@agronomybadger

Combine Cleaning
Fall Weed Seed Management

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Why Fall Weed Seed Management Matters

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Really Seed Production? Why?

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Fall Weed Seed Management- Seed Retention

WEED SEED PRODUCTION & RETENTION IN SOYBEAN

TABLE 1

		Seed Production per plant		Seed Retention % at harvest	
		2013	2014	2013	2014
Palmer amaranth	Arkansas	50,022 ± 8,209	33,195 ± 5,775	99.98 ± 0.00	99.85 ± 0.05
	Illinois	26,038 ± 3,753	-	99.95 ± 0.03	-
	Nebraska	36,978 ± 5,399	58,004 ± 9,434	98.89 ± 0.23	99.93 ± 0.02
	Missouri	13,384 ± 27,363	60,221 ± 21,991	99.98 ± 0.00	99.67 ± 0.20
	Tennessee	22,833 ± 4,914	-	99.96 ± 0.01	-
Waterhemp	Illinois	25,649 ± 5,800	11,833 ± 2,277	99.98 ± 0.01	94.98 ± 0.94
	Nebraska	60,228 ± 8,348	82,811 ± 15,051	99.99 ± 0.00	99.63 ± 0.10
	Missouri	19,727 ± 2,493	23,787 ± 4,200	100.00 ± 0.00	99.84 ± 0.04
	Wisconsin	17,459 ± 2,625	38,221 ± 7,956	99.96 ± 0.00	98.80 ± 0.30

Adapted from: Schwartz, L., Norsworthy, J., Young, B., Bradley, K., Kruger, G., Davis, V., Steckel, L., Walsh, M. (2016). Tall Waterhemp (*Amaranthus tuberculatus*) and Palmer amaranth (*Amaranthus palmeri*) Seed Production and Retention at Soybean Maturity. Weed Technology, 30(1), 284-290. doi:10.1614/WT-D-15-00130.1

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Fall Weed Seed Management- Seed Retention

TABLE 2

	Total Seed Captured per plant	**% Seed Shattered** before crop harvest	**% Seed Shattered** during harvest delay	**% Retained** on plant after simulated harvest
Redroot pigweed	149,427 ± 27,267	7.2 ± 1.1	7.7 ± 0.9	85.1 ± 17.5
Common ragweed	2,204 ± 382	7.2 ± 1.2	14.1 ± 2.4	78.7 ± 15.3
Common lambsquarters	62,091 ± 11,332	4.3 ± 0.7	40.6 ± 8.1	55.2 ± 12.0
Common cocklebur	1,325 ± 155	14.4 ± 3.5	48.2 ± 8.2	38.9 ± 5.5
Giant foxtail	26,334 ± 2,124	26.3 ± 3.6	24.0 ± 2.8	49.8 ± 5.2
Large crabgrass	84,721 ± 11,637	46.3 ± 6.9	13.7 ± 1.9	40.0 ± 7.7

Adapted from: Haring S. (2017) Harvest Weed Seed Control: An Integrated Weed Management Strategy for Organic and Conventional Production System. M.S. Thesis. Blacksburg, VA: Virginia Tech. 64 p

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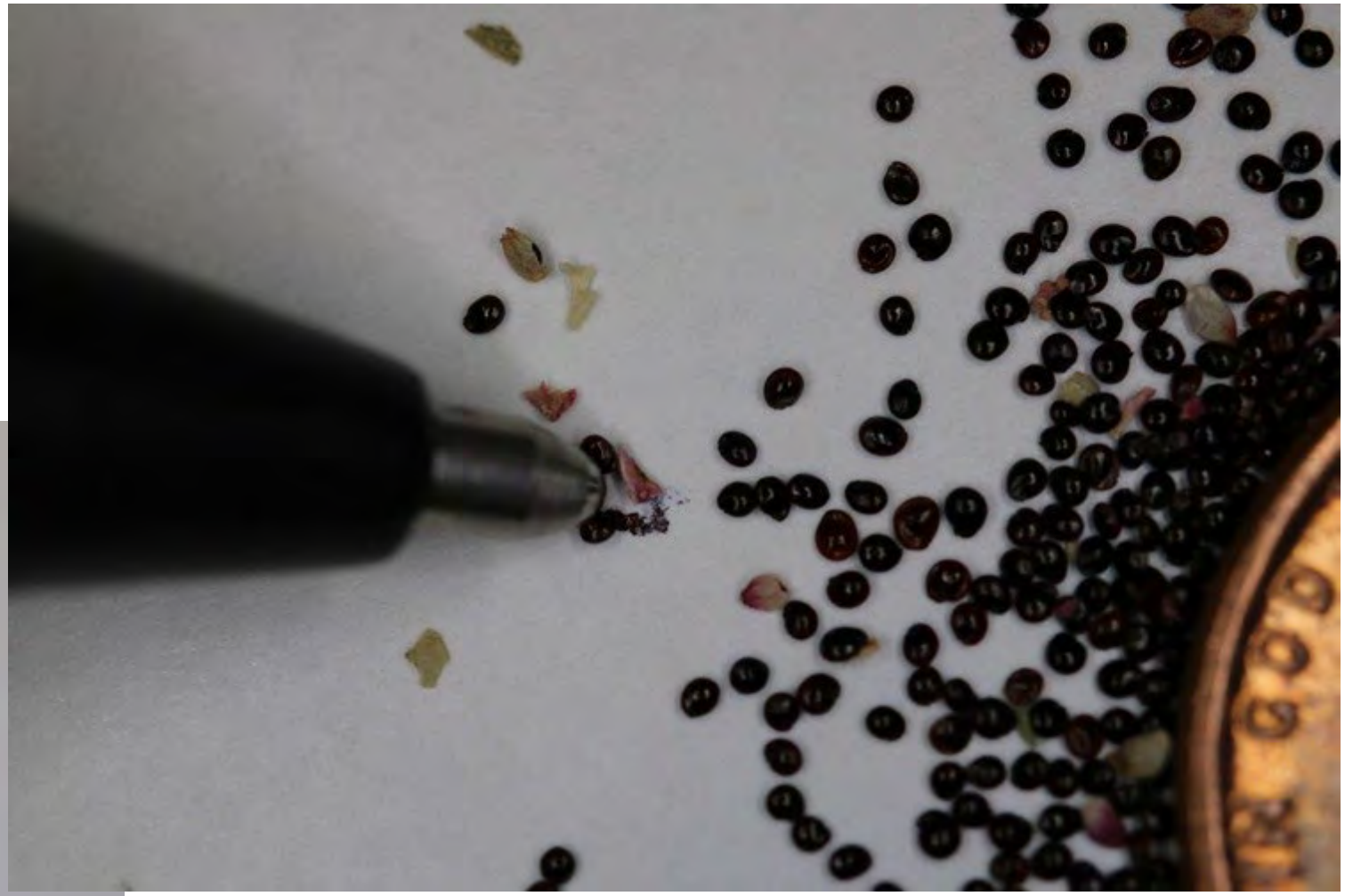
Waterhemp Seed



