Conogethes punctiferalis

Scientific Name

Conogethes punctiferalis (Guenée, 1854) (*Astura*)

Synonyms:

Astura punctiferalis Guenée, 1854
Botys nicippealis Walker, 1859
Deiopeia detracta Walker, 1859
Astura guttatalis Walker, 1866

Taxonomic Note: *Conogethes* and *Dichocrocis* have been considered synonyms in the older literature; and *punctiferalis* is often seen combined with *Dichocrocis* (Wang, 1980).

Figures 1 & 2. *Conogethes punctiferalis* adult, dorsal and ventral views (Pest and Diseases Image Library, Bugwood.org).

Conogethes punctiferalis has been a species complex (Solis, 1999) and difficult to identify at the species level. There has been no taxonomic revision of *Conogethes* to separate species or range within the genus (Robinson et al., 1994). Inoue and Yamanaka (2006) re-described *C. punctiferalis* and described two new closely allied species that have been confused with *C. punctiferalis* in the literature. This study illustrates and clearly describes the external morphology and genitalic differentiation of *C. punctiferalis* based on studies of the type specimens. They state that the synonyms above should be “critically reconsidered” and do not include them in their synonymy. Species in this complex have very similar morphology, variable color morphs, and overlapping host ranges (Armstrong, 2010). Because the identities of species in the literature is unknown and their biology is indistinguishable, this datasheet has been written using information on all species within the *C. punctiferalis* species complex, with emphasis placed on the polyphagous form that feeds on fruits from a number of plant families.

Common Name(s)
Castor capsule borer, durian fruit borer, maize moth, peach pyralid moth, Queensland bollworm, shoot borer, smaller maize borer, yellow peach moth

Type of Pest
Moth, borer

Taxonomic Position
Class: Insecta, **Order:** Lepidoptera, **Family:** Crambidae (Munroe and Solis, 1999), Subfamily: Spilomelinae (Solis and Maes, 2002; Regier et al., 2012)

Reason for Inclusion
Suggestion from CAPS Community

Pest Description
Eggs: Eggs are "round and light yellow in color, and 0.63 × 0.41 mm in size. After incubation of 6–7 days, the eggs turn dark brown with a dark head" (reviewed in Shashank et al., 2015).

Larvae: "The larva of the moth has a black head and a pale greenish body with a pinkish suffusion dorsally." Coloration can vary by type of food (Chong et al., 1991). Fully grown larvae are 16 to 26 mm (approx. $^{5}/_{8}$ to 1 in) (Devasahayam and Abdulla Koya, 2005) and are rather stout, pale, or reddish-brown with numerous flattened horny warts that have short bristly hairs. The prothoracic shield is large and the head is reddish-brown (USDA, 1957).

Pupae: "The pupa measures 15 mm long [approx. $^{9}/_{16}$ in]" (Chong et al., 1991) and is brown in color. The pupa is enclosed by a white silken cocoon (USDA, 1957).

Adults: Adults are pale straw yellow with numerous small black spots and a wing span of 18 to 24 mm (approx. $^{11}/_{16}$ to $^{15}/_{16}$ in) (Chong et al., 1991).

Figure 3. Forewing closeup of *Conogethes punctiferalis* (Pest and Diseases Image Library, Bugwood.org).

Biology and Ecology
After mating, females lay the small, oval eggs on or near fruit or seeds of hosts (USDA, 1957). Females lay from 20 to 30 eggs (reviewed in MAF Biosecurity New Zealand, 2009). Once they hatch, larvae feed on or in seeds, seed capsules, and young shoots (USDA, 1957). The larvae go through five instars (Devasahayam and Abdulla Koya,

2005). Pupation usually occurs in the larval tunnels within a silk cocoon, surrounded by shelters of webbing and frass (Chong et al., 1991; MAF Biosecurity New Zealand, 2009). The adult emerges about 8 days later (Chong et al., 1991). In Australia, pupation can take 2 to 3 weeks (in summer) to as long as 8 weeks (in winter).

