

NEW MITE PESTS AND NEW HOST RECORDS OF PHYTOPHAGOUS MITES (ACARI) FROM THE PHILIPPINES

LEONILA A. CORPUZ-RAROS

Professor, Department of Entomology, College of Agriculture, University of the Philippines Los Baños, 4031 College, Laguna, Philippines; also Curator, Entomological Museum, Museum of Natural History, University of the Philippines Los Baños, 4031 College, Laguna, Philippines

Three species of mite pests are reported for the first time from the Philippines, namely, *Steneotarsonemus pallidus* (Banks) (Tarsonemidae), *Eotetranychus lewisi* (McGregor) (Tetranychidae), and *Tetranychus urticae* Koch (Tetranychidae). All three species infest strawberries in Benguet province; *E. lewisi* also infests poinsettia in Benguet; and *T. urticae* is a more widespread pest of roses and chrysanthemums, with specimens originating from commercial gardens in the provinces of Benguet, Laguna and Cavite. The diagnostic characteristics of these species are presented; specimens are illustrated and notes are given on the damage these mite pests cause as well as their associated predators.

New plant host records are provided for 14 other species of phytophagous mites and new island records for four species. Notable among these new pest records are *Oligonychus biharensis* (Hirst) on cassava from Isabela province, *O. coffeae* (Nietner) on mango from Guimaras Island, and *Panonychus citri* (McGregor) on citrus from Davao City.

Key words: Acari, chrysanthemum mites, mite pests, ornamental mite pests, phytophagous mites, rose mites, spider mites, strawberry mites, Tarsonemidae, Tenuipalpidae, Tetranychidae

Abbreviations: BPI-DES - Bureau of Plant Industry - Davao Experiment Station, BSU - Benguet State University, DA - Department of Agriculture, F - female, LACR - L. A. Corpuz-Raros collection series, M - male, UPLB - University of the Philippines Los Baños, ViSCA - Visayas State College of Agriculture

INTRODUCTION

Two groups of mites have evolved as strict plant parasites: the superfamilies Tetranychoidae and Eriophyoidea in the acarine suborder Actinedida or Prostigmata. The Tetranychoidae include the spider mites (Tetranychidae), flat mites or false spider mites (Tenuipalpidae), and smaller families like Tuckerellidae among those represented in the Philippine fauna. The Eriophyoidea include three families, the most common species belonging to the Eriophyidae, which are commonly known as gall mites, crinum mites, rust mites and other names based on the type of abnormalities induced on their host plants. Two other actinedid families have phytophagous members, namely, Tarsonemidae in Tarsonemoidea, and Penthaleidae in Eupodoidea.

Among these phytophagous groups, the Tetranychoidae are best known in the Philippines due

to the works of Rimando (1962a & b, 1966, 1968). The works of Corpuz-Raros (1978, 1982, 1986, 1989a & b, and 2001) sporadically described or recorded additional species and hosts of these mites. The Eriophyoidea have not been studied intensively by Filipinos; most species records are by the American specialist, Keifer (1962a & b, 1963, 1965, 1966a & b, and 1969) who identified specimens from coconut and other plants in coconut plantations sent by cadang-cadang researchers of the Philippine Coconut Authority in Albay province in the early 1960s. Only four other species of eriophyoids have been reported outside coconut plantations and are incidentally included in checklists or other papers by Baltazar (1968), Corpuz-Raros (1982 and 1989a), and Barrion and Litsinger (1991).

The tarsonemid mite, *Polyphagotarsonemus latus* (Banks), was the first mite to be recognized as a pest of tomato, potato and other crops in the Philippines. It was reported as early as 1934 by Fajardo and

Belosillo, under its junior synonym, *Tarsonemus translucens* Green. A second species, *Steneotarsonemus spinki* Smiley, was reported much later on rice (Sogawa 1977).

Recent requests for identification of mite pests on high-value crops like strawberries, roses and chrysanthemums, and the expressed concern of growers and researchers in Benguet province within the Cordillera Autonomous Region, have prompted the present report. Similar requests were also received in the mid-1990s from commercial growers in Laguna and Cavite especially on roses. Study of these materials resulted in the identification of three species that were not previously known to occur in the country. In addition, a number of previously known phytophagous mites were collected on new host plants, including important crops. Four species that were previously known only from Luzon were found to occur also in other islands in the Visayas and Mindanao. These new records form the basis of the present report.

Taking into account the three species newly recorded herein, a total of 70 species of phytophagous mites are now known from the Philippines. These are distributed to the different families as follows: 3 Tarsonemidae, 31 Tetranychidae, 18 Tenuipalpidae, 4 Tuckerellidae, 2 Phytoptidae, and 12 Eriophyidae. These do not include three doubtfully documented species (Corpuz-Raros and Rimando 2001) listed in Capco [(1957) 1959] and Gabriel (1997). These species are *Steneotarsonemus bancrofti* (Michael) (Tarsonemidae) on sugarcane, *Oligonychus exsicicator* (Zehntner) (Tetranychidae) also on sugarcane, and *Phyllocoptruta oleivora* (Eriophyidae) on citrus.

Many more unidentified specimens of tetranychids and tenuipalps are in the current holdings of the Museum of Natural History (MNH), University of the Philippines Los Baños (UPLB), indicating that our fauna of these groups are richer than we presently know. No collection effort has been devoted to the Eriophyoidea because of the specialized methods needed for preserving them. They have been frequently encountered as vagrants or causing abnormalities on many plants and the only species reported are those that are readily identified.

Diagnostic characteristics of newly recorded species are described and illustrated, and notes are made on their damage and associated predators. Nomenclature of dorsal body setae follows Lindquist (1985). Voucher specimens of species recorded as new to the Philippines are deposited at the MNH, UPLB.

DESCRIPTIONS AND RECORDS OF SPECIES

Family Tarsonemidae

1. *Polyphagotarsonemus latus* (Banks)

Tarsonemus latus Banks 1904: 55. Type: Washington, D.C., USA, ex young shoots of mango in greenhouse.

Polyphagotarsonemus latus: Beer and Nucifora 1965: 25; (Corpuz-)Raros 1986: 67; Corpuz-Raros, 1989a: 305.

Acarus translucens Green 1890 (*non* Nietner, 1861): 12

Tarsonemus translucens: Green 1913: 2; Fajardo and Belosillo 1934: 523

NEW RECORDS. LUZON IS.: University of the Philippines Los Baños (UPLB) Campus, College, Laguna, ex squash; LEYTE IS.: Visayas State College of Agriculture (VisCA) Campus, Baybay, Leyte, ex *Acacia mangium*. MINDANAO IS.: Bureau of Plant Industry-Davao Experiment Station (BPI-DES), Davao City, ex pumelo.