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Waterhemp Seed Dispersal: Combines

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Waterhemp Seed Dispersal: Combines

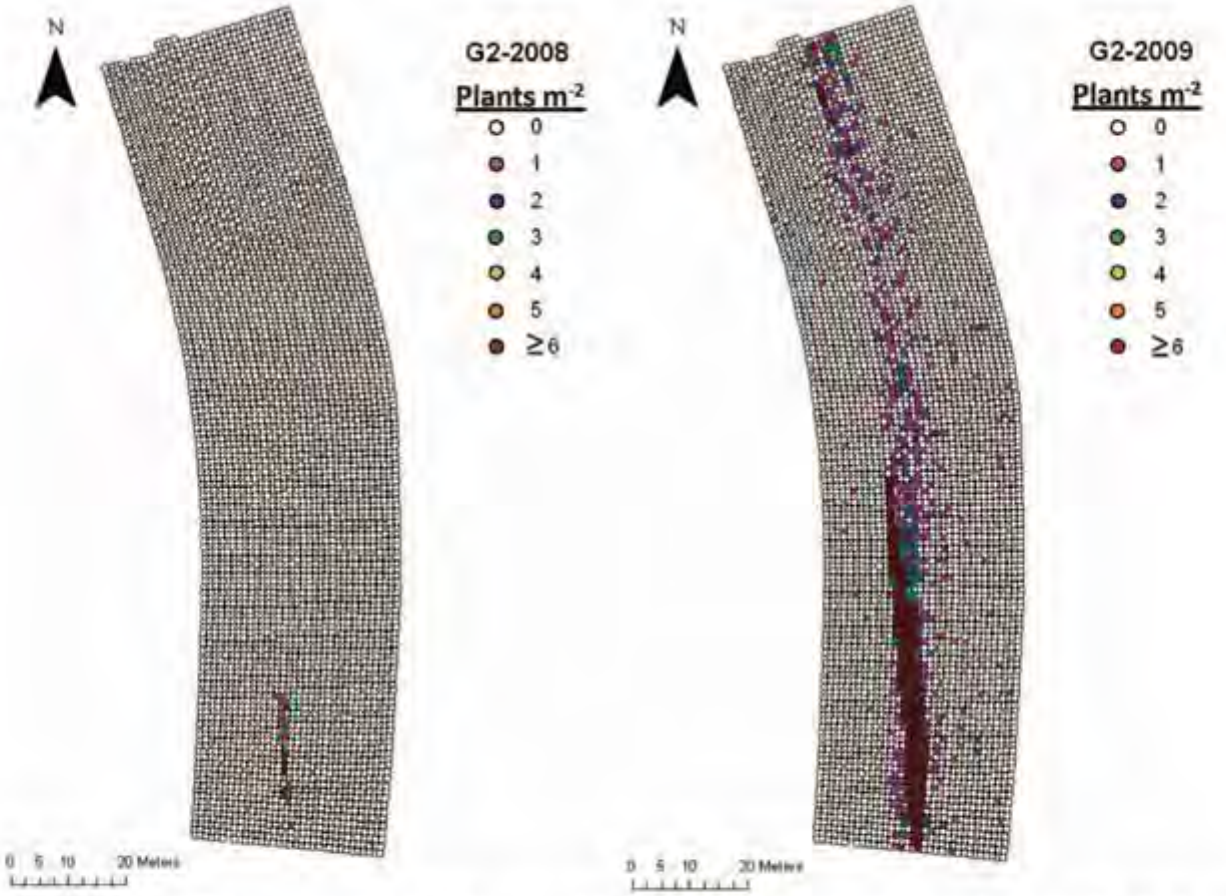

Figure 1. Glyphosate-resistant Palmer amaranth density maps from 2008 (first growing season after introduction) and 2009 (second growing season) for field G2 (0.53 ha) at the University of Arkansas–Agriculture Research and Extension Center, Fayetteville, AR.

WSSA

In-Field Movement of Glyphosate-Resistant Palmer Amaranth (*Amaranthus palmeri*) and Its Impact on Cotton Lint Yield: Evidence Supporting a Zero-Threshold Strategy

Jason K. Norsworthy, Griff Griffith, Terry Griffin, Muthukumar Bagavathiannan, and Edward L. Gbur*

Norsworthy et al.: In-field movement of Palmer amaranth 237

Norsworthy, Jason K., et al. "In-field movement of glyphosate-resistant Palmer amaranth (Amaranthus palmeri) and its impact on cotton lint yield: evidence supporting a zero-threshold strategy." *Weed Science* 62.2 (2014): 237-249.

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Combine Weed Seed Dispersal

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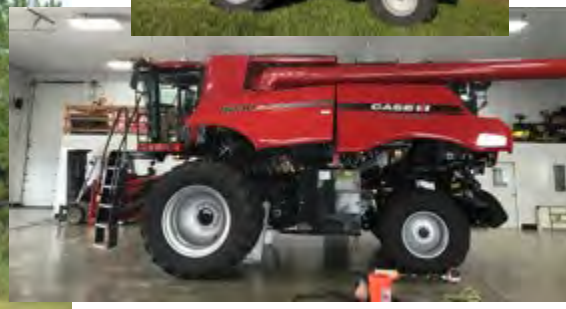
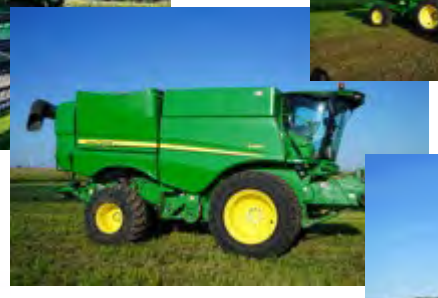
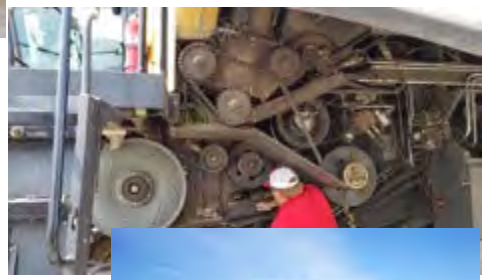
2018-2024 Combine Cleaning Clinics
19 Combines- 17 contained weed seed







