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Individualistic Perspectives on Plant Competition

Perspectives on Plant Competition by James B. Grace; David Tilman; Competition by Paul A. Keddy

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#### INDIVIDUALISTIC PERSPECTIVES ON COMPETITION

Grace, James B., and David Tilman (eds.). 1990. **Perspectives on plant competition**. Academic Press, New York. xiv + 484 p. \$79.95 (cloth), ISBN: 0-12-294452-6 (alk. paper); \$49.95 (paper), ISBN: 0-12-294453-4 (acid-free paper).

Keddy, Paul A. 1989. **Competition**. Chapman and Hall, New York. xi + 202 p. \$65.00 (cloth, U.S.), \$78.00 (cloth, Canada) ISBN: 0-412-31350-2; \$25.00 (paper, U.S.), \$35.00 (paper, Canada), ISBN: 0-412-31360-X.

The importance of competition to populations and communities has been hotly debated. Just exactly what is meant by competition and how it can be studied effectively are key aspects of this debate, as two recent books will illustrate. The volumes written by Keddy and edited by Grace and Tilman have as their aims, first, distilling what is known about competition, and further, provoking synthesis of and progress beyond the current disparate views. The Grace and Tilman book deals exclusively with competition among plants; Keddy considers competition in general. The two books present a series of well-developed individualistic views of competition and how it should be studied. The views are not all compatible: if some are right, then others are necessarily wrong.

The Grace and Tilman volume resulted from a conference of plant ecologists who have approached the study of competition in different ways. The book is divided into three thematic sections: factors determining competitive ability/dominance, the role of competition in communities, and the effects of heterotrophs (herbivores, parasites, and symbionts) on plant competition. Examples are presented from a wide variety of ecosystems, including agricultural and successional areas, pastures, lakeshores, steppe and tundra, arid lands, heathlands, and eucalypt forest; one paper, by Sommer, deals with phytoplankton.

The conflicts between individual-level and population-level definitions and measures of competition are frequently apparent in the book, as they are in Keddy's. These sometimes seem to be treated as simply semantic issues, which I do not think gives proper weight to the difference between the two perspectives. Growth rates of individuals are inadequate to predict community-level effects unless other factors (e.g., survival, reproduction, dispersal, establishment) are overall equal for the species being compared. A chapter by Berendse and Elberse is particularly interesting in combining nutrient turnover measures with those of individual plant growth rates to bridge the gap from individual growth to population responses. Also, Oksanen develops the relationship between his food chain models and plant traits such as growth rate, growth form, and allocation to defense.

Other recurrent themes are the significance of environmental heterogeneity/gradients and the need to evaluate competition in relation to the many interactions that potentially affect a population. Fowler provides a thoughtful discussion of the conceptual and practical difficulties in studying a world where environmental conditions and populations vary in time and space and interact in multiple combinations. It provides a good argument for thinking carefully about the structure of the system one is studying.

This book will be useful to both graduate students and professional ecologists. Its twenty chapters are clearly written; one may not agree with what an author has to say, but one can understand what is being said. The book would provide a stimulating set of readings for a graduate seminar, as much remains to be done to resolve the perspectives presented.

Keddy's book is written for graduate students and presents another individualistic view of competition. The book consists of eight chapters, each of which ends with questions for discussion. Chapter 1 presents alternative definitions and classifications of competition. Chapters 2 and 3 present empirical examples and models of competition. Examples are drawn from both plant and animal ecology and are presented in sufficient biological detail for a naive reader to appreciate. Chapters 4 through 7 present Keddy's views on how to improve research on competition. I found these to be the most clear and valuable of the book. (There are, of course, other ideas about what should be done.) Chapter 8 is largely a diatribe on cultural barriers to advancement of understanding. There is much good advice for graduate students in this book, but also much that is debatable.

Keddy's presentations of models and kinds of competition do not clearly distinguish what is really a different mechanism from what is a particular way of producing a more general mechanism. A recent edited volume on community ecology (1986, J. Diamond and T. J. Case (eds.), *Community ecology*, Harper and Row, New York, NY) does a better job of laying out approaches to conceptualizing competition. Keddy does include Rosenzweig's interesting models of competition and habitat selection, which are not yet well enough known. Keddy's book can provide a good introduction to the enormous and confusing literature on competition, but one needs to read also some of the interestingly broad set of references he cites (or perhaps the Grace and Tilman volume) to sample other perspectives as well.

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