

WEED TECHNOLOGY



VOLUME 32 | NUMBER 1
JANUARY-FEBRUARY 2018

ISSN 0890-037X | WETEE9 32(1) 1-101 (2018)

Published online by Cambridge University Press



WEED TECHNOLOGY

Published six times a year by the Weed Science Society of America

Jason K. Norsworthy, *Editor*

The Weed Science Society of America 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. Topics for *Weed Technology* include all aspects of weed management in agricultural, horticultural, ornamental, forestry, aquatic, turf, recreational, rights-of-ways, and other settings; weed resistance to herbicides; herbicide resistant crops; biological weed control agents; new weed management techniques; impacts of weed competition with crops; vegetation management with plant growth regulators; weed surveys; weed-related grower surveys; education; and extension. Symposia papers and reviews are accepted. Consult the editor for additional information.

Associate Editors (Assignment Year)

Jason Bond, *Stoneville, MS* (2010)
Kevin Bradley, *Columbia, MO* (2012)
Barry Brecke, *Jay, FL* (2013)
Ian Burke, *Pullman, WA* (2007)
Peter Dittmar, *Gainesville, FL* (2016)
Steve Fennimore, *Salinas, CA* (2004)
Aaron Hager, *Urbana, IL* (2012)

Brad Hanson, *Davis, CA* (2013)
Prashant Jha, *Huntley, MT* (2016)
William Johnson, *West Lafayette, IN* (2007)
Andrew Kniss, *Laramie, WY* (2016)
Patrick McCullough, *Griffin, GA* (2016)
Scott McElroy, *Auburn, AL* (2012)
Robert Nurse, *Guelph, ON* (2016)

Darren Robinson, *Ridgetown, ON* (2008)
Larry Steckel, *Jackson, TN* (2007)
Daniel Stephenson, *Alexandria, LA* (2013)
Mark VanGessel, *Georgetown, DE* (2013)
Michael Walsh, *Crawley, Australia* (2016)
Cammy Willett, *Fayetteville, AR* (2017)

Tracy Candelaria, *Managing Editor*

Officers of the Weed Science Society of America

Janis McFarland, *President*
Scott Senseman, *President-Elect*
Larry Steckel, *Vice President*
Kevin Bradley, *Past President*

Hilary Sandler, *Secretary*
Rick Boydston, *Treasurer*
Sarah Ward, *Director of Publications*
Mark Bernards, *Chair, Constitution and Operating Procedures*

Weed Technology (ISSN 0890-037X) is published by the Weed Science Society of America, 12011 Tejon Street, Suite 700, Westminster, CO 80234. It is published bimonthly, one volume per year, six issues per year beginning in January.

Membership includes online access to *Weed Technology*, *Weed Science*, *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 *Weed Technology* subscription page at <https://www.cambridge.org/core/journals/weed-technology/subscribe>; Email: subscriptions_newyork@cambridge.org in USA, journals@cambridge.org outside USA.

Weed Technology publishes six times a year in January, March, May, July, September, and November. Annual institutional electronic subscription rates: US \$369.00; UK £257.00.

Please use Editorial Manager to access manuscript submissions (<http://www.editorialmanager.com/wt>). Authors are asked to pay \$85 for the first page and \$65 per page thereafter 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 *Weed Technology* 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 that area who request such materials for the purpose of scientific research.

Weed Technology published by the Weed Science Society of America.

Copyright 2018 by the Weed Science Society of America.

All rights reserved. Reproduction in part or whole prohibited.

Cover

Combining selective herbicides with glyphosate is a routine practice intended to improve control of glyphosate-resistant weeds. In the unique case of rapid response giant ragweed, glyphosate exposure elicits mature leaf desiccation in a matter of hours. This research addresses the impact of rapid desiccation on interactions of glyphosate with other herbicides and a time-sensitive management option to enhance control. Photo courtesy of Nick T. Harre.