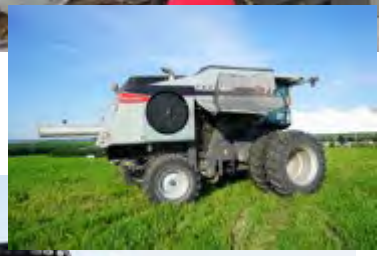


Photo: Jamie Patton

Where Weed Seeds Hide

Photo: Jamie Patton

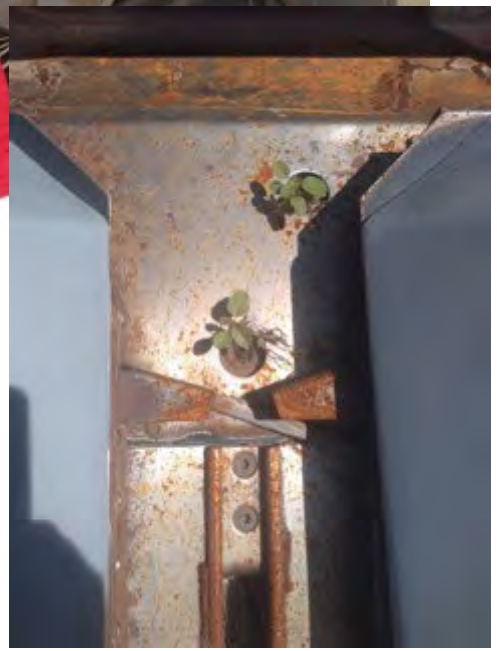


Photo: Josh Kamps

Where Undesired Seeds May Hide

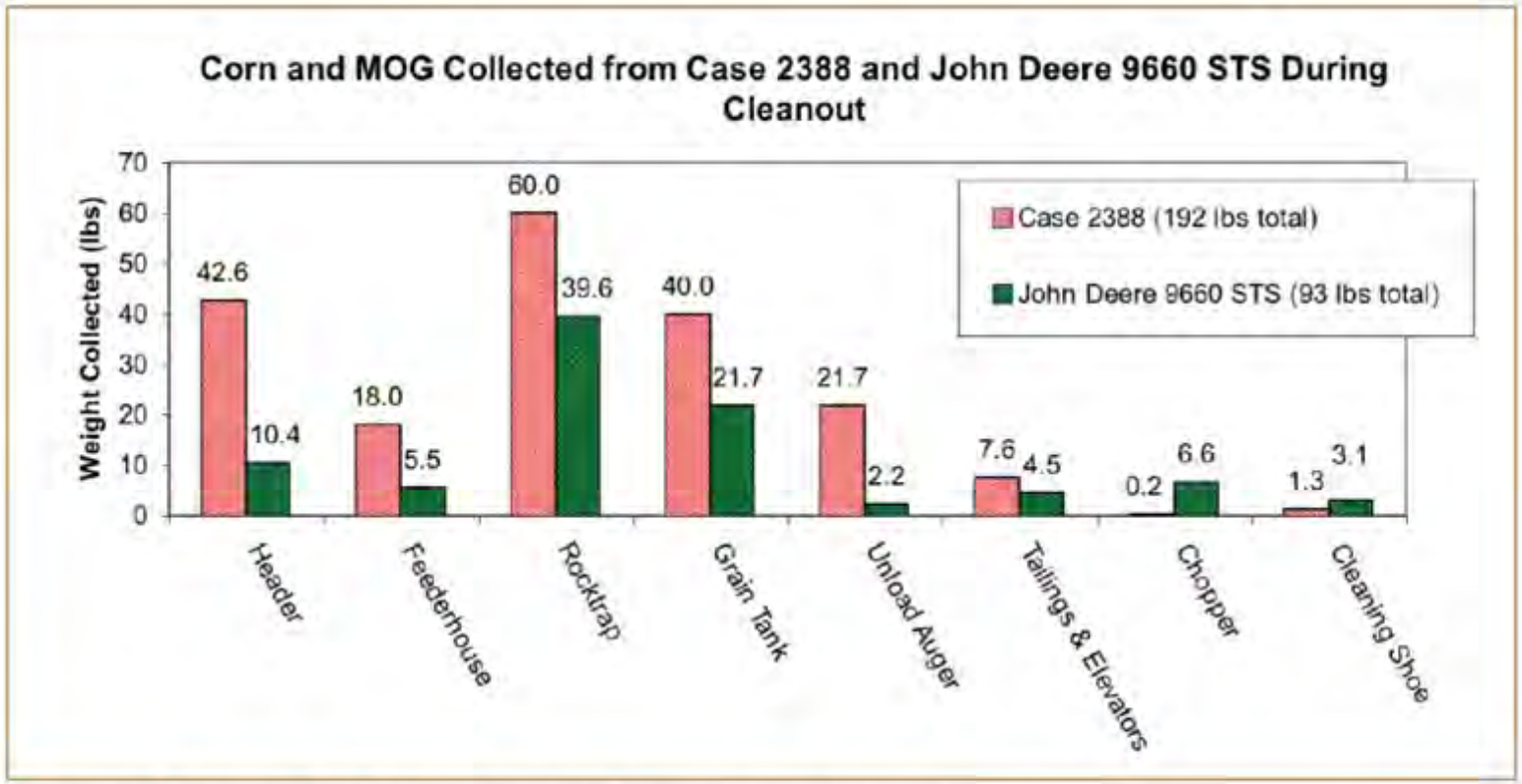


Figure 1. *Material collected inside combines during cleaning.*

John Deere data courtesy of: Hanna, H.M., Quick, G.R., and Jarboe, D.H. 2004. Combine Cleanout for Identity Preserved Grains. Proceedings of the 2004 International Quality Grains Conference, Indianapolis, Indiana. July 19-22, 2004

