

WEED TECHNOLOGY



VOLUME 33 | NUMBER 5

SEPTEMBER–OCTOBER 2019

ISSN 0890-037X | WEET9 32(6) 659–767 (2019)

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)

Peter Dittmar, *Gainesville, FL* (2016)

Steve Fennimore, *Salinas, CA* (2004)

Aaron Hager, *Urbana, IL* (2012)

Brad Hanson, *Davis, CA* (2013)

Prashant Jha, *Ames, IA* (2016)

Amit Jhala, *Lincoln, NE* (2018)

David Johnson, *Des Moines, IA* (2019)

William Johnson, *West Lafayette, IN* (2007)

Andrew Kniss, *Laramie, WY* (2016)

Drew Lyon, *Pullman, WA* (2018)

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)

Eric Webster, *Baton Rouge, LA* (2018)

Cammy Willett, *Fayetteville, AR* (2017)

Tracy Candelaria, *Managing Editor*

Officers of the Weed Science Society of America

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

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 February.

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 February, April, June, August, October, and December. Annual institutional electronic subscription rates: US \$388.00; UK £270.00.

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 2019 by the Weed Science Society of America.

All rights reserved. Reproduction in part or whole prohibited.

Cover

WSSA survey respondents from 2016 through 2018 have listed kochia (*Bassia scoparia*) as among the top 6 most troublesome weeds in corn, cereal grains, sugarbeet, alfalfa, canola, pulse crops, and rights of way. Glyphosate-resistant biotypes of kochia are especially troublesome in Western North American cropping systems that rely on glyphosate for weed control (including wheat-fallow rotations and glyphosate-resistant crops). The availability of alternative herbicides to control glyphosate-resistant kochia depends greatly on crop choice (see page 658).

Photo credit: Andrew R. Kniss, University of Wyoming

WEED TECHNOLOGY

VOLUME 33

SEPTEMBER–OCTOBER 2019

NUMBER 5

• RESEARCH ARTICLES

- Evaluation of the time-of-day effect of herbicides applied POST on protoporphyrinogen IX oxidase-resistant and -susceptible Palmer amaranth (*Amaranthus palmeri*)
J. Drake Copeland, Garret B. Montgomery and Lawrence E. Steckel 651
- Herbicide options for glyphosate-resistant kochia (*Bassia scoparia*) management in the Great Plains
Gustavo M. Sbatella, Albert T. Adjesiwor, Andrew R. Kniss, Phillip W. Stahlman, Phil Westra, Michael Moechnig and Robert G. Wilson 658
- Survey reveals frequency of multiple resistance to glyphosate and dicamba in kochia (*Bassia scoparia*)
Eric P. Westra, Scott J. Nissen, Thomas J. Getts, Philip Westra and Todd A. Gaines 664
- Differential response of horseweed (*Conyza canadensis*) to halauxifen-methyl, 2,4-D, and dicamba
Cara L. McCauley and Bryan G. Young 673
- Halauxifen-methyl preplant intervals and environmental conditions in soybean
Marcelo Zimmer, Bryan G. Young and William G. Johnson 680
- Chemical termination of cover crop rapeseed
M. Carter Askew, Charles W. Cahoon Jr., Michael L. Flessner, Mark J. VanGessel, David B. Langston Jr. and J. Harrison Ferebee IV 686
- Burning postharvest sugarcane residue for control of surface-deposited divine nightshade (*Solanum nigrescens*) and itchgrass (*Rottboellia cochinchinensis*) seed
Douglas J. Spaunhorst, Albert J. Orgeron and Paul M. White Jr. 693
- Management of pigweed (*Amaranthus* spp.) in grain sorghum with integrated strategies
Marshall M. Hay, J. Anita Dille and Dallas E. Peterson 701
- Integrated pigweed (*Amaranthus* spp.) management in glufosinate-resistant soybean with a cover crop, narrow row widths, row-crop cultivation, and herbicide program
Marshall M. Hay, J. Anita Dille and Dallas E. Peterson 710
- Confirmation of S-metolachlor resistance in Palmer amaranth (*Amaranthus palmeri*)
Chad Brabham, Jason K. Norsworthy, Michael M. Houston, Vijay K. Varanasi and Tom Barber 720
- Broadleaf weed control in rain-fed chickpea
Saeed Shahbazi, Marjan Diyanat, Sareh Mahdavi and Soheida Samadi 727
- Modeling germination of smallflower umbrella sedge (*Cyperus difformis* L.) seeds from rice fields in California across suboptimal temperatures
Rafael M. Pedroso, Durval Dourado Neto, Ricardo Victoria Filho, Albert J. Fischer and Kassim Al-Khatib 733
- Evaluation of broadcast and spot herbicide applications for narrowleaf goldenrod [*Euthamia graminifolia* (L.) Nutt.] management in lowbush blueberry
Muhammad H. Farooq, Qamar U. Zaman, Nathan S. Boyd and Scott N. White 739
- Fluridone and acetochlor cause unacceptable injury to pumpkin
J. Harrison Ferebee IV, Charles W. Cahoon Jr., Thierry E. Besançon, Michael L. Flessner, David B. Langston, Thomas E. Hines, Hunter B. Blake and M. Carter Askew 748

• INTRIGUING WORLD OF WEEDS

- Common evening-primrose (*Oenothera biennis* L.)
Lawrence E. Steckel, Lynn M. Sosnoskie and Sandra J. Steckel 757

• CORRIGENDUM

- Fluridone and acetochlor cause unacceptable injury to pumpkin – CORRIGENDUM
J. Harrison Ferebee IV, Charles W. Cahoon Jr., Thierry E. Besançon, Michael L. Flessner, David B. Langston, Thomas E. Hines, Hunter B. Blake and M. Carter Askew 761