

Detection Survey of Mango Seed Weevil, *Sternochetus mangiferae* (Fabricius)
(Coleoptera: Curculionidae) in Thailand

Udorn Unahawutti^{1/} Oratai Euatrakool^{2/} Apinya Rujitharanawong^{2/} Somyot Chukumnerd^{2/}
Walaikorn Rattanadechakul^{3/} Alongkot Phodee^{3/} Sunadda Chaowalit^{3/} Ittipon Bannakan^{3/}

Abstract

Detection survey of mango seed weevil was undertaken throughout major mango production areas in six regions of Thailand. In each region, 1-2 provinces were selected as representatives of the region including province of Chiang Mai, Phichit, Nakorn Ratchasima, Ratchaburi, Petchaburi, Suphanburi, Chachoeng Sao and Chonburi. The survey was targeted on three mango cultivars of Namdork Mai, Thongdum and Chockanan which are the main cultivars exporting to Malaysia. Malaysian had agreed the methodology of survey protocol that was developed by Thailand. Fruit surveys were carried out in mango orchards during April to June 2009 to coincide with fruiting season. At least 600 fruits in each region were collected for mango seed weevil detection. All random sampling fruits were longitudinal cut open and dissection of seed for inspect the presence of mango weevils. Specimens found in infested fruits were collected and sent for identification by taxonomists at Insect Taxonomy Group, Entomology and Zoology Division, Plant Protection and Research Development Office, Department of Agriculture, Bangkok. Mango weevils collected from different areas were all identified to species and found to be *Sternochetus olivieri* (Faust). Therefore, result from the survey indicated that *S. mangiferae* is absence in Thailand.

Key words: detection survey, mango seed weevil (*Sternochetus mangiferae* (Fabricius)), mango

^{1/} Expert Office ^{2/} The Office of Agriculture Regulation

^{3/} Plant Protection Research and Development

Department of Agriculture 50 Phaholyothin Road, Chatuchak, Bangkok 10900 Thailand Office

Introduction

In the third Consultation Meeting on Cooperation in Plant Quarantine Activities at Thailand and Malaysia Borders held during 13-15 December 2005 in Chiang Rai, Thailand, Malaysian side informed the meeting that mango seed weevil, *Sternochetus mangiferae* (Fabricius) was notified as a quarantine pest of concern and five intercepted weevils on mangoes from Thailand were submitted to Natural History of London for identification. It was indicated that one specimen was identified as *S. mangiferae*. Therefore, mangoes from Thailand would be prohibited to import into Malaysia. However, Malaysia still allowed the importation of mangoes from Thailand under special arrangements until further verification.

To solve this issue, the Department of Agriculture dispatched two insect taxonomists to Commonwealth Scientific and Industrial Research Organization, CSIRO), Australia. One hundred specimens of weevils were thoroughly examined by experts of CSIRO. Based on external and genitalia characters, only two species were identify namely, *S. olivieri* (Faust) and *S. frigidus* (Fabricius). None of *S. mangiferae* was found. In the fifth Consultation Meeting on Cooperation in Plant Quarantine Activities at Thailand and Malaysia Borders held during 22-24 December 2008 in Chiang Mai, Thailand, the Malaysian side preliminarily agreed on the finding and required further confirmation. The Meeting agreed to form a Technical Ad-hoc Working Group comprising of experts from Thailand and Malaysia to jointly conduct a specific detection survey of mango seed weevils in major mango producing areas in Thailand to confirm the absence of *S. mangiferae* in Thailand.

Objective

1. To conduct a specific detection survey to determine species of mango weevils in major mango producing areas in Thailand
2. To confirm that *S. mangiferae* is not present in Thailand.

Materials and Methods

Survey areas

Survey on mango seed weevil was done throughout major mango production areas in 6 regions of Thailand. In each region, 1-2 provinces were selected as representatives of the region.

The following eight provinces including, (1) Chiang Mai (2) Phichit (3) Nakorn Ratchasima (4) Ratchaburi (5) Petchaburi (6) Suphanburi (7) Chachoeng Sao and (8) Chonburi are target for the survey (Appendix 1).

