Screening Aid

Fruit Piercing Moth
Eudocima phalonia (Linnaeus)

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Version 3.0
7 Mar 2016

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The fruit piercing moth, *Eudocima phalonia* (Linnaeus), is a serious pest of commercial fruit crops. Opposite of most Lepidoptera, it is the adult, not the larva, that causes economic damage. A strongly sclerotized proboscis allows adults of both sexes to pierce the skin of fruits and suck out the fluid inside. Economically important hosts include apple, citrus, grape, melon, mango, papaya, pear, pineapple, strawberry, and tomato. Fruits damaged by *E. phalonia* adults are dry, spongy, and prone to secondary infection at wound sites. *Eudocima phalonia* is native to the Indomalayan Region and has spread to other parts of Asia, Australia, and Africa.

Fig. 1: Live resting *E. phalonia* adult (Photo by Logan Lai, Flickr).

Eudocima is a genus in the Erebidae (formally a subfamily of the Noctuidae) and contains 47 species, all of which have adults that feed by piercing fruit. The combination *Eudocima phalonia* was only recently reinstated and this same species is often referred to as "*Eudocima fullonia*" or "*Othreis fullonia*" in economic literature. *Eudocima* are very large moths (wingspan 70-100 mm; 3-4 in) with variable patterned forewings and striking yellow or orange hindwings and abdomen. Eight species are present in the New World, although none are established in the U.S. Two species, *E. apta* and *E. serpentifera*, occasionally stray into the U.S.: *E. apta* has been recorded from Arizona, Florida, Missouri, New Mexico, North Carolina, Louisiana, Oklahoma, Texas, Vermont, and Wisconsin; *E. serpentifera* has been recorded from Louisiana and Colorado. A few other noctuids have bright yellow hindwings (e.g. *Noctua pronuba* and some *Catocala*) but these species are much smaller than *E. phalonia* and they do not have long upturned labial palpi or the apex of the forewing is not pointed.

The taxonomy of *Eudocima* is confusing and species are often misidentified (especially photos on the Internet, but also in published literature). Forewing patterns are variable for many species, contributing to misidentifications. Vernon Brou and Alberto Zilli are preparing a worldwide revision of the genus that includes several new species. Any species-level identification of *Eudocima* should be confirmed by an expert.

Fig. 2: Spread male *E. phalonia* adult. Note bright yellow/orange hindwings.

Because no synthetic pheromone is currently unavailable for *E. phalonia*, this aid is designed to assist in the detection of suspect adults through visual surveys in orchards. Guidelines for visual surveys along with photographs of *E. phalonia* adults are included here under Level 1 Screening (Page 2). If a suspect *E. phalonia* adult is found, capture it and submit it to your regional domestic identifier along with the name and location of any associated host. Report any species of *Eudocima* encountered, even if it does not appear to be *E. phalonia*.

Visual Survey Method for *E. phalonia* in Fruit Orchards

[The following inspection method is modified from the USDA-APHIS-PPQ-CPHST Citrus Commodity Survey Guidelines]

Inspect the fruit by flashlight after sundown a few weeks before harvest and look for:

1) Large, red-glowing eyes of adult moths (easily seen)
2) Check trees or fallen fruit on the ground in the two outer rows of an orchard, particularly on the leeward side
3) Most damage occurs in the peripheral rows of trees
4) Moths are most active in the first few hours of the night
5) Focus on areas where the larval hosts (vines in the Menispermaceae or *Erythrina* spp.) are present; larvae of *Eudocima* are also unmistakable (Fig. 6).

Eudocima adults usually rest with their forewings folded above their bodies, concealling their bright yellow or orange hindwings. Their large size and unique wing pattern easily distinguishes them from all other genera of North American Lepidoptera. The photos of live resting adults in Fig. 3 illustrate how an individual might appear during a visual survey.

Fig. 3: Live *Eudocima* adults; a-b: *E. phalonia* in Taiwan (Photo by Sipher Wu, Flickr); c: *E. phalonia* in Malaysia (Photo by Alexey, Flickr); d: *E. phalonia* (Photo by Logan Lai, Flickr); e: *E. tyrannus* in Taiwan (Photo by Sipher Wu, Flickr).

Fig. 4: *Eudocima phalonia* spread adults. Images are ACTUAL SIZE (wingspan = 70-100 mm).

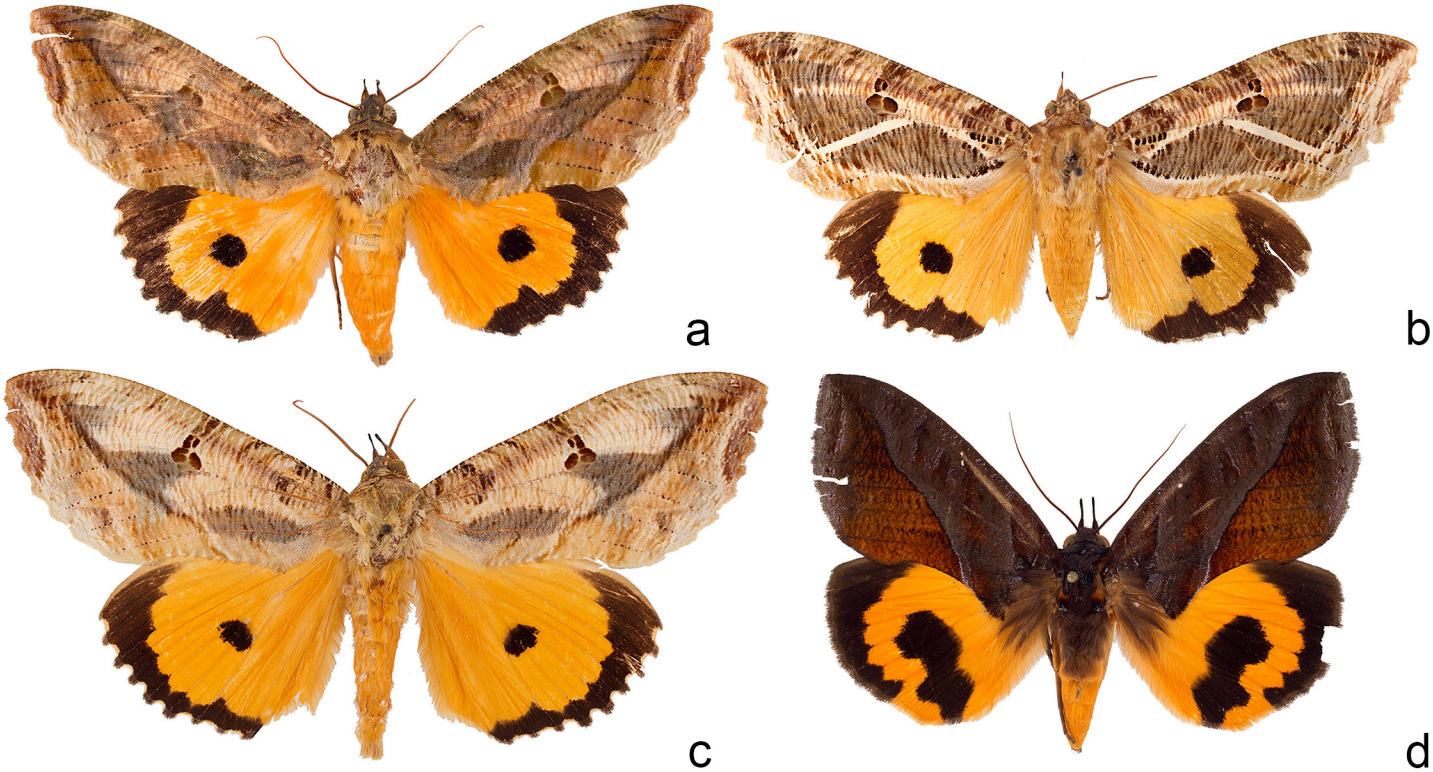

Fig. 5: Other species of *Eudocima*; a: *E. apta* male from Texas; b: *E. apta* female from Florida; c: *E. materna* female from Malawi (*E. materna* is the counterpart of *E. apta* in the Old World); d: *E. colubra* from Panama. Images are ACTUAL SIZE (wingspan = 70-100 mm).

Fig. 6: Larva of *Eudocima tyrannus*; larvae of *E. phalonia* are similar (Photo by Almandine).

Citation

Gilligan, T. M. and S. C. Passoa. 2016. Screening aid: Fruit piercing moth, *Eudocima phalonia* (Linnaeus). Identification Technology Program (ITP), USDA-APHIS-PPQ-S&T, Fort Collins, CO. 4 pp.

References for more information on *Eudocima*

Brou, V. A. 1994. New records of two fruit-piercing moths encountered in Louisiana and other southern states. Southern Lepidopterists' News 16: 39-40.

Brou, V. A. 2006. A new US record for the tropical fruit-piercing moth *Eudocima serpentifera* (Walker, [1858]). Southern Lepidopterists' News 28: 105-108.

Brou, V. A., A. R. Giese and D. H. Miller. 2013. A new U.S. state record for tropical fruit-piercing moth in the family Erebidae Leach. Southern Lepidopterists' News 35: 27-28.

Comstock, J. A. 1963. A fruit-piercing moth of Samoa and the South Pacific Islands. Canadian Entomologist 95: 218-222.

Davis, E. E., S. French and R. C. Venette. 2005. Mini risk assessment, fruit piercing moth: *Eudocima fullonia* Green (Lepidoptera: Noctuidae). University of Minnesota/USDA Forest Service, St. Paul, MN. 43 pp.

Pague, C. and V. A. Brou. 2013. The second confirmed record of *Eudocima serpentifera* (Walker, [1858]) (Lepidoptera: Erebidae) in the United States. Southern Lepidopterists' News 35: 179.

Reddy, G. V. P., Z. T. Cruz, J. Bamba and R. Muniappan. 2005. Host adaptation of the fruit piercing moth, *Eudocima fullonia*. Physiological Entomology 30: 398-401.

Zilli, A. and W. Hogenes. 2002. An annotated list of the fruit piercing moth genus *Eudocima* Billberg, 1820 (sensu Poole) with descriptions of four new species (Lepidoptera: Noctuidae: Catocalinae). Quadrifina 5:
153-207.

Acknowledgments

We would like to thank Joel Floyd and USDA-APHIS-PPQ National Identification Services for support of this work. Funding for this project was provided to T. M. Gilligan through section 10201 of the 2008 Farm Bill. Terrence Walters (USDA-APHIS-PPQ-S&T ITP) provided grant supervision and access to imaging equipment. Special thanks to Vernon Brou for providing additional information and correcting several identification errors in an earlier version of this document.