



2022-2023 WSSA Standing Committee Report

Committee Code and Name: E-12b Herbicide Resistance Education

Committee Chair: Jill Schroeder

Committee Members, 2021 (includes sub-committee members)

- Amy Asmus
- Michael Barrett
- David Ervin
- George Frisvold
- Todd Gaines
- Raymond Jussaume
- Andrew Kniss
- Ramon Leon
- John Madsen
- Jill Schroeder
- Francois Tardif
- Lee VanWychen
- Muthu Bagavathiannan
- David Shaw
- Katie Dentzmann
- Ian Burke
- Aaron Hager
- Bill Chism
- Clint Pilcher (ESA representative)
- Mark VanGessel (EPA liaison)
- Lindsay Haines (NRCS)
- Kelly Tindall (EPA)
- Cameron Douglass (USDA-OPMP)
- Chandra Aradhya (HRAC)
- Caren Schmidt (Public Awareness)
- Lynn Sosnoskie (Extension)
- Neil Hoffman and/or Rebecca Fletcher (APHIS - (Ex off)

Board Coordinator: Lynn Sosnoskie

Committee Members Rotating Off: John Madsen (APMS); Chandra Aradhya (HRAC)

Recommended Replacements/Additions: Gray Turnage (APMS); Craig Alford (HRAC); Emily Unglesbee (Communications Specialist)

2023 Plan for Committee Activities

Goals for 2023:

- Complete the crop advisor survey and finalize the report.
- Amy Asmus and Katie Dentzman are working with the Iowa Pest Resistance Management Program (IPRMP) group. Members of this committee will collaborate with the Iowa project when possible and will look to learn from this group as a case study in community engagement.
- PNW community efforts are continuing.
- Continue work on developing the resistance management assessment framework; goal would be to have a framework that regions/locales can use in their discussions and to refine crop specific resistance management tools. HRAC needs to be involved in this effort.
- Continue to engage with federal partners and other professional organizations.
- Engage communication specialist to learn more about how to frame issues.
- Continue to communicate with the WSSA-Endangered Species and Herbicide Resistance Committees with goal to complement activities and avoid duplication of efforts.

Recommendations for Board/Society Action:

Funds requested for 2023:

- The committee requests \$10,000 to support activities that could not be undertaken due to COVID-19 in 2022. The activities may include a tour of the PNW projects for USDA and EPA staff, follow up to the listening sessions for CCA members/crop advisors, or travel for other outreach activities. The board will be kept apprised of proposed activities with requests for approval if restrictions due to COVID-19 allow planning to go forward.

Other requests for the Board:

- Consider developing additional mechanisms to remain in a leadership position addressing and articulating the complex issues impacting agriculture and natural resources because of pest resistance.
- Feedback on directions the committee is taking, on partnerships being developed, and on the published material we have developed.
- The PPDC Resistance Workgroup recommended to EPA that pesticide label reform is needed to address resistance issues. The E-12b committee requests that the Board support the label reform movement by ensuring stakeholder input to the ongoing work and small sub groups that are moving forward based on the workgroup recommendations.

Summary of 2022 Activities

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- Complete the crop advisor listening sessions and finalize the report.
- Amy Asmus and Katie Dentzman are working with the Iowa Pest Resistance Management Program (IPRMP) group. Members of this committee will collaborate with the Iowa project when possible and will look to learn from this group as a case study in community engagement.
- PNW community efforts are continuing.
- Continue to engage with federal partners and other professional organizations.

List the committee's accomplishments (since the last annual meeting):

1. **Crop advisor listening sessions** (Katie Dentzman) All of the sessions have been completed, scored, and summarized. Preliminary results were presented at the annual meeting of the Agriculture, Food, and Human Values Society (May 2022, Athens, GA). Katie developed a survey of the full Certified Crop Advisor (CCA) community from these initial results and after working with ISU survey institute to

finalize. The survey has been sent out to the CCA community with results expected in January. This work is funded by a grant from the North Central IPM Center.