Detection survey

The survey was targeted on three mango cultivars of Namdork Mai, Thongdum and Chockanan which are the main cultivars exporting to Malaysia. At least two mango orchards in each province were chosen. Fruits were randomly collect by hand or with picking pouch on a short pole. The minimum numbers of sampling mangoes were not less than 600 fruits (or ~200 kg/region) in each region. Therefore, total number of 4,800 fruits (or ~1,600 kg) or more were examined.

Sample fruits collected in mango orchards were either longitudinal cut open then dissect seed for inspect the presence of mango weevils in the field or transported sample fruits to plant quarantine laboratory in Bangkok for cutting. All mango weevil found in infested fruits was sent for identification by taxonomists at Insect Taxonomy Group, Entomology and Zoology Division, Plant Protection and Research Development Office, Department of Agriculture, Bangkok. In case of uncertainty identification, the specimen will submit to CSRIO, Australia for final confirmation.

Mango weevil identification

Identification to species level of *Sternochetus* species has been described by Oberprieler, 2008; Poonchaisri and Chaowalit, 2008. Their morphological description is considered 3 elements; pronotum, elytra and aedeagus, each of which has a distinct character that can be differentiated. The morphology is described in Table 1 and Figure 1-6.

Result and Discussion

Detection survey

Survey was carried out in each designated GAP mango orchards in 6 regions during April to July 2009 to coincide with fruiting season. The total number of fruits sample collect from orchards was 5,946. The number fruit dissected and mango variety is presented in Table 2. All random sampling fruits were longitudinal cut open and dissection of seed for inspect the presence of mango weevils. Mango weevils collected from different mango orchards and regions were all identified to species and all of 75 weevils found to be *S. olivieri* (Faust). Lower numbers

of mango seed weevil infestation in orchards can be clarified by farmers applied Good Agricultural Practice (GAP) result in reduction of pest. Fruit bagging is using for mango at early fruiting stage for prevention of insect damage. It is important to note that during the time inspect and cutting fruit to collect mango weevil, we found alive larva stage of mango pulp weevil but we cannot rear it in fresh mango and they all dead. Woodruff and Fasulo, 2009 has been reported that *S. mangiferae* has not been reported developing in any host except mango, *Mangifera indica* L. In the laboratory, oviposition has been obtained on potatoes, peach, litchi, plum, string beans, and several varieties of apple. However, none of the resulting larvae reached maturity.

In order to verify and confirm absence of *S. mangiferae* in Thailand, we did survey and collected large numbers of mangoes produce for processing e.g. mango pickle or canned mango pulp from fruit industries and produce for domestic consumption from local market, road side, backyard mango etc where pest management does not apply at the same manner of GAP mango farm. This aimed to get lots of weevil and identify their specie. Number of seed dissected was 2,484 and found *S. olivieri* 61 infested.

Conclusion

Thus, the evidence of detection survey found only just *S. olivieri* is demonstrated that *S. mangiferae* is absence in Thailand.

Acknowledgements

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Table 1 Morphological identification of mango weevil, *Sternochetus* (Oberprieler, 2008; Poonchaisri and Chaowalit, 2008)

| Scientific name | Pronotum | Elytra | Aedeagus |
|--|---|--|--|
| <i>Sternochetus olivieri</i> (Faust) | medially with a conspicuous carina (keel) in basal 2/3 of length, which is flanked on either side by a line of white scales and its anterior end (in middle of pronotum) by tuft of dense, erect black scales. | large, whitish macula (patch) stretching from just behind humeri (shoulders) to top of declivity, inscribing a black, inverted medial triangle before middle of length and sometimes posteriorly interrupted by a fainter, dark, transverse band above declivity | with sides nearly parallel, apically broadly rounded and no internal sclerites |
| <i>Sternochetus mangiferae</i> (Fabricius) | with sides nearly parallel from base to beyond middle, interstriae flat to faintly but evenly costate (ridge), striae punctures rectangular to square, whitish macula forming a more or less distinct V and transverse posterior band | with erect black scales scattered over basal part of pronotal disk | with pair of internal sclerites separate, not touching apically |
| <i>Sternochetus frigidus</i> (Fabricius) | narrowing from base to apex, odd interstriae except sutural one distinctly costate-tuberculate, striae punctures round, whitish macula fragmented but usually forming a vague anterior inverted triangle inscribing a similar, smaller black median triangle and a broken posterior band on declivity | with erect black scales arranged in medial pair of loose cluster | with pair of internal sclerites overlapping apically |

