Western Society of Weed Science Annual Meeting 2024

Proceedings of the Western Society of Weed Science Volume 77

Denver, Colorado, USA 4-7 March 2024

Editor:

Carl Libbey

ISBN: 979-8-3313-0357-0

Printed from e-media with permission by:

Curran Associates, Inc. 57 Morehouse Lane Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

Printed with permission by Curran Associates, Inc. (2024)

For permission requests, please contact Western Society of Weed Science at the address below.

Western Society of Weed Science 12011 Tejon Street, Ste. 700 Westminster, CO 80234 USA

Phone: 303-327-8016

info@wsweedscience.org

Additional copies of this publication are available from:

Curran Associates, Inc. 57 Morehouse Lane Red Hook, NY 12571 USA Phone: 845-758-0400

Fax: 845-758-2633

Email: curran@proceedings.com Web: www.proceedings.com

GENERAL SESSION	13
Introductions and Announcements.	13
WSWS Presidential Address.	13
The Archaeology of the Mesa Verde Region.	13
Science for a Changing World: Applications in the Colorado River Basin.	13
Washington DC Update	13
POSTER SESSION	14
WSWS Project 1. Weeds of Range, Forestry, and Natural Areas	14
Assessing the Effectiveness of Plant Identification Apps During Invasive Plant Survey	ys 14
A Case for EDRR in Wyoming.	14
Invasive Annual Grass Control on Rangelands with Indaziflam.	
Seed Ecology of the Invasive Malta Starthistle (<i>Centaurea melitensis</i>) and Implication Management.	
Weed Suppression in Rangeland and Natural Areas Utilizing Native Grasses	15
Factors Influencing Plant Response to Indaziflam	16
Ornamental Plants: Invasion Risk for Wyoming.	16
Comparing Remotely-Sensed Invasive Annual Grass Estimates with Ground Monitori Data at Varying Spatial Scales.	
Seedbank Suppression is Critical for Long-Term Dyers Woad Control: It's a Long Wo	oad. 17
Elongated Mustard Management Update in Utah.	18
Managing Tall Oatgrass: It's Not the Cow, It's the How Part II	
WSWS Project 2. Weeds of Horticultural Crops	19
Exploring the Interaction of Tiafenacil with ACCase Inhibitors and Glufosinate for Ita Ryegrass Control in Hazelnut.	
Evaluating the Effect of Endothall-treated Irrigation Water on California Crops	19
Evaluation of Electrical Weed Control in California Orchards	20
Weeds Present at Green Chile Harvest in the Rio Grande Valley of Southern New Me	
Development of Non-synthetic Herbicide Application Programs for Weed Manageme Perennial Crops	
WATTS UP! Soil Applied Pulse Electric Field for Weed Control.	21
Reducing Plastic Dependence in Horticulture: Hydromulching in Strawberry	22
Hydromulches Enhance Weed Management and Crop Yield in Organic Onion Produc	

	Evaluating Nostoc Control with Herbicides in Nursery Gravel Pads.	. 23
	Effect of Hill-drop Seeding on Snap Bean Yield and Potential of In-row Cultivation	. 23
	Can Paper Mulch Replace Plastic Mulch for Floral Hemp Production?	. 24
	Halosulfuron and Imazosulfuron Effects on Yellow Nutsedge Plants Exceeding Sizes Lis on Labels	
	Management of Herbicide-Resistant Palmer Amaranth in Chipping Potato	. 25
	Weed Control and Nitrogen Rate Trial on Native Spearmint.	. 25
V	VSWS Project 3. Weeds of Agronomic Crops	. 26
	Relating Herbicide Residue Level to Sugarbeet Stand and Growth Reduction	. 26
	Pre-emergence Herbicide Efficacy as Influenced by Delayed Incorporation	. 26
	Quizalofop Efficacy for Feral Rye Control in CoAXium Wheat Production Systems in Oregon.	27
	Alternative Herbicides to Control Glyphosate-Resistant Erigeron spp	. 28
	Integration of Fall-Planted Cereal Cover Crops and Herbicides for Weed Control in Dry Bean.	28
	Echinochloa Complex Differential Response to Florpyrauxifen-benzyl in California	. 28
	Confirmation of Glyphosate Resistance in Erigeron spp. in Oregon.	. 29
	Tolpyralate and Bromoxynil Efficacy on Green Foxtail in Small Grains.	. 30
	Effect of Relative Humidity on Glufosinate Efficacy in Kochia and Common Lambsquare Populations.	
	Effects of Adjuvants on Canola Desiccation with Diquat.	. 31
	Wild Oat Resistance in North Dakota.	. 31
	In-Vitro Evaluation of Sorgoleone for Monocot Weed Growth Inhibition	. 31
	Fall Application of Residual Herbicides Reduces Weed Abundance in Spring-Planted Chickpeas	32
	Glyphosate & Glufosinate: Fate in California Almond Orchards	. 32
	Palmer Amaranth (<i>Amaranthus palmeri</i>) and Waterhemp (<i>Amaranthus tuberculatus</i>): an Emerging Problem in Idaho and Oregon.	33
	Does Soil-applied Nitrogen Influence Weed Control and Soybean Yield?	. 33
	Evaluation of Stale Seedbed and Delayed Planting Date for Weed Management in Sugar Beet.	34
	Potential Of Soil and Plant Surfactants on the Efficacy of Some Pre-and-post Emergence Herbicides.	
	Wheat, Canola, and Pulse Tolerance to Pronamide	. 35
	Rapidicil TM , a New Preplant Burndown PPO-Herbicide from Valent U.S.A.	. 35

