Refining melastome dispersal modes in rain forest landscapes

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Summary  Class 1 weeds Miconia calvescens D.C. and Clidemia hirta (L.) D.Don, together with other exotic melastomes, are currently localised threats and are targeted for eradication within the Wet Tropics bioregion of Far North Queensland. Queensland Department of Natural Resources, Mines and Water weed eradication teams are searching for seedlings using a predicted isotropic dispersal model developed by CSIRO Sustainable Ecosystems (see Westcott and Dennis 2006). This model assigns an equal probability of dispersal in all directions from a single source individual, and determines radii from the source plant within which varying percentages of dispersed seed may be found. However, the model does not account for directional movement by birds between neighbouring fruiting individuals, changes in movement affected by landscape features such as changing community structure or linear features such as creeks, or environmental conditions which may affect establishment success. This paper describes the associated research issues, including the approaches used and the results obtained to date, in refining the isotropic dispersal model in order to reduce search effort without reducing search efficacy. Ultimately our goal is to support attempts to eradicate these species when they are identified within the landscape by increasing search efficiency.

Initial results from radio tracking the movement of birds within sites where all fruiting species have been identified and mapped are revealing preferences by different bird species for different fruiting species. The data also reveal differing levels of constancy to a particular fruiting species, different utilisation patterns of fruit resources, and varying rates of movement between fruit locations; in some cases territorial defence of food resources by individuals has also been observed. These insights will permit us to refine predictions about the seed dispersal phase of weed colonisation of new landscapes.

Mapping distributions of seedlings around fruiting trees and placing these distributions in a landscape context considering topography and land cover type reveals patterns of establishment that suggest specific habitat requirements for germinating seeds. Field observations and published studies on other small-seeded melastomes reveal trends in distribution within the natural environment for other small-seeded melastomes, which parallel our findings. These data will permit refinement of the seed-dispersal model to arrive at a seedling-dispersion model.

Our data thus far all provide support for the generality of the isotropic model, but reveal species-specific modifying factors both for the birds and the plants. Adequately describing the effect of these factors represents an opportunity for enhancing search efficiency. Consequently we aim to reduce search effort without reducing search efficacy thereby supporting attempts to eradicate these species when they are identified within the landscape. Further development of our models should permit generation of refined dispersal predictions for other small-seeded berry-fruited taxa.

Keywords  Miconia calvescens, Clidemia hirta, seed dispersal models, bird dispersal.

REFERENCES