Using Rainforest Research

Feral Fruit: pond apple infests north Queensland

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Pond apple (*Annona glabra*) is a major environmental weed of north Queensland, affecting mainly wetland ecosystems such as melaleuca and palm swamps, creeks, drains and coastal foreshores. The multi-stemmed trees grow up to 15 metres high forming dense stands that out-compete native species. They also have the alarming ability to grow in areas that have suffered little or no disturbance. Large infestations exist in the Murray, Tully, Johnstone and Russell-Mulgrave catchments, and in the Daintree and Cooktown lowlands. Pond apple is also found right up to the tip of Cape York, and on some Torres Strait Islands. Not surprisingly, pond apple is listed in Australia's top twenty Weeds of National Significance.

Weed wars

Originating from the Tropical Americas and coastal West Africa, pond apple now grows in several tropical countries. It is interesting to note that pond apple is being invaded in its native American habitat by Australian melaleucas – whereas in Australia, the melaleuca communities are being invaded by pond apple.

To formulate and implement an effective management plan, it is vital to know:

- Where the plant does/can grow
- When seeds are produced
- How much seed is produced
- How long the seed remains viable
- How and where the seeds are spread

Rainforest CRC researchers from the Department of Natural Resources and Mines (NR&M), Melissa and Stephen Setter, are conducting ecological studies into pond apple in a collaborative project to address these questions. Information obtained is combined with results of other research into control methods to develop more effective pond apple management options.

How it spreads

Some of the most interesting research to date has been into pond apple dispersal.

Water is the most obvious means of dispersal - both the seeds and fruits float, and apparently remain viable after long periods in fresh or saline water. Although most pond apple is probably spread by water, recent Rainforest CRC research has confirmed that two very different animals also assist in its dispersal.

One of the Wet Tropics most-loved endangered species, the cassowary, is giving this noxious weed a helping hand, as is the area's most notorious animal pest, the feral pig. Field observations and dung collections verified that both animals consume pond apple fruit and pass intact seed in the wild. Cassowary droppings with up to 850 seeds were found, and feral pig dung with up to 290 seeds.

Top: Pond apple grows in wet but not permanently inundated situations. It is often multi-stemmed and may have swollen bases or slightly buttressed roots. Leaves are opposite, 7-12cm long, and many turn yellow in the winter dry season.
Bottom: Pond apple fruit are similar in size and shape to a mango and yellow/orange when ripe, usually between December and March. Each fruit has 100-200 seeds encased in aromatic orange flesh – naked seeds look roughly like pumpkin seeds. Flowers are cream and pink, and not easily seen on the tree.
(photos: NR&M)

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The Rainforest CRC is a research partnership involving the Commonwealth and Queensland State governments, the Wet Tropics Management Authority, the tourism industry, Aboriginal groups, CSIRO, James Cook University, Griffith University and The University of Queensland

Captive feeding studies found that pond apple seeds take up to 28 hours to pass through a cassowary, and up to 72 hours before defecation by a feral pig. According to CSIRO Scientist David Westcott, cassowaries could therefore potentially deposit viable pond apple seed many hundreds of metres, and perhaps several kilometres away from where they ate it. CRC researchers from NR&M, Jim Mitchell and Bill Dorney, have done feral pig movement studies that suggest that these animals could distribute seed up to 10 kilometres from the site of ingestion.

Control considerations

The ability of cassowaries and feral pigs to disperse pond apple has both environmental and management implications. It means that we may find pond apple in areas where we would not expect to if it were solely water-dispersed. This affects the approach to finding and destroying the weed.

The fact that an endangered species is helping to spread a weed poses a multifaceted management problem. In some areas, pond apple is perceived to be an important cassowary food source, and its removal could cause community concern. Although the validity of this concern is unclear at this stage, it certainly requires consideration. In some cases, a pond apple control program may need to include provision of an alternative cassowary food source, perhaps by revegetating with more appropriate food plants. The retention of pond apple as a cassowary food source cannot be recommended as this would lead to further degradation of natural cassowary habitat as the pond apple invasion continues.

Melissa Setter collects feral pig dung containing pond apple seed (photo NR&M)

The Feral Pig *(Sus scrofa)* (photo NRM)

The Cassowary *(casuarina casuarina)*

The role of the feral pig is less complicated, but still requires consideration when developing pest management strategies. As pigs are more widespread than cassowaries, they may be able to distribute seed into more diverse areas.

Moving forward

The research so far has already provided some answers to help land managers make decisions about controlling pond apple. However a few information gaps still need to be filled so that the most efficient and comprehensive management strategies can be developed and put into action. To this end, new research is being planned to investigate pond apple dispersal by water currents, as well as continuing long-term studies such as seed longevity studies. The underlying aim of all of this research is to find answers to questions asked by land mangers trying to deal with the problem of pond apple and other weeds in the Wet Tropics.

For more information

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