This species breeds throughout the year in India and parts of Australia (USDA, 1957). In Japan, this species has two to three generations per year. “Overwintering occurs as full-grown larvae within thick silken cocoons, spun inside loose scales of the trunk bark, or within the mummified fruit of the peach or chestnut. The larvae pupate within the cocoons in the spring, and moths emerge in mid-May” (Púcat, 1995).

In laboratory conditions, this species completes its lifecycle in about 28 days in castor, 31 days in cardamom, and 32 days in ginger. Damage caused by this species increased when relative humidity was increased (Stanley et al., 2009).

A literature review of the bioecology can be found in (Shashank et al., 2015).

Damage

The larva of this species is the damaging stage, and it bores into stems, shoots, buds, fruits, and seeds of many plants. Boring by this species can predispose the fruits to secondary pathogens (Chong et al., 1991).

Cocoa: The larvae bore into the husk of the fruits. “In cocoa, boring often starts in regions of pods that meet with other pods or the bark; the pest is also often associated with severe plant bug damage” (Chong et al., 1991).

Corn: “Evidence of larval feeding includes damage to silk, grain and cob, and sometimes tunnels bored into the stalk” (Púcat, 1995).

Cotton: Larvae bore into cotton bolls and sometimes the stems. They produce masses of webbing and excreta at the entrance to their tunnels (Cotton Catchment Communities Cooperative Research Centre, 2007).

Durian: “In durian, boring usually occurs under a mass of frass, webbed together in between thorns of the fruit” (Chong et al., 1991).

Ginger: Larvae begin feeding on the green contents of the leaves and later bore into the shoots, feeding on the inner core (Devasahayam et al., 2010). Larvae feeding in the center of the stem cause the death of the “heart”, “which is visible when the terminal shoots yellow. Usually, the larva is mature before it reaches the rhizome and leaves the stem to pupate: occasionally it arrives at the rhizome and damages it” (Chong et al., 1991). Characteristic symptoms in ginger include the presence of bore holes on the pseudostem from which frass is extruded and the withered central shoot (Devasahayam and Abdulla Koya, 2005).

Pest Importance

There are a limited number of reports describing the amount and type of damage caused by this species and most reports are limited to a specific host crop (Korycinska, 2012).

It has previously been described as a destructive pest of peaches in China as well as on cotton in Australia. It has occasionally caused almost complete loss of grain sorghum in coastal areas of Australia (USDA, 1957). More recent reports refer to it as minor and irregular pest of sorghum, corn, and cotton (reviewed in Korycinska, 2012). Astridge (2001) considers this species to be a major pest of rambutan and durian in north Queensland.

In India and Sri Lanka, this species is a serious pest of castorbean and fruit (USDA, 1957). Devasahayam and Abdulla Koya (2005) states that this species is the most serious pest of ginger, especially in India. Crop yield can be significantly affected when more than 45% of shoots in a clump are damaged (Devasahayam et al., 2010). In India, capsule yield loss in cardamom was recorded between 6.8 and 9.2% while castor capsule damage was recorded between 11 and 27% (reviewed in Shashank et al., 2015).

Hill (1983) states this species is a major pest of *Curcuma domestica* (turmeric) and *Ricinus communis* (castor). It's also listed as a minor pest of *Carica papaya* (papaya), *Elettaria cardamomum* (cardamom), *Macadamia ternifolia* (macadamia), *Morus* spp. (mulberry), *Pisidium guajava* (guava), *Prunus persica* (peach), *Punica granatum* (pomegranate), and *Zingiber officinale* (ginger).

This species has caused yield losses of 25% when 23 to 24% of ginger pseudostems were infested. Forty percent yield losses in ginger have been reported in certain parts of India (reviewed in Devasahayam and Abdulla Koya, 2005). According to Chong et al. (1991) "damage by *D. punctiferalis* is often isolated, and husks are frequently not bored through. Nevertheless, such boring often predisposes disease infection of fruits. In ginger, the larva feeding in the center of the stem causes death of the "heart", which is visible when the terminal shoot yellows. Usually, the larva is mature before it reaches the rhizome, and leaves the stem to pupate: occasionally it arrives at the rhizome and damages it."

