Ecology of Soil Seed Banks

Edited by Mary Allesio Leck, V. Thomas Parker and Robert L. Simpson. 1989. Academic Press (Harcourt Brace Jovanovich, San Diego). 462 pp., illus. U.S. $75.

Our awareness of intricate reproductive processes and strategies in plants has increased dramatically over the last two decades. Stimulating texts on population dynamics, pollination biology, seed dispersal, seed ecology, and life history strategies have appeared in science libraries. The topic of soil seed banks (i.e., dormant seeds beneath or on the soil surface) is one of the contemporary areas of plant reproductive ecology to receive analytical attention and it is fortunate that we now have a text on the subject.

Leck, Parker, and Simpson have invited twenty-three contributors from the United States and Canada, and one each from England and Panama to contribute papers on one or more of sixteen topics. The topics are grouped, and accordingly divide the book into five parts; introduction, seed bank processes, seed banks and vegetation type, management and soil seed banks, and a synthesis. Each topic is an up-to-date review of the available published information. In several manuscripts, there are hints of preparation difficulties because the source information has been incomplete, often difficult to compare, and even poorly sampled. Nevertheless, the authors have put together excellent chapters that are readable, adequately illustrated, and thoroughly referenced. The single reference section near the back of the book consists of 59 pages and nearly 1500 different references!

The two-page preface by the editors commences with a recollection of the old adage "One year's seeding — seven years' weeding". A good place to start because farmers and gardeners were the first to recognise the role of the soil in the regeneration of plant populations. A reminder by J. P. Grime that the poppies in Flanders field were the result of exposure of the seed bank to germinating conditions sets the the tone for his short foreword, "Seed banks in ecological perspectives". He, and the authors of chapter one, describes how early seed bank work consisted of finding out the kinds and numbers of dormant seeds in different soils, how long the seeds can survive, and improving the methodology. The topic then progressed beyond the descriptive approach to one of seed bank classification, and then to an analysis of their dynamics.

The introduction (the first five chapters), describes in more detail the dynamics of seed banks. Unfortunately, there is no chapter specifically on how seeds get into the soil — the bank deposit (i.e., seed dispersal and the "seed rain"); but the cash withdrawal — kinds of dormancy and dormancy breakage is well covered. The role of seed herbivores (bank robbers?) is emphasized, as is their determination of the make-up of seed banks, and how they have shaped the evolution of seed bank strategies. The final chapter in this section describes how predictive modelling can be used, if only we had a sufficiently sound data base.

Part three describes the seed banks of eight different sets of biomes; arctic/alpine, coniferous forests, temperate deciduous forests, tropical regions, grasslands, California chaparral/Mediterranean shrublands, deserts, and wetlands. Each author(s) has used their/his/her own format to describe the state of knowledge for that study. Several themes recur in these texts: (i) The proportions and diversity of species in the seed bank rarely correspond to those of the above-ground vegetation. (ii) Very little is known about seed banks and their dynamics, especially in arctic/alpine and tropical systems. (iii) Seed banks are most extensive in the early stages of succession, or where there is frequent disturbance. (iv) Seed banks are especially well developed after fires in coniferous forests and chaparral vegetation, where they are just one of several survival strategies (which include serotiny, spouting, and dispersal). (v) Few shade-tolerant, large-seeded, or woody species are represented in seed banks.

Part four describes how seed banks can be manipulated in artificial or in natural plant communities, to discourage undesirable species or to encourage those that are preferred. This section is well written and has considerable application. For instance, ideas are provided on how to tackle serious weed problems in arable lands or in wetlands. In addition, there are enlightening discussions on the manipulation of environments to enhance certain floristic features (e.g., in marshes), or to help preserve rare species or communities.

Finally, in Part five, the editors write a synthesis for the book in order to interrelate its various components.

In my view the book is an excellent addition to any science library and will likely be an internationally important text on this intriguing topic for many years to come.

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