# INVASIVE PLANT SCIENCE AND MANAGEMENT





### Invasive Plant Science and Management

Published quarterly by the Weed Science Society of America

Antonio DiTommaso, Editor

The Weed Science Society of America (WSSA) publishes original research and scholarship in the form of peer-reviewed articles in three international journals. Weed Science is focused on understanding "why" phenomena occur in agricultural crops. As such, it focuses on fundamental research directly related to all aspects of weed science in agricultural systems. Weed Technology focuses on understanding "how" weeds are managed. As such, it is focused on more applied aspects concerning the management of weeds in agricultural systems. Invasive Plant Science and Management is a broad-based journal that focuses not only on fundamental and applied research on invasive plant biology, ecology, management, and restoration of invaded non-crop areas, but also on the many other aspects relevant to invasive species, including educational activities, policy issues, and case study reports.

#### **Associate Editors (Assignment Year)**

Jacob N. Barney, School of Plant and Environmental Sciences, Virginia Tech, Blacksburg, VA 24061 (2012)

John Cardina, Department of Horticulture & Crop Science, Ohio State University, Wooster, OH 44691 (2008)

Chelsea Carey, Point Blue Conservation Science, Petaluma, CA 94954 (2022)

Stephen F. Enloe, Center for Aquatic and Invasive Plants, University of Florida, Gainesville, FL 32653 (2010)

Guillaume Fried, Plant Health Laboratory, Anses, 34988 Montferrier-sur-Lez, France (2017)

Catherine S. Jarnevich, US Geological Survey, Fort Collins, CO 80526 (2015)

Marie Jasieniuk, Department of Plant Sciences, University of California, Davis CA 95616 (2017)

Darren J. Kriticos, Cervantes Agritech, Canberra, ACT 2601, Australia (2010)

Elizabeth LaRue, Department of Biological Sciences, University of Texas, El Paso, TX 79968 (2022)

James K. Leary, Center for Aquatic and Invasive Plants, University of Florida, Gainesville, FL, 32653 (2014)

Kelly G. Lyons, Department of Biology, Trinity University, San Antonio, TX 78212 (2008)

Rob J. Richardson, Department of Crop Science, North Carolina State University, Raleigh, NC 27695 (2014)

Ryan M. Wersal, Department of Biology, Minnesota State University, Mankato, Mankato, MN 56001 (2014)

#### **Biology of Invasive Plants Series Editors**

David R. Clements, Trinity Western University, Langley, BC V2Y 1Y1, Canada (2020)

Darren J. Kriticos, Cervantes Agritech, Canberra, ACT 2601, Australia (2010)

Tracy Candelaria, Managing Editor

#### Officers of the Weed Science Society of America

http://wssa.net/society/bod/

*Invasive Plant Science and Management* (ISSN 1939-7291) is an official publication of the Weed Science Society of America, 12011 Tejon Street, Suite 700, Westminster, CO 80234 (720-977-7940). It is published quarterly, one volume per year, four issues per year beginning in March.

Membership includes receipt of *Weed Science, Weed Technology, Invasive Plant Science and Management*, and the online *WSSA Newsletter*. Dues should be sent to WSSA, 12011 Tejon Street, Suite 700, Westminster, CO 80234 no later than December 1 of each year. Membership in the society is on a calendar-year basis only.

New subscriptions and renewals begin with the first issue of the current volume. Please visit the *Invasive Plant Science and Management* subscription page at https://www.cambridge.org/core/journals/invasive-plant-science-and-management/subscribe; Email: subscriptions\_newyork@cambridge.org in USA, journals@cambridge.org outside USA.

Invasive Plant Science and Management publishes four times a year in March, June, September, and December. Annual institutional electronic subscription rates: US \$402.00; UK £280.00.

Please use Editorial Manager to access manuscript submissions (http://www.editorialmanager.com/ipsm). Authors are asked to pay \$65 per page as a portion of the cost of publication, plus an additional processing charge of \$55 per manuscript if none of the authors are WSSA members. The Editor can make exceptions in advance when justified.

The Weed Science Society of America fully subscribes to the belief that progress in science depends upon the sharing of ideas, information, and materials among qualified investigators. Authors of papers published in *Invasive Plant Science and Management* are therefore encouraged, whenever practicable and when state and federal laws permit, to share genotypically unique, propagative materials they might possess with other workers in the area who request such materials for the purpose of scientific research.

Invasive Plant Science and Management published by the Weed Science Society of America.Copyright 2022 by the Weed Science Society of America.All rights reserved. Reproduction in part or whole prohibited.

Cover Photo: Data collection activities in June 2019 at Boulder Lake in the Bridger-Teton National Forest near Pinedale, Wyoming, USA. See article by Courkamp et al. in this issue. Photo credit: Roman Borys.



## INVASIVE PLANT SCIENCE AND MANAGEMENT

#### **Table of Contents**

Vernalization required to induce flowering in rosettes of garlic mustard ( <i>Alliaria petiolata</i> ).  Elizabeth J. Katovich, Erik S. Katovich and Roger L. Becker	107
Estimating local eradication costs for invasive <i>Miscanthus</i> populations throughout the eastern and midwestern United States. Carolyn J. Lowry, David P. Matlaga, Natalie M. West, Martin M. Williams II and Adam S. Davis	115
Indaziflam reduces downy brome ( <i>Bromus tectorum</i> ) density and cover five years after treatment in sagebrush-grasslands with no impact on perennial grass cover.  Jacob S. Courkamp, Paul J. Meiman and Scott J. Nissen	122
Susceptibility of native and invasive submersed plants in New Zealand to florpyrauxifen-benzyl in growth chamber exposure studies. Andrew W. Howell, Deborah E. Hofstra, Mark A. Heilman and Robert J. Richardson	133
Case Study	
Improving chemical control of nonnative aquatic plants in run-of-the-river reservoirs. Ryan M. Wersal, Bradley T. Sartain, Kurt D. Getsinger, John D. Madsen, John G. Skogerboe, Justin J. Nawrocki, Rob J. Richardson and Morgan R. Sternberg	141
Commentary	
Eradication of <i>Commelina benghalensis</i> in a long-term experiment using a multistakeholder governance model: a case of regulatory concerns defeating ecological management success.	150