Known Hosts[1]

This species is highly polyphagous and has been recorded on 65 host plants from 30 different families. Many hosts are economically important (Devasahayam and Abdulla Koya, 2005). Shashank et al. (2015) states that the preferred host is cardamom followed by *Hedycium* spp., *Alpinia* spp., and *Ammomum* spp.

Major hosts

Alpinia spp., *Ammomum* spp. *Curcuma longa* (turmeric), *Dimocarpus longan* (=*Euphoria longana*) (longan), *Dimocarpus longan* subsp. *malesianus* (=*Nephelium malaiense*) (mata kuching), *Durio zibethinus* (durian), *Elettaria cardamomum* (cardamom),

Gossypium spp. (cotton), *Hedycium* spp., *Nephelium lappaceum* (rambutan), *Prunus persica* (peach), *Ricinus communis* (castorbean), *Sorghum bicolor* (sorghum), *Sorghum bicolor* subsp. *bicolor* (=*S. vulgare*) (great millet), *Theobroma cacao* (cocoa), and *Zingiber officinale* (ginger) (Yunus and Hua, 1980; Hill, 1983; Chong et al., 1991; Astridge, 2001; reviewed in Shashank et al., 2015).

Minor hosts
Artocarpus heterophyllus (jackfruit), *Averrhoa carambola* (carambola), *Brachychiton acerifolius* (flame tree), *Caesalpinia bonduc* (yellow nicker), *Carica papaya* (papaya), *Castanea mollissima* (Chinese chestnut), *Ceiba pentandra* (kapok tree), *Citrus* spp. (citrus), *Citrus limon* (lemon), *Citrus sinensis* (orange), *Dillenia indica* (elephant apple), *Diospyros virginiana* (American persimmon), *Eriobotrya japonica* (loquat), *Etlingera elatior* (=*Phaeomeria speciosa*) (kantan), *Ficus carica* (fig), *Flemingia* spp., *Glycine max* (soybean), *Helianthus* spp. (sunflower), *Livistona humilis* (livistona palm), *Macadamia integrifolia* (macadamia), *Macadamia ternifolia* (macadamia), *Malus* spp. (apple), *Mangifera indica* (mango), *Morus* spp. (mulberry), *Morus alba* (white mulberry), *Persea americana* (avocado), *Pisidium guajava* (guava), *Planchonia careya* (billy goat plum), *Prunus domestica* (plum), *Punica granatum* (pomegranate), *Quercus virginiana* (live oak), *Sapindus* spp., (*Solanum melongena* (eggplant), *Tectona grandis*[2] (Bankok teak), *Vitis vinifera* (grape), and *Zea mays* (corn) (Yunus and Hua, 1980; Hill, 1983; Gour and Sriramulu, 1992; Waterhouse, 1993; Zhang et al., 1994; Herbison-Evans and Crossley, 2010; EPPO, 2013; reviewed in Shashank et al., 2015).

[1] The recently described species *Conogethes pinicolalis* was originally referred to as the pinaceae-feeding type (PFT) of *C. punctiferalis* (Wang et al., 2014). As such, references to pineaceae host plants for *C. punctiferalis* were excluded from the host list. Shashank et al. (2015) states that the *Conogethes* reared on castor and cardamom are two different species; however, taxonomic revision of this species complex has not been completed.

[2] Zhang et al. (1994) states that *Conogethes punctiferalis* feeds on the seeds of this species.

Pathogens or Associated Organisms Vectored
This species is not known to vector any pathogens or associated organisms; however, boring by this species can predispose the fruits to secondary pathogens (Chong et al., 1991).

Known Distribution
This species is found in southern and eastern Asia, Australia, Indonesia, and New Guinea (USDA, 1957). This species is also present in Hawaii (Nishida, 2002).

Asia: Bangladesh, Brunei, Cambodia, China, India, Indonesia, Iraq, Japan, Korea, Laos, Malaysia, Myanmar, Philippines, Sri Lanka, Taiwan, Thailand, and Vietnam; **North America:** Hawaii (Nishida, 2002); **Oceania:** Australia, Papua New Guinea (Waterhouse, 1993; Zhang et al., 1994; Púcat, 1995; EPPO, 2013).