2. **Herbicide Resistance Management Plan:** Bill Chism led an effort to develop a list of elements important to consider in a resistance management plan. The goal would be to provide this information to EPA as an outcome of the 2021/22 work of the Pesticide Program Dialogue Committee (EPA-PPDC) to address EPA role in pesticide resistance management (see the 2022 E-12b report to WSSA). Bill and Jill approached David Simpson who had chaired a sub-committee of this committee who had drafted a manuscript addressing this subject. David is currently working to finalize and submit this paper. In addition, he is working with a Corteva team to develop a nicely formatted image of the assessment tool for creating a resistance management plan.
3. **EPA – PPDC:** The fall meeting was cancelled. The EPA Resistance Management workgroup was moving forward with Cameron Douglass agreeing to serve as chair of a new workgroup. The EPA side was to be led by Nikhil Mallampalli and Jonathan Becker; however, Dr. Becker recently retired from EPA. The workgroup development and further activity is on pause until the PPDC reconvenes. Katie Dentzman attended and spoke at an EPA pesticide listening session at the Iowa State Fair in August of 2022. She is additionally working with Cameron Douglass to arrange a presentation of her work to the USDA in the spring of 2023.
4. **International IPM Symposium:** Clint Pilcher, Katie Dentzman, and George Frisvold organized a session titled “Approaching IPM and Resistance Management Through Understanding How Community Social Dynamics Can Affect Adoption” that was held on March 2, 2022 in Denver, CO (<https://ipmsymposium.org/2022/>). Presenters included E-12b committee members Clint Pilcher, Katie Dentzman, Amy Asmus, Jill Schroeder. The presentations led to an extended discussion and a subsequent invitation from the organizing committee to serve on a framing committee to discuss **Meeting the Needs of Twenty-First Century Agriculture: A Dialogue on the Application and Future of IPM.** Clint Pilcher, Amy Asmus and Jill Schroeder represent the E-12b committee. Several virtual meetings have been held to develop a framework for a larger dialogue that will go forward in 2023.
5. **Mark VanGessel tour for EPA.** WSSA sponsored a tour in the mid-Atlantic hosted by Mark and Bill Chism. Forty-three EPA staff from BEAD, PRD, RD, EFED attended. The focus was on herbicide resistance and challenges of implementing mitigations strategies (pick list outlined on proposed atrazine label). The EPA staff had a chance to interact with farmers and crop consultants; weeds of concern were Italian ryegrass, common ragweed, and Palmer amaranth. Survey feedback from the participants was very positive.
6. **Pacific Northwest RM programs:** Ian Burke. Grain grower groups from the PNW worked to establish permanent funding to support RM research and outreach. \$2M was appropriated in FY23, and an additional \$1M was appropriated in FY24 to fully fund the Initiative. The funding is appropriated to fund weed science research through ARS. ARS is in the process of hiring 1 weed scientist in FY23 and will be hiring two additional positions on FY24 appropriations to fill roles that had been lost in recent years. The program is just launching with initial proposal development for research programs.
7. David Shaw, Amy Asmus and Jill Schroeder have continued to have virtual conversations with Cameron Douglass (USDA-OPMP) and Lindsay Haynes (USDA-NRCS) to discuss ways that WSSA can assist NRCS with resistance training efforts.
8. **Iowa Pesticide Resistance Management Program:** Katie Dentzman, Amy Asmus, and Clint Pilcher continue to work with the Iowa Pest Resistance Management Program. They assisted in hosting a statewide summit in April 2022 (see summary at: <https://iastate.box.com/s/iref1q94jyy04dlbdq6bdsbw2pih2y74>) and are involved in developing the IPRMP Phase II Guiding Document along with a range of other Iowa stakeholders, with dual foci on further developing the Communication/Outreach and Economics components.
9. **National IPM Coordinating Committee:** Katie Dentzman gave a presentation on socio-economic dimensions of pesticide resistance at the annual meeting of the NIPMCC
10. **Joint AFHVS and ESA-NCB Meeting Proposal:** Katie Dentzman and Clint Pilcher worked together along with members of their respective professional organizations to develop and submit a conference

grant proposal to USDA AFRI Program A1642 proposing a series of transdisciplinary conference activities between the Agriculture, Food, and Human Values Society and the Entomological Society of America—North Central Branch.

Publications:

Cara McCauley, Travis Legleiter, Rod Herman, Reza Rasoulpour, Jill Schroeder, Todd Pilcher, Karen Meinders, and Terry Wright. **Sustainability and Weed Management – What Is It and How Are We Doing?** Weed Technology (accepted). The publication is a summary of the presentations from the WSSA 2021 symposium of the same title. Schroeder’s section provides a history of activities of the E-12b Herbicide Resistance Education Committee.

