GROUND COVER PLANTS FOR WEED CONTROL IN AMENITY HORTICULTURE

A thesis presented in partial fulfilment of the
requirements for the degree of Doctor of Philosophy (PhD)
in Plant Science
at Massey University
Palmerston North, New Zealand

Chin Lui Foo

2012

Abstract

Aspects of the establishment and use of ground cover plants for urban weed control were investigated. Established ground cover populations of different taxa were monitored over 1 year at 14 sites for their ability to block light from the soil and prevent weeds from establishing. Field trials compared 12 ground cover species of widely differing growth form for rate of establishment and ability to block light and suppress weeds. Another field trial compared various types of mulch with selective herbicides and hand weeding as techniques for establishing ground cover species. No single growth form was superior to others, and it was the density of the foliage that was key to suppressing weeds. Ground cover plants should be selected for having persistently dense canopies throughout the year, such as *Coprosma acerosa* 'Taiko' and *Juniperus procumbens*. Deciduous species like *Persicaria capitata*, evergreen species which become sparser in winter like *Pimelea prostrata*, and plant canopies which open up during flowering like *Grevillea lanigera,* all allow weeds to germinate while the ground is exposed. Ground cover plants appear to deter weeds mainly by keeping weed seeds dormant through preventing red light from reaching weed seeds and triggering a phytochrome response leading to germination. Keeping the ratio of red to far-red light below 0.3 appeared to give best inhibition of weed seed germination. Presence of mulch and spot application of selective herbicides can help prevent weeds causing problems should gaps appear within ground covers, and these may be preferable to hand weeding. Little herbicide tolerance information exists for ornamental ground cover plants, so herbicide tolerance trials were conducted on eight ground cover plant species. This work showed that herbicides can aid in ground cover plant establishment and subsequent maintenance to selectively spot-treat weeds that appear. Ground cover species were assessed which grow low enough to be mowed but which seldom need mowing, to replace grass turf in situations where mowing is inconvenient such as under trees, on slopes, or roadsides. *Dichondra micrantha* and *Soleirolia soleirolii* showed the most potential, forming dense low growing swards that tolerated a wide range of herbicides.

Acknowledgements

I wish to express my sincere thanks and gratitude to my chief supervisor Dr Kerry Harrington for his patience and guidance throughout my period of candidature, for always making time available to discuss my research and providing insightful comments at every stage.

I am also grateful for Dr Marion Mackay who pointed me in the right direction on matters relating to taxonomy and amenity horticulture and for her encouragement.

Thanks are due to Nafees Anwar for providing statistical advice and guidance.

Thanks are also due to Messrs. Craig McGill and Robert Southward for their knowledge on seeds.

I would also like to thank Mr Martin Wrigley for his contributions and advice during the early phase of this project.

This work was also made possible through the technical assistance provided by the team led by Mr. Steven Ray at the Plant Growth Unit, especially to Lesley, Lindsay, and Scott; also to Mr Mark Osborne and his team; and plant science technicians Ms Kay Sinclair and Mr James Slater who assisted with my field work.

Financial assistance was rendered by the Massey University Doctoral Scholarship, the Dan Watkins Scholarship administered by the New Zealand Plant Protection Society, and the Sir Victor Davis Foundation.

Thanks are also due to the various herbicide companies for providing their products in trials, and to the EcoCover Company for providing the paper mulch used.

Dedications

This thesis is especially dedicated in loving memory of my father and grandmother, who were always a source of inspiration and encouragement.

I would also like to dedicate this work to everyone at home who provided emotional comfort and support during this long journey of scholarship.

Table of contents

List of Figures

List of Tables