9.32 MITES INJURIOUS TO ORCHIDS IN THAILAND

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INTRODUCTION

Thailand is the biggest orchid exporting country in the world. An increased interest in growing orchids as commercial cut flowers during the last two decades has led to an increase in the incidence of pests and diseases on this crop and their spread in the country. Among many pests of orchids, mites are common and the most injurious. About ten species of mites have been recorded on orchids in the United States, Europe, the Bahamas and Hawaii (Pritchard, 1959; Garrett and Haramoto, 1967).

Since organic chemicals are often effective for the control of only certain species, accurate determination of the mites causing damage to the orchids along with information on their biology is of great importance for developing methods for their management.

MATERIAL AND METHODS

Taxonomic studies

The mites were collected from wild orchids, orchids grown as ornamentals and commercially grown in different areas of eight provinces. The most satisfactory method of collecting these mites was to bring the infested parts of each orchid cultivar to the laboratory in separate polyethylene bags and examining them for the mites. The mites were then picked up from the orchid tissues and mounted on slides in Hoyer's medium and they were then identified. Damage symptoms produced by various species of mites on their respective host orchids were recorded.

Biological studies

The biology of *Tenuipalpus pacificus* Baker, the most injurious species on the orchids, was studied in the laboratory at temperature and relative humidity of $28 \pm 2°C$ and $57 \pm 3\%$, respectively. In order to obtain fresh eggs, 50 female mites from the stock culture were placed individually on the leaf of the orchid seedlings. After 24 h, females were removed and only one egg was retained on each leaf. Individual mites were reared through one complete generation. This study was replicated five times.

RESULTS AND DISCUSSION

Taxonomic characters and damage symptoms

Five species of mites are found to be pests of orchids in Thailand. Four of them are false spider mites and they are *Tenuipalpus pacificus* Baker, *Dolichotetranychus vandergooti* (Oudemans), *Brevipalpus californicus* (Banks) and *B. phoenicis* (Geijskes). The fifth species found feeding on orchids is *Tetranychus truncatus* Ehara. Among these five species, *T. pacificus* is the most serious pest and widely distributed.

Key to mite pests of orchids in Thailand

1. Female usually measuring over 370 μ; with relatively robust filamentous setae; mites protected by a silken web; palp with a thumb-claw complex. ..... *Tetranychus truncatus*
– Female usually measuring less than 370 μ; without robust setae on the body; mites not protected by a silken web; palp without thumb-claw complex 2
2. Idiosoma long, about twice or more as long as its breadth; hysterosoma with two pairs of dorsocentral setae and with one pair of dorsosublateral setae ..... *Dolichotetranychus vandergooti*
– Idiosoma not twice as long as it is broad; hysterosoma with three pairs of dorsocentral setae and without dorsosublateral setae 3
3. Body oval and reticulate; palp four segmented, penultimate pair of dorsolateral setae of comparable length to the rest 4
– Body with broad podosoma, narrow opisthosoma and without reticulation; palp three segmented; penultimate pair of dorsolateral setae is flagelliform while the rest are lanceolate ..... *Tenuipalpus pacificus*
4. Hysterosoma with six pairs of dorsolateral setae; propodosoma with regular polygonal reticulation mediodorsally ..... *Brevipalpus californicus*
– Hysterosoma with five pairs of dorsolateral setae; median propodosomal area without reticulation ..... *Brevipalpus phoenicis*

Tenuipalpus pacificus Baker
(Figs. 1-3)

Tenuipalpus pacificus Baker, 1945:38; Pritchard and Baker, 1951:42.

This species is characterized by having two pairs of anterior medioventral setae and two pairs of posterior medioventral setae.

The mite was found predominantly on the lower surface of the orchid leaves. Although the mite was found to injure almost every type of orchids, *Dendrobium* was recognized as the principal host. Infested leaves show white speckles on the lower surface of leaves which finally become brown pits of dead tissue. The mite also injures orchid flowers leaving a papule or rash-like symptom on the sepal. Feeding by this mite on the flowers sometimes leaves small transparent spots surrounding the punctured area and distorts the flowers.

Dolichotetranychus vandergooti (Oudemans)
(Figs. 4-6)

Dolichotetranychus vandergooti (Oudemans), Baker and Pritchard, 1956 : 371-372; Rimando, 1962:46-47.

Female of this species is characterized by having one pair of anal setae; pregenital setae separated by a distance less than width of genital plate; genital plate with tuberculate longitudinal striae. Male may be recognized by its palpus having a single distal seta and by two rod-like setae on each of tarsi I and II.