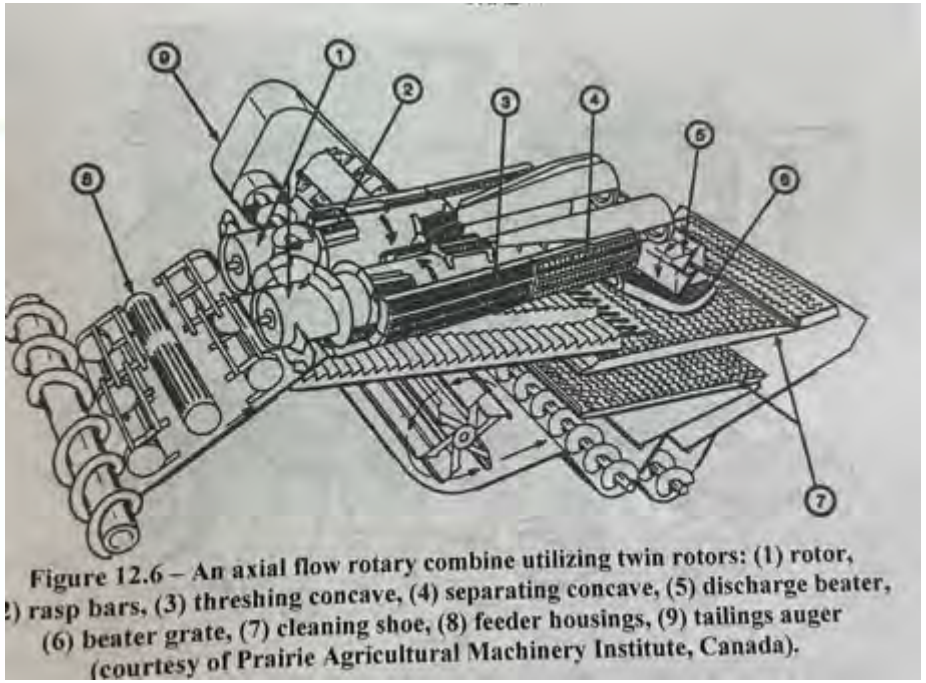
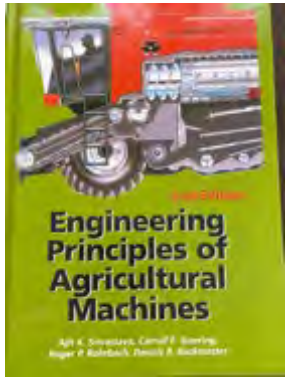


Figure 12.6 – An axial flow rotary combine utilizing twin rotors: (1) rotor, (2) rasp bars, (3) threshing concave, (4) separating concave, (5) discharge beater, (6) beater grate, (7) cleaning shoe, (8) feeder housings, (9) tailings auger (courtesy of Prairie Agricultural Machinery Institute, Canada).



Grain Harvesting Chapter 12 Engineering Principles of Agricultural Machines, 2nd ed., pp. 403-436 St. Joseph, Michigan: ASABE. (doi: 10.13031/2013.41474)

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So Your Going To Clean Your Combine Between Fields?

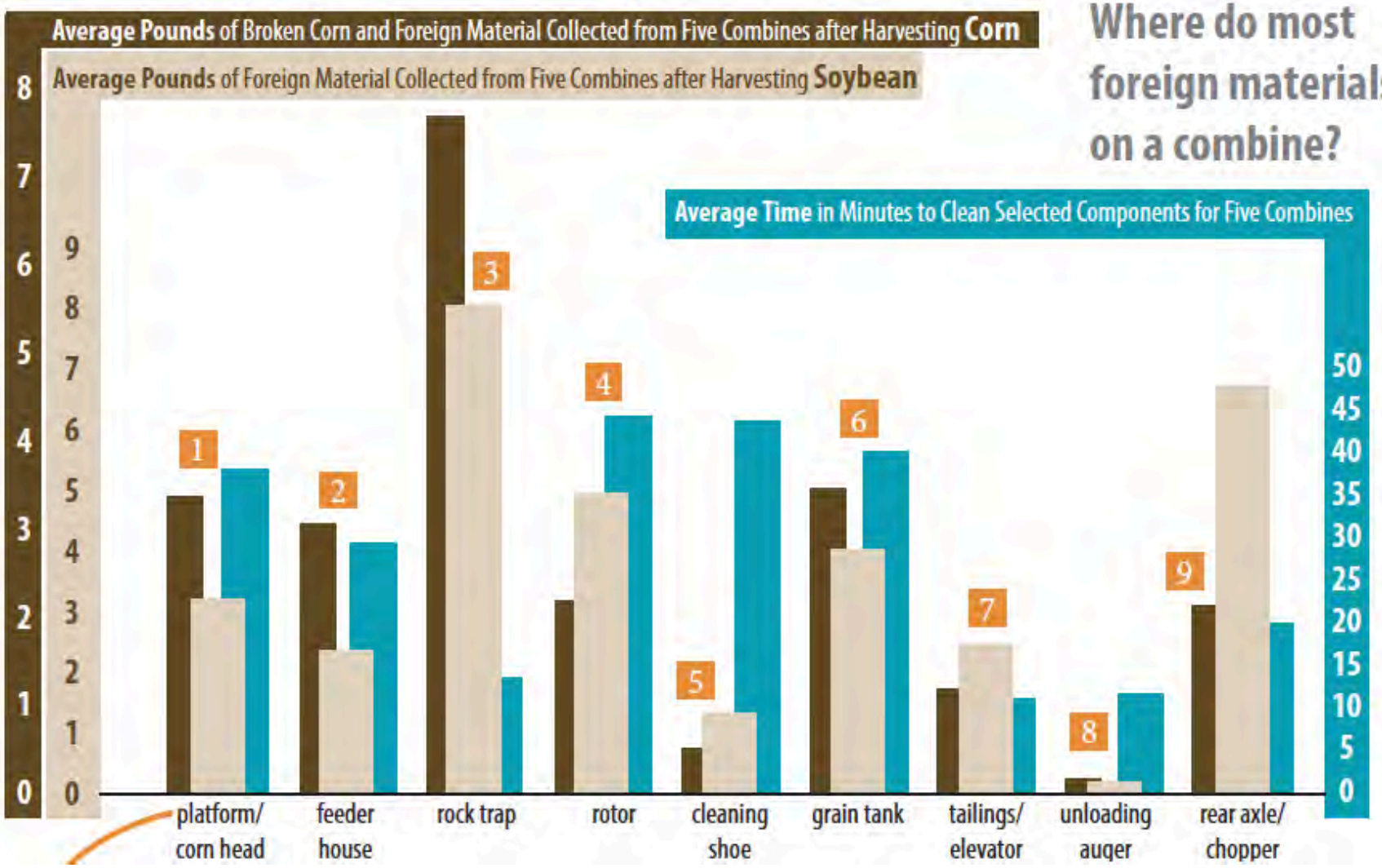

Photo: Mimi Broeske


Photo: Roger Schmidt

Read, Follow, and Understand all safety instructions for the combine and cleaning equipment!

Use proper Personal Protective Equipment!

Where to Focus Cleaning Time



Where do most foreign materials hide on a combine?