Pathway

This species can move through international trade. There are records of this species being intercepted on fruit consignments in England, Wales, the Netherlands, and New Zealand (MAF Biosecurity New Zealand; Korycinska, 2012). Interceptions in England and Wales occurred on sugar apple, mango, and guava (Korycinska, 2012). Interceptions in New Zealand occurred on capsicum and tomato).

Conogethes sp. have been intercepted at U.S. ports of entry 748 times (742 interceptions were of larvae). The species has been intercepted and identified 104 times at U.S. ports of entry (all interceptions were of larvae) (AQAS, 2014; queried December 9, 2014). The United States allows peaches into Guam and CNMI from Canada, Korea, and certain parts of Japan and ginger into all ports from all countries (FAVIR, 2014).

Potential Distribution within the United States

Much of the species' distribution occurs in the subtropics; however it has also been recorded from northern Japan and China. Threshold temperatures from the Hebei Province in northern China were calculated at 8.4°C (47.1°F) for eggs, 7.3°C (45.1°F) for larvae, and 11.3°C (52.3°F) for pupae (reviewed in Korycinska, 2012).

This species is currently present in Hawaii (Nishida, 2002).

Survey

Approved Method for Pest Surveillance*:

The approved method for this species is a trap and lure combination. The trap is the large plastic delta trap. The lure is effective for 28 days (4 weeks).

Any of the following Trap Product Names in the IPHIS Survey Supply Ordering System may be used for this target:

1) Large Plastic Delta Trap Kits, Orange
2) Large Plastic Delta Trap Kits, Red
3) Large Plastic Delta Trap Kits, White

The Lure Product Name is "*Conogethes punctiferalis* Lure."

NOTE: Pest Surveillance (Pest Detection, Farm Bill, etc.) funding cannot be used to survey for this pest in Hawaii, where it is known to be established.

IMPORTANT: Do not include lures for other target species in the trap when trapping for this target.

Trap spacing: When trapping for more than one species of moth, separate traps for different moth species by at least 20 meters (65 feet).

*For the most up-to-date methods for survey and identification, see Approved Methods for Pest Surveillance on the CAPS Resource and Collaboration Site, at https://caps.ceris.purdue.edu/approved-methods.

Survey site selection:
This species is highly polyphagous and has been recorded on 65 host plants from 30 different families. Many hosts are economically important and include: castor bean, cotton, peach, and sorghum, as well as many tropical fruits including: cocoa (grown in Puerto Rico and the U.S. Virgin Islands), ginger (grown in Puerto Rico and the U.S. Virgin Islands), longan (grown in Florida), and turmeric (grown in Hawaii and Puerto Rico) (USDA, 1998; USDA-NRCS, 2015). See 'Known Hosts' for a complete host list.

Trap placement:
In trapping studies in Japanese peach orchards, traps were placed 1.5 m (~5 ft) above the ground (Kondo et al., 2008).

Time of year to survey:
This species breeds throughout the year in India and parts of Australia (USDA, 1957). In Japan, this species has two to three generations per year. Emergence of moths occurs in mid-May (Púcat, 1995). In Japanese peach orchards, moths were trapped from June to August (Kondo et al., 2008).

Literature-Based Methods:
Trapping: Konno et al. (1982) identified the sex pheromone as (E)-10-hexadecenal. The addition of (Z)-10-hexadecenal led to an increase trap catches (4x more). Another minor component identified was hexadecanal. Liu et al. (1994) found that the most attractive blends were a mixture of 16:Ald, E10-16:Ald, and Z10-16:Ald at a ratio of 16:100:8 and a blend of E10-16:Ald and Z10-16:Ald at a ratio of 100:8. Chakravarthy and Thyagaraj (1998) trapped for this species using a ratio of 9:1 for (E)-10-hexadecenal and (Z)-10-hexadecenal. This blend has been used for mass-trapping, monitoring, and mating disruption in Japan, Korea, and China (Kimura and Honda, 1999). In Korea, an 80:20 ratio of (E)-10-hexadecenal and (Z)-10-hexadecenal had the highest attractiveness in several tests in orchard fields (Jung et al., 2000). Further work by Xiao et al. (2012) found that certain hydrocarbons had a synergistic effect on responses to pheromones (lab data).