	Herbicide-resistant Common Chickweed [<i>Stellaria media</i> (L.) Vill.] Populations and Yield Losses in Small Grain Crops in the Central Valley of California	5
	Mechanism of Resistance to Pyroxulam in Italian Ryegrass	5
	Potential Interaction Between Cover Crops and Soil Nitrogen for Dry Edible Bean Growth and Development	
	Weed Control with 2,4-D and Glufosinate Applied Alone, Mixed, and Sequentially in Soybean.	7
	Response of Italian Ryegrass to Crop Rotation and Indaziflam in Eastern Washington 38	3
	Kentucky Bluegrass Response to Pyroxasulfone and Carfentrazone	3
	Evaluation of Preemergence and Postemergence Herbicide Options in Soybean for Weed Control in Southwest North Dakota.	9
	Impact of Irrigation on Herbicide Activity in Cotton Production System	Э
	Weed Control from Soil Residual Herbicides in Sugarbeet	Э
	Bulk Segregant Analysis Identifies Regions of the Genome Associated with Paraquat Resistance in <i>Conyza sumatrensis</i>	C
	Effect of Cover Crop Presence on Herbicide Efficacy	1
	Evaluation of Dicamba, Glyphosate, and Glufosinate-Resistant Sugar Beet Across the Western Production Region	1
	Herbicide Resistant Italian Ryegrass Survey in Northern Idaho and Eastern Washington 42	2
	Crop Safety Evaluation of Dichlorprop-p and Bromoxynil Preplant Applications	2
	Scorch EXT and Maestro EXT: Dichlorprop-p Based Herbicides for Management of Kochia in Fallow and Small Grains. 42	
	Pre-plant Burndown of Conyza spp. in soybeans using atrazine + mesotrione and the evaluation of changes in leaf structure, weed germination timing, and plant back intervals. 43	3
	Halauxifen + Diclosulam in Association with Other Herbicides in Pre-plant of Soybeans ENLIST: Control of Conyza Spp., Changes in Leaf Structure and Membrane Damage 44	4
	Indaziflam Reduces Downy Brome Seedbanks in Wheat-Fallow Systems in Eastern Washington. 44	4
	Building a Weed Seed Database from the Field of Inland Pacific Northwest	5
	Mature Alfalfa Tolerance to Flaming. 4	5
V	VSWS Project 4. Teaching and Technology40	6
	Field Experiences for Effective Weed Management: the Promise of Co-Produced Student- Led Invasive Plant Surveys	5
	From Stress to Success: Hormesis Explained	6
	Advancing Weed Science Research, Extension, and Education: NIFA Grants and Panel Reviewer Opportunities. 4	7