Adapted from: Adapted from figure data from Hanna HM, Jarboe DH, Quick GR (2009) Grain Residual and Time Requirements for Combine Cleaning. Applied Engineering in Agriculture

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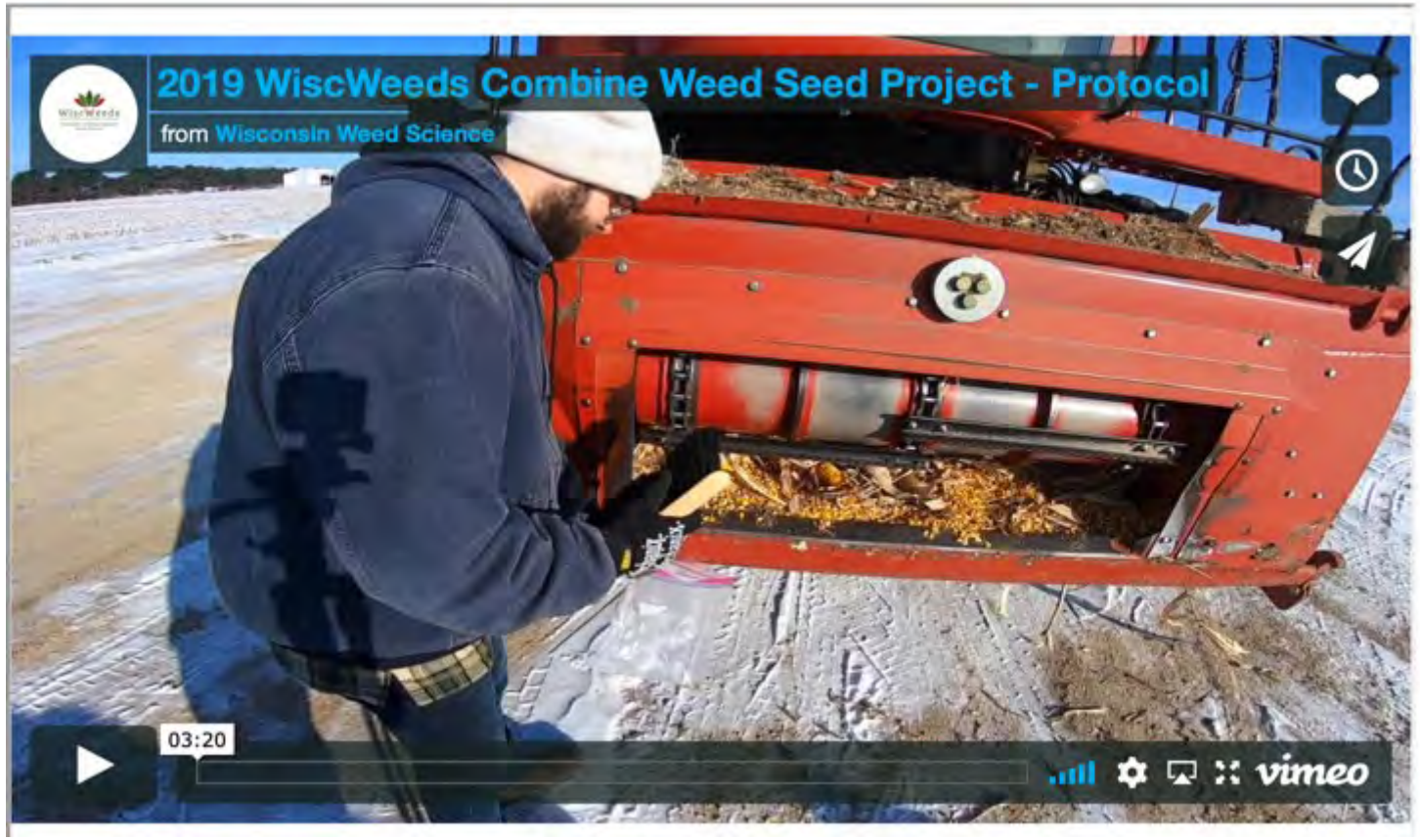
Weed Seed Movement Through Combines: 2020 Study

Nick Arneson: Outreach Specialist UW-Madison Cropping Systems Weed Science Program
Dr. Rodrigo Werle: UW-Madison Extension Cropping Systems Weed Scientist

Thank you to everyone who helped collect samples for this project!



Cropping Systems Weed Science
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Weed Seed Movement Through Combines: 2020 Study

- **97% of combine samples received (n=31) contained viable weed seed**
- **Most frequently observed weeds (% of samples present) were: grass (~68%), pigweed (~55%), and common lambsquarters (~55%).**
- **Combine head samples contained the most weed species with ~49% of the total weeds emerged (Feeder house, ~30%; Rock trap, ~19%; Rotor, ~2%)**

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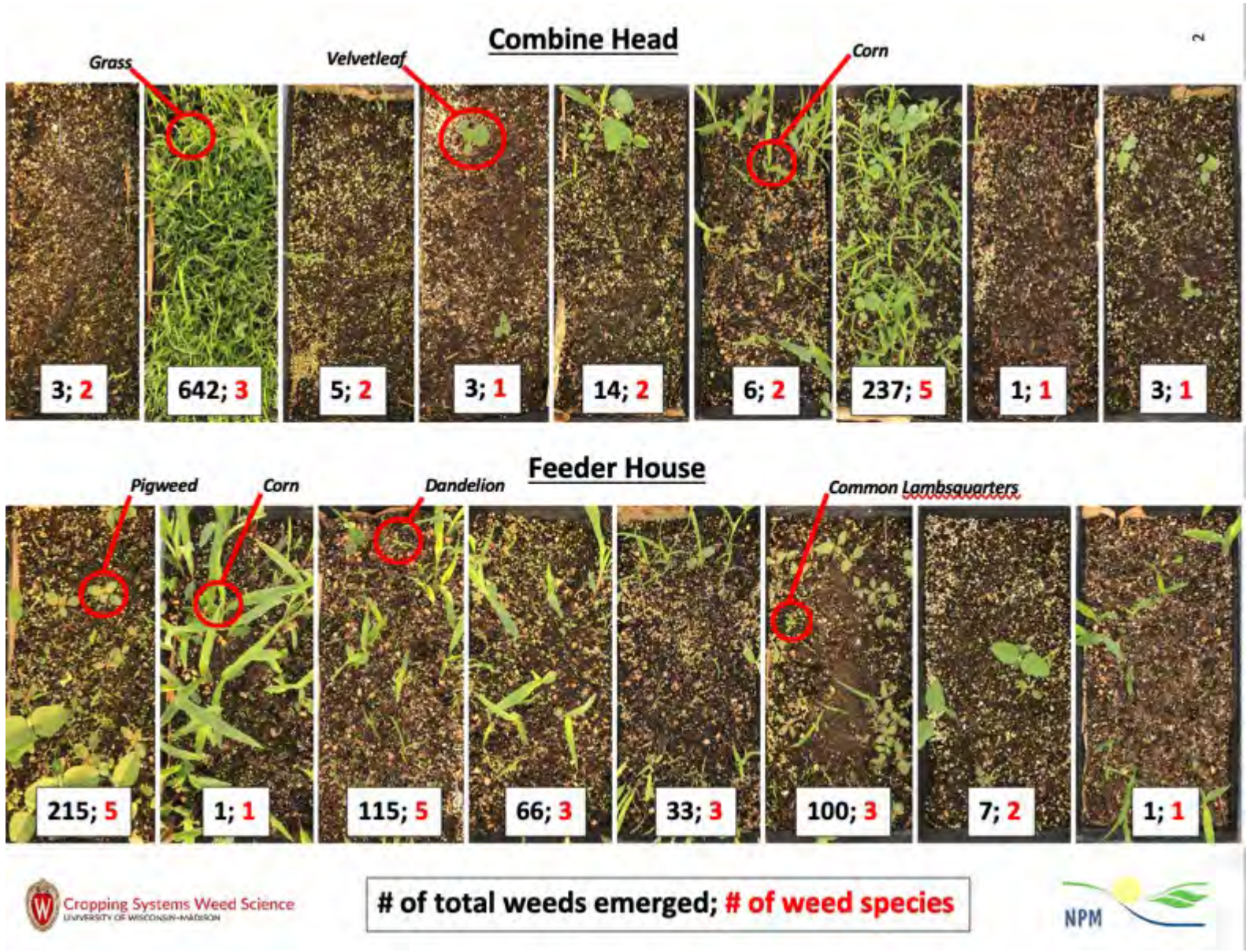
Arneson, N.J., D.H. Smith, R. Werle (*2020*) Weed Seed Movement Through Combines: 2020 Case Study. WI Cropping Systems Weed Science Research Brief (In-review)