(E)- and (Z)-8-tetradecenyl formate have been synthesized and tested for effectiveness in trapping *C. punctiferalis*. Mori et al. (1990) found that "a 10:1 mixture of the (E)- and (Z)-formate was shown to be as attractive as a 10:1 mixture of (E)- and (Z)-10-hexadecenal (genuine pheromone) in a 100-µg dose against the male yellow peach moth, *Dichocrocis* [*Conogethes*] *punctiferalis*." The genuine pheromone is unstable under natural conditions (Mori et al., 1990).

There seems to be a difference in attraction between populations: "*Dichocrocis* [*Conogethes*] *punctiferalis* (Pyralidae) seems to consist of two different populations in the northeastern Asia region, with one group responding to the blend of 100: 8-100:11

between (E)-10-hexadecenal and (Z)-10-hexadecenal and the other to that of 100: 43. The first group was found in Japan and China and the second in Korea and also China" (Boo, 1998).

Visual survey: Visual surveys have previously been conducted in New Zealand, specifically on chestnuts in parks (Ganev and Braithwaite, 2003).

Not recommended: This species has been trapped in light traps previously (Korycinska, 2012). Light trapping has been done in some districts of Japan, but it is not considered very efficient (Konno et al., 1982).

Key Diagnostics/Identification

Approved Method for Pest Surveillance*:

The approved method for this species is morphological. Final identification requires dissection of adult male genitalic structures and compared with Inoue and Yamanaka (2006).

A larval key to selected intercepted Pyraloidea larvae (including *Conogethes* spp.) is found in Solis (1999).

*For the most up-to-date methods for survey and identification, see Approved Methods for Pest Surveillance on the CAPS Resource and Collaboration Site, at https://caps.ceris.purdue.edu/approved-methods.

Easily Confused Species

This genus is not found in the United States. In the Western Hemisphere, the adults can be confused externally with two species, *Asturodes fimbriauralis* (Guenée) that occurs in the Western Hemisphere as far north as Mexico and *Polygrammodes elevata* (Fabricius) that occurs in the United States (M. A. Solis, 2015, personal communication).

References

AQAS. 2014. *Conogethes* sp. interceptions. Agricultural Quarantine Activity Systems. Accessed December 9, 2014 from: https://aqas.aphis.usda.gov/aqas/HomePageInit.do#defaultAnchor.

Armstrong, K. 2010. DNA barcoding: a new module in New Zealand's plant biosecurity diagnostic toolbox. Bull OEPP/ EPPO 40:91–100.

Astridge, D. 2001. Insect fauna surveys on rambutan, durian and mangosteen in North Queensland. Technical Bulletin Department of Primary Industry and Fisheries, Northern Territory of Australia, 75-79.

Boo, K. S. 1998. Variation in sex pheromone composition of a few selected Lepidopteran species. J. Asia-Pacific Entomol. 1(1): 17-23.

Chakravarthy, A. K. and N. E. Thyagaraj. 1998. Evaluation of selected synthetic sex pheromones of the cardamom shoot and fruit borer, *Conogethes punctiferalis* Guenee (Lepidoptera: Pyralidae) in Karnataka (abstract only). Pest Management in Horticultural Ecosystems 4(2): 78-82.

Chong, K. K., P. A. C. Ooi, and H. C. Tuck. 1991. Crop Pests and Their Management in Malaysia. Tropical Press Sdn. Bhd, Malaysia. 242 pp.

Cotton Catchment Communities Cooperative Research Centre. 2007. Yellow peach moth.

Devasahayam, S. and K. M. Abdulla Koya. 2005. Insect Pests of Ginger. In P. N. Ravindran & K. N. Babu (Eds.), Ginger: The Genus. Zingiber. 367-390 pp.

Devasahayam, S., T. K. Jacob, K. M. Abdulla Koya, and B. Sasikumar. 2010. Screening of ginger (*Zingiber officinale*) germplasm for resistance to shoot borer (*Conogethes punctiferalis*). Journal of Medicinal and Aromatic Plant Sciences 32(2): 137-138.