2. *Steneotarsonemus pallidus* (Banks) Fig. 1A-B

Tarsonemus pallidus Banks 1901: 294. Type: Jamaica, New York, USA, ex leaves of chrysanthemum in greenhouse.

Steneotarsonemus pallidus: Beer 1954: 1267; Jeppson et al. 1975: 295.

DESCRIPTION. This mite is readily distinguished by the absence of setae between coxae IV, and in the male (Jeppson et al. 1975), the flange on femur IV is large, greater than the length of segment. Additionally the female has a broadly expanded, subcircular pseudostigmatic organ; 2 pairs of dorsal propodosomal setae, the anterior pair as long as genu I and the posterior pair very long, about 3/4 the anterior width of body; hysterosoma with four dorsal plates, with 2-1-2-1 pairs of short and simple setae, from first to fourth plate; first ventral propodosomal setae located well behind apodeme I; and femur I bearing 4 setae, of which one is thick and the other thin.

Measurements (in μm) of one female example: body length including gnathosoma 275, greatest width 139; pseudostigmatic organ 12, anterior propodosomal seta 14, genu I 14, posterior propodosomal seta 71, hysterosomal setae 7-12 long.

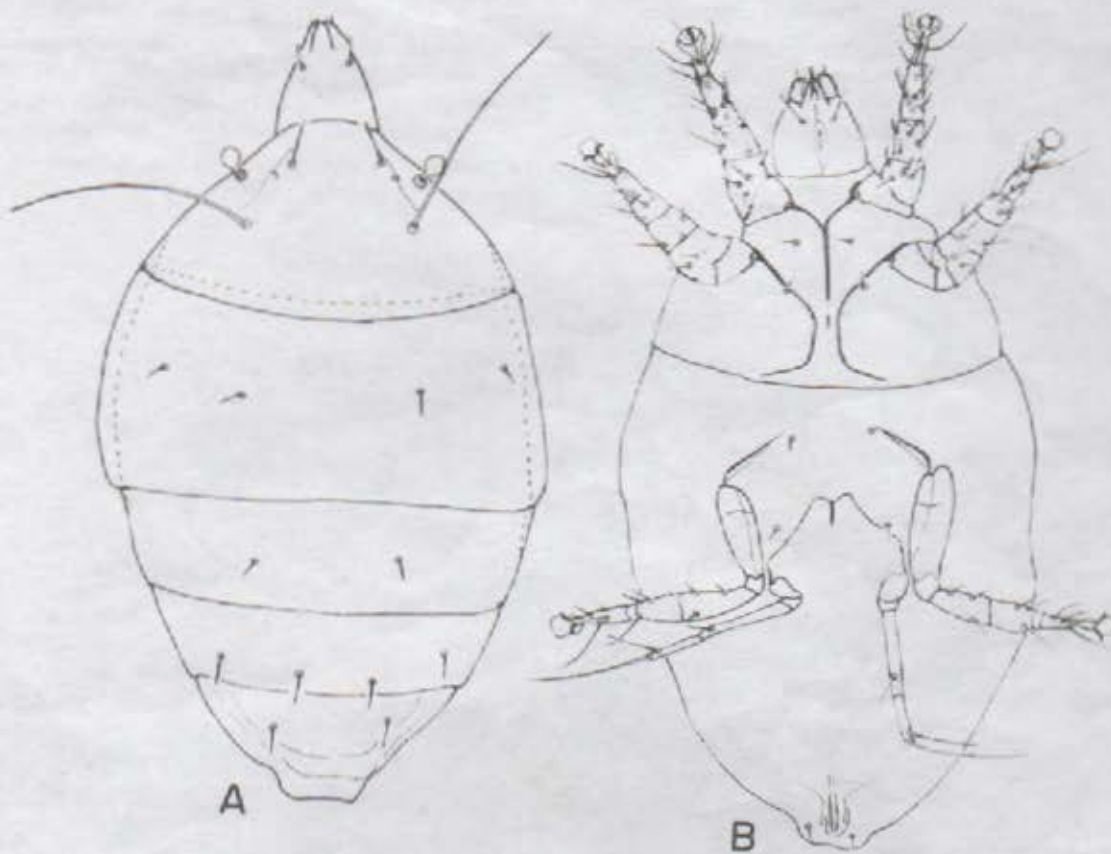


Fig. 1. *Steneotarsonemus pallidus* (Banks), female: A. dorsum, B. venter

SPECIMENS EXAMINED. Numerous females, LUZON IS.: Baguio City, 1996, ex strawberry, submitted for identification by M.P. Ferino (LACR 4686).

DISTRIBUTION. North America, Europe, Hawaii, Asia including Philippines (new species record).

REMARKS. *Steneotarsonemus pallidus* is reportedly a destructive pest of strawberries and a number of ornamental plants. The damage caused on strawberries was not seen; the specimens available were only those of the pests in vials of ethyl alcohol. According to Jeppson et al. (1975), infested strawberry leaves appear roughened and wrinkled on upper leaf surfaces, the leaf margins become irregularly folded and fluted, and the veins bulge upward like blisters. Mildly injured plants appear dense because the petioles fail to elongate while those with severe symptoms are dwarfed at the crown and have small leaflets that fail to unfold completely. Flowers and young

fruits are also infested and the bases of their sepals turn brown to black and dry up.

Family Tetranychidae

3. *Aponychus vannus* Rimando
Aponychus vannus Rimando 1968: 8; (Corpuz-)Raros 1986: 83; Corpuz-Raros (1989): 307. Type: College Campus, Laguna, ex variegated *Bambusa* sp.

NEW RECORDS. LUZON IS.: Pintor, Gamu, Isabela, ex *Bambusa vulgaris* cv. *vittata*; Muñoz, Nueva Ecija, ex *B. blumeana* (*B. spinosa*).

4. *Eotetranychus lewisi* (McGregor) Fig. 2 A-G
Tetranychus lewisi McGregor 1943: 127. Type: Corona, California, USA, ex orange.
Eotetranychus lewisi: Pritchard and Baker 1955: 205; Meyer 1974: 203; Jeppson et al. 1975: 171; Meyer 1987: 116.

DESCRIPTION: The male aedeagus is distinctively curved downward at an obtuse angle

to the shaft, the basal shaft is concave dorsally, and the distal portion is finely pointed like a stylet. Male specimens from strawberry (Fig. 2E-1) and poinsettia (Fig. 2E-2, bottom) differ somewhat in the thickness of the basal shaft of their *aedeagi*.