Weed Seed Movement Through Combines: 2020 Study



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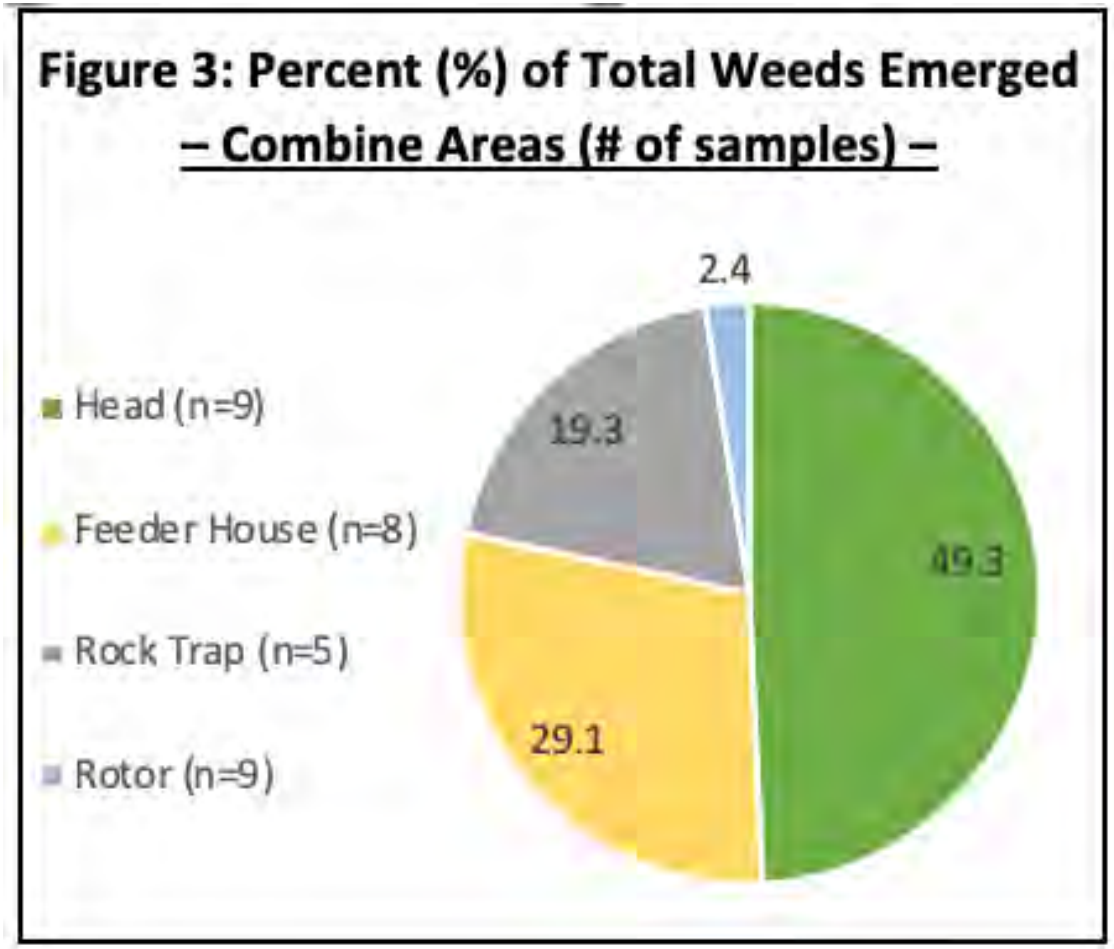

