

## BOOK REVIEW

# Recent advances in the development and germination of seeds

Edited by R. B. Taylorson

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This book is a collection of the main papers, given at the Third International Workshop held in Williamsburg, USA, in 1989. Collections of the short papers and abstracts of poster presentations from the meeting were published earlier.

The book begins with a review by M. Black highlighting the important contributions that study of seeds has made to our understanding of plant development and control mechanisms. It ends with a summary by A. M. Mayer of the current state of play and a personal view of possible future developments. Both these chapters set the book nicely in context and clearly demonstrate the major contributions that studies of seeds have made to the mechanisms of plant development. In between these two 'pieces of bread' is a filling which is 'meat' for molecular biologists, biochemists and physiologists to get their teeth into. To a greater extent than in many reports of seed biology meetings this one emphasized the mechanistic aspects of seed biology and outlined a number of new approaches.

It is initially difficult to find one's way around this collection of papers. From the content of the chapters a grouping into 'seed development' as opposed to 'dormancy/germination' events could have been adopted; however, chapters on each appear to be mixed, it seems, at random.

Chapters on the use of transgenic plants and mutants indicate the growing importance of these approaches in unravelling the mechanisms controlling seed development, dormancy/germination. There is a comprehensive review of phytin in seeds, sites of and mechanisms of deposition and an outline of improved analytical procedures and techniques. An excellent discussion on membrane behaviour is included using pollen as a model system. Fourier transform infrared spectroscopy is used to measure gel to crystalline phase changes though its potential for studies on seeds has yet to be fully evaluated.

There are chapters on dormancy, demonstrating control of acid-soluble protein synthesis by ABA in dormant grain. There is an elegant analysis of the complex germination responses to light based on the finding that phytochrome exists as a molecular dimer.

A descriptive model based on a 'dose-response' approach to integrate the effect of light and nitrate is also outlined. There are two discussions of the regulation of metabolism in seeds, one on the relationships and interactions between phytochrome and growth-regulating substances and one outlining the potential role of  $Ca^{2+}$  as a 'stimulus-response' coupler in germination. Recent work suggests that the definition of differences in metabolism between dormant and non-dormant seeds is still elusive, though relationships between dormancy breaking activity of chemicals and the lipophilicity and/or molecular size are suggested. Apart from a few papers on water impermeability of seed coats in relation to germination and on the mechanisms of priming (or should this be more precisely, mechanisms of germination) there is little, surprisingly, on the role of water in seeds in relation to the initiation and control of cell elongation. Nor is there much on the mechanisms of seed longevity. Perhaps the next Conference in Angers in 1992 will address these issues.

Virtually all of the papers are concerned with 'natural' seeds though there is an authoritative review on the production of somatic embryos of agricultural and horticultural crop species and on the difficulties biologists face in developing a reliable synthetic seed technology.

Clearly, there is much in this book for those concerned with identifying mechanisms underlying seed developmental and germination response. But what is the potential value of the book for agronomists interested in exploiting such knowledge to improve seed quality and manipulate seed germination and seedling emergence? Chapters on changes in plant water status at specific stages on protein deposition and subsequent effects on germination performance, on dehydration tolerance/membrane behaviour, seed coat characteristics in relation to water uptake, discussions of the mechanisms underlying recalcitrant seed responses to drying, mechanisms of seed priming and the effects of dormancy-breaking chemicals in relation to their molecular size and lipophilicity provide good background information and useful pointers. Surprisingly, there is no dis-

# Recent Advances In The Development And Germination Of Seeds

**Jessica J Manson**



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