Foreword

Most of the papers in this volume were presented at the joint meeting of the New Zealand Society of Plant Physiologists and the Agronomy Society of New Zealand which I was privileged to be invited to attend in August 1991. Because of the two societies involved, the meeting had rather a special flavour for it brought together workers on basic aspects of seed science and those concerned more with applied aspects of the science, technology and the agricultural uses of seeds. Both partners greatly profited from the association and it is important that the close links remain, to continue the benefits that already have been obtained. The contents of this book therefore reflect the special nature of the meeting, consisting of contributions representing the varied nature of research on seeds in New Zealand.

Relatively little has been published concerning the germination physiology of native New Zealand plants. It is clearly important that to improve our understanding of the ecology of the country's vegetation, the behaviour of native seeds should be studied. The articles by C. Burrows and P. Banister and P. Jameson should prove to be valuable additions to the literature that already exists but clearly much remains to be done in this area.

Seed quality and performance are matters of great significance in agriculture and horticulture; and they justifiably receive attention here. In a wide-ranging review of seed quality, J. Hampton points to the research which is being done and which should expand in the future to maintain New Zealand's good reputation in seed production. Many laboratories in the world are attempting to find quick, reliable ways of assessing seed quality by biochemical means and the search for molecular markers occupies much attention. While physiological aspects of quality are not included in his paper, the rapid and accurate methods described by K. Sutton for the analysis of protein in wheat flour might find application to problems connected with viability and vigour. Other aspects of quality are considered by M.P. Rolston *et al.* (interesting roles of fungal endophytes in seeds of perennial ryegrass and tall fescue), by D. Leung (deterioration of maize seeds) and by B.A. McKenzie *et al.* (effects of nitrogen fertilization on chick pea quality).

How seeds perform after sowing is of course a key aspect of quality. Seed physiologists have discovered several ways of improving germination performance by various pre-sowing treatments and several species, so-treated, are now available commercially. P. Coolbear gives a comprehensive review of treatments in current use and discusses their advantages and limitations, together with what is known about their physiological and biochemical bases. Performance in the field is not only a matter of good germination. Seedling establishment involves several processes including mobilisation of the seed's reserves. C.Cornford *et al.* point out how little is known about this process in pasture grass seed, especially in comparison with existing knowledge of the cultivated cereals. They describe their investigation of starch mobilisation in Italian ryegrass which reveal some interesting properties of the enzymes involved. Factors in the environment are known to influence reserve mobilisation, an aspect of which is considered in two articles by M. Andrews *et al.* who show that applied nitrate enhances reserve mobilisation in several cereals and the pre-emergence growth of maize; the mechanism of the influence on reserve mobilisation unfortunately is not known. Other properties of the seed are also important in respect of emergence. An effect related to coleoptile length (thought to protect the first leaf from damage) forms the subject of the contribution by S. Hines and her colleagues.

Seeds will feature prominently in the biotechnology which modifies plants and their properties by recombinant DNA techniques. Not only are seeds themselves the targets for change such as by alteration of the protein, oil or carbohydrate reserves, but seed components which have important physiological properties are being introduced into other organs (and species) by genetic transformation. One very important example is the various kinds of inhibitors of proteinases occurring in seeds which retard the activity of enzymes in insects and other animals. Since they can therefore confer on plants some degree of defence against insect attack, biotechnologists are active in transferring genes for these inhibitors into different plants where they are expressed in various organs. This exciting subject is reviewed by M. McManus and his colleagues who describe work in New Zealand and overseas.

I am very glad to have had the opportunity of listening to the papers delivered at the meeting and reading them afterwards, thereby gaining an appreciation of the range of activity in seed science in New Zealand.

I wish all the authors continued success in their research.

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