Table 2 Number of fruit dissected, mango variety and mango weevil detect

| Regional | Province | Mango variety | No. of fruit dissected | Weight (kg) | No. of mango weevil | | |
|--------------|----------------------------------|---------------|------------------------|--------------|---------------------|----------|-----------|
| | | | | | Larva | Pupa | Adult |
| 1 | Phrao, Chiang Mai | Namdokmai | 373 | 97 | 0 | 0 | 9 |
| | Chiang Dao, Chiang Mai. | Chok Anan | 860 | 215 | 1 | 2 | 11 |
| 2 | Sawankhalok, Sukhothai | Chok Anan | 461 | 124 | 0 | 0 | 6 |
| | Noen Maprang, Phitsanulok | Namdokmai | 113 | 42 | 0 | 0 | 0 |
| | Sak Lek, Phichit | Thongdam | 383 | 119 | 0 | 0 | 3 |
| 3 | Mueang Nong Khai, Nong Khai | Chok Anan | 232 | 80 | 0 | 0 | 6 |
| | Kut Chap, Udon Thani | Chok Anan | 268 | 65 | 0 | 0 | 2 |
| | Waritchaphum, Sakon Nakhon | Namdokmai | 296 | 74 | 0 | 0 | 3 |
| 4 | Pak Chong, Nakhon Ratchasima | Namdokmai | 687 | 250 | 0 | 2 | 5 |
| 5 | Nong Ya Plong, Phetchaburi | Chok Anan | 327 | 109 | 2 | 1 | 7 |
| | Doem Bang Nang Buat, Suphan Buri | Namdokmai | 227 | 72 | 0 | 0 | 1 |
| 6 | Si Mahosot, Prachin Buri | Namdokmai | 486 | 107 | 0 | 0 | 5 |
| | Ko Chan, Chon Buri | Chok Anan | 789 | 195 | 0 | 0 | 9 |
| | Phanat Nikhom, Chon Buri | Namdokmai | 120 | 50 | 0 | 0 | 8 |
| | Phanom Sarakham, Chachoengsao | Namdokmai | 324 | 112 | 0 | 0 | 0 |
| Total | | | 5,946 | 1,711 | 3 | 5 | 75 |










| scientific name | common name | body length (mm) | pronotum | elytra | aedeagus | remark |
|--|-------------------|------------------|---|--|--|-------------|
| <i>Sternochetus olivieri</i> (Faust) | mango seed weevil | 6-8 |  |  |  | damage seed |
| <i>Sternochetus mangiferae</i> (Fabricius) | mango seed weevil | 8-10 |  |  |  | damage seed |
| <i>Sternochetus frigidus</i> (Fabricius) | mango pulp weevil | 3.8-5.9 |  |  |  | damage pulp |

Figure 1. Different feather of *Sternochetus* spp. (Poonchaisri and Chaowalit, 2008)