WEED TECHNOLOGY

VOLUME 32

JANUARY-FEBRUARY 2018

NUMBER 1

• INTRODUCTION

Introduction to the Symposium on Precision Agriculture and Weed Science. **Krishna N. Reddy and Rosalind R. James**. 1

• SYMPOSIUM

UAV Low-Altitude Remote Sensing for Precision Weed Management. **Yanbo Huang, Krishna N. Reddy, Reginald S. Fletcher, and Dean Pennington**. 2

Beyond Precision Weed Control: A Model for True Integration. **Stephen L. Young**. 7

Multiscale Invasive Plant Monitoring: Experiences from the Greater Everglades Restoration Area. **LeRoy Rodgers, Tony Pernas, Jed Redwine, Brooke Shamblin, and Shea Bruscia**. 11

Geographic Information System for Pigweed Distribution in the US Southeast. **Reginald S. Fletcher and Krishna N. Reddy**. 20

• WEED MANAGEMENT-MAJOR CROPS

Confirmation of Glyphosate-Resistant Kochia (*Kochia scoparia*) from Sugar Beet Fields in Idaho and Oregon. **Vipan Kumar, Joel Felix, Don Morishita, and Prashant Jha**. 27

Echinochloa Resistance to Herbicides Continues to Increase in Arkansas Rice Fields. **Christopher E. Rouse, Nilda Roma-Burgos, Jason K. Norsworthy, Te-Ming Tseng, Clay E. Starkey, and Robert C. Scott**. 34

Imazethapyr plus Propanil Mixtures in Imidazolinone-Resistant Rice. **Eric P. Webster, Gustavo M. Teló, David C. Blouin, and Benjamin M. McKnight**. 45

Glyphosate-Induced Antagonism in Rapid Response Giant Ragweed (*Ambrosia trifida*). **Nick T. Harre, Julie M. Young, and Bryan G. Young**. 52

Cover Crops Suppression of Palmer Amaranth (*Amaranthus palmeri*) in Cotton. **Matheus G. Palhano, Jason K. Norsworthy, and Tom Barber**. 60

• WEED MANAGEMENT-TECHNIQUES

Tolerance of Several Legumes to Residual Imazapyr Applied Under Greenhouse Conditions. **Maria Leticia M. Zaccaro, John D. Byrd Jr., and David P. Russell**. 66

Herbicide Spray Penetration into Corn and Soybean Canopies Using Air-Induction Nozzles and a Drift Control Adjuvant. **Cody F. Creech, Ryan S. Henry, Andrew J. Hewitt, and Greg R. Kruger**. 72

• WEED MANAGEMENT-OTHER CROPS/AREAS

Spray Penetration into a Strawberry Canopy as Affected by Canopy Structure, Nozzle Type, and Application Volume. **Shaun M. Sharpe, Nathan S. Boyd, Peter J. Dittmar, Greg E. MacDonald, Rebecca L. Darnell, and Jason A. Ferrell**. 80

In-row Vegetation-free Strip Width Effect on Established 'Navaho' Blackberry. **Nicholas T. Basinger, Katherine M. Jennings, David W. Monks, Wayne E. Mitchem, Penelope M. Perkins-Veazie, and Sushila Chaudhari**. 85

• NOTE

Cool-Season Weed Control Using Ammonium Nonanoate and Cultivation in Organic Vidalia® Sweet Onion Production. **W. Carroll Johnson III, and Xuelin Luo**. 90

Control of Protoporphyrinogen Oxidase Inhibiting Herbicide Resistant and Susceptible Palmer Amaranth (*Amaranthus palmeri*) with Soil-Applied Protoporphyrinogen Oxidase-Inhibiting Herbicides. **Alinna M. Umphres, Lawrence E. Steckel, and Thomas C. Mueller**. 95

• CORRIGENDUM

Control of Protoporphyrinogen Oxidase Inhibiting Herbicide Resistant and Susceptible Palmer Amaranth (*Amaranthus palmeri*) with Soil-Applied Protoporphyrinogen Oxidase-Inhibiting Herbicides – CORRIGENDUM. **Alinna M. Umphres, Lawrence E. Steckel, and Thomas C. Mueller**. 101