	Developing a Decision Support System to Aid in Selection of Multiple Mode of Action Tank Mixes
	The Importance of Communicating Agricultural Science and Technology, the Role of CAST, and You!
	2023 Survey Results for the Most Common and Troublesome Weeds in Grass Crops, Pasture, and Turf
	What Should Undergraduate Students Learn About Applied Plant Protection?49
	Educational Strategies for Sustainable Weed Control in Agricultural Systems with Crop Rotation in the State of Mato Grosso Do Sul Under a Climate Change Scenario
W	SWS Project 5. Basic Biology and Ecology
	Wind Speed and Nozzle Orientation Impact on Spray Patterns in Wind-Tunnel Experiments.
,	The Role of Cytokinin and Sucrose on 2,4-D Rapid Response of Conyza sumatrensis 51
	Nozzle Angle and Orientation Considerations for Targeted Spray Applications 51
	Potential Impacts of Transgenerational Memory from Weed Competition on Spring Wheat. 52
	Elevated Temperature Impact on Grass and Broad Leaf Weeds
	Herbicide Resistance Within Oregon's Perennial Horticulture Crops: New Cases of Pendimethalin, Glufosinate, and ALS Resistance
	Germination of Common Lambsquarters (<i>Chenopodium album</i>) Seeds in Response to Nitrate and Far-red Light
	Modeling Germinability of Annual Bluegrass in Grass Seed Production Systems 54
	Basis for Dicamba Resistance in Palmer Amaranth (Amaranthus palmeri)
	Understanding the Molecular Mechanism of a Novel Transcription Factor Imparting Non-target-site Resistance to Quizalofop in Rice
WSV	WS PROJECT 1: WEEDS OF RANGE, FORESTRY, AND NATURAL AREAS 56
	Improving Rangeland Sustainability Through Novel Downy Brome Management Tactics. 56
	Evaluating Differences in the Ecology of Small, Non-native Annual Mustards and the Need for Management in Grasslands
	Effects of Grazing Deferment Following Invasive Annual Grass Control with Indaziflam in Northeast Wyoming
	The Effects of Invasive Annual Grass Control on Shrub Leader Growth and Mule Deer (<i>Odocoileus hemionus</i>) Visitation in Boulder County, CO US
	Impacts of Herbicide, and Macro- and Micro-nutrients on Non-native Annual Grass, Ventenata, and Desired Species Composition in Montana Rangelands
	Long-Term Resilience of Sagebrush Steppe Plant Communities to Annual Grass Control. 59

	Long-Term Effects of Indaziflam Applications on a Healthy, Diverse Landscape in Nort Utah.	
	Twenty Years of the Snake River Project: an EDRR Success Story	60
	Management of Potential Wildfire Ladder Fuels in Western U.S. Forests.	60
	Forb Response to Florpyrauxifen-benzyl, Aminopyralid, and Clopyralid for Use in Natural Areas.	
	Better Together? Remote Detection of Invasive Annual Grass Species as Groups vs Sing Species Models.	
	Harnessing Digital Technologies to Advance Invasive Annual Grass Management	62
	Lichen and Moss Response to Cheatgrass Control with Indaziflam and Fire	63
	What Does Repeated Rapid Landscape Monitoring Tell Us About Invasive Annual Gras Treatment?	
	Carbon on the Range: Impacts of Exotic Annual Grass Invasion and Wildfire	65
	Update of Long-term Cheatgrass Control Benefits on Boulder County Open Space Properties.	65
V	VSWS PROJECT 2: WEEDS OF HORTICULTURAL CROPS	
	Tankmixing Bicyclopyrone and Bromoxynil Herbicides for Post-Emergence Weed Management in Direct-Seeded Onion.	
	Reducing Hand Hoeing in Chile Pepper by Controlling Weeds in a Rotational Sorghum Crop.	69
	Adapting Solarization and Biosolarization Technology to Low Desert Agriculture	69
	Crop Safety and Weed Control in Organic Highbush Blueberries Using Electrical Weedi	_
	Onion Response to Bicyclopyrone Applied Pre-Emergence to Manage Weeds in Direct Seeded Onion	70
	Progress Toward In-season Chemigation Treatments for Branched Broomrape Managem	
	Florpyrauxifen for Orchard Floor Weed Management in Western Tree Nuts	71
	Control of Italian Ryegrass, Yellow Nutsedge, and Hazelnut Suckers with EXP KD1	71
	Managing Italian Ryegrass in Hazelnut Orchards with Electricity.	72
	Barley Cover Crops Outperform Brown Mustard for Early-season Weed Control of New Mexico Chile Pepper.	
	Overcoming Weed Competition During Pollinator Habitat Establishment.	73
	Twists and Turns: Effects of Simulated Excess Rainfall on Potato Crop Injury	74
	Can Application Timing Reduce Potential Flumioxazin Injury to Potato?	74
	Yellow Nutsedge Control in Pacific Northwest Potato Production.	75