Pronotum

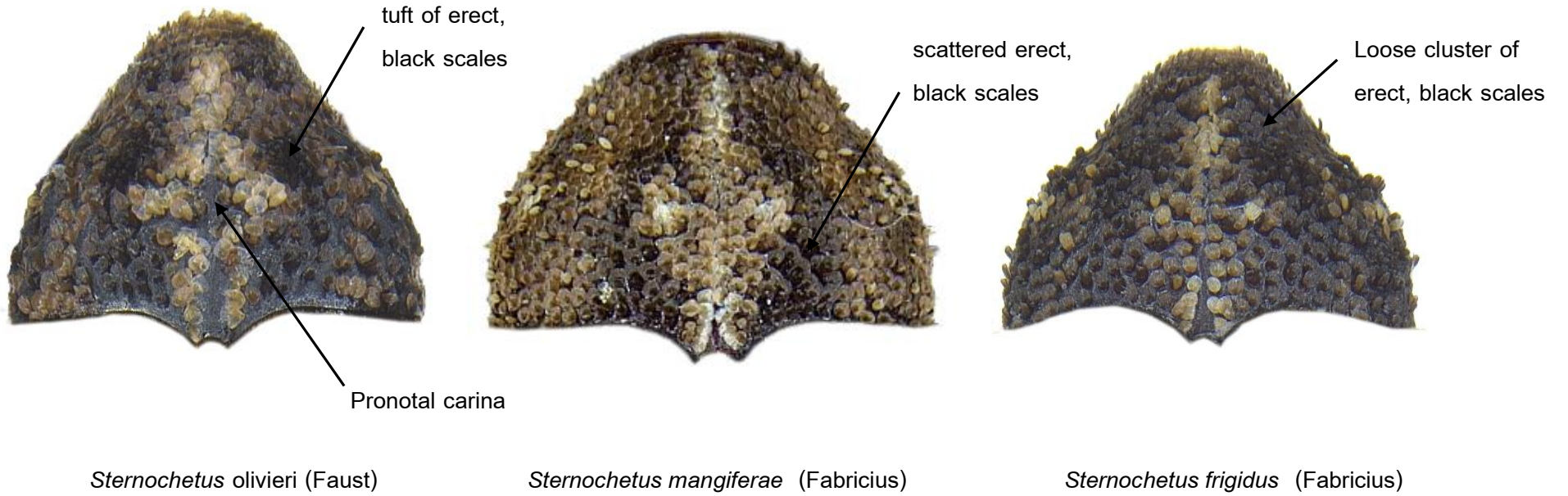


Figure 2 Pronotal morphology of *Sternochetus* spp. (Poonchaisri and Chaowalit, 2008)

Elytra

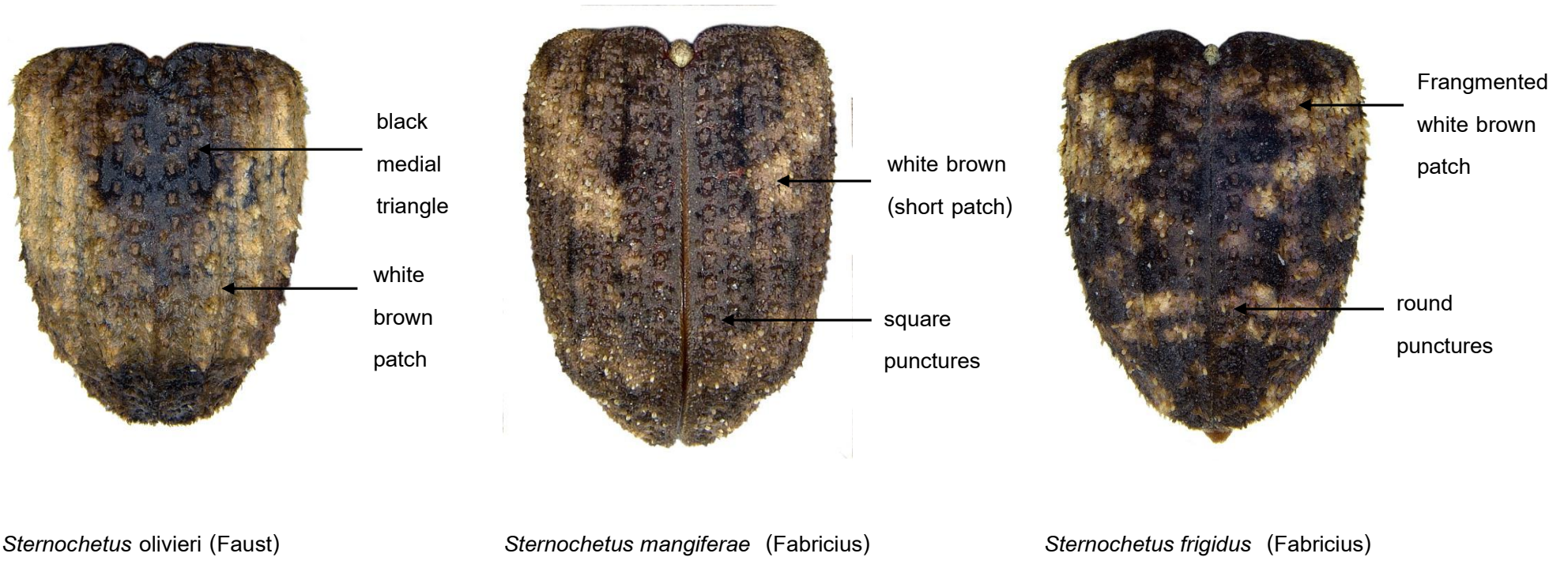
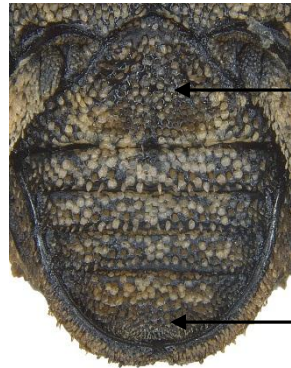


