

# ***Tomicus* Bark Beetles: A Key for Separating Program Species *piniperda* from European Exotics *destruens* and *minor***

This key pertains to three species of *Tomicus*, all of European origin. One of them, *T. piniperda* (L.), successfully established in the U.S. and was first detected in Ohio in 1992. It is commonly known as the pine shoot beetle. As of 2009, the National Agricultural Pest Information System indicates that this pest has been found in at least 17 states in the Northeast and Midwest.

The other two species, *T. destruens* (Wollaston) and *T. minor* (Hartig), are distributed in different parts of Europe. *Tomicus destruens* was for many years thought to be a subspecies or ecotype of *T. piniperda*. Geographic distributions of the two overlapped in several areas of Europe. Both seemed to attack various kinds of pine trees and effect the same type of damage. Then, after Wood and Bright (1992) listed it as a separate species, several authors (Gallego and Galián 2001; Kerdelhué *et al.* 2002; Kohlmayr *et al.* 2002) successfully demonstrated via genetic polymerase chain reaction studies and behavioral and morphological studies that *piniperda* and *destruens* are distinct species.

CAPS survey specialists and identifiers need to be able to distinguish all of these species from each other. In certain states where it is already established, *T. piniperda* will be ‘background static’, so to speak, unless it is detected in a previously uninfested county. In those states, specialists will need to be able to distinguish *T. piniperda* from the other two exotics. In states where none of the species exist, specialists will need to separate specimens of *Tomicus* from those of other scolytid genera before sending them forward for more specific identification.

To accomplish initial separation of *Tomicus* from other scolytids, including *Ips*, *Orthotomicus*, *Scolytus*, and *Xyleborus*, and to separate among species of *Tomicus*, the following reference materials are recommended as an interfacing group:

- Passoa, S. and J. Cavey. 1993. Key to help screen *Tomicus piniperda* (L.) from other North American Scolytidae (Coleoptera). USDA, APHIS, PPQ. NA-TP-06-93. 5 pp.
- Brodel, C. 2000. Distinguishing *Tomicus minor* from *T. piniperda*. USDA, APHIS, PPQ. 1 p.
- Brodel, C. 2009. *Tomicus* bark beetles: a key for separating program species *piniperda* from European exotics *destruens* and *minor*. USDA, APHIS, PPQ. 4 pp.

## **Good Lighting Technique Required**

To adequately view antennal setae referred to by Brodel (2009), one must have a lateral view of the antennal club. Direct light from one gooseneck lamp at the tip of the antenna, but in a plane just above the tip. Another gooseneck lamp should be held above the plane of the antenna, with its light shining parallel to the length dimension of the antennal club, but in the opposite direction of the first gooseneck. This orientation of lights relative to the antenna will, figuratively, make each seta “glow” and thus stand out from the background color of the antennal cuticle, even if that color is light yellowish or reddish brown. Using this technique, one will notice that, in *piniperda*, the area between sutures 2 and 3 looks very similar at first glance to the shiny areas

between the base of the club and suture 1 and between sutures 1 and 2. In contrast, with *destruens*, the area between sutures 2 and 3 seems to be covered with setae, whereas segments 1 and 2 appear mostly shiny with sparse setae.

## **Bibliography**

- Brodel, C. 2000. Distinguishing between *Tomicus minor* and *T. piniperda*. USDA, APHIS, PPQ. 1 pg.
- Brodel, C. 2009. *Tomicus* bark beetles: a key for separating program species *piniperda* from European exotics *destruens* and *minor*. USDA-APHIS-PPQ. 4 pp.
- Gallego, G. and J. Galián. 2001. The internal transcribed spacers (ITS1 and ITS2) of the rDNA differentiate (sic) the bark beetle forest pests *Tomicus destruens* and *T. piniperda*. *Insect Molecular Biology* 10: 415-420.
- Kerdelhué, C., G.Roux-Morabito, J. Forichon, J. Chambon, A. Robert, and F. Lieutier. 2002. Population genetic structure of *Tomicus piniperda* L. (Curculionidae: Scolytinae) on different pine species and validation of *T. destruens* (Woll.). *Molecular Ecology* 11: 483-495.
- Kohlmayr, B., M. Riegler, R. Wegensteiner, and C. Stauffer. 2002. Morphological and genetic identification of the three pine pests of the genus *Tomicus* (Coleoptera, Scolytidae) in Europe. *Agricultural and Forest Entomology* 4: 151-157.
- Passoa, S. and J. Cavey. 1993. Key to help screen *Tomicus piniperda* (L.) from other North American Scolytidae (Coleoptera). USDA, APHIS, PPQ. NA-TP-06-93.
- Wood, S. L. and D. E. Bright, Jr. 1992. A catalog of Scolytidae and Platypodidae (Coleoptera), Part 2: Taxonomic index. Vol. A. Great Basin Naturalist Memoirs, no. 13. Brigham Young University, Provo, Utah. 833 pp.