WS	WS PROJECT 3: WEEDS OF AGRONOMIC CROPS	75
	Alternatives to Paraquat for Weed Burndown in Alfalfa.	75
	EPSPS Copy Number Variation is Correlated with Glyphosate Resistance in Some Italian Ryegrass Populations	
	A Quizalofop-p-ethyl and Glufosinate-ammonium Premix - the Rest of the Story	76
	Post-emergence Pendimethalin in Herbicide Mixture Applications Effect on Weed Control and Rice Response in Water-Seeded Rice	
	Storen: A New Corn Herbicide in 2024 That Provides Clean Rows and Clear Results	78
	Florpyrauxifen-benzyl Provides Selective Broadleaf Weed Control in Sugarbeet	78
	Optimization of Metamitron Rate Applied PRE in Sugar Beet for Management of Palmer Amaranth.	79
	Herbicide Strategies to Manage Glyphosate-, Glufosinate-, and Dicamba-Resistant Kochia Populations in Triple-Stacked Sugarbeet Cultivar.	
	Herbicide-Resistance In Kochia (Bassia scoparia) is Increasing in North Dakota	80
	Kochia Resistance to Foliar-Applied PPO Herbicides.	80
	Kochia Resistance to Soil-Applied PPO Herbicides.	81
	Creating and Employing a Geospatial Database for Monitoring Resistant Weed Population in the Pacific Northwest.	
	Evaluating Chaff Lining in Canadian Cropping Systems.	82
	Smooth Scouringrush (<i>Equisetum laevigatum</i>) Control in Direct-seed Pacific Northwest Cropping Systems with Residual and Non-residual Herbicides	83
	Pre and Post-Emergent Use of Flumetsulam in Clover Grown for Seed	83
	Rotational Crop Response to a Novel Cereal Mixture of Tolpyralate and Bromoxynil	84
	Russian Thistle Cooperative Management.	84
	POST Emergence Broadleaf Weed Control in Sorghum Sudangrass.	85
	IronGate Is a New Pre-mixture of Flucarbazone and Pyroxsulam for Weed Control in US Wheat.	85
	Grassy Weed Control in Winter Wheat with Imazamox and Quizalofop-p-ethyl	86
	Weed Seed and Plant Control with IR and Visible Light.	86
	Pre-emergent Herbicides for Low Desert Guayule.	86
	Screening Post Emergence Herbicides for Annual Grass Control in Grass Seed Production	
	Rapidicil TM , a Novel Broad-Spectrum Burndown Herbicide from Valent U.S.A. LLC	
	Integrating Unmanned Aerial System (UAS) Imagery with Ground-Based Spot Spray Application Technology.	88

	Nozzle Selection and Application Methods for Optimal Weed Management in Specialty Crops Utilizing Trellis.	88
WS	WS PROJECT 4: TEACHING AND TECHNOLOGY	
	Various Dicamba Thresholds in Soybean.	
	Invasive Annual Grasses Tech Transfer Partnership: Empowering Land Managers to Strategically Defend and Grow the Sagebrush Core.	89
	Protecting Freshwater Resources in the Arid West: Understanding the Impacts of Aquatic Weeds.	
	Utilizing Hands-On Learning During In-Person Extension Weeds Schools	90
	Podcasting as a Strategy to Win the War Against Weeds.	91
WS	WS PROJECT 5: BASIC BIOLOGY AND ECOLOGY	91
	The Influence of Rainfall on S-metolachlor Activity Applied to Wheat Residue	91
	Novel Weed Control with Low Doses of Electricity	92
	Evaluation of Intermediate Wheatgrass (<i>Thinopyrum intermedium</i>) Herbicide Tolerance	92
	From Liberty 280 (Racemic Glufosinate) to Liberty® ULTRA Herbicide (L-glufosinate), Powered by Glu-LTM Technology.	
	Effect of Different Herbicides on Soil Health in Cotton Production Systems.	93
	Developing a Petri Dish Assay to Compare the Response of Pigweed Species to Residual Herbicides.	94
	Buffering the Effects of a Changing Climate: Halophytes as a Source of Osmotic Stress Tolerance.	94
	Factors Affecting the Management of Aminopyralid Residues, a Persistent Herbicide User for Invasive Plant Management in Alaska.	
	Investigating Dicamba Resistance in Kochia Populations from Colorado	95
	Germination, Ecology, and Herbicide Resistance Status of Palmer Amaranth and Common Waterhemp in the Central Valley of California	
	GST Inhibition - Influence on Quizalofop P-ethyl Metabolism in Winter Wheat	97
	Kochia and Russian Thistle: Two Tumbleweeds in a Pod?	97
	Russian Thistle Seedbank Longevity and Seedling Emergence in Oregon	97
SYI	MPOSIUM: ESA, How Got Here and Potential Implications	98
	EPA Perspective.	98
	U.S. Forest Service Perspective.	98
	Colorado Department of AG Perspective.	98
	Questions and Discussion.	98
CVI	MPOSITIM: Palmer Amaranth in the West	98