Figure 3 Elytral morphology of *Sternochetus* spp. (Poonchaisri and Chaowalit, 2008)

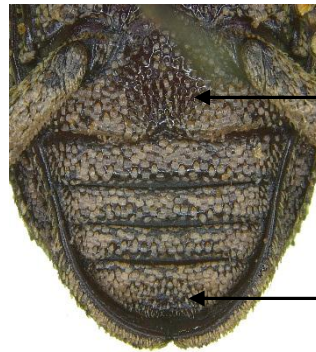
Sex



flat

flat

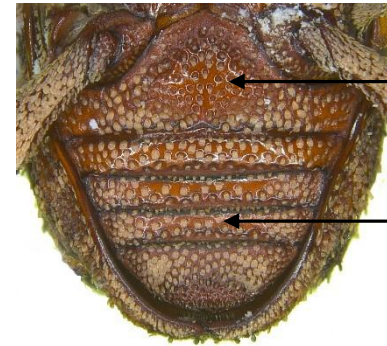
male



flat

flat

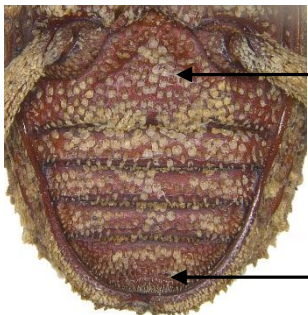
male



flat

flat

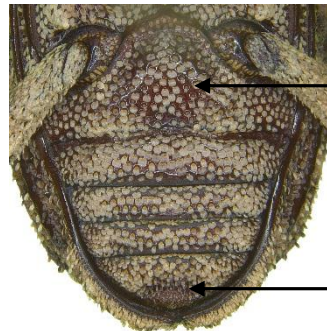
male



convex

deflexed
apical
margin

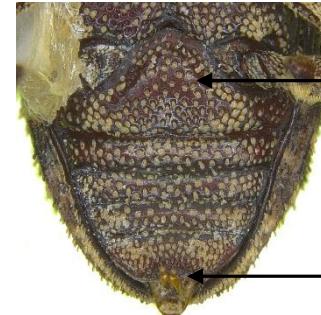
female



convex

deflexed
apical
margin

female



convex

deflexed
apical
margin

female

Sternochetus olivieri (Faust)

Sternochetus mangiferae (Fabricius)

Sternochetus frigidus (Fabricius)

Figure 4 Abdominal morphology of *Sternochetus* spp. (Poonchaisri and Chaowalit, 2008)

