Toumeyella parvicornis **System:** Terrestrial

Kingdom	Phylum	Class	Order	Family
Animalia	Arthropoda	Insecta	Hemiptera	Coccidae

Common name cochenille-tortue du pin (French), Pine tortoise scale (English)

Synonym *Toumeyella numismaticum*

Similar species

Summary The Pine tortoise scale, *Toumeyella parvicornis* native to Eastern United States and Southern Canda, was reported for the first time on Middle Caicos, Turks and Caicos islands in 2005 infesting the endemic, Pinus caribaea var. bahamensis. The scale infestation causes a reduction in the vigour of the trees and curtails seed production. It also causes dieback and often leads to mortality of the pine trees. *T. parvicornis* has since caused major declines in numbers of its host species with reports of between 90-95% loss.

view this species on IUCN Red List

Species Description
The covers of a mature female *Toumeyella parvicornis* are 1/4 inch long, hemispherical and dark brown to black with light brown to cream coloured mottling. Males are typically small and inconspicuous. *T. parvicornis* has one generation and overwinters as immatures on twigs. Crawlers usually hatch the last two weeks of June (Malinoski & Clements, 2003). *T. parvicornis* is preyed upon by the lady beetle (*Hyperaspis binotata*) (Bishop & Bristow, 2003). *T. parvicornis* can easily be distinguished from all other species of *Toumeyella* by its dorsal bilocular pore aggregations (Williams & Kondo, 2009).
Please follow this link *T. parvircornis* images.

Lifecycle Stages
Toumeyella parvicornis has an altered lifecycle when comparing its habitance in either temperate or tropical biotas. In temperate regions there are distinct seasons with cold winters which leads to the adult females to hibernate inside the bark of its host, which allows for only one generation per year. However in tropical regions where it is warmer all year round, the adult female is active all year creating several generations per year (Sanchez, 2008). Typical lifecycle east of the Rockies: Adults (Jan-June) -> Eggs (June) -> Crawlers (June-July) -> Nymphs (July) -> Adults (Sanchez, 2008).

Habitat Description
Toumeyella parvicornis was first reported in the 1920's in the state of Wisconsin, United States (Natural Resources Canada, 2005). Its native range consists of the Eastern United States and Southern Canda, where it is found on Scots Pine (*Pinus sylvestris*), Jack Pine (*P. banksiana*), Austrian Pine (*P. nigra*) and Red Pine (*P. resinosa*) trees (Sanchez, 2008). It also been reported to be found on Virginia pine (*P. virginiana*), Swiss mountain pine, white loblolly pine, shortleaf pine (*P. echinata*), slash pine (*P. elliottii*) and Chinese pines (Malinoski & Clements, 2003). In Jack Pine forests of Central Michigan, United States, *T. parvicornis* is found almost exclusively in areas where Mouldy Ant (*Formica exsectoides*) is present (Bishop & Bristow, 2003). On the Turks and Caicos Islands (which are part of the United Kingdom Overseas Territories) *T. parvicornis* has been discovered on *P. caribaea* var. *bahamensis* which an endemic species to the Bahamas Archipelago (Hamilton, 2007).

General Impacts
Toumeyella parvicornis has been found to reduce the vigour of *Pinus caribaea* var. *bahamensis*, cause dieback, reduce seed production, and often lead to mortality of the tree. *T. parvicornis* also secretes a sugary honeydew which encourages growth of a sooty mould which now covers most of the understory in the *P. caribaea* var. *bahamensis* pineyards of The Turks and Caicos Islands and inhibits their growth.
The introduction of *T. parvicornis* has seen a 90% mortaility rate of *P. caribaea* var. *bahamensis* on the Turks and Caicos Islands (Hamilton, 2007; KEW, 2010). This amount of deceased dry material also increases the likelihood of forest fires within the pineyards, causing not only damage to Pine populations but surrounding populations also (Hamilton, 2007). These effects coupled with proposed sea-level rise are likely to have detrimental impacts on *P. caribaea* var. *bahamensis* (Ross *et al*, 2009). *P. caribaea* var. *bahamensis* is now currently threaten within its home range, which is not only detrimental ecologically but also culturally as it is considered the national tree of the Turks and Caicos Islands (Hamilton, 2007).
Current data from the Pine Recovery Project has shown that all areas on The Caicos Islands with live trees have scale insect, with an average infestation of 3 (5 being completely infested) and an average canopy decline of 3-4 (5 being completely dead). An average of 44-50% of the 140 plots sampled by the project had no seedlings present and an average of 50% of the trees within the plots were dead. (Sanchez, 2008).

Management Info
Physical: To monitor for *Toumeyella parvicornis*, it is suggested to look for ants (seeking honeydew), honeydew, and sooty mold near branch terminals. In the spring the large female *T. parvicornis* are found at the base of needles on twigs (Bishop & Bristow, 2003).
Fire is also being explored as a tool for management, potentially extinguishing Pine Scale numbers, whilst encouraging new *P. caribaea* var. *bahamensis* growth (KEW Community Poster, 2010).
Chemical: Dormant oil sprays are effective in reducing overwintering populations. Summer rate of horticultural oil or insecticidal soap sprays may be used in late June to kill crawlers. If infestations are very heavy, a contact insecticide may be used in April to mid May (Malinoski & Clements, 2003). Work by Smirnoff and Valero (1975) showed that pines treated with urea N fertilizer increased total pine tortoise scale populations, whereas potassium treated plots decreased infestations from 42% to 21% (as seen in Scheffer & Williams, 1987) Scheffer & Williams (1987) also mention that the use of insecticides has the potential to increase scale populations due to the reduction of predators, reduction of intraspecific competition for food and increased plant growth leading to increased nutritional value of the host plant.
Biological: Within the *P. caribaea* var. *bahamensis* nursery, work is also being conducted to propagate individuals immune to the Pine Scale threat (KEW Connections, 2010).
Integrated management: On the Turks and Caicos Islands government services (TCI, Royal Botanic Gardens Kew, US Forest Service, Department of Environment and Coastal Resources) and non-government organizations (Turks and Caicos National Trust, TNC) are working together on creation of nurseries, the mapping and monitoring of the *T. parvicornis* infestation and developing an international pine scale working group, the TCI Pine Recovery Project has been established to deal with preventing and managing the spread and impacts of pine scale (KEW, 2010; Salamanca *et al*, 2010). Nurseries and seed collection of *P. caribaea* var. *bahamensis* are intended to establish sources in case there's desecration of natural populations due to *T. parvicornis* infestation (Hamilton, 2007). Cultural: Public awareness campaigns using posters and other tools have been initiated in an effort to raise public knowledge of the problem amonsgt the general public and in schools.

Principal source:

Compiler: IUCN SSC Invasive Species Specialist Group (ISSG) with support from the Overseas Territories Environmental Programme (OTEP) project XOT603, a joint project with the Cayman Islands Government - Department of Environment

Review:

Pubblication date: 2010-06-02

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[4] TURKS AND CAICOS ISLANDS

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Summary: This compilation of information sources can be sorted on keywords for example: Baits & Lures, Non Target Species, Eradication, Monitoring, Risk Assessment, Weeds, Herbicides etc. This compilation is at present in Excel format, this will be web-enabled as a searchable database shortly. This version of the database has been developed by the IUCN SSC ISSG as part of an Overseas Territories Environmental Programme funded project XOT603 in partnership with the Cayman Islands Government - Department of Environment. The compilation is a work under progress, the ISSG will manage, maintain and enhance the database with current and newly published information, reports, journal articles etc.

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