

A COMPARATIVE STUDY OF THE INVASIVENESS OF TWO
ALIEN FLESHY-FRUITING WOODY PLANTS ON THE
NORTHERN TABLELANDS OF NEW SOUTH WALES

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Summary. Two alien fleshy-fruited woody plants, hawthorn, *Crataegus monogyna*, and St. Lucie's Cherry, *Prunus mahaleb*, that differ in their degree of invasiveness, are the subjects of a comparative study to identify what factors are important in invasions by woody plants. This paper outlines the research methods and reports preliminary findings on the dispersal ecologies of both plants.

INTRODUCTION

For the last decade there has been a rapid expansion in studies concerning invasion by introduced organisms in Australia (3, 4). A great deal of attention has been paid to organisms that have had an economic impact on agriculture (e.g. viruses, feral animals and weeds of crops and pastures). Recently there has been an increase in the study of invasions by long-lived woody plants: *Mimosa pigra* (6), Broom, *Cytisus scoparius* (10), various ornamental trees (7, 2) and feral fruit trees (8). This report outlines a comparative study of two introduced fleshy-fruited woody plants (hawthorn, *Crataegus monogyna* and St. Lucie's Cherry, *Prunus mahaleb*) that differ in their degree of invasiveness (especially rate of range expansion) in the Northern Tablelands of N.S.W.

Both species are members of the Rosaceae and co-occur in their native ranges. Both thrive in the Armidale region. Hawthorn grows to 7 m tall, is deciduous and produces pithy red fruits in autumn. It is widespread throughout the Northern Tablelands of N.S.W., and along the highlands through southern N.S.W, Victoria, South Australia, and Tasmania. In some areas it has 'escaped' from hedges and has become problematic in agricultural areas. St. Lucie's Cherry (here after cherry) grows to 6 m, is deciduous and bears watery black fruit in mid-summer. Its only recorded wild occurrence is restricted to a small and slowly expanding population centred on the Armidale State Forest near Armidale N.S.W. (9).

METHODS

History. Oral histories of both species in the district are gradually being built up. Precise archival data is rare. Supplementary data on ages of hedges is being sought from basal stem disks, from which annual growth rings are counted. This information is also being used to calculate rates of spread. Data from Tenterfield, a relatively isolated hawthorn population is being collected, and at a later date the population of cherry trees at Armidale will be felled and analysed.

Demography. Demographic analysis of both species is the main research tool. Two permanent quadrats of 100 m² were set up in 1987 to monitor the demography of hawthorn. All plants >1 m tall were tagged, mapped and their basal circumference and height were measured. Likewise two quadrats of 10 m² were set up to monitor the cherry, where all plants >30 cm were tagged, mapped and measured. One further plot of 1.2 ha monitors both hawthorn and the cherry. Censuses have been conducted in 1987, 1988 and 1989 with a further two scheduled for 1990 and 1991.

For both species fruit set rates are monitored yearly, as well as fruit crop size, soil seed longevity, and seedling demography.

Dispersal ecology. Considerable attention is being paid to differences in the dispersal ecologies of both species. Because one species bears fruit in summer and the other in autumn-winter, there are likely to be differences in type, abundance and behaviour of dispersal agents available

to both species and resultant dispersal shadows. Details on abundance, visitation rates, meal sizes and post-feeding flight distances were obtained for avian dispersers. Mammal dispersal is more difficult to monitor. Collection of faeces containing intact seeds and records of minimum dispersal distances are being collected opportunistically.

RESULTS

History. Hawthorn was introduced to Australia as a hedge plant, partially as a substitute for expensive fencing and predominantly as 'cultural baggage' of European (predominantly British) settlers. As yet no specific dates have been assigned to hedges at Tenterfield. Old photographs and recollections of residents suggest that the majority of hedges were planted since 1850. 'Tenterfield Station' was probably the first property to establish hedges and subsequently became the source of seed and seedlings for other properties in the district. Hedges went out of favour in the early twentieth century due in main to the large amount of labour required to keep hedges stock-proof and also that hawthorn was beginning to spread and become a problem. However, in areas of severe tree decline hawthorn is now regarded as beneficial by providing shelter for stock.

The cherry was originally introduced to Australia as a hardy rootstock for commercial orchard trees. The only recorded wild population occurs in the Armidale State Forest. These trees are approximately 70-75 years old, dating back to the establishment of the forest. These trees probably originated from a neighbouring property which has an abandoned orchard.

Demography. No analysis of demographic data has been undertaken. Initial impressions suggest that large plant demographies are similar. Both species are long-lived (>70 years). Hawthorn tends to sucker especially after disturbance, while the cherry does not. The cherry has seedling densities under parent canopies of two orders of magnitude greater than hawthorn, while away from parent trees seedling densities are similar.

Fruit set rates are twice as high for hawthorn than the cherry however fruit crop size is much greater in the cherry. Hawthorn may retain fruit on the tree for up to nine months during the autumn and winter while the cherry maintains ripe fruit for only one month. Seed longevities in the soil are similar with both species displaying dormancy.

Dispersal Ecology. Dispersal ecologies differ greatly. Table 1 shows the dispersal agents so far identified for both species. The cherry has a range of dispersers that include seven birds and three mammals. The more important dispersers (Noisy Friarbirds and Red Wattlebirds) operate over distances < 100 m (Bass, unpublished data). Hawthorn on the other hand has one principal bird disperser with three mammal dispersers. Despite having fewer dispersers hawthorn may be dispersed > 1000 m due particularly to the gregarious behaviour and increased abundance of Pied Currawongs during the autumn and winter (1).

Table 1. The dispersal agents of *P. mahaleb* and *C. monogyna*.^a

Dispersers	<i>P. mahaleb</i>	<i>C. monogyna</i>
Birds		
Pied Currawong	x	x
Olive-backed Oriole	x	
Noisy Friarbird	x	
Red Wattlebird	x	
Mistletoebird	x	
Silvereye	x	x
Australian Raven	x	
Mammals		
Fox	x	x
Brush-tailed possum	x	x
Rabbit	x	
Wallaroo		x

^aSource D.A. Bass unpublished data

Factors that promote short-distance dispersal in the cherry include a short fruiting season and limited geographical range of the plant which keeps dispersers close to the fruit source.

Autumn and winter are a time of low invertebrate abundance and subsequently Pied Currawongs switch to fruit as their main food. The long fruiting season of hawthorn and the widespread population means that fruit are available to dispersers over a long time and a wide area.

CONCLUSIONS

Of the four types of factors listed by Kloot (5) as important in naturalisation of introduced flora, biological and environmental factors could be regarded as similar for both species and historical and managerial factors as very different. This study suggests that the history of introduction and the degree of human assistance/management in moving plants around are the main factors determining the variation in range expansion between the two species. Hawthorn is the more invasive due to its long history of widespread planting in hedges and gardens. The cherry was not widely planted and remains close to its point of introduction. The role of animal dispersal appears to be less important in terms of range expansion of plants and more important in the local population expansion of both species. While this study is at an early stage these initial findings can be useful in identifying other potential woody weeds and as a guide for research to monitor woody weed invasions.

ACKNOWLEDGEMENTS

This study was funded by an ARC grant and a University of New England internal research grant awarded to Associate J.M.B. Smith. The Forestry Commission of New South Wales gave permission for the work undertaken in the Armidale State Forest and Richard Vyner allowed me to work on his property "newby Park".

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