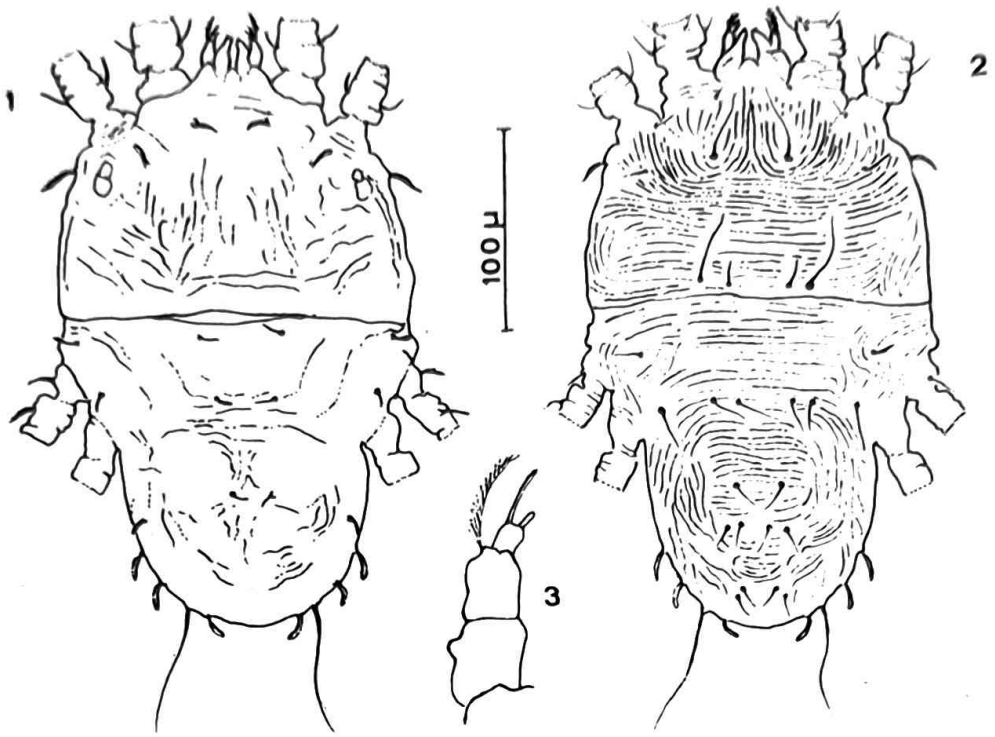
This species is a common pest of Vanda Miss Joaquim and *Dendrobium* orchids. They are usually found in groups under the leaf sheaths. The death of the plant tissue occurs as a result of feeding by this mite around the node and leaf sheath of the orchids. Heavy infestation could cause defoliation of the orchids.

Brevipalpus californicus (Banks)
(Fig. 7)

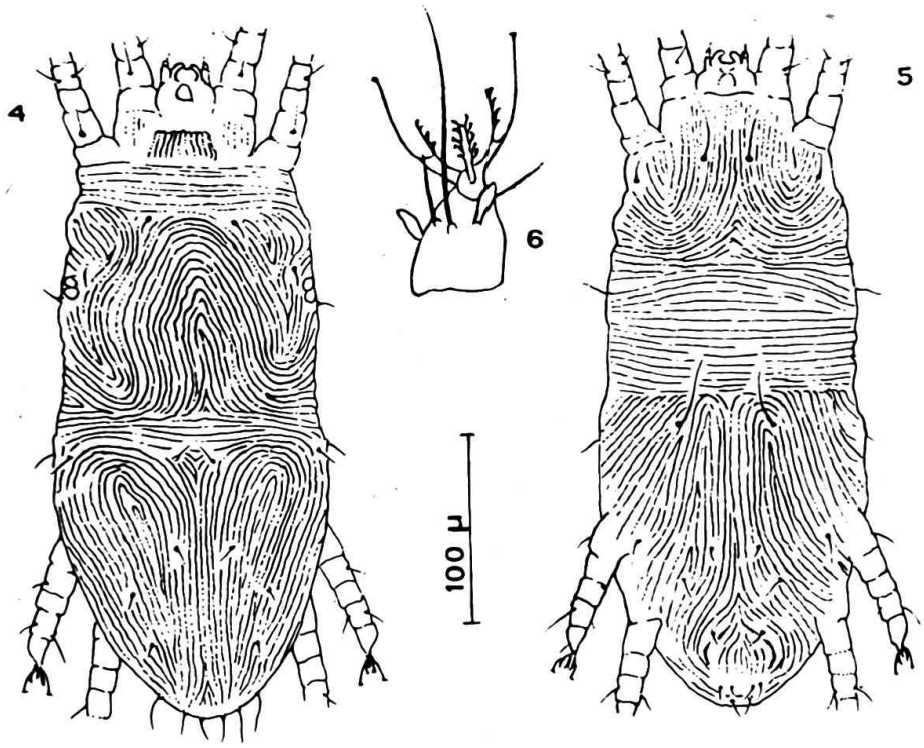
Tenuipalpus californicus Banks, 1904:55.