This species is further characterized as follows: dorsal body setae long, minutely pilose, extending well beyond bases of those next behind; median dorsal body striae longitudinal on propodosoma, transverse on hysterosoma; terminal sensillum of palp tarsus about one and

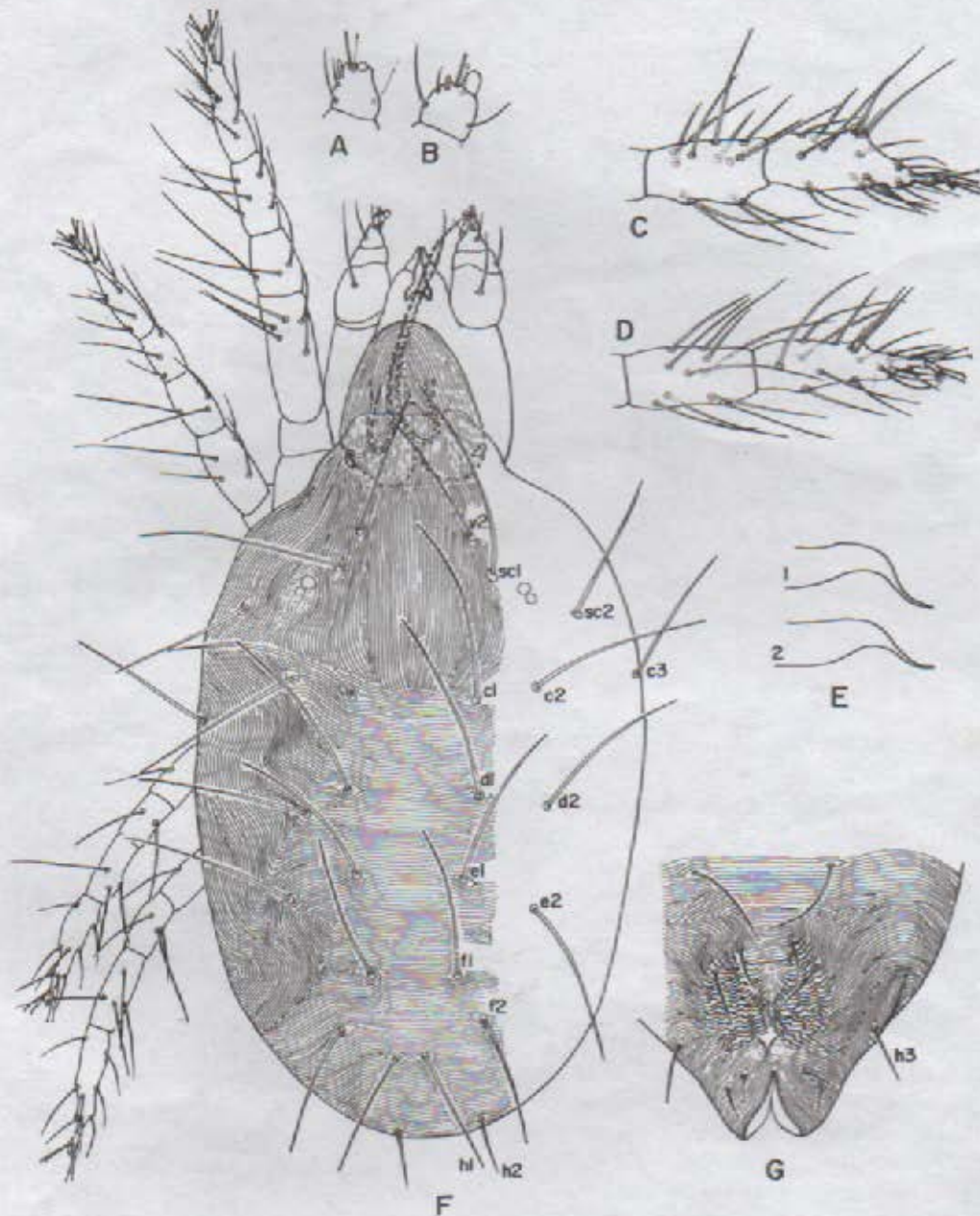


Fig. 2. *Eotetranychus lewisi* (McGregor): A. palp tarsus of male; B. palp tarsus of female; C. tibia and tarsus I of male; D. tibia and tarsus I of female; E. aedeagus of male from strawberry (1) and poinsettia (2); F. dorsum of female; G. caudoventral region of female.

one third as long as wide in female, very small and about as long as wide in male; peritremes looped distally, the tip a simple bulb; striae on female genital flap and those anterior to it transverse. Chaetotaxy (solenidia) of leg segments, in female: coxae 2-2-1-1, trochantera 1-1-1-1, femora 10-7-4-4, genua 5-5-4-4, tibiae 9(1)-8-6-7, tarsi 14(1) + 2 duplex-13(1) + 1 duplex - 10(1)-10(1); in male, basal segments as in female, tibiae 9(3)-8-6-7, tarsi 14(3) + 2 duplex - 13(1) + 1 duplex - 10(1)-10(1). Proximal to the duplex setae on tarsus are 5 tactile setae and 1 solenidion in female, and 4 tactile and 2 solenidia in male.

Measurements (in μm) of one example collected from strawberry: body length including gnathosoma 439, greatest width 346; length of setae: v_2 75, sc_1 109, sc_2 75, c_1 99, c_2 95, c_3 85, d_1 99, d_2 88, e_1 85, e_2 92, f_1 75, f_2 71, h_1 65, h_2 27 and h_3 31.

SPECIMENS EXAMINED. LUZON IS.: 37 F, 18 M, BSU Campus, La Trinidad, Benguet, 18.i.2001, L.M. Colting, ex strawberry leaves (LACR 4858); 13F, 1M, Baguio City, 27.xii.1983, E.W. Baker, ex poinsettia leaves.

DISTRIBUTION. Southwestern U. S., Mexico, Central America Africa, Philippines (new species record).

REMARKS. Specimens from poinsettia were tentatively identified by Dr. E.W. Baker in 1983 during one of his visits to the Philippines. Study of these specimens confirms this identity and they appear conspecific with spider mites now regarded as a pest of strawberries, along with *Tetranychus urticae* Koch (Fig. 3A-I).

A nymphal and an adult forms of the female predatory phytoseiid mite, *Amblysetus kopaeus* Schicha and Corpuz-Raros, were collected together with *E. lewisi* on strawberry. Larvae of a cecidomyiid fly were found in abundance and observed to feed voraciously on the spider mite.

Oligonychus biharensis (Hirst)

Paratetranychus biharensis Hirst 1924a: 69.
Type: Pusa, India, ex rose.