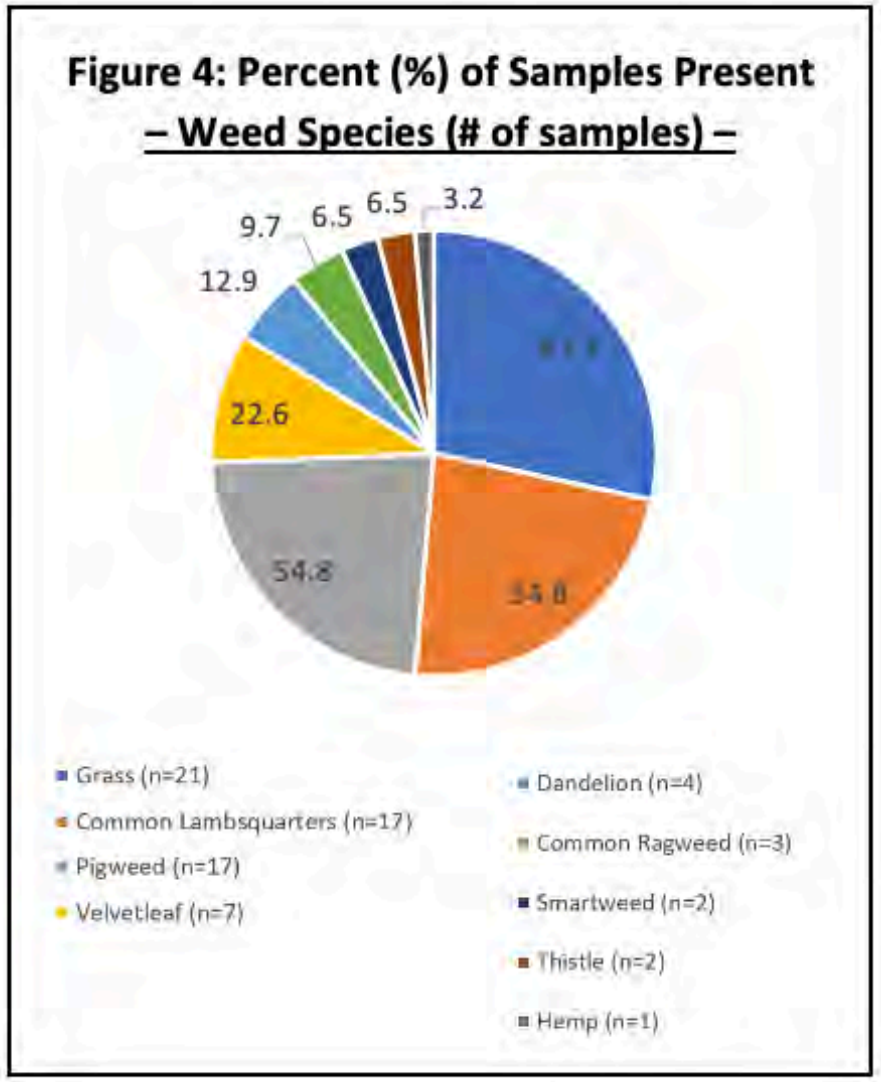

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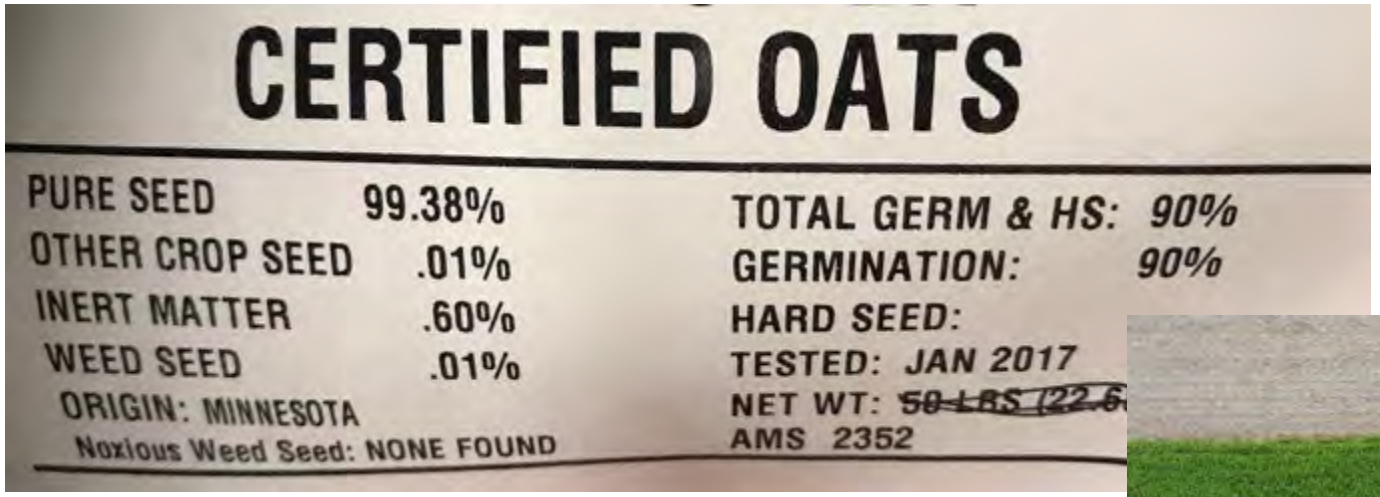
Waterhemp Seed Dispersal: Feed, Seed, and Bedding



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Cost of Spreading Waterhemp Seed

Yield Loss

Light

Water

Soil Fertility

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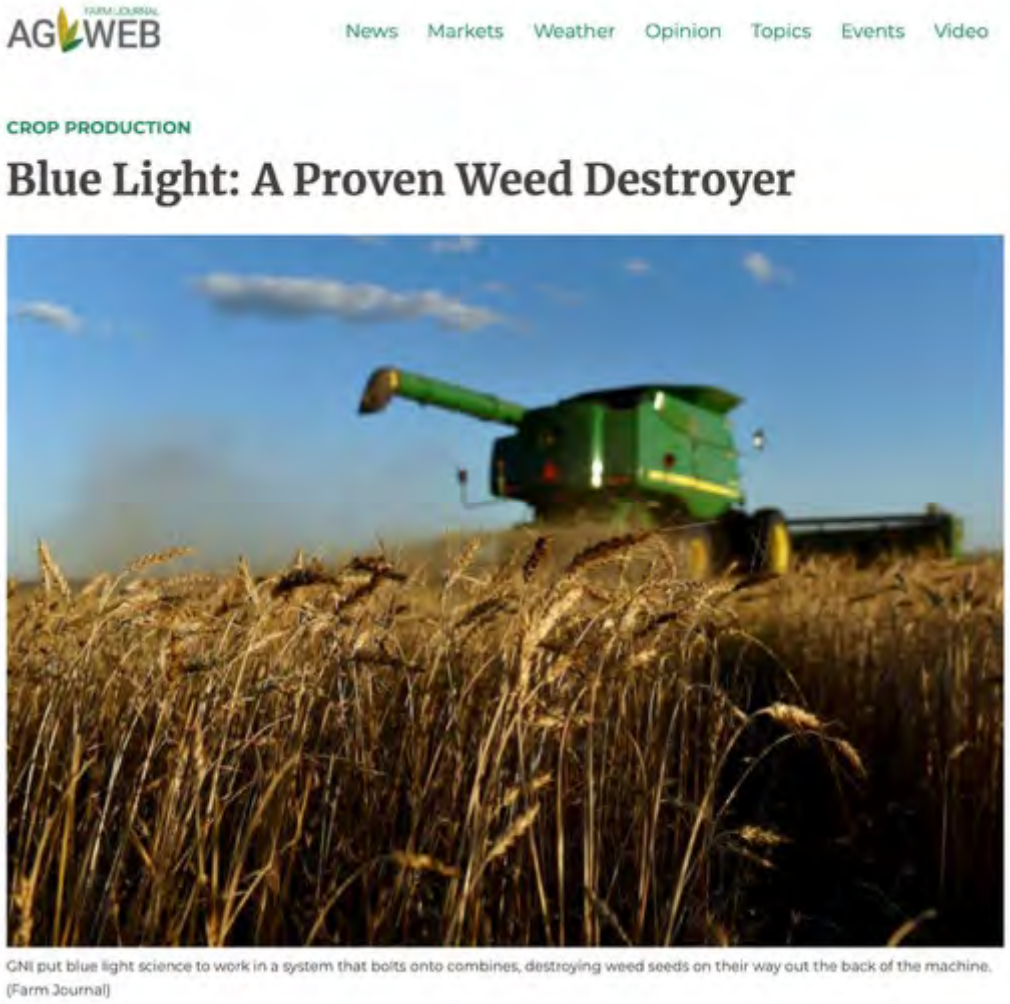
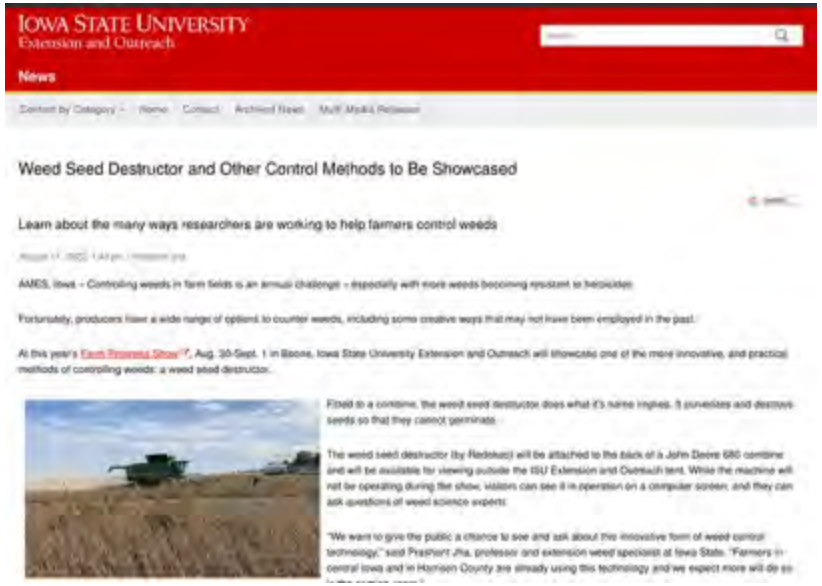
Vencill et. al (*2012*) Herbicide Resistance: Toward an Understanding of Resistance Development and the Impact of Herbicide-Resistant Crops. Weed Science: Special Issue 2012, Vol. 60, No. sp1, pp. 2-30.