Brevipalpus californicus (Banks), Pritchard and Baker, 1951:30.

The mite is characterized by having six pairs of dorsolateral hysterosomal setae; propodosoma with regular polygonal reticulation mediodorsally; tarsus II bears two sensory rods distally.



Figs. 1–3. *Tenuipalpus pacificus* Baker; Female.
1. Dorsal view, 2. Ventral view, 3. Palpus



Figs. 4–6. *Dolichotetranychus vandergooti* (Oudemans)
4. Dorsal view of female, 5. Ventral view of female, 6. Male tarsus I

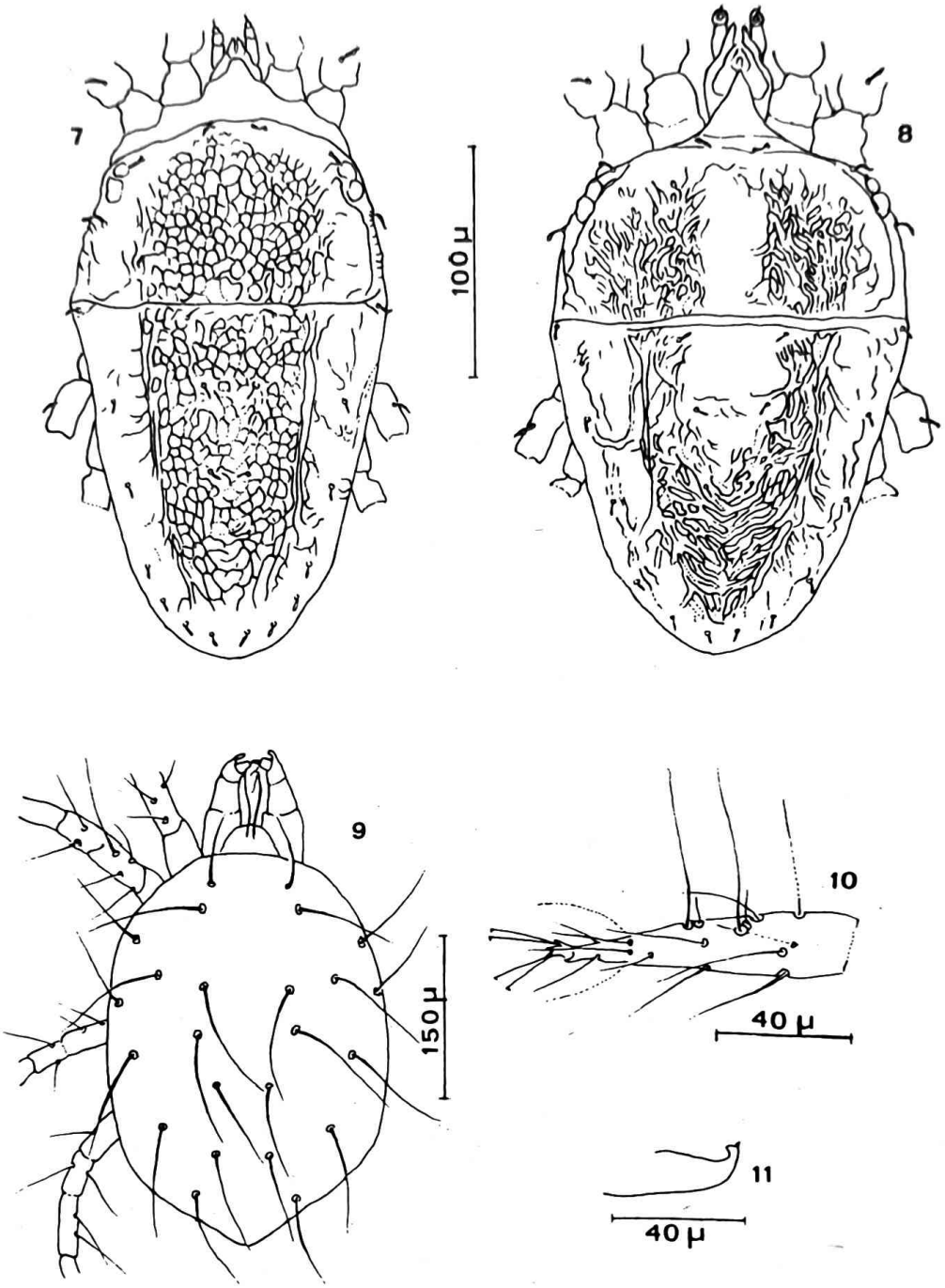


Fig. 7. *Brevipalpus californicus* (Banks); Female

Fig. 8. *Brevipalpus phoenicis* (Geijskes); Female

Figs. 9-11. *Tetranychus truncatus* Ehara
9. Dorsal view of female, 10. Female tarsus I, 11. Male aedeagus

The specimens of *B. californicus* were obtained entirely from orchid flowers. The mite causes small dark purple spots along the outer surface of sepals.

