus*, a cosmopolitan species that is a pest of a wide range of ornamental and agricultural crops, but differs slightly in the form of the ventral ornamentation.

Spicemen-2: *Cunaxa* sp. (Prostigmata: Cunaxidae):

Distribution: Fast moving mites, found in a wide variety of habitats, e.g., on plants (including crop species), shrubs and trees, and in moss, bark, soil and food stores. They prey on small arthropods, other mites and nematodes, including pest species (Smiley, 1992).

Spicemen-3: *Eupodes* sp. (Order Prostigmata)
Species of *Eupodes* have a worldwide distribution. Many live in soil and leaf litter, but some have been collected on grasses and other plants. Available evidence indicates that their diet is comprised of algae and fungi, and they are not regarded as pests.

Spicemen-3: Bdellidae, larva (Prostigmata: Bdellidae)
Bdellids have a worldwide distribution. Their diet, habits and habitats are like those of the family Cunaxidae (Smiley, 1992). Some species have been investigated as control agents of pest mites, insects and nematodes (Gerson *et al*., 2007).

Spicemen-4: Ascinae adult female (Mesostigmata: Ascidae, subfamily Ascinae)
Members of the predatory Ascinae are very diverse in biology and habitat, occurring, for example, on plants and at the sea shore, in salt marshes, soil, humus, stored foods, and bird, mammal and arthropod nests. Species that live on plants prey on other invertebrates or feed on fungi or pollen (Halliday *et al*., 1998).

3. Cycad (*Cycas micronesica* K.D. Hill)

Spicemen-1:*Lepidoglyphus destructor* (Schrank) (Astigmata: Glycyphagidae):
Glycyphagids and *Lepidoglyphus* have a worldwide distribution. Mites of this genus are common inhabitants of house dust and stored foods, e.g., oats, rye, linseed, rice and dried fruit. They also occur in outdoor habitats, e.g., grassland soil, and stacks of grain, straw and hay. They thrive in damp, humid conditions and feed on the microscopic fungi that grow in such environments (Knülle, 1987).

Spicemen-2: *Amblyseius obtusus* species group, *Amblyseius* near *lentiginosus* Denmark &Schicha, adult female (Mesostigmata: Phytoseiidae)

Description: Members of this species group were originally collected from apple trees and have subsequently been recorded on other plants, e.g., grapevines, *Citrus* sp., *Ficus* sp., strawberry, mango, *Pinus radiata* and *Quercus* sp. They are known to prey on pest mites, e.g., *Panonychus citri* (Tetranychidae), and *Tegolophus australis* and *Phyllocoptruta oleivora* (both Eriophyidae), and have been evaluated as a biocontrol agent (James *et al*., 2001)

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