

Is Australian pine, *Casuarina* spp. a good candidate for biological control in Florida?

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Australian pines invade coastlines where they interfere with endangered sea turtle and crocodile nesting



The problem: Australian pine or *Casuarina* spp. constitutes one of the major environmental threats to the biodiversity of South Florida coastal areas. In Florida, the infested area includes 30 state parks, over 50,000 ha in ENP, and over 160,000 ha state-wide. On the Gulf coast about 33% of the remaining natural coastline or about 20 miles are heavily invaded by Australian pine. On the Atlantic coast from Indian river to Dade Counties 46% of the undeveloped barrier island coastline is heavily infested.

A primary reason Australian pines form dense stands and invade natural areas of Florida is the lack of natural enemies that maintain plant populations in balance. Few natural enemies of Australian pine have been found in Florida, whereas several hundred are known from Australia.

Spittlebug in Florida



Australian pines constitute urban dangers



Control is problematic as plants regenerate from cut or treated trees



Australian pines form dense monospecific stands that decrease biodiversity



Potential Australian biological control agents:



Australian pine borer

Australian pine borer



Australian defoliating chrysomelid beetle



Where is Australian pine from?

Three *Casuarina* species occur in Florida:

- *C. equisetifolia* - occurs along tropical and subtropical coastlines of northern and northeastern Australia. Also, Burma to Vietnam, Malaysia, Melanesia and Polynesia.
- *C. glauca* - occurs along the east coast of Australia in brackish estuaries and streams usually near the coasts
- *C. cunninghamiana* - occurs along the northern and eastern coasts of Australia

(Source: Flora of Australia)



Australian pine is a valued plant in Australia



Australian spittlebug



Australian defoliating caterpillars

The prospects for biological control of *Casuarina* spp. are generally good.

Australian pines:

- are environmental weeds that decrease biodiversity
- promote erosion of beaches
- threaten endangered species such as sea turtles and American crocodile
- are taxonomically isolated from the North American flora, so family-level specialists can be considered
- have many damaging insect species that keep it in balance in Australia

Several conflicts of interest of controlling Australian pine exist as they are valued for:

- Shade
- Fuel
- Windbreaks

Australian pine is a taxonomically isolated group in North America with only distantly related species in our flora. The nearest relatives include:

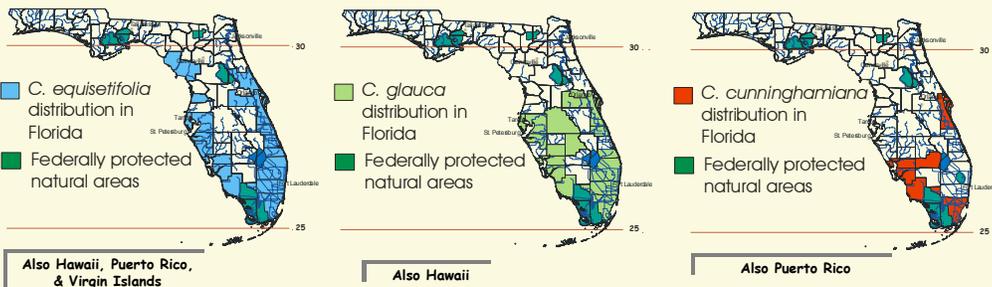
Fagales

- Fagaceae (e.g. beech, chestnut, & oak)
- Juglandaceae (e.g. hickory & pecan)
- Casuarinaceae (*Casuarina* spp.)
- Myricaceae (e.g. bayberry & wax myrtle)
- Betulaceae (e.g. alder, birch, & hornbeam)

For determination of safety of biological control agents, test plants will be drawn from these plant families.

(Sources: Judd et al. 2002; Wunderlin & Hansen 2003)

Where is Australian pine a problem?



Also Hawaii, Puerto Rico, & Virgin Islands

Also Hawaii

Also Puerto Rico

To minimize conflicts of interest we propose to focus on reducing reproduction of Australian pine by introducing insects that feed on fruits, flowers, and seeds.



Australian pine fruit