Brevipalpus phoenicis (Geijskes)
(Fig. 8)

Brevipalpus phoenicis (Geijskes), Pritchard and Baker, 1951 : 38-39; Gonzalez, 1975: 82-85.
Brevipalpus deleoni Pritchard and Baker, 1958: 234-235.

This species is characterized by having five pairs of dorsolateral hysterosomal setae; median propodosomal area without reticulation and is characterised by faint and loose oval areolae.

Only few specimens of this mite were collected from orchid flowers. They were found along with *B. californicus*. No damage symptoms could be clearly associated with this mite.

Tetranychus truncatus Ehara
(Figs. 9–11)

Tetranychus truncatus Ehara, 1956: 507–508.

The females generally resemble those of *Tetranychus telarius* group in structure. The aedeagus of the male is stout; the anterior projection is small and rounded, and the posterior projection consists of tiny barb.

This mite is occasionally found damaging orchid seedlings during hot dry condition. It was the only spider mite found in orchid houses. Heavy infestation could result in drying and death of orchid seedlings.

Biology of *T. pacificus*

Developmental stage and longevity

The newly laid egg of *T. pacificus* is bright red, oblong, with a thin hair attached to one end. As incubation progressed, the egg became opaque white and shiny. The average duration of each stage of development, ovipositional period and longevity of the adult are shown in Table 1.

Table 1
Developmental period and longevity of *T. pacificus*

Stage of development	No. observed	Average no. of days ($\bar{X} \pm$ S.D.)
Egg	110	9.45 ± 0.12
Larva	101	4.58 ± 0.09
Protonymph	88	4.51 ± 0.12
Deutonymph	74	4.66 ± 0.11
Egg to adult	72	23.52 ± 0.27
Male longevity	27	33.07 ± 0.59
Female longevity	26	31.92 ± 0.72
Preovipositional period	70	3.24 ± 0.08
Ovipositional period	26	24.65 ± 0.66

Fecundity

After the third moult the mites became adults. Male mites were attracted to and remained near the deutonymphal females and copulation occurred immediately after female ecdysis. Each female could lay an average of 1.39 ± 0.58 eggs per day and an average total of 36.6 ± 1.3 eggs throughout the adult life.

Sex ratio

Studies on the sex ratio of *T. pacificus* in the laboratory revealed that there were only 339 males out of the total number of 1608 progenies produced by 40 mated adult females giving a sex ratio of 3.74♀:1 ♂ compared to 4.39♀:1 ♂ in the natural population.

Factors affecting the mite population

The environmental factors were observed to have some influence on the population of mites in the orchid house. Crowding of the orchid plants on the benches or growing beds provided good shelter for orchid mites. Thick canopy of leaves protected the mites from being killed by

sprays of acaricides. Proper spacing of plants on the bench is important and helps in proper distribution of acaricidal sprays and watering so that they are effective. The cut leaves of *Nephrolepis* ferns used in flower arrangement and as a supplement crop commonly grown under the orchid benches provided alternate food source for the orchid mites. The orchid growers are not aware of the mite infestation on *Nephrolepis* fern since it is of low commercial value. In order to keep the population of mites under control in this situation, alternate hosts in the orchid house should not be overlooked. Old orchids of low productivity are generally neglected by the owners in the farm. These orchids serve as a breeding site for the mites. In order to reduce the population of mites, removal of nonproductive orchid crops is recommended.

SUMMARY

Studies on the mites injurious to orchids in Thailand were conducted during 1983–1984. Five species of mites are found damaging orchids in this country. They are *Tenuipalpus pacificus* Baker, *Dolichotetranychus vandergooti* (Oudemans), *Brevipalpus californicus* (Banks), *B. phoenicis* (Geijskes) and *Tetranychus truncatus* Ehara. *T. pacificus* is the most injurious to the orchids. The mites cause four different types of damage symptoms on orchids. Biological studies on *T. pacificus* in the laboratory revealed that the mites could develop from egg to adult in 23.52 ± 0.27 days. The average longevity of the adult mites is 33.65 ± 0.55 days. Each female could lay a total of 36.6 ± 1.3 eggs. The ovipositional period extended for an average of 24.65 ± 0.66 days. Sex ratio of this mite under the laboratory condition was 3.74 ♀: 1 ♂.

ACKNOWLEDGEMENTS

The authors wish to thank Mrs. K. Kamchaipai and Dr. U. Charanasri for the identification of mites of orchid plants. The authors are also indebted to the Bangkok Flower Center Co. Ltd. for providing orchid seedlings during the biological study of *T. pacificus*.

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