Oligonychus biharensis: Pritchard and Baker 1955: 364; Rimando 1962b: 25; (Corpuz-) Raros 1986: 89; Corpuz-Raros 1989a: 308.

NEW RECORDS. LUZON IS.: Pintor, Gamu, Isabela, ex cassava; Baguio City, ex *Alnus japonica*; Los Baños, Laguna, ex *Bauhinia meleandra* and *Derris elliptica*; Mt. Makiling, Bagong Silang, Los Baños, Laguna, ex *Pueraria phaseoloides*. LEYTE IS.: Villaba, Leyte, ex *Flemingia congesta*.

REMARKS. The occurrence of *O. biharensis* as a pest of cassava in the Philippines is a new development. Only the carmine spider mite, *Tetranychus kanzawai* Kishida, was previously known here and given attention to as a pest of cassava. *O. biharensis* was previously reported from the Philippines on a number of plants including apple, pear, guava, roses, and gabi (taro) but apparently not as a serious pest. The infestation of cassava in Isabela was serious but it was confined to a small patch near a mango tree. At the other edge of the cassava field, the plants were infested with *T. kanzawai*. Leaves infested by *O. biharensis* were silvered on both upper and lower surfaces while those infested by *T. kanzawai* showed the typical chlorotic stipplings along the midrib and major veins. No natural enemies were found despite the abundance of phytoseiids on other crops and weeds adjacent to the cassava field.

O. biharensis is widespread in the Oriental Region where it has been reported on many plants. It has also been listed as a pest of cassava in Peninsular Malaysia (Ehara and Tho 1988) and India (Gupta 1985).

6. *Oligonychus coffeae* (Nietner)

Acarus coffeae Nietner 1861. Type: Ceylon, ex coffee tree

Oligonychus coffeae: Pritchard and Baker 1955: 315; Rimando 1962b: 21; (Corpuz-)Raros 1986: 90; Corpuz-Raros 1989a: 308.

NEW RECORDS. LUZON IS.: Baguio City, ex calla lily (*Zantedischia aethiopica*); Canlubang, Laguna, ex grapevine. GUIMARAS IS. (new island record), ex mango.

7. *Oligonychus matthyssei* Rimando

Oligonychus matthyssei Rimando 1962b: 25; (Corpuz-) Raros 1986: 90; Corpuz-Raros 1989a: 309. Type: Los Baños, Laguna, Philippines, ex *Gliricidia sepium*.

NEW RECORD. LEYTE IS. (new island record), ex *Gliricidia sepium*.

REMARKS. *Oligonychus matthyssei* is one of a few Philippine spider mites with a high degree of host specificity. It is so far known to occur only in the Philippines on kakawate or *G. septium*.

8. *Panonychus citri* (McGregor)

Tetranychus citri McGregor 1916: 284. Type: Orlando, Florida, USA, ex lemon.

Panonychus citri: Ehara 1956: 499; Rimando 1962b: 12; (Corpuz-) Raros 1986: 92; Corpuz-Raros 1989a: 309.

NEW RECORD. MINDANAO IS. (new island record): BPI-DES, Bago Oshiro, Davao City, ex *Citrus* sp. (calamandarin).

REMARKS. Although the name of the pest is highly suggestive of it, citrus as host for *Panonychus citri* was unknown and undocumented until the present report. Rimando (1962b) first reported its occurrence in the Philippines on balimbing (*Averrhoa carambola*) and on roses. The specimens forming the basis for this host record were sent for identification in 1991 by BPI personnel in Bago Oshiro who were studying its biology. This mite is considered one of the most serious pests of citrus in California, South Africa, and Japan (Jeppson et al. 1975) and perhaps in other parts of the world where it occurs.

9. *Paraponychus pilipinus* (Corpuz-Raros)

Aponychus pilipinus Corpuz-Raros 1978: 212; (Corpuz-)Raros 1986: 82; Corpuz-Raros 1989a: 306. Type: Mt. Makiling, Puting Lupa, Calamba, Laguna, Philippines, ex *Grewia multiflora*.

Paraponychus pilipinus: Rimando and Corpuz-Raros, 1996: 13.

NEW RECORDS. LUZON IS.: Mt. Makiling, National Arts Center area, Los Baños, Laguna, ex *Mallotus ricinoides*; Mt. Makiling, Puting Lupa, Calamba, Laguna, ex *Ficus ulmifolia*, *Litsea perrottetii* and *Vitex parviflora*.

10. *Tetranychus fijiensis* Hirst

Tetranychus fijiensis Hirst 1924b: 523; (Corpuz-) Raros 1986: 97; Corpuz-Raros 1989a: 310. Type: Ovalou, Fiji, ex coconut

Pritchardina fijiensis: Rimando 1962b: 26.

NEW RECORDS. LUZON IS.: Mt. Makiling, National Arts Center area, Los Baños, Laguna and, at Puting Lupa, Calamba, Laguna, ex *Pericamphyllus glaucus*.

11. *Tetranychus kanzawai* Kishida

Tetranychus kanzawai Kishida 1927: 105; Rimando 1962b: 32; (Corpuz-) Raros 1986: 98; Corpuz-Raros 1989a: 311. Type: Yamanashi Prefecture, Japan, ex mulberry.

NEW RECORD. LUZON IS.: UPLB Campus, College, Laguna, ex mungbean in greenhouse (artificially infested from cassava and colony established on mungbean).

12. *Tetranychus truncatus* Ehara

Tetranychus truncatus Ehara 1956: 507; Rimando 1962b: 31; (Corpuz-)Raros 1986: 102; Corpuz-Raros 1989a: 312. Type: Suginami Tokyo, Japan, ex mulberry.

NEW RECORDS. LUZON IS.: Canlubang, Laguna, ex mungbean; UPLB Campus, College, Laguna, ex Baguio beans, cabbage and pechay; Masang, Victoria, Laguna ex pole sitao. MINDANAO IS.: Cagayan de Oro City, Misamis Oriental, ex *Ipomoea triloba*.

13. *Tetranychus urticae* Koch Fig. 3A-I

Tetranychus urticae Koch 1836: 350; Meyer 1974: 234; Jeppson et al. 1975: 234; Meyer 1987: 136. Type: Regensburg, Germany, ex nettle.

Tetranychus telarius (Linnaeus 1758) (a suppressed name), in part: many authors

Tetranychus cinnabarinus Boisduval 1867: 88; Rimando 1962b:30; (Corpuz-) Raros 1986: 96; Corpuz-Raros, 1989a: 310.

Tetranychus sp.: Cadatal and Cadapan 1996: 195.