Future Harvest Weed Seed Control Tactics



GNI put blue light science to work in a system that bolts onto combines, destroying weed seeds on their way out the back of the machine. (Farm Journal)



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Dedicate Time to Fall Weed Seed Management

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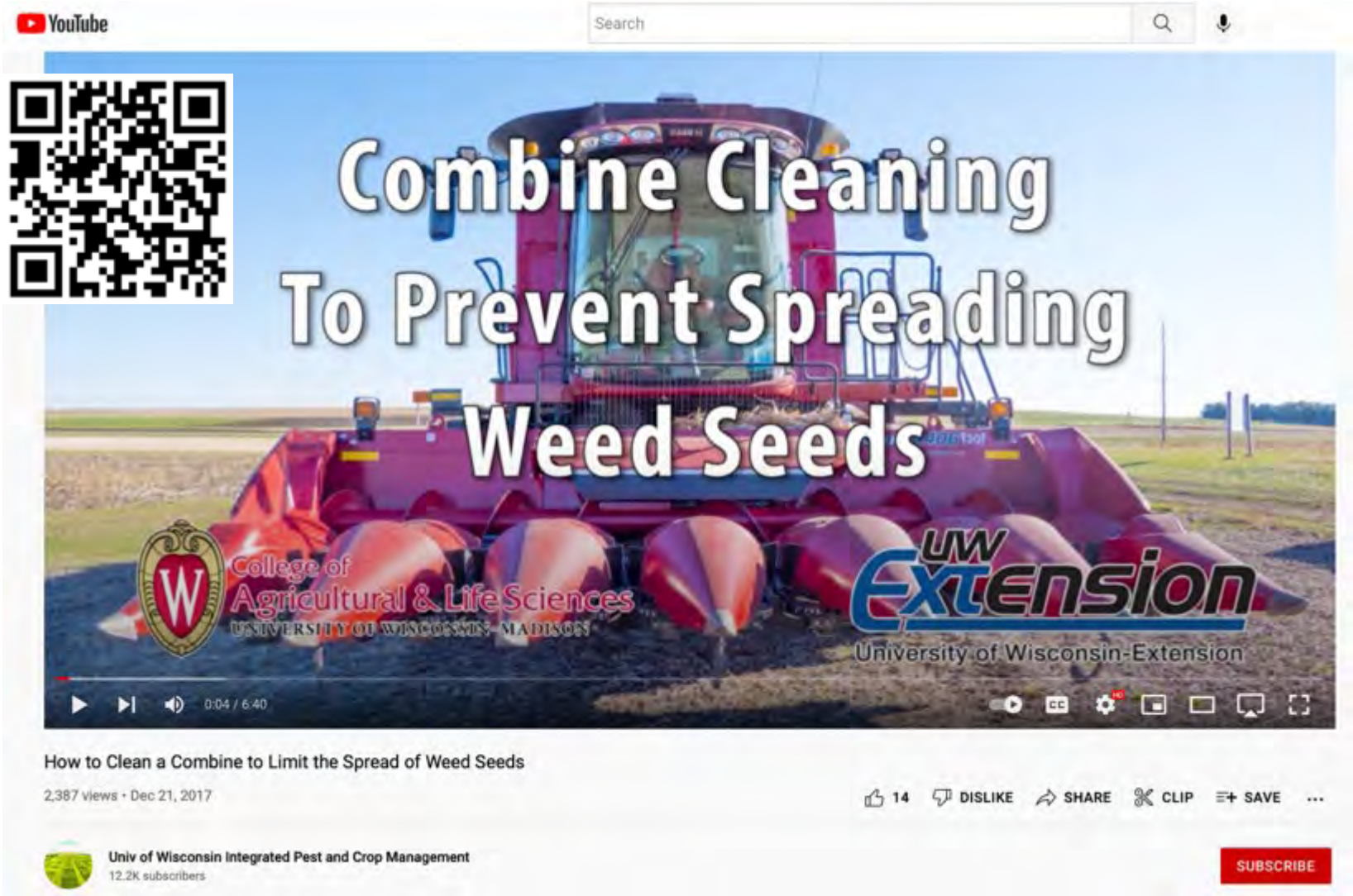
Additional Resources



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Thanks!

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Questions?

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