Origin Stories: Hypotheses for	or the Rise of Palmer Amaranth	98
Impacts of Palmer amaranth	to the dry bean Industry	98
Impacts of Palmer amaranth	to the sugar beet Industry	98
Impacts of Palmer Amaranth	to the Seed Industry	98
State of Palmer Amaranth Re	sistance in the West.	98
Management of Palmer Ama	ranth the West	98
DISCUSSION SESSIONS		100
Project 1 Discussion Session:	Pasture, Range, Forestry, and Natural Areas	100
Project 2 Discussion Session:	Weeds of Horticultural Crops	103
Project 3 Discussion Session:	Weeds of Agronomic Crops	105
Project 4 Discussion Session:	Teaching and Technology	107
Project 5 Discussion Session:	Basic Biology and Ecology	109
Discussion Session: Educatio	n and Regulatory	111
WSWS BOARD OF DIRECTO	R'S BOARD POST ANNUAL MINUTES (2023)	114
WSWS BOARD OF DIRECTO	R'S SUMMER BOARD MEETING MINUTES (2023)	118
WSWS ANNUAL BUSINESS N	MEETING MINUTES (2024)	126
WESTERN SOCIETY OF WE	ED SCIENCE NET WORTH REPORT	131
WESTERN SOCIETY OF WE	ED SCIENCE CASH FLOW REPORT	132
WSWS 2024 FELLOW AWAR	DS	133
Sandra McDonald, Mountain	West PEST – Fort Collins, Colorado	133
Stott Howard, Syngenta Crop	Protection, Des Moines, Iowa	134
WSWS 2024 HONORARY ME	MBER	134
WSWS 2024 OUTSTANDING	WEED SCIENTIST AWARDS	135
Outstanding Weed Scientist,	Early Career, Public Sector: Albert Adjesiwor	135
The Outstanding Weed Scien	tist, Early Career, Private Sector: Derek Sebastian	135
The Outstanding Weed Scien	tist, Public Sector: Andrew Kniss	135
The Outstanding Weed Scien	tist, Private Sector: Greg Dahl	135
WSWS 2024 PROFESSIONAL	STAFF AWARD	136
The Outstanding Professional	Staff: Cody Beckley	136
The Outstanding Weed Mana	ger: Joe Swanson	136
WSWS 2024 PRESIDENTIAL	AWARD OF MERIT	137
Tracy Rauch		137

WSWS 2024 ELENA SANCHEZ MEMORIAL STUDENT SCHOLARSHIP	
RECIPIENTS	138
Jennifer Valdez Herrera	138
Victor Hugo Vidal Ribeiro	138
Tong Zhen	138
WSWS 2024 RITA BEARD ENDOWMENT STUDENT SCHOLARSHIP	139
Erin Teichroew	139
WSWS 2024 STUDENT PAPER AND POSTER AWARDS	140
WSWS 2024 ANNUAL MEETING NECROLOGY REPORT	142
David E. Bayer	142
Keith (KC) Carl Hamilton	143
Doug Ryerson	143
Stephen D. Miller	143
Lauren Thompson	144
Thomas B. Threewitt	145
Raymond D. William	146
WSWS 2024 ANNUAL MEETING RETIREES REPORT	147
WSWS 2024 ANNUAL MEETING ATTENDEES	148
WSWS 2024 ANNUAL MEETING – AUTHOR INDEX	154
WSWS 2024 ANNUAL MEETING ABSTRACT NUMBER, PAGE NUMBER INI	DEX . 164
2024 WSWS SUSTAINING MEMBERS	168