Department for Environment Food & Rural Affairs

Plant Pest Factsheet

Pine tortoise scale

Toumeyella parvicornis

Figure 1. Pine tortoise scale *Toumeyella parvicornis* adult females on Virginia pine *Pinus virginiana*, U.S.A. © Lacy Hyche, Auburn University, Bugwood.org

Background

Pine tortoise scale *Toumeyella parvicornis* (Cockerell) (Hemiptera: Coccidae) is a Nearctic pest of pine reported from Europe in Italy for the first time in 2015. It is contributing to the decline and mortality of stone pine (*Pinus pinea*) in and around Naples, Campania region, particularly in urban areas. In North America it is a sporadic pest of pine around the Great Lakes and as far north as Canada. It is a highly invasive pest in the Caribbean, where in the last decade it has decimated the native Caicos pine (*Pinus caribaea* var. *bahamensis*) forests in the Turks and Caicos Islands (a UK Overseas Territory), causing 95% tree mortality and changing the ecology in large areas of the islands.

Figure 2. *Toumeyella parvicornis* immatures on *Pinus pinea* needles, Italy © C. Malumphy

Figure 3. *Toumeyella parvicornis* teneral adult females, U.S.A. © Albert Mayfield, USDA Forest Service, Bugwood.org

Figure 4. *Toumeyella parvicornis* teneral adult female covered in a dry powdery wax, Italy © C. Malumphy

Figure 5. *Toumeyella parvicornis* male wax tests (protective covers), Italy © C. Malumphy

Figure 6. Bark-feeding adult female *Toumeyella parvicornis* are globular, the small orange dots are first instars; on *Pinus sylvestris*, U.S.A. © Jill O'Donnell, MSU Extension, Bugwood.org

Figure 7. Needle-feeding adult female *Toumeyella parvicornis* are elongate-oval and moderately convex; on *Pinus caribaea*, Turks and Caicos Islands © C. Malumphy

Figure 8. *Pinus pinea* bark covered in sooty mould growing on honeydew excreted by *Toumeyella parvicornis*, Italy © C. Malumphy

Figure 9. Objects below pine trees infested with *Toumeyella parvicornis* become black with sooty mould growing on honeydew, Italy © C. Malumphy

Figure 10. *Pinus pinea* infested with *Toumeyella parvicornis* showing needle loss, Italy © C. Malumphy

Figure 11. *Pinus pinea* infested with *Toumeyella parvicornis* showing severe needle loss, flagging and decline, Italy © C. Malumphy

Figure 12. New growth of *Pinus caribaea* is white due to a conspicuous covering of wax secreted by *Toumeyella parvicornis*, Turks and Caicos Islands © C. Malumphy

Figure 13. New growth of *Pinus caribaea* infested with *Toumeyella parvicornis* appears to be covered in snow, Turks and Caicos Islands © C. Malumphy

Geographical Distribution

Toumeyella parvicornis is native to the Nearctic region, occurring from Mexico, throughout the United States except the north-west, and into south-central Canada. It has recently been introduced to Puerto Rico, Turks and Caicos Islands and Italy.

Host Plants

Toumeyella parvicornis feeds exclusively on *Pinus* species (Pinaceae) including: jack pine, *P. banksiana*; lodgepole pine, *P. contorta*; shortleaf pine, *P. echinata*; slash pine, *P. elliotti*; spruce pine, *P. glabra*; mugo pine, *P. mugo*; longleaf pine, *P. palustris*; stone pine, *P. pinea*; Scots pine, *P. sylvestris*; loblolly pine, *P. taeda*; and Virginia pine, *P. virginiana*.

It is not yet known how susceptible Scots pine is to *T. parvicornis* and it is interesting to note that *T. parvicornis* was not recorded on *P. pinea* until it was introduced to Italy.

Description

Toumeyella parvicornis eggs are ovoid, pinkish, almost transparent, and about 0.4 mm long. First-instar nymphs, commonly called crawlers, are oval, orange or reddish and have six legs (Fig. 6). Older nymphs are pinkish, legless, oval and convex (Fig. 2). Adult females occur in two distinct forms being oval and strongly convex in shape when feeding on the bark (Fig. 6), or elongate and moderately convex when on the needles (Fig. 7). They are initially greenish (Fig. 3), becoming reddish-brown with cream or dark brown speckles or stripes (Fig. 1), and they may secrete large quantities of white powdery wax (Fig. 4). This wax quickly disappears with wind and rain. Mature females are a uniform dark brown (Figs 6-7). At times the adult females overlap each other on the twigs or needles. They attain a maximum length of 4.4 mm and width of 4 mm. The male wax tests (protective covers) are oval, white, translucent, and about 3.0 mm long (Fig. 5). Adult males are winged and resemble small flies but are rarely seen.

