STUDIES IN THE ECOLOGY OF PHEASANT'S EYE

(Adonis microcarpus DC.)

Thesis submitted by

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SUMMARY

The taxonomy of the annual species of the genus *Adonis* L. (Fam. *Ranunculaceae*) found in Australia was revised. Previous authors had determined that *A. annuus* L. emend Huds. (Syn. *A. autumnaalis* L.) and *A. aestivalis* L. were present. Examination of the Australian material revealed general uniformity in all characters except that some variation was found in achene ornamentation, in particular, the degree of dentation of the transverse crest.

It was concluded that all the material was referable to *A. dentatus* Del. ssp. *microcarpus* (DC.) Riedl or *A. dentatus* ssp. *intermedius* (Webb et Berth.) Riedl. These taxa were shown to be virtually indistinguishable except for the degree of dentation of the transverse crest. Recent authors have considered them mutually synonymous and to be included in *A. microcarpus* DC.

It was found that adequate material for taxonomic determination must meet certain criteria. The achenes must be fully mature, contain a normal seed and be low on the carpellary spike. Previous errors in determination were attributed to these criteria not being met.

A comparison of plants grown in favourable and adverse environments revealed the limits of morphological differences in South Australia, and a full description of the species and complete herbarium records for Australia are given.

A survey of the extent of *A. microcarpus* in South Australia was undertaken and full details are presented. The distribution is related to environmental factors. The incidence of alkaline soils, especially those containing free lime was the most significant
influence on the plant's distribution. *Adonis* does not flourish in areas receiving an annual rainfall of less than 300 mm or having a mean minimum July temperature of less than 4.5°C; it is favoured by the change to shorter farming rotations. The distribution of *Adonis* interstate is influenced by the same environmental factors.

By comparison with overseas specimens available within Australia it was concluded that the Australian material originated in the western Mediterranean, and investigations revealed that the plant was probably introduced as seed from France about the turn of the century as an ornamental. It was moved throughout Australia (primary spread) where it was planted around houses and homesteads. Later, in areas favourable for the plant, many dwellings were abandoned and former house paddocks amalgamated. Cropping spread it throughout the farming unit (secondary spread). This second process is still proceeding and *Adonis* has become a serious weed in parts of the cereal areas of South Australia.

Plant counts taken in quadrats set in an annual pasture show that the proportion of *Adonis* in the sward falls through the season. Late autumn or early winter cultivations almost completely remove *Adonis* from the sward, as germination does not take place after mid-June. *Adonis* does not tolerate crop competition as well as some major cereal weeds. These factors explain why the weed is inconsequential in cropping years.

Germination tests in the field show that a significantly higher proportion of achenes buried at 2.5 and 5.0 cm below the surface emerged than did those placed on or 1.5 cm below the surface. In the field the percentage germination averaged 35.2% which is comparable to other genera in the family. Laboratory
investigations utilizing standard germination induction techniques were unsuccessful.

A. microcarpus is a weed of annual medic pastures. In seeking a selective herbicidal control the following chemicals were tested: ametryne, benazolin, bromoxynil, 2,4-D, 2,4-DB, linuron, MCPA, mecoprop, methabenzthiazuron, oxadiazon and prometryne. Bromoxynil (20%) at 0.7 l/ha, applied when the plants were at the two to four leaf stage, was found to be satisfactory. A practical control programme is outlined.
iv.

STATEMENT

This thesis contains no material which has been accepted for the award of any other degree or diploma in any University and, to the best of my knowledge and belief, it contains no material previously published or written by another person, except when due reference is made in the text.
ACKNOWLEDGEMENTS

I am indebted to the South Australian Department of Agriculture and particularly to the late Director, Mr. A.G. Strickland, and the present Director, Mr. M.R. Irving for permission to undertake these studies, and to Mr. A.F. Tideman formerly Senior Weeds Officer, presently Chief Agronomist and to Mr. G.B. Baldwin, Senior Weeds Officer for their constant encouragement. The help and advice of colleagues in the Weed Section of the Department is also acknowledged.

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During the preparation of the manuscript, Mrs. D. Green typed the drafts and Mrs. D.L. Hewish prepared the final copy. Mrs. M. Schubert prepared the figures and Messrs. T. Edwards and J. Clark undertook the photographic work. I am greatly obliged to all of them for their care and patience.