



Combine Cleaning Fall Weed Seed Management

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Extension

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Why Fall Weed Seed Management Matters



Really Seed Production? Why?



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



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 \pm 27,267	7.2 \pm 1.1	7.7 \pm 0.9	85.1 \pm 17.5
Common ragweed	2,204 \pm 382	7.2 \pm 1.2	14.1 \pm 2.4	78.7 \pm 15.3
Common lambsquarters	62,091 \pm 11,332	4.3 \pm 0.7	40.6 \pm 8.1	55.2 \pm 12.0
Common cocklebur	1,325 \pm 155	14.4 \pm 3.5	48.2 \pm 8.2	38.9 \pm 5.5
Giant foxtail	26,334 \pm 2,124	26.3 \pm 3.6	24.0 \pm 2.8	49.8 \pm 5.2
Large crabgrass	84,721 \pm 11,637	46.3 \pm 6.9	13.7 \pm 1.9	40.0 \pm 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



Waterhemp Seed



Waterhemp Seed Dispersal: Combines



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Waterhemp Seed Dispersal: Combines

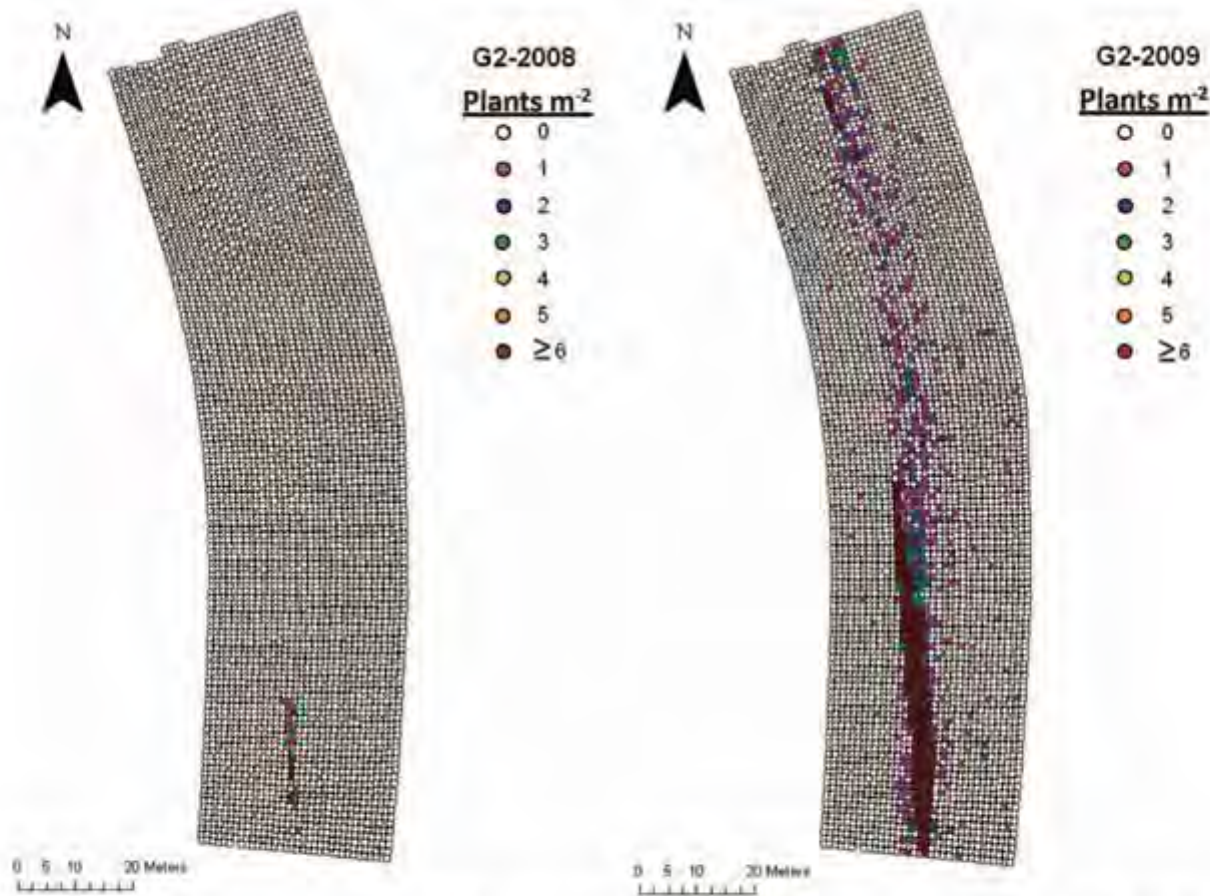


Figure 1. Glyphosate-resistant Palmer amaranth density maps from 2008 (first growing season after introduction) and 2009 (second growing season) for field G2 (0.53 ha) at the University of Arkansas–Agriculture Research and Extension Center, Fayetteville, AR.

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



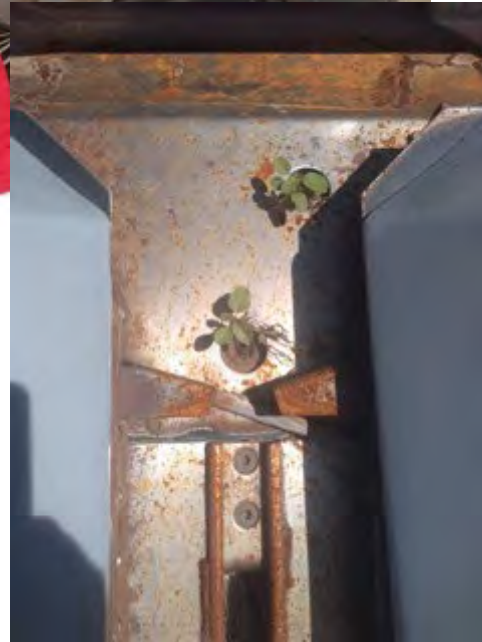
2018-2024 Combine Cleaning Clinics

19 Combines- 17 contained weed seed



Photo: Jamie Patton

Where Weed Seeds Hide



Where Undesired Seeds May Hide

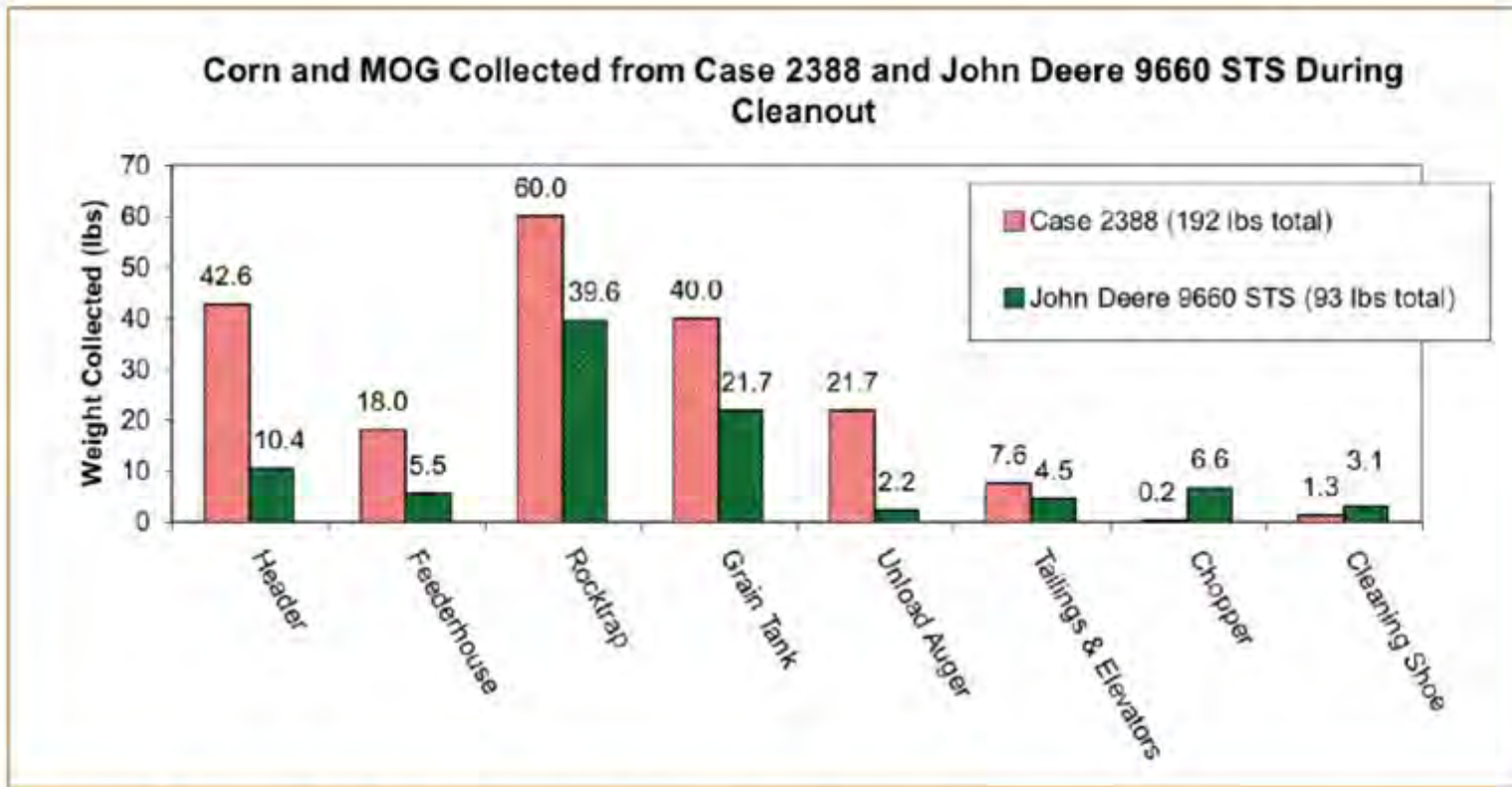
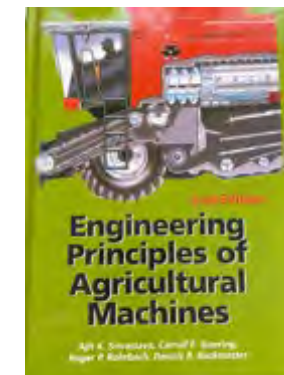
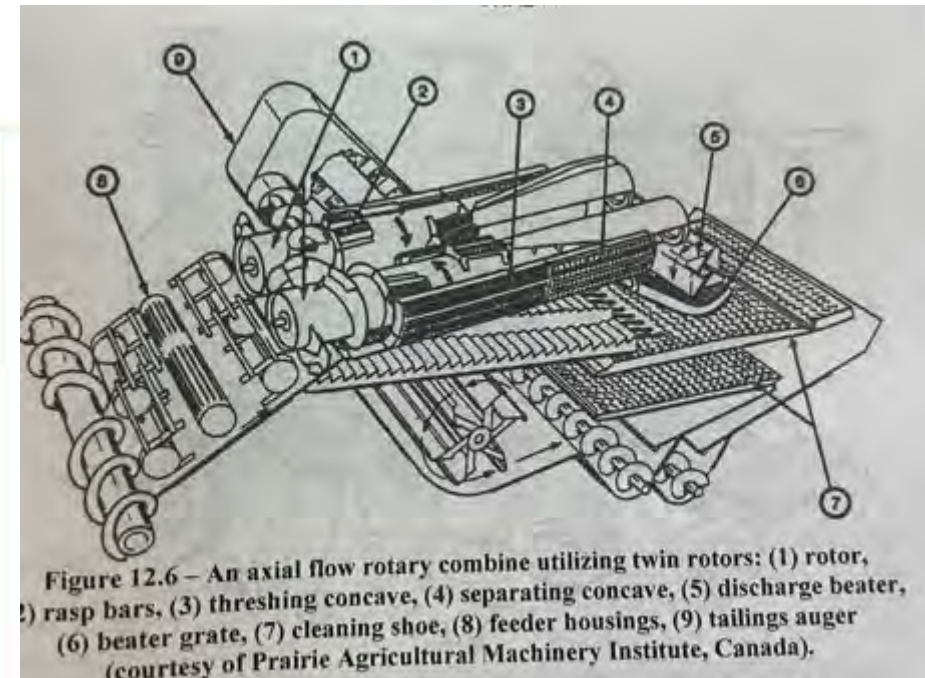


Figure 1. Material collected inside combines during cleaning.

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



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



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So Your Going To Clean Your Combine Between Fields?



Photo: Mimi Broeske