Biology

Toumeyella parvicornis is highly adaptable with the number of generations varying according to abiotic conditions; it has one generation per year in the northern limit of its range in Canada and North East U.S.A., three or four generations in southern U.S.A., and breeds continuously under the tropical conditions in the Caribbean with five or more generations each year. It is sexually reproductive and each adult female lays about 500 eggs, which are protected under the female body. Females have three immature stages prior to becoming adults, while males have four immature stages (including a pre-pupa and pupa).

Dispersal and Detection

The main natural dispersal stage is the first nymphal-instar, often referred to as the ‘crawler’. Crawlers wander over the host in search of a suitable feeding site and once they

have inserted their mouthparts the females are largely sessile. Adult males are winged and fly in search of a mate, but cannot establish new populations. Natural dispersal over longer distances is primarily by wind (recently demonstrated in the Turks and Caicos Islands using sticky traps) and phoresy (being carried on other animals). International spread is most likely to occur in plant trade. The pathway of introduction to the Turks and Caicos Islands is suspected to be with the import of infested Christmas trees, whereas the pathway of introduction to Italy is unknown.

In Italy the first signs of an infestation of *T. parvicornis* may be seen in early spring when the first generation starts to feed. The scales excrete enormous quantities of honeydew which can give the pine tree a shiny appearance, particularly on the bark. Thick black sooty moulds develop on the honeydew turning the bark and needles black (Fig. 8). The ground and objects below the infestation can also turn black (Fig. 9). New growth may turn white due to large quantities of wax secreted by the young females (Figs 12-13) although this was quickly disappears with wind and rain. There is yellowing, needle loss, and flagging (die back) (Figs 10-11). There can be a general decline in the health of the tree and eventually susceptible trees may be killed.

Surveying and monitoring for the scale can be very difficult on mature *P. pinea* due to the height of the trees (often 15-20m) and there are no branches or needles available for inspection at the base of the tree. Therefore a cherry-picker is essential to monitor the pest and to take samples.

Toumeyella parvicornis can easily be confused in the field with related species, such as striped pine scale *Toumeyella pini* (King), a Nearctic pest of pine that has a similar biology to *T. parvicornis*, and has recently been introduced to the Bahamas.

Economic Impact

Toumeyella parvicornis periodically causes mortality of seedlings and saplings of hard pines and severe damage to pole stands in North America. Feeding by the nymphs and adult females causes needle loss and branches to die. Heavily attacked trees turn yellow and finally die. The honeydew excreted by the scale insects and associated sooty moulds hinders photosynthesis and contributes to tree weakening.

Toumeyella parvicornis rapidly killed pine trees in the Turks and Caicos Islands and devastated the pine forests, causing expiration of the pine in many areas. The tropical climate allowed the scales to breed continuously throughout the year and there was a lack of natural enemies. The pines appear to have been environmentally stressed, largely due to insufficient water, and were, therefore, more vulnerable and less resilient to an introduced exotic pest. It is highly unlikely that *T. parvicornis* will have a similar dramatic impact to the pine forests in Europe due to less favourable climatic conditions for the scale insect and the forests are likely to be more resilient.

Figure 13. Heathly *Pinus caribaea* forest in the Bahamas © C. Malumphy

Figure 14. Dead and dying *Pinus caribaea* trees in the Turks and Caicos Islands due to a massive infestation of *Toumeyella parvicornis* © Dr Martin Hamilton, Research Leader (UKOTs), The Herbarium, Kew

Advisory Information

Suspected outbreaks of *Toumeyella parvicornis* or any other non-native plant pest should be reported to the relevant authority:

For **England and Wales**, if pest is suspected at a nursery please contact your local **APHA Plant Health and Seeds Inspector** or the **PHSI Headquarters**, Sand Hutton, York. Tel: 01904 405138, Email: planthealth.info@apha.gsi.gov.uk. If suspected elsewhere, please report the finding on Tree Alert (www.forestry.gov.uk/treealert).

For **Scotland**, if pest is suspected at a nursery please contact the **Scottish Government's Horticulture and Marketing Unit:** Email: hort.marketing@gov.scot. If suspected elsewhere, please report the finding on Tree Alert (www.forestry.gov.uk/treealert).

For **Northern Ireland**, contact the **DAERA Plant Health Inspection Branch:**
Tel: 0300 200 7847 Email: planthealth@daera-ni.gov.uk

For additional information on UK Plant Health please see:
https://secure.fera.defra.gov.uk/phiw/riskRegister/
https://www.gov.uk/plant-health-controls
http://www.gov.scot/Topics/farmingrural/Agriculture/plant/PlantHealth/PlantDiseases
https://www.daera-ni.gov.uk

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Date: November 2016
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