Dentzman, Katherine. Academics and the ‘easy button’: Lessons from pesticide resistance. *Agriculture and Human Values* 39(4): 1179-1183.

Allen, J., D. Ervin, G. Frisvold, J. Brosnan, J. McCurdy, B. Grubbs, A. Patton, M. Elmore, T. Gannon, B. McCarty, P. Mucollough, J. Kaminski, S. Askew, A. Kowalewski, J. Unruh, J. McElroy and M. Bagavathianan. 2022. Herbicide-Resistance in Turf Systems: Insights and Options for Managing Complexity. *Sustainability* 2022, 14, 13399. <https://doi.org/10.3390/su142013399>

Ervin, D, L. Dixon, A. Montroy, A. Patton, B. Bowling, M. Elmore, T. Gannon, J. Kaminski, A. Kowalewski, J. McCurdy, S. Elroy, B. Unruh and M. Bagavathianan. (2022). Contemporary Challenges and Opportunities for Improved Lawn Weed Management: Insights from U.S. Lawn Care Operators. *Outlooks on Pest Management*. Volume 33, Number 3, June 2022, pp. 95-100(6) DOI: https://doi.org/10.1564/v33_jun_04

Boyd, N., Moretti, M., Sosnoskie, L., Singh, V., Kanissery, R., Sharpe, S., . . . Sandhu, R. (2022). Occurrence and management of herbicide resistance in annual vegetable production systems in North America. *Weed Science*, 70(5), 515-528. doi:10.1017/wsc.2022.43

Shaw, David, Amy Asmus, David Ervin, Jill Schroeder. **Changing the Paradigm for Pesticide Resistance Management**. Pest Management Science (in preparation).

What information was posted on the WSSA website?

- Nothing new at this time.

What amount of funds were requested? How much was spent?

- \$90,000 grant received from USDA-APHIS; remaining funds were used to partially support the crop advisor listening sessions.
- WSSA funding in the amount of \$10,000 was requested to cover additional expenses not allowed under the APHIS grant in 2021; the funds were not spent due to the decision (COVID restrictions) to change course from an in-person listening session to several virtual listening sessions and receipt of other funds to support the listening sessions and development of the crop advisor survey.

What was the impact of the committee activities/accomplishments on the following: membership, publication, policy, legislation, and/or education?

- Herbicide resistance has received substantial attention from a number of federal agencies, as well as Capitol Hill. WSSA has been placed in a prominent leadership role because of our efforts.
- Educational products have been used extensively for training purposes. We have partnered with a number of commodity groups to extend our reach.

- Many members have been involved in committee and subcommittee activities and have engaged with new groups of stakeholders. The activities have engaged audiences (examples include AAAS and NAS) that were not aware of resistance as an issue comparable to the antibiotic resistance that has been an issue of great concern to these scientists. A number of additional members have been involved in 2022.
- EPA and USDA agencies continue to look to WSSA as the authoritative source for technical information and education in regards to herbicide resistance management strategies.
- Members of the Entomology Society of America have been engaged as a partner to continue collaboration and partnership on resistance outreach activities.
- The PNW has been working with local partnership NRCS reps to brainstorm outreach and education, as well as designing a herbicide resistance program for integration into their current Conservation Activity Plan program. The IMRMP has been pursuing similar work with the Iowa State NRCS, and continues to develop plans for communication, outreach, and economic impact assessments.

What is the current state of the committee's projects and activities?

Notes from the January 5, 2023 meeting of the committee that are not captured elsewhere in the report:

- The crop advisor survey is ongoing with Dr. Dentzman as the lead. The results should be available in January, after which they will be analyzed, summarized, and presented at an Agronomy Society of America webinar.
- The resistance management manuscript and assessment will be finalized and shared.
- Committee members continue to engage in IPM framework discussions.
- Committee members continue to interact with other organizations through symposia and meetings.
- Kelly Tindall (EPA) shared that the PPDC just appointed a new Designated Federal Official; therefore, plans for the spring meeting of the PPDC are moving forward. Cameron Douglass (USDA-OPMP) shared that the workgroup activity on the role of EPA in the issue of pesticide resistance is moving forward; the chairs are working on the process.
- Cameron Douglass (USDA-OPMP) shared that the Federal IPM Coordinating Committee is exploring the formation of an informal subgroup wherein federal agencies could discuss and work on government coordination of resistance management activities. Also, NRCS approved the launching of a new Conservation Enhancement on Resistance Management that, when rolled out, will provide growers with a new source of incentives (in addition to those from basic Conservation Practice enrollment). Lastly, the USDA's Office of Pest Management Policy (OPMP) is working to improve coordination between EPA's Office of Pesticide Programs (OPP) and the Biotechnology Regulatory Service (BRS) in USDA's Animal and Plant Health Inspection Service (APHIS), including hosting regular meetings to discuss common herbicide biotechnology issues.
- Craig Alford (HRAC) shared a slide set outlining changes in the administrative team (<http://www.hracglobal.com/usa/>). They have hosted a resistance management webinar series and are promoting herbicide resistance management through sponsorship of an award at WSSA. HRAC members are updating the MOA codes on herbicide labels. CropLife has sponsored a case study on the economic impact of resistance and is interested in developing a one-page educational piece to promote awareness of herbicide resistance.
- Committee discussion was robust on the topic of education – the question raised was ‘what has WSSA or members done to change the information/outreach since the inception of the committee?’ A preventative approach as originally posed, no longer is appropriate in many situations (not all – some areas are active in prevention due to low levels of resistance). Points raised include:
 - Aaron Hager – The discipline is now dealing with metabolic resistance in addition to target site resistance. Are we managing correctly? Emphasis is now on reducing seed production which is hard to implement economically; growers and consultants must take a more biological approach to management.

- Greg Dahl – weed management is much more complex as a result and emphasizes nonchemical approaches. Weed management becomes a farm-by-farm decision which makes it difficult to provide input to assist farmers.
- Mark VanGessel – cover crops have shown benefit in the NE. The regional and field by field approach creates a challenge for messaging.
- Lynn Sosnoskie – Their focus is on biological/ecological aspects – an understanding of dispersal and affect of human activity. Prevention is still important in the NE.
- Muthu Bagavathianan – TX cotton in a semiarid environment; cover crops are gaining importance but it is challenging in moisture limiting environments. Harvest weed seed control not as suitable for this system; they are looking at multitactical strategies.
- Andrew Kniss – made three points: 1) the economics of tank mixtures, especially as a prevention tool, is not to the grower’s advantage. 2) His messaging has changed to an EDRR (early detection rapid response to eliminate HR weeds) approach based on the invasive species literature. 3) the Zero Threshold approach for weed seed production fits within the EDRR approach.
- David Ervin – the issues around HR apply to systems beyond agronomic and horticultural crops and must include systems like turf. We must concentrate on tailoring solutions to the specific setting.
- Clint Pilcher – messaging is a social issue. The Agriculture, Food and Human Society and Entomology Society are sending representatives to each other’s meetings to improve understanding.
- Caren Schmidt (PA committee) said that public awareness would be interested in developing stories on the Crop Life Case Study, the crop advisor survey, and the activities of the Take Action/GROW group.
- Bill Chism (ESA committee) shared an update on work and lead a discussion on how they could interact with the HRE committee. He foresees label changes/restrictions to address ESA which poses a risk to the tools available for managing HR weeds. The committee was invited to the workshop to be presented at the WSSA meeting. Discussion that followed was robust and included:
 - Katie Dentzman – communication and trust building is needed when looking at regulation
 - David Ervin – Extension specialists are the trusted source; therefore, must be engaged around HRM and ESA issues.
 - David Shaw – We need to be very careful with the language we choose to use when discussing the impact of HR on ESA. What is the impact of herbicide resistance on ESA?
 - All – we need to recruit a communications specialist to be a member of our team.
 - All – we need to improve communication among groups – how do we share knowledge across industries.
 - Amy Asmus – There is a relationship between pest management and ESA. The industry is losing tools because of ESA. Pests with no tools for management become invasive. Once we cannot control pests, what does their increased presence do to the preservation of the environment that the endangered species needs to survive? Also, might the endangered species become threatened further by new pests?
- Katie Dentzman contacted Emily Unglesbee (Virginia Tech GROW Director of Outreach and Extension) after the meeting and invited her to join our committee to assist with the communications discussions and help chart a path forward.