DESCRIPTION. *Tetranychus urticae* has a long history of confused usage with other members of the *T. telarius*-complex especially *T. cinnabarinus* Boisduval. As a general rule, the name *T. urticae* was applied to the green spotted form and *T. cinnabarinus* to the carmine form of *T. telarius* with the suppression of the third name by the International Commission on Zoological Nomenclature in 1972. Besides this color difference, *T. urticae* was differentiated in having generally oval dorsal lobes on its integumental striae while these lobes are more pointed in *T. cinnabarinus*. Many acarologists questioned the reliability of both characters which are both variable and overlapping in various degrees; and the reproductive isolation between them is incomplete. Du Pont (1979) sunk *T. cinnabarinus* as a synonym of *T. urticae*, and many acarologists have accepted this synonymy. After evaluating

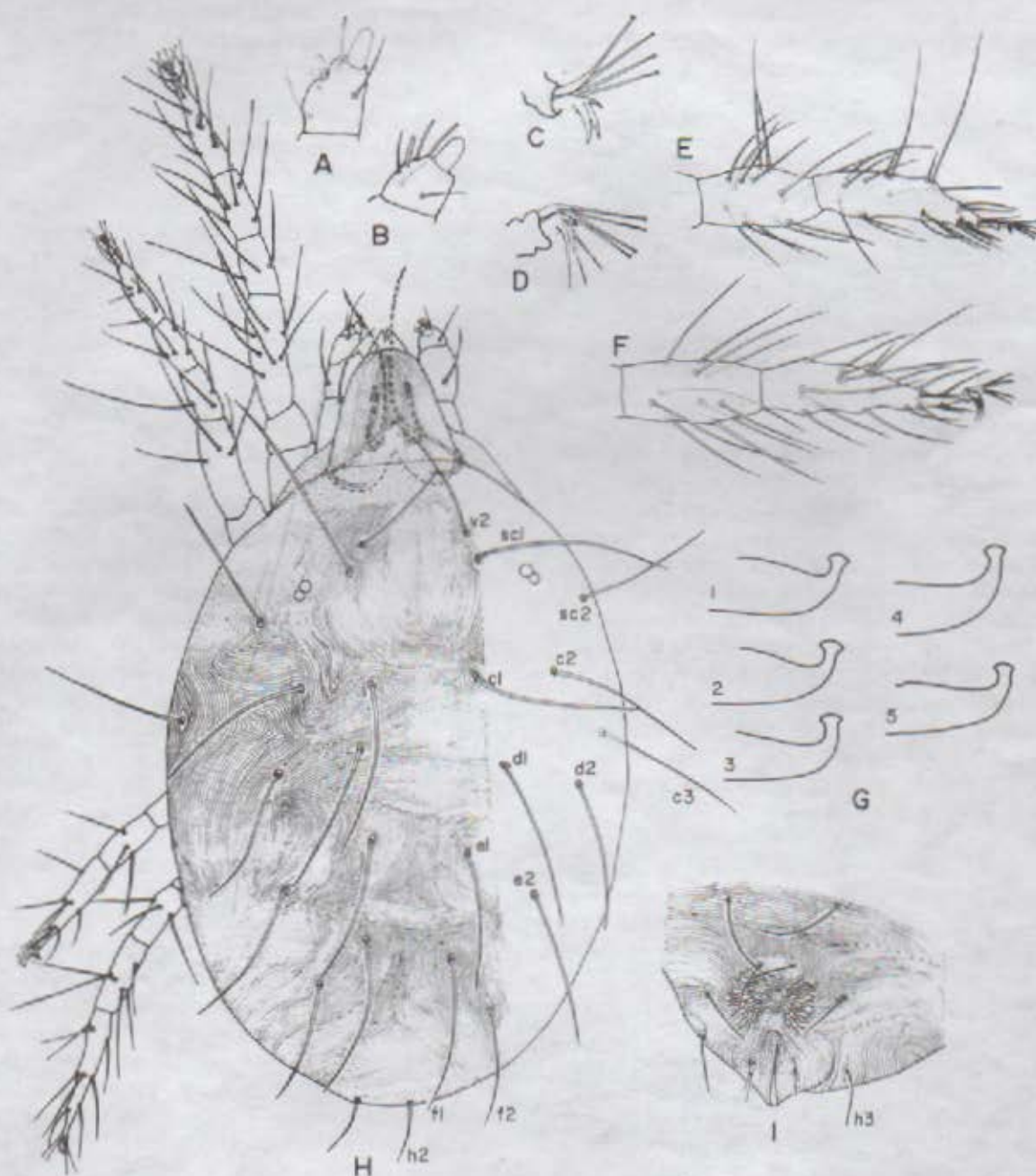


Fig. 3. *Tetranychus urticae* Koch: A. palp tarsus of male; B. palp tarsus of female; C. pretarsus I of male; D. pretarsus II of male; E. tibia and tarsus I of male; F. tibia and tarsus I of female; G. aedeagi of males of various color forms and from different host plants -- green with spot, from rose (1), red with spot, from rose (2), red without spot, from rose (3), green with spot, from chrysanthemum (4) and unknown color, from strawberry; H. dorsum of female; I. caudoventral region of female.

evidences, Meyer (1987) came to the same conclusion not only with respect to *T. cinnabarinus* but also several other names that

were applied earlier to the species called *T. urticae*. Only *T. cinnabarinus* has been used in Philippine literature among these synonyms.

As defined by Meyer (1987), *T. urticae* has a small aedeagal knob that is not less than one-fourth the length of the dorsal margin of the shaft. The axis of the shaft is parallel to or forms a small angle with the axis of the shaft, and the dorsal margin of the knob and the size of the anterior and posterior projections of the knob are equally developed (Fig. 3G). Neither do they differ among specimens collected from chrysanthemum and strawberry.

T. urticae is further characterized by its longitudinal striae between the third (*e1*) and fourth (*f1*) pairs of dorsomedian setae and a diamond-shaped figure defined between these named setae in the female; dorsal setae longer than intervals between them; terminal sensillum on palp tarsus about one and a half times as long as broad in female (Fig. 3B), twice in male (Fig. 3A); peritremes looped distally; transverse striae on female genital flap and longitudinal ones anterior to it; 4 tactile setae proximal to the posterior duplex setae on tarsus I of female, and 5 tactile and 1 solenidion in male; male empodium I with a strong mediodorsal spur that is about one-third the length of the 2 proximoventral spurs (Fig. 3C); male empodium II with 3 pairs of proximoventral hairs and a strong mediodorsal spur (Fig. 3D); empodium of all legs in female with 3 pairs of proximoventral hairs and have a very small or no dorsal spur.