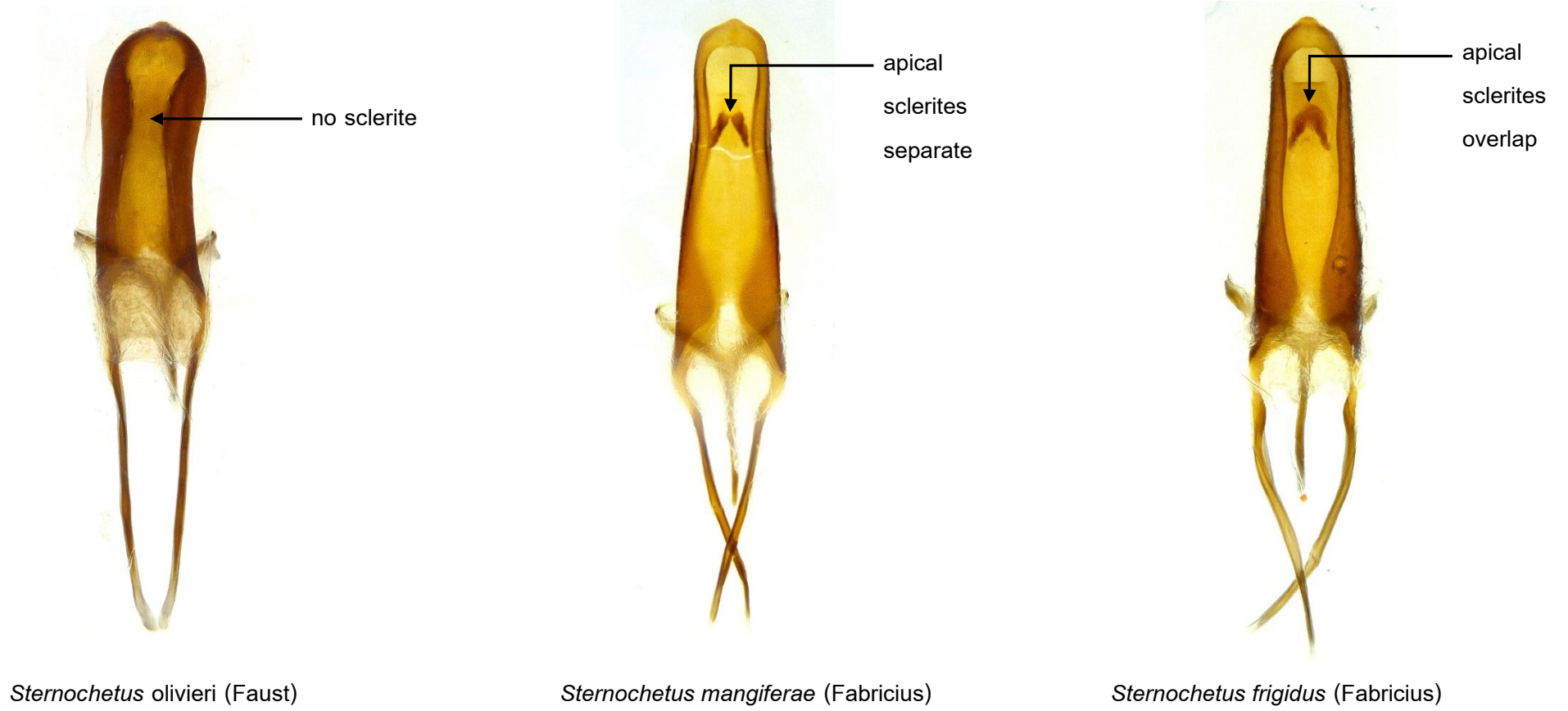


Figure 5 Aedeagus morphology of *Sternochetus* spp. (Poonchaisri and Chaowalit, 2008)



Figure 6 Morphology of *Sternochetus* spp. (Oberprieler, 2008)



Figure 7 Random collect mangoes by hand or with picking pouch on a short pole.



