Oracella acuta **System:** Terrestrial

Kingdom	Phylum	Class	Order	Family
Animalia	Arthropoda	Insecta	Hemiptera	Pseudococcidae

Common name pine mealybug (English), loblolly pine mealybug (English)

Synonym *Pseudococcus acuta* , Lobdell, 1930
Pseudococcus acutus , Lobdell, 1930

Similar species

Summary Mealybugs like Oracella acuta are generally small, cryptic creatures that cause major problems in agricultural and ornamental ecosystems. They are notorious invaders of new territories, with populations developing rapidly when there is more than one generation per year.

view this species on IUCN Red List

Notes
Oracella acuta is the only pine-infesting mealybug known to produce “resin cells” that cover the females. These characteristic cells are attached to twigs near the needle base. They protect the females from attacks by predators and shield them from insecticide treatments (Sun *et al*. 1996).

Lifecycle Stages
In March (the southeastern Unites States), when new shoots expand, *Oracella acuta* crawlers feed on new growth. Shoot tips just below the terminal bud are the preferred feeding site, but some crawlers settle at the inner base of the needle fascicles. Females, about 2 to 3 millimetres long, secrete a whitish resinous material used to construct the resin cells. Egg production inside these cells begins in mid-April. Crawlers hatch after a few days. Males of the overwintering (first) generation are usually wingless, whereas males of subsequent generations have wings. All females are wingless. Thus, most natural dispersal is via wind-blown crawlers (Sun *et al*. 1996).

Habitat Description
Mealybugs are widely distributed throughout the world with the exception of the cold extremes of the Arctic and Antarctic (Miller 2005). Female *Oracella acuta* can tolerate up to 22 hours of high temperatures (40 degrees C) and may live for 6 days without feeding (Pang and Tang 1994, in Sun *et al*. 1996). *O. acuta* occurs in Maryland, which has a minimum temperature of -20°C; such low-temperature tolerance suggests dispersal is possible even further north in China (Sun *et al*. 1996).

Reproduction
Oracella acuta may produce up to four or five generations per year in loblolly pine seed orchards (Clarke *et al*. I990a, in Sun *et al*. 1996). Each first-generation female lays an average of 182 eggs (Sun *et al*. 1996). Second-generation females lay an average of 113 eggs; the hatch rate is 90% (Sun *et al*. 1996).

Nutrition
Mealybugs are phytophagous, feeding by sucking plant juices through a set of stylets. Individual species infest one or more or leaves, fruit, branches, main stems, trunks, or roots (Miller 2005). Loblolly pine (*Pinus taeda*) is the mealybug's primary host in the United States; *O. acuta* also occurs on slash pine (*P. elliottii*), longleaf pine (see *Pinus palustris* in IUCN Red List of Threatened Species), Virginia pine (*P. virginiana*), and shortleaf pine (*P. echinata*) (Johnson and Lyon 1988, Clarke *et al*. 1992, in Sun *et al*. 1996).

General Impacts
In the United States, where they are native, the mealybug *Oracella acuta* only infest new shoots and cones (Ciesla 1995). In China, in contrast, adults and crawlers completely cover needles and shoots on infested branches in China. Feeding at the base of old needles causes copious resin flow, and the needles turn brown and drop off. Loss of old needles can reach 70 to 80% on severely infested trees (Xu *et al*. 1992, Pan *et al*. 1994, in Sun *et al*. 1996). Damage may cause tree deformity, growth loss and reducation of seed production (Ciesla 1995). Mealybugs also produce copious amounts of honey-dew, a nutrient-rich excretion that promotes fungal growth and induces sooty mold infestations on trees (Sun *et al*. 1996). This rapid growth of a thick layer of sooty mold on both shoots and needles severely reduces photosynthesis (Sun *et al*. 1996). Su *et al*. (1995) (in Sun *et al*. 1996) reported that infested slash pines exhibited a reduction of 38% in photosynthesis, 25% in shoot growth, and 24% in tree height growth over a three-year period. Slash pines of all ages are infested by the mealybug, but the most severe damage occurs in high-density, 7 to I0 year-old plantations (Sun *et al*. 1996). Severely weakened trees are susceptible to attacks by other native insects, such as the Masson pine caterpillar (*Dendrolimus punctatus*) and pine bast scale (*Matsucoccus matsumurae*) (McClure *et al*. 1983, in Sun *et al*. 1996).

Management Info
Preventative measures: Preventing accidental introduction is the first line of defense in managing exotic pests. Two lines of action can be taken; inspection of incoming logs, wood products and plant materials and internal quarantines.
Countries with extensive plantations of exotic trees and those which import large volumes of wood or plant products are especially susceptible to introduction and establishment of undesirable exotic insects. Risk of new introductions can be minimised through management of imported materials by: a) Inspection of incoming materials at international ports of entry; b) Restrictions on imports from high risk areas; c) Proper treatment of infested plant materials and wood products; d) When new trade routes for forest products or plant materials are planned, analysis of the risk of introduction of potentially damaging pests should be conducted. Such an analysis was conducted by USDA when several timber companies in the United States expressed an interest in importing logs from Siberia and the Russian Far East (USDA 1991).
In 2002, United Nation FAO's (Food and Agriculture Organization) Interim Commission on Phytosanitary Measures imposed a global standard for treating wood packaging International Standard for Phytosanitary Measures No. 15 to stop the spread of invasives.
Chemical: Of eleven insecticides screened, the most effective were diesel oil and pine resin emulsions containing Rotenone and deltamethrine (Pan *et al*. 1994, in Sun *et al*. 1996). Insecticides may be sprayed, injected, or applied as aerosols.
Biological: Each year, natural enemies are introduced to control about 40 pest insects worldwide. The average success rate is 15%, and it is 60% for the control of scale insects or mealybugs (Pu 1987, in Sun *et al*. 1996). This indicates mealybugs may be more amenable to classical biological control than other pests. Three primary endoparasitoids of *O. acuta* have been identified: *Zarhopalus debarri* Sun (Encyrtidae), *Acerophagus coccois* E. Smith (Encyrtidae), and one in the genus *Allotropa* (Clarke *et al*. 1990 1992, Sun *et al*. 1998, in Masner *et al*. 2004).

Pathway
International transport and transfer of *Oracella acuta* has occured *via* movement of pine scion material (Debarr 1992, in Ciesla 1995). In order to minimise the risk of new pest introductions, it is necessary to inspect incoming logs, wood products and plant materials, as well as wooden cargo crates, pallets, and scrap lumber (Ciesla 1995).

Principal source:

Compiler: IUCN/SSC Invasive Species Specialist Group (ISSG) with support from the Forestry Division (Council Of Agriculture) Taiwan

Review: Expert review underway

Pubblication date: 2007-10-01

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[2] CHINA

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