



GENETICS IN EUCALYPTUS TAXONOMY AND BREEDING

A STUDY OF HYBRIDIZATION, VARIATION AND  
INHERITANCE IN EUCALYPTUS

By L.D. PRYOR, M.Sc.; Dip.For.

P A R T     I

A thesis in two parts presented in support  
of my application for the Degree of Doctor  
of Science at the University of Adelaide.

A handwritten signature in cursive script that reads "Lindsay D. Pryor".

Lindsay D. Pryor

7/12/57

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## P R E F A C E

The genetic study of Eucalyptus in relation to taxonomy and breeding has been integrated with ecological study of the genus which was the principal theme of the thesis for which I was awarded the Degree of Master of Science in 1939. This is appropriate, since it is now clear that future progress in the study of Eucalyptus in any one of these fields (genetics, taxonomy, breeding or ecology) must, for best results, often draw substantially on the others.

Since 1939 I have continuously studied the genus. The publications and papers submitted herewith record the findings of my scientific investigations from that date. Where the published work of others has been drawn upon, reference is made on each occasion throughout the texts. Likewise, where the results of personal communication or other unpublished sources have been incorporated, these are also referred to in each case.

Three separate studies have been made in cooperation with specialists in other fields, and this is indicated by joint authorship in each case. These are No.10, which was prepared with J.H. Willis of the National Herbarium, Melbourne; No.18, with M.M. Chattaway and H. Kloot of the Division of Forest Products, C.S.I.R.O., Melbourne; No.23, with L.H. Bryant, of the Division of Wood Technology, Forestry Commission of New South Wales. The extent of the contributions by the joint authors is indicated in precise detail in the attached notes.

The work presented is otherwise entirely original and has been carried out by me personally.

The factual data have been derived from four main sources: firstly, from extensive field study of Eucalyptus in its natural habitat over most of the Australian mainland and Tasmania, and briefly in New Britain and Papua; secondly, from material grown experimentally in the Yarralumla Nursery of the Parks and Gardens Section of the Department of the Interior in Canberra; thirdly, from the 200 acre experimental Eucalyptus garden on the outskirts of Canberra; and finally, from laboratory study in the Parks and Gardens Section.

Extensive use has been made of the National Herbarium, Sydney, which houses Maiden's and Blakely's collections.

The work covers five main aspects:-

- (1) The study of character inheritance;
- (2) Ecological features closely associated with a genetic basis;
- (3) Natural hybridizing, artificial crossing and breeding;
- (4) The integration of genetic study with Eucalyptus systematy;
- (5) Morphological and physiological aspects resulting in a large measure from study on a genetic basis.

Each separate paper contains one or more original aspects, and these may be indicated generally following the grouping below:-

- (1) The nature of the inheritance of many characters including those of anthers, inflorescence, leaf bud and fruit features, wood, bark, oil, lignotubers, insect eating resistance, rate of growth and frost resistance. These are contained especially in papers 5, 6, 8, 9, 11, 18, 20, 23.
- (2) The genetic basis of Eucalyptus ecological associations, the delimitation of species - areas and the study of clinal variation in *E. pauciflora* is given particularly in papers 7, 15, 19.
- (3) The factors determining natural hybridization, the recognition of genetically isolated infrageneric groups and the means of effecting artificial hybridization are set out, especially in papers 4, 5, 11, 12, 13, 16, 21.
- (4) The integration of genetics with systematy is contained in papers 8, 10, 13, 15, 19, and particularly in 22.

- (5) The morphology of the inflorescence and aspects of mycorrhizal behaviour in papers 9, 14, 17.
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