Figure 8 Sample fruits were cut opened and dissected seed for the presence of mango weevils



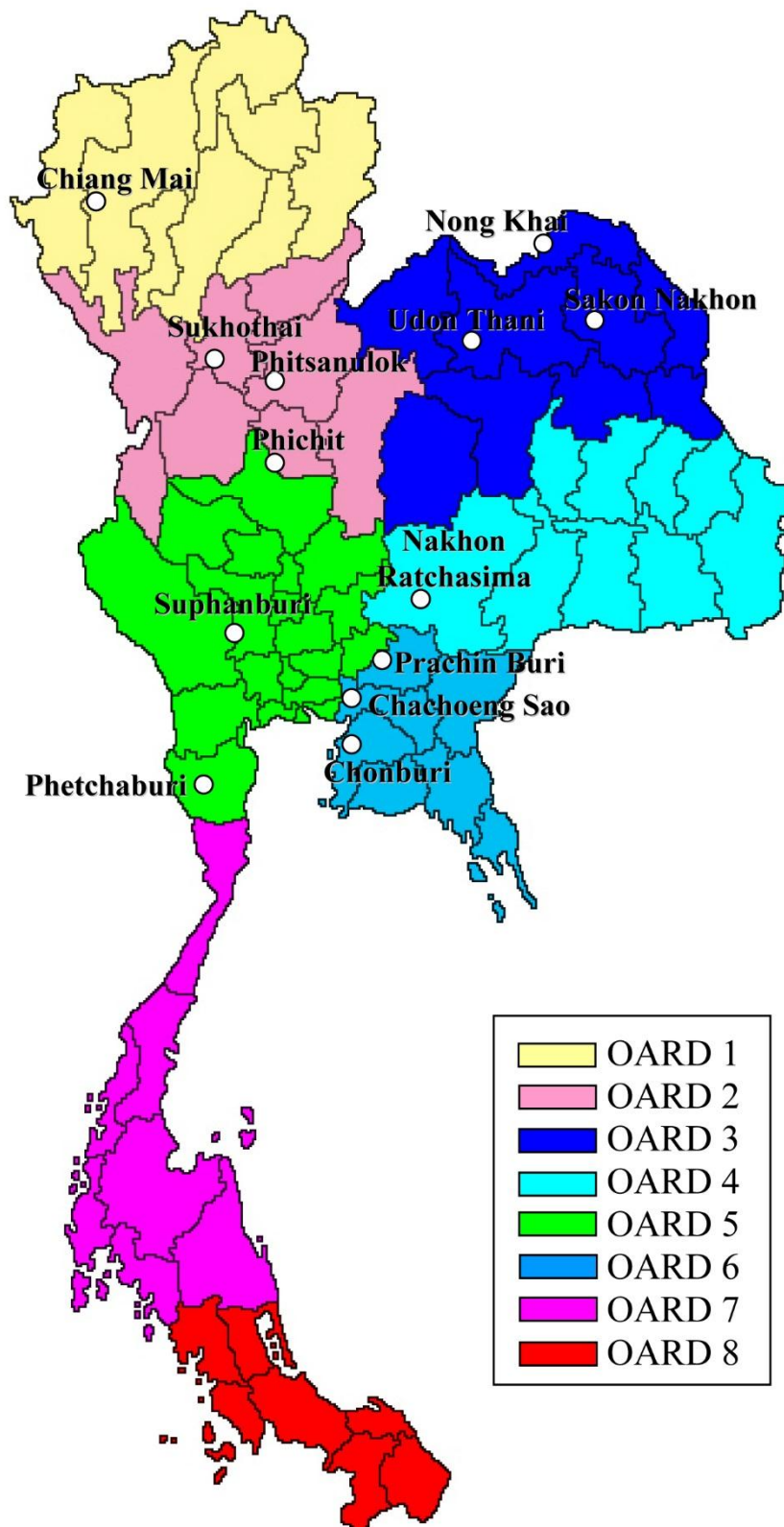
Figure 9 Mangoes were collected and transported to plant quarantine laboratory in Bangkok.



Figure 10 Mango seed weevils found inside seed.



Figure 11 *Sternochetus oliveiri* adults



OARD; Office of Agricultural Research and Development Region

Map of survey mango orchard