EPPO. 2013. PQR – EPPO database on quarantine pests. Available at: http://www.eppo.int.

FAVIR. 2014. Fruits and Vegetables Import Requirements (FAVIR) database.

Ganev, S. and M. Braithwaite. 2003. Resource requirements for national active surveillance programmes of high impact exotic pests in New Zealand. New Zealand Plant Protection 56: 10-15.

Gour, T. B. and M. Sriramulu. 1992. Grapevine, *Vitis vinifera* Linn. a new host of castor shoot and capsule borer *Conogethes punctiferalis* (Guenée). Tropical Pest Management 38(4): 459.

Herbison-Evans, D. and S. Crossley. 2010. *Conogethes punctiferalis* (Guenée, 1854).

Hill, D. S. 1983. Agricultural Insect Pests of the Tropics and Their Control (2nd ed.). Cambridge University Press, New York. 746 pp.

Inoue, H. and H. Yamanaka. 2006. Redescription of *Conogethes punctiferalis* (Guenée, 1854) and descriptions of two new closely allied species from Eastern Palaearctic and Oriental Regions (Pyralidae: Pyraustinae). Tinea. 19 (2): 80-91.

Jung, J.-K., K.-S. Han, K.-S. Choi, and K.-S., Boo. 2000. Sex pheromone composition for field-trapping of *Dichocrocis punctiferalis* (Lepidoptera: Pyralidae) males (abstract only). Journal of Applied Entomology 39(2): 105-110.

Kimura, T. and H. Honda. 1999. Identification and possible functions of the hairpencil scent of the yellow peach moth, *Conogethes functiferalis* (Guenée) (Lepidoptera: Pyralidae). App. Entomol. Zool. 34(1): 147-153.

Kondo, A., K. Nagata, and F. Mochizuki. 2008. Geographical differences in pheromone trap performance in the yellow peach moth, *Conogethes functiferalis* (Guenée) (Lepidoptera: Pyralidae) occurring in Japanese peach orchards. Jpn. J. Appl. Entomol. Zool. Chugoku Branch 50: 35-38.

Konno, Y., K. Arai, K. Sekiguchi, and Y. Matsumoto. 1982. (E)-10-hexadecenal, a sex pheromone component of the yellow peach moth, *Dichocrocis punctiferalis* Guenée (Lepidoptera: Pyralida). Appl. Ent. Zool. 17(2): 207-2017.

Korycinska, A. 2012. Rapid assessment of the need for a detailed Pest Risk Analysis for *Conogethes punctiferalis* (Guenée). The Food and Environment Research Agency. 7 pp.

Liu, M., Y. Tian, and Y. Li. 1994. Identification of minor components of the sex pheromone of yellow peach moth, *Dichocrocis punctiferalis* Guenée, and field trials. Entomologia Sinica 1(2): 150-155.

MAF Biosecurity New Zealand. 2009. Import Risk Analysis: Table grapes (*Vitis vinifera*) from China. 322 pp.

Mori, K., H. Watanabe, M. Fujiwhara, and S. Kuwahara. 1990. (E)- and (Z)-tetradecenyl formate, potent sex pheromone mimics against the yellow peach moth. Pheromone Synthesis 122: 1257-1259.

Munroe, E. and M. A. Solis. 1999. Pyraloidea, pp. 233-256 *In* Kristensen, N., ed. Lepidoptera, Moths and Butterflies, Vol. 1, Arthropoda, Insect, Vol.4, Part 35. Handbook of Zoology. Walter de Gruyter & Co. Berlin. 491 pp.

Nishida, G. M. 2002. Hawaiian Terrestrial Arthropod Checklist. Fourth Edition.313 pp.

Púcat, A. 1995. *Conogethes punctiferalis.* Yellow Peach Moth. Canadian Food Inspection Agency Science Branch.

Regier, J. C., C. Mitter, M. A. Solis, J. E. Hayden, B. Landry, M. Nuss, T. J. Simonsen, S.-H. Yen, A. Zwick and M. P. Cummings. 2012. A molecular phylogeny for the pyraloid moths (Lepidoptera: Pyraloidea) and its implications for higher-level classification. Systematic Entomology 37:635-656.