Chaetotaxy of legs (solenidia) in females: coxae 2-2-1-1, trochantera 1-1-1-1, femora 10-6-4-4, genua 5-5-4-4, tibiae 9(1)-7-6-7, tarsi 12(1)+2 duplex-13(1)+1 duplex-9(1)-10(1); in males, coxae to genua as in female, tibiae 9(4)-7-6-7, tarsi 13(3)+2 duplex-13(1)+1 duplex-9(1)-10(1).

Measurements (in μm) of one female example: body length including gnathosoma 585, greatest width 346; length of setae: *v2* 85, *sc1* 150, *sc2* 108, *c1* 133, *c2* 126, *c3* 119, *d1* 138, *d2* 112, *e1* 116, *e2* 119, *f1* 129, *f2* 95, *h1* absent, *h2* 44, *h3* 48.

SPECIMENS EXAMINED. LUZON IS.: BSU Campus, La Trinidad, Benguet, L.M. Colting, on different dates and hosts as follows -- *ex roses*, 18.i.2001, 5M and 1F, green with spot; 15M and 12F, red with spot; and 16M and 18F, red without spot (LACR 4857); 15.iii.2001, 5M and 12F, green with spot (LACR 4864); *ex chrysanthemum*, 15.iii.2001, 4M and 5F, green with spot (LACR 4868); 21.iii.2001, 4M and 5F,

green with spot (LACR 4868); and *ex strawberry*, color not recorded, 4M and 9F, 18.i.2001 (LACR 4858); and 4M and 13F, 15.iii.2001 (LACR 4865).

Other specimens examined: *Ex chrysanthemum* -- BSU Campus, La Trinidad, Benguet, 2F and 4M, green with spot, 2.ix.2001, R.C. Garcia (LACR 4932); Benguet, 9F, green with spot, 21.x.1998, BSU and DA-Cordillera personnel; and Makati, Metro Manila, 3M and 11F, unknown color, 28.ii.1995, J. Litsinger (LACR 4574). *Ex roses* -- Tuntungin, Los Baños, Laguna, T. Cadatal, all green with spot: 7M and many F, 12.iv.1993 (LACR 4219); and 10M and 2F, 9.i.1998 (LACR 4819); Cavite, 4M and 9F, color unknown, 23.ii.1994, received for identification (LACR 4564).

REMARKS. Specimens of *T. urticae* collected from roses were variably greenish or yellowish to reddish, with large, dark green spots on either side of idiosoma. On chrysanthemum, the specimens were all greenish while the color of those from strawberry was not recorded. Los Baños specimens on roses were also green. Comparison of aedeagus among these specimens showed no obvious differences and all fit the *urticae*-type described above (Fig. 3G). Even a reddish non-spotted form on roses (Fig. 3G-5) from Benguet was indistinguishable and occurred on the same leaf samples as the green and red spotted specimens. This is the first time that the common green form is reported as *T. urticae*.

Damage of *T. urticae* on roses consists of the typical mottled appearance of leaves caused by spider mites in general. Heavy infestation results in yellowing and drying of entire leaves, then their premature fall (Cadatal and Cadapan 1996). This report of *T. urticae* on roses now brings to four species the number of spider mites infesting this crop in the Philippines. The three others are *Eotetranychus smithi* Pritchard and Baker, *Oligonychus biharensis* (Hirst), and *Panonychus citri* (McGregor) (Rimando 1962b; Corpuz-Raros 1989a).

A single specimen of the phytoseiid female predatory mite, *Amblyseius tamatavensis* Blommers, was collected in association with *T. urticae* in one collection lot on roses from Benguet while larval cecidomyiids were present in abundance. Another collection from Benguet on chrysanthemum harbored many predatory ascids,

(*Lastosetius* sp.) together with *T. urticae* on which it was observed to feed voraciously.

Family Tenuipalpidae

14. *Brevipalpus californicus* (Banks)

Tenuipalpus californicus Banks 1904: 55. Type: Redlands, California, USA, ex orange peel
Brevipalpus californicus: Baker 1949: 337; Rimando 1962b: 38; (Corpuz-)Raros 1986: 108; Corpuz-Raros 1989a: 313.

NEW RECORDS. LUZON IS.: Pintor, Gamu, Isabela, ex corn; Bintawan, Villaverde, Nueva Vizcaya, ex *Duranta erecta*; Baleta Pass, Nueva Vizcaya, ex *Lantana camara*; Cassamata nursery, Bangued, Abra, ex *Symplocos ahernii*. UPLB Campus, College, Laguna, ex *Casuarina equisetifolia*, coffee, *Lagenaria siceraria*, *Lycopersicon lycopersicon*, *Momordica charantia* and *Trichosanthes cucumerina*; UPLB Forestry Campus, College, Laguna, ex bird-of-paradise (*Strelitzia reginae*), *Commelina benghalensis*, poinsettia and unknown lily; Mt. Makiling, National Arts Center area, ex *Cassia spectabilis*; Mt. Makiling, Jamboree site, Los Baños, Laguna, ex *Broussonetia papyrifera*, *Imperata cylindrica* and *Psidium guajava*; Mt. Makiling, Bagong Silang, Los Baños, Laguna, ex jackfruit; Mt. Makiling, Dampalit Creek, Los Baños, Laguna, ex *Cordia dichotoma*; Mt. Makiling, Los Baños, Laguna, ex *Arenga pinnata*; Mt. Makiling, Puting Lupa, Calamba, Laguna, ex *Acalypha amentacea*, *Antidesma pentandra*, *Cleidion speciflorum*, *Costus speciosus*, *Grewia multiflora*, *Piper betle* and *P. retrofractum*; Mt. Makiling, Kapos, San Rafael, Santo Tomas, Batangas, ex *Leucosyke capitellata*; Los Baños, Laguna, ex *Cassia alata*; Anos, Los Baños, Laguna, ex aster; Mt. Isarog, 420 m, Del Rosario, Curry, Pili, Camarines Sur, ex potato; LEYTE IS.: ViSCA Campus, Baybay, Leyte, ex rose. MINDANAO IS.: Nasipit Lumber Company, Tungao, Agusan del Norte, ex *Calamus maximus* and *Vernonia vidalii*.

15. *Brevipalpus obovatus* Donnadieu

Brevipalpus obovatus Donnadieu 1875:116. Rimando 1962b: 39; (Corpuz-)Raros 1986: 109; Corpuz-Raros 1989a: 314. Types: France, ex *Phytolaca* and *Primula veris*.

NEW RECORDS. LUZON IS.: Pantabangan, Nueva Ecija, ex *Knoxia corymbosa*; Los Baños, Laguna, ex *Citrus reticulata* var. Szinkom; Mt. Makiling, Bagong Silang, Los

Baños, Laguna, ex *Melanolepis multiglandulosa*; Mt. Makiling, Puting Lupa, Calamba, Laguna, ex *Piper betle*.

