may offer some advantages. A Web link will soon be available to provide updates and corrections to *World Economic Plants*. The many thousands of taxon-specific literature records mentioned above as absent from the book are available instead in GRIN. In contrast to the book, where organization of taxonomic names is by genus without provision of a cross-reference organized by plant family or by geographical regions, Web-based searches can be conducted using plant family, country, or state names as the basis for query. However, the book provides concise synopses of taxonomic data, common names, and associated information in a clear, well-organized format that makes for efficient consultation.

Laura C. Merrick  
Department of Agronomy, Iowa State University, Ames, IA 50011-1010  
(lmerrick@iastate.edu)


This book is a comprehensive reference book on the ecology of seed germination and dormancy. It represents the synthesis of the authors' joint research and ideas on seed ecology over 32 yr. It covers all terrestrial ecosystems (from tropical to arctic) where seeds are found. The content, level of detail, and approach is scholarly and thus appropriate to those at the cutting edge of seed research, but it is also a suitable reference book for final-year undergraduate students involved in projects on seeds. For crop scientists, there is much information on germination and dormancy of species related to crop plants and also of weeds. However, many of the species described are not relevant to crop production per se.

Baskin and Baskin have achieved a remarkable synthesis of the literature on seed dormancy and its impact on germination ecology. The book includes practical procedures for germinating seeds so that results can be used in understanding and interpreting the behavior of seeds in the field. A chapter is devoted to the authors' rather complex classification of seed dormancy. The focus of the book is seed ecology, so environmental control of changes in each type of dormancy is discussed, leading naturally to a review of the persistence of seeds in the soil. A good account of the reasons for variation in dormancy within species (including polymorphism, genetic, and maturation effects) follows. Then almost half of the book comprises a biogeographical perspective of seed germination ecology. Vegetation zones are considered in two primary geographical areas (subtropical-tropical and temperate-arctic), which in turn are subdivided into a total of 10 generally recognized types of natural vegetation. Weedy species are included. An extra chapter justifiably covers dormancy and germination of plants with specialized life cycles or habitats since these are often found in more than one major vegetation region or their life cycles may be specialized. Examples include parasitic angiosperms, carnivorous plants, orchids, halophytes, and aquatic plants. These chapters include data on dormancy and germination of 3580 species. The final chapter synthesizes this information into a world biogeography of seed dormancy types in a way never achieved before. The authors also attempt to interpret the literature in terms of the evolution of seed dormancy.

Probably no one would disagree that the inability of viable seeds to germinate when in conditions suitable for seedling growth can arise for one of three basic reasons: embryo immaturity and development (called "morphological dormancy" in the book), seed coat impermeability or hardsenessedness (called "physical dormancy"), and physiological inhibition (called "physiological dormancy"). Insofar as the book classifies non-germination of viable seed on this basis, it is helpful. The use of the term "physical dormancy" for what is more widely known as hardsenessedness is allowable, but the term "quiescence" is perhaps a more apt descriptor of the condition of the seed than dormancy: a dry seed does not fail to germinate because it is dormant; it fails to germinate because of a lack of water.

However, the more detailed classification of seed dormancy types into a combination of the putative mechanism and the environmental treatments required to relieve the dormancy is quite complex and sometimes speculative. For example, physiological dormancy is classified into "non-deep," "intermediate," and "deep" types, with five possible mechanisms of non-deep dormancy. The attempt to classify seed dormancy into one of these categories is unsatisfactory where the seed dormancy of a species has not been studied in detail. For example, some seeds with non-deep physiological dormancy are said to require at least 4 wk at a high temperature to promote dormancy loss. If seeds from tropical evergreen rainforests require high temperatures to relieve dormancy, the authors, in a circular argument, suggest that they likewise must have non-deep physiological dormancy if they take more than 4 wk to germinate. (Less than 4 wk is taken to mean that the seeds are nondormant.) The time and temperature characterization is also an arbitrary distinction. The depth of dormancy specified in the book thus needs to be approached with some caution.

A particular weakness is the paucity of information concerning quantitative studies of seed population dynamics. The models proposed by Cohen and by Venable and Lawlor are mentioned but without quantitative values. The concept of predictive dormancy (Venable and Lawlor) and how it is to be estimated is also unclear.

The final chapter attempts a useful synthesis, including interesting information on, for example, the relative absence of dormancy in seeds of tropical evergreen forests. However, the attempt to interpret the earlier chapters in terms of evolution of dormancy is so highly speculative as to be of little value and comprises a rather unsatisfying conclusion to an otherwise excellent book. As stated by the authors in connection with angiosperms, "all we can do is consider fossil seeds in terms of what is known about morphology and types of dormancy in extant species." It would have been better to have omitted such speculations.

The quality of the production is excellent, although some may wish to see photographs of the seeds and ecosystems. Given that much of the information is derived from the literature, the diagrams included are sufficient. Very few typographical errors were noted.

The undoubted strength of this book is its successful and comprehensive synthesis of the literature on seed dormancy. It represents the culmination of decades of scholarly research, and the reader reaps the benefit in one volume. For those involved in plant ecology in any one of the ecosystems described, the coverage is excellent. Usefulness is enhanced by giving references at the end of each chapter. While this must lead to some repetition, it provides quick access to the literature relating to a specific ecosystem or topic and it is also much easier to find specific references in the text. Practical advice will also help those faced with the task of germinating seeds of species not worked on previously. The strength of the book is therefore its comprehensive and global perspective.