Robinson, G. S., K. R. Tuck, and M. Shaffer. 1994. A Field Guide to the Smaller Moths of South-East Asia. Malaysian Nature Society and the Natural History Museum. Art Printing Works Sdn. Dhd., Kuala Lumpur, Malaysia.

Shashank, P. R., B. Doddabasappa, V. Kammar, A. K. Chakravarthy, and H. Honda. 2015. Molecular characterization and management of shoot and fruit borer *Conogethes punctiferalis* Guenee (Crambidae: Lepidoptera) populations infesting cardamom, castor and other hosts. In A. K. Chakravarthy (ed) New Horizons in Insect Science: Towards Sustainable Pest Management. Springer. pp. 207-227.

Solis, M. A. 1999. Key to selected Pyraloidea (Lepidoptera) larvae intercepted at U.S. ports of entry: revision of Pyraloidea in "Keys to some frequently intercepted lepidopterous larvae" by Weisman 1986. Proceedings Entomological Society of Washington 101(3): 645-666 (last modified and updated, 2011 at http://www.ars.usda.gov/Services/docs.htm?docid=21547).

Solis, M. A. and K. V. N. Maes. 2002. Preliminary phylogenetic analysis of the subfamilies of Crambidae (Pyraloidea: Lepidoptera). Belgian Journal of Entomology. 4:53-95.

Solis, M. A. 2015. Identification methods for *Conogethes punctiferalis*. Personal communication to L. D. Jackson on July 29, 2015 from M. A. Solis (USDA-ARS).

Stanley, J., S. Chandrasekaran, and G. Preetha. 2009. *Conogethes punctiferalis* (Lepidoptera: Pyralidae) its biology and field parasitization (abstract only). 79(11): 906-909.

USDA. 1957. Insects not known to occur in the United States. Yellow peach moth (*Dichocrocis punctiferalis* (Guenee)). 37-38 pp.

USDA. 1998. Hawaii Ginger Root. Annual Summary. United States Department of Agriculture. Hawaii Agricultural Statistics Service. 4 pp.

USDA-NRCS. 2015. The PLANTS Database National Plant Data Team, Greensboro, NC 27401-4901 USA. Accessed June 3, 2015 from: http://plants.usda.gov.

Wang, J., T. Zhang, Z. Wang, K. He, Y. Liu, and J. Li. 2014. Molecular taxonomy of *Conogethes punctiferalis* and *Conogethes pinicolalis* (Lepidoptera: Crambidae) based on mitochondrial DNA sequences. Journal of Integrative Agriculture 13(1): 1982-1989.

Wang, P.-Y. 1980. Economic Insect Fauna of China. Science Press. Fasc. 21. 229 pp..

Waterhouse, D. F. 1993. The Major Arthropod Pests and Weeds of Agriculture in Southeast Asia: Distribution, Importance and Origin. Australian Centre for International Agricultural Research. Canberra, Australia.

Xiao, W., S. Matsuyama, T. Ando, J. G. Millar, and H. Honda. 2012. Unsaturated cuticular hydrocarbons synergize responses to sex attractant pheromone in the yellow peach moth, *Conogethes punctiferalis*. J. Chem. Ecol. 8 pp.

Yunus, A. and T. H. Hua. 1980. List of economic pests, host plants, parasites and predators in West Malaysia (1920-1978). Malaysia Ministry of Agriculture Bulletin: No. 153, Kuala Lumpur, Malaysia: Ministry of Agriculture, Publications Unit. 448 pp.

Zhang, B. –C. 1994. Index of Economically Important Lepidoptera. Wallingford, UK: CAB International. 599 pp.

This datasheet was developed by USDA-APHIS-PPQ-CPHST staff. Cite this document as:

Molet, T. 2015. CPHST Pest Datasheet for *Conogethes punctiferalis*. USDA-APHIS-PPQ-CPHST.

Reviewers

September 2015
M. Alma Solis, USDA Agricultural Research Service, Beltsville, MD