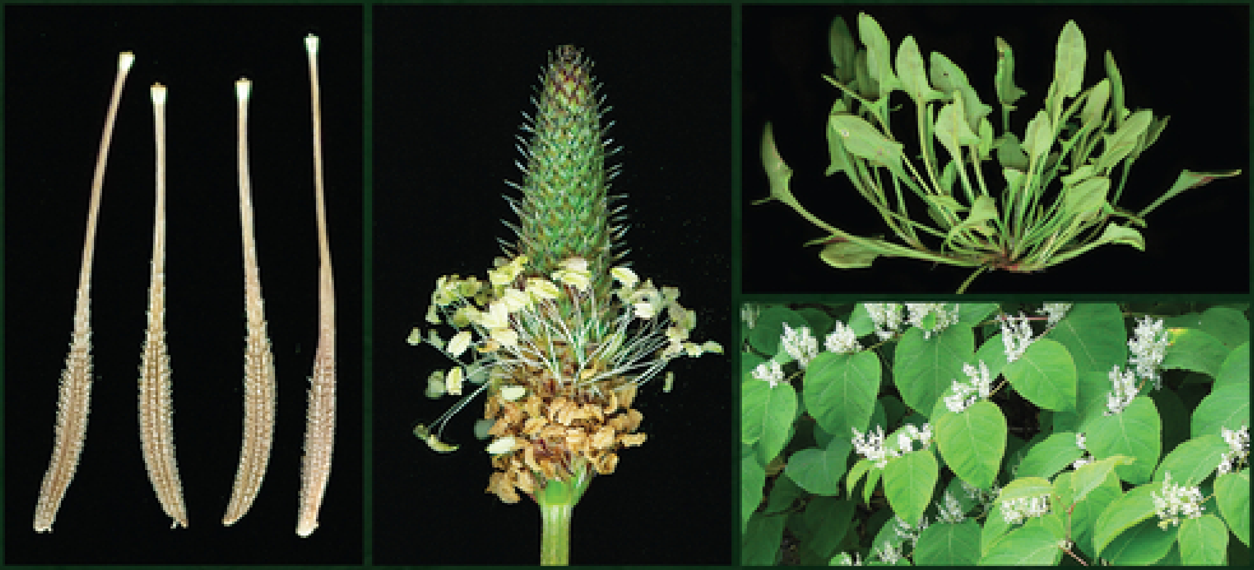
# PERSISTENCE STRATEGIES OF WEEDS



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WILEY Blackwell

This edition first published 2022


*Registered Office(s)*
John Wiley & Sons, Inc., 111 River Street, Hoboken, NJ 07030, USA
John Wiley & Sons Ltd, The Atrium, Southern Gate, Chichester, West Sussex, PO19 8SQ, UK

*Editorial Office*
The Atrium, Southern Gate, Chichester, West Sussex, PO19 8SQ, UK

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Wiley also publishes its books in a variety of electronic formats and by print-on-demand. Some content that appears in standard print versions of this book may not be available in other formats.

*Library of Congress Cataloging-in-Publication Data applied for*

9781119525608

Cover Design: Wiley
Cover Images: Courtesy of Mahesh K. Upadhyaya

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Anil Shrestha (PhD, Michigan State University) is a Professor of Weed Science and the current chair of the Department of Viticulture and Enology at California State University, Fresno, CA, USA. He works on weed biology, ecology, and management in annual and perennial cropping systems and has published extensively in these areas. He is an Academic Editor for PLOS ONE, an Associate Editor for *Agronomy Journal* and *Agricultural and Environmental Letters*, and an editorial board member for the *Journal of Crop Production* and the *Journal of Agroecology and Sustainable Food Systems*. He is a fellow of the American Society of Agronomy and has received the Weed Science Society of America's teaching excellence award, California Weed Science Society's award of excellence, and the California State University, Fresno Provost's excellence in teaching award.

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# Preface

Weeds reduce crop yields, lower the quality of agricultural produce, affect livestock health, and interfere with human life in a variety of ways. A considerable amount of time, money, and other resources are spent in controlling weeds by producers as well as by the general public, yet weeds persist. Unfortunately, we have relied very heavily on the use of synthetic herbicides to control weeds for the past several decades. This has hampered research on other nonchemical options for weed management. It is now well recognized that excessive use of synthetic herbicides carries risks to both the environment and the sustainability of herbicides as a tool. Widespread resistance to herbicides has developed among weed species and for almost all major classes of herbicide chemistry.

Stemming from concerns for human health and the environment, public opposition to the use of synthetic herbicides is progressively increasing. The sustainability of our food production systems is rapidly becoming an important issue globally, and pesticide-free, organic produce is becoming increasingly popular. In order to develop novel and more holistic methods for weed management, a sound understanding of persistence strategies of weeds is necessary. This understanding will help us identify the vulnerabilities of different weeds and could lead to development of novel, safe, and effective weed management strategies by making modifications to our production systems and reduce our dependence on synthetic herbicides. However, because weeds are masters of persistence, have co-evolved with humanity, and are very much the product of how we manipulate agroecosystems and other environments, we need to look beyond short-term simplistic remedies and understand our complex relationship with weeds.

This book takes a comprehensive approach to understand the persistence of weeds and strives to fill the gap in our understanding of the underlying issues behind the problem of weed persistence and serves as a comprehensive source of information for students, researchers, and weed managers. The various topics covered in this book include an overview of weed persistence, the role of seed production, dissemination and seedbanks, variability in seed dormancy, physiology and genetics of seed dormancy, seed longevity, vegetative propagation and propagule banks, the influence of agronomic practices, allelopathy, predation, soil microbes, climate change, weed evolution, and the development of herbicide resistance. Because weeds and their management are global concerns, specialists from around the world have been selected to write chapters on these topics.

The key learning objective of this book for students and other readers is to enhance understanding of what underpins the persistence strategies of weeds. While this book is aimed to serve upper-level undergraduates and/or graduate students, it can also be used as a reference or text for courses in agroecology and organic agriculture. Weed scientists and weed management professionals working for universities and government agencies, agri-business consultants, organic farmers, and other environmentally conscious producers will find this book a valuable source of information on persistence strategies of weeds. We also expect this book to stimulate research on development of environmentally friendly weed management options.

We thank all the chapter authors of this book for contributing informative chapters in their areas of specialization, external reviewers for their critical and constructive reviews of chapter manuscripts, and our families for their cooperation, patience, and encouragement.

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