16. *Brevipalpus phoenicis* (Geijskes)

Tenuipalpus phoenicis Geijskes 1939: 230. Type: Holland, ex *Phoenix* sp.
Brevipalpus phoenicis: Sayed 1946: 99; Rimando 1962b: 40; (Corpuz-)Raros 1986: Corpuz-Raros 1989a: 314.

NEW RECORDS. LUZON IS.: Pintor, Gamu, Isabela, ex *Pithecellobium dulce*; Madiit, Dolores, Abra, ex *Alphitonia zizyphoides*; UPLB Campus, College, Laguna, ex *Haematoxylon campechianum*; Anos, Los Baños, Laguna, ex *Clerodendron thomsonae*; Los Baños, Laguna, ex *Graptophyllum pictum*; Mt. Banahaw, Concepcion, Sariaya, Quezon, ex *Dracontomelon edule*.

17. *Dolichotetranychus floridanus* (Banks)

Stigmaeus floridanus Banks 1900: 77. Type: Florida, USA, ex pineapple.
Dolichotetranychus floridanus: Sayed 1938: 606; Baker and Pritchard 1956: 274; Rimando 1962b: 45; (Corpuz-)Raros 1986: 114; Corpuz-Raros, 1989a: 315.

NEW RECORD. LEYTE IS. (new island record): Ormoc City, Leyte, ex pineapple (Queen variety).

REMARKS. The record from Ormoc City is based on specimens from a heavily infested commercial plantation of Queen pineapple that were referred to the Department of Plant Protection of ViSCA in 1990.

18. *Tenuipalpus orilloi* Rimando

Tenuipalpus orilloi Rimando 1962b: 42; Corpuz-Raros 1986: 117; Corpuz-Raros 1989a: 316. Type:

NEW RECORD. LUZON IS.: Anos, Los Baños, Laguna, ex santol.

SUMMARY

Recent collections of phytophagous mites infesting strawberries in Benguet province were obtained and identified, including the cyclamen mite, *Steneotarsonemus pallidus* (Banks) (Tarsonemidae);

the two-spotted mite, *Tetranychus urticae* Koch. (Tetranychidae), and another spider mite, *Eotetranychus lewisi* (McGregor). *T. urticae* is also a serious pest of roses and chrysanthemums in Benguet and of roses in Laguna and Cavite. *E. lewisi* also infests poinsettia in Benguet. All three species are reported for the first time from the Philippines. Their distinctive characteristics are described and illustrated. Some notes are made on the synonymy of *T. urticae*; the nature of damage on host plants and associated predators are given for the newly recorded species.

New plant host records including many crops are also reported for 14 other species of phytophagous mites, most of which are spider mites. Notable of these are *Oligonychus biharensis* (Hirst) on cassava, *O. coffeae* (Nietner) on mango, and *Panonychus citri* (McGregor) on citrus (calamandarin). New island distribution records are reported for three spider mites and one false spider mite that were previously reported only from Luzon Island.

ACKNOWLEDGMENT

I thank Dr. Lolita M. Colting, Department of Entomology, Benguet State University for the collections of spider mites from strawberries, chrysanthemums, and roses; Dr. William Gruezo, College of Arts and Sciences, UPLB, for checking the names of some host plants; Mr. Rufino C. Garcia for drafting the illustrations; and Ms. Angelita Soriano for typing the manuscript.

REFERENCES CITED

- BAKER EW.** 1949. The genus *Brevipalpus* (Acarina: Pseudoleptidae). Amer Midl Nat 42(2): 350-402.
- BAKER EW, PRITCHARD AE.** 1956. False spider mites of the genus *Dolichotetranychus* (Acarina, Tenuipalpidae). Hilgardia 24: 357-381.
- BALTAZAR CR.** 1968. Supplementary host list and checklist of Philippine plant pests. Philipp J Sci 97(2): 177-227.
- BANKS N.** 1900. The red spiders of the United States (*Tetranychus* and *Stigmaeus*). US Dept Agr Div Ent Tech Ser 8: 65-77.
- BANKS N.** 1901. *Tarsonemus* in America. Proc Ent Soc Wash 4: 294-296.
- BANKS N.** 1904. Class III, Arachnida, Order I, Acarina four new species of injurious mites. J New York Ent Soc 12: 53-56.
- BARRION AT, LITSINGER JA.** 1991. A new blister mite pest of rice in the Philippines. Intl Rice Res Newsl 16(4): 21.
- BEER RE.** 1954. A revision of the Tarsonemidae of the Western Hemisphere (Order Acarina). Univ Kansas Sci Bull 36(2): 1091-1387.
- BEER RE, NUCIFORA A.** 1965. Revisione dei generi della famiglia Tarsonemidae (Acarina). Boll Zool Agric Bachic(2) 7: 19-43.
- BOISDUVAL A.** 1867. Essai sur l'entomologie horticole. Paris. 648 p.
- CADATAL TD, CADAPAN EP.** 1996. Regulation of spider mite (*Tetranychus* sp.) population on roses. Philipp Ent 10(2): 195-201.
- CAPCO SR.** (1957)1959. A list of plant pests in the Philippines with special reference to field crops, fruit trees and vegetables. Philipp J Agr 22(1-4): 3-80.
- CORPUZ-RAROS LA.** 1978. New Philippine Tetranychoida (Acarina). Kalikasan, Philipp J Biol 7: 211-230.
- CORPUZ-RAROS LA.** 1982. Philippines. In: Prasad V, editor, History of acarology. Oak Park, Michigan: Indira Publishing House. p. 365-382.
- (CORPUZ-)RAROS LA.** 1986. Mites. In: Guide to Philippine Flora and Fauna 8: 51-197. Natural Resources Management Center, Ministry of Natural Resources and University of the Philippines, Diliman, Quezon City.
- CORPUZ-RAROS LA.** 1989a. Hosts, geographic distribution and predatory mite associations of Philippine phytophagous mites (Acari). Philipp Agr 72(3): 303-322.
- CORPUZ-RAROS LA.** 1989b. A review of Philippine *Tuckerella* (Tuckerellidae, Acari). Philipp Ent 7(6): 551-556.
- CORPUZ-RAROS LA.** 2001. *Tuckerella filipina*, a new species of Tuckerellidae (Acari) from the Philippines. Int J Acarol 27(1): 71-74.
- CORPUZ-RAROS LA, RIMANDO LC.** 2001. A review and revised checklist of the mites in B. P. Gabriel's "Insects and Mites Injurious to Philippine Crop Plants." Philipp Ent 15(2): 163 - 179.
- DONNADIEU AL.** 1875. Recherches pour servir a l'histoire des Tetranyques. Ann Soc Linn Lyon (n ser) 22: 29-136.
- DU PONT LM.** 1979. On gene flow between *Tetranychus urticae* Koch, 1836 and *Tetranychus cinnabarinus* (Boisduval) Boudreaux 1956 (Acari: Tetranychidae): synonymy between the two species. Ent Exp Appl 25: 297-303.
- EHARA S.** 1956. Tetranychoid mites of mulberry in Japan. J Fac Sci Hokkaido Univ 12: 499-510.

- EHARA S, THO YP. 1988. Spider mites of the Malay Peninsula (Acarina: Tetranychidae). *J Fac Educ Tottori Univ (Nat Sci)* 37(1): 1-24.
- FAJARDO TG, BELOSILLO GC. 1934. A mite disease of tomato, potato and other plants in the Philippines. *Philipp J Sci* 54: 523-543.
- GABRIEL BP. 1997. Insects and mites injurious to Philippine crop plants. College, Laguna, Philippines: National Crop Protection Center, University of the Philippines Los Baños. 172 p. (Revised 2000).
- GEJSKES DC. 1939. Beitrage zur Kenntnis der europäischen Spinnmilben (Acari, Tetranychidae), mit besonderer Berücksichtigung der niederländischen Arten. *Wageninngen Landbouwhoogeschool Meded* 42(4): 1-68.
- GREEN EE. 1890. Insect pests of the tea plant. Colombo, Ceylon. 85 p.
- GREEN EE. 1913. Injurious insects in Ceylon. *Rept Govt Ent Dept Agr Ceylon pt IV (1911-12)*, p. 2-5.
- GUPTA SK. 1985. Plant mites of India. Zoological Survey of India, Calcutta. Calcutta: Sri Aurobindo Press. 500 p.
- HIRST S. 1924a. Description of new Acari, mainly parasitic on rodents. *Proc Zool Soc Lond* 1924: 49-69.
- HIRST S. 1924b. On some new species of red spider. *Ann Mag Nat Hist Lond* (9)14: 522-527.
- INTERNATIONAL COMMISSION ON ZOOLOGICAL NOMENCLATURE. 1972. Opinion 968. *Acarus telarius* Linnaeus 1758 (Arachnida): suppressed under the Plenary Powers. *Bull Zool Nom* 28(3-4): 85-87.
- JEPSON LR, KEIFER HH, BAKER EW. 1975. Mites injurious to economic plants. Berkeley: University of California Press. 614 p, 74 pl.
- KEIFER HH. 1962a. Eriophyid studies B-7. *Calif Dept Agr Bur Ent* p. 1-20.
- KEIFER HH. 1962b. Eriophyid studies B-8. *Calif Dept Agr Bur Ent* p. 1-20.
- KEIFER HH. 1963. Eriophyid studies B-9. *Calif Dept Agr Bur Ent* p. 1-20.
- KEIFER HH. 1965. Eriophyid studies B-13. *Calif Dept Agr Bur Ent* p. 1-20.
- KEIFER HH. 1966a. Eriophyid studies B-17. *Calif Dept Agr Bur Ent* p. 1-20.
- KEIFER HH. 1966b. Eriophyid studies B-18. *Calif Dept Agr Bur Ent* p. 1-20.
- KEIFER HH. 1969. ARS-USDA Eriophyid Series C-1: 1-20.
- KISHIDA K. 1927. Notes on *Tetranychus kanzawai* n. sp., a new tetranychid mite injurious to leaves of the mulberry in Japan. *Zool Mag* 39(460): 105-107.
- KOCH CL. 1836. Deutsche Crustacea, Myriapoda, Arachnida, fasc. 1.
- LINDQUIST EE. 1985. External anatomy. p. 3-28. In: Helle W, Sabelis MW, editors. Spider mites their biology, natural enemies and control. Volume IA. Amsterdam: Elsevier Science Publishers.
- McGREGOR EA. 1916. The citrus mite named and described for the first time. *Ann Ent Soc Amer* 9: 284-290.
- McGREGOR EA. 1943. A new spider mite on citrus in South-Western California (Acarina: Tetranychidae). *Proc Ent Soc Wash* 45(5): 127-129.
- MEYER MKPS. 1974. A revision of the Tetranychidae of Africa (Acari) with a key to the genera of the world. *Rep S Afr Dept Agr Tech Serv Ent Mem* 36: 1-291.
- MEYER MKPS. 1987. African Tetranychidae (Acari: Prostigmata) with reference to the world genera. *Rep S Afr Dept Agr Water Supply Ent Mem* 69: 1-175.
- NIETNER J. 1861. Observations on the enemies of the coffee tree in Ceylon. 31 p.
- PRITCHARD AE, BAKER EW. 1955. A revision of the spider mite family Tetranychidae. *Pacif Coast Ent Soc Mem* 2: 1-472.
- RIMANDO LC. 1962a. Four new species of spider mites of the genera *Eotetranychus* and *Schizotetranychus* (Tetranychidae, Acarina). *Philipp Agr* 45(10): 535-544.
- RIMANDO LC. 1962b. The tetranychoid mites of the Philippines. *Univ Philipp Coll Agr Tech Bull* 11: 1-52.
- RIMANDO LC. 1966. A new subfamily of spider mites with the descriptions of a new genus and two species (Acarina: Tetranychidae: Aponychinae). *Philipp Agr* 50(2): 105-113.
- RIMANDO LC. 1968. The genus *Aponychus* (Tetranychidae, Acarina). *Philipp Ent* 1: 6-10.
- RIMANDO LC. 1996. *Rarosiella cocosae*, n. gen. n. sp. (Tenuipalpidae: Acarina), a new pest of coconut in Camiguin Island, Philippines. *Philipp Ent* 10(1): 1-7.
- RIMANDO LC, CORPUZ-RAROS LA. 1996. A revision of the Tribe Eurytetranychini in the Tetranychinae (Tetranychidae: Acari). *Philipp Ent* 10(1): 9-14.
- SAYED MT. 1938. Sur une nouvelle sous-famille et deux nouveaux genres de Tetranyques (Acariens). *Bull Mus Hist Nat Paris (Ser 2)* 10: 601-610.
- SAYED MT. 1946. Contribution to the Acarina of Egypt V. Five new species of Tetranychidae. *Bull Soc Fouad 1^{er} Ent* 30: 79-97.
- SOGAWA K. 1977. Occurrence of the rice tarsonemid at IRRI. *Intl Rice Res Newsl* 16: 17.