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Use the key by Passoa and Cavey (1993) up to couplet 5 and then transfer to this key. Their key and couplets a through c in this key enable one to separate specimens of *Tomicus*, both program species *piniperda* and invasive European species, from other scolytid beetles likely to be intercepted in domestic traps. These include *Orthotomicus*, *Ips*, *Scolytus*, and *Xyleborus*. If a specimen keys to *Tomicus*, then proceed to couplet 1 of the key below. Couplet 1 refers to figures in Passoa and Cavey and the job aid “Distinguishing *Tomicus minor* from *T. piniperda*” by Brodel (2000).

- a. Couplet 5 not reached ..... not *Tomicus*
- a'. Couplet 5 reached ..... b
  
- b. Scutellum not visible and/or scales or scale-like setae present ..... not *Tomicus*
- b'. Scutellum visible and no scales or scale-like setae present ..... c
  
- c. Elytral declivity with setae not arranged in rows .....  
 ..... *Tomicus puellus* OR not *Tomicus*  
 [NOTE: *T. brevipilosus* (Eggers), *T. puellus* (Reitter), and *T. pilifer* (Spessivtsev) are Asian species]
- c'. Elytral declivity with setae arranged in rows from base to apex ..... *Tomicus* 1

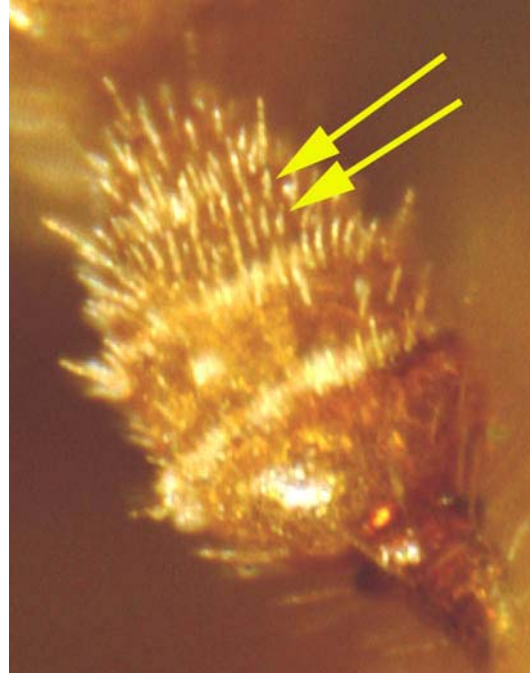
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- 1. Second row of setae from elytral suture continues uninterrupted to apex of elytral declivity (NOTE: 5-10% of *T. piniperda* females have a more continuous, but not necessarily complete, second row of setae-- S. L. Wood); antennal club with very few, scattered setae between sutures 2 and 3 ..... *T. minor* (Hartig)
- 1'. Second row of setae from elytral suture absent or sparse on elytral declivity (see Figs. 6 and 7 in key by Passoa and Cavey and drawing of *T. piniperda* in job aid by Brodel); antennal club with more numerous setae between sutures 2 and 3 (Figs. 1 and 2) ..... 2
  
- 2. Antennal club with one row of setae, usually in a zigzag line, between the second and third sutures (Fig. 1) (NOTE: this line might sometimes be straight and be seen to originate

- near the 2<sup>nd</sup> suture); density of setae on antennal segment 3 appearing about the same as on segments 1 and 2 (Fig.1)..... *T. piniperda* (L.)
- 2'. Antennal club with three rather indistinct rows of setae, sometimes seen as two, between the second and third sutures (Fig. 2); density of setae on segment 3 appearing much greater than on segments 1 and 2 (Fig. 2) ..... *T. destruens* (Wollaston)



**Fig. 1.** *T. piniperda*: antennal club with one row of setae (arrow), usually in a zigzag line, between the 2<sup>nd</sup> and 3<sup>rd</sup> sutures



**Fig. 2.** *T. destruens*: antennal club with two or three rows of setae (arrows) between the 2<sup>nd</sup> and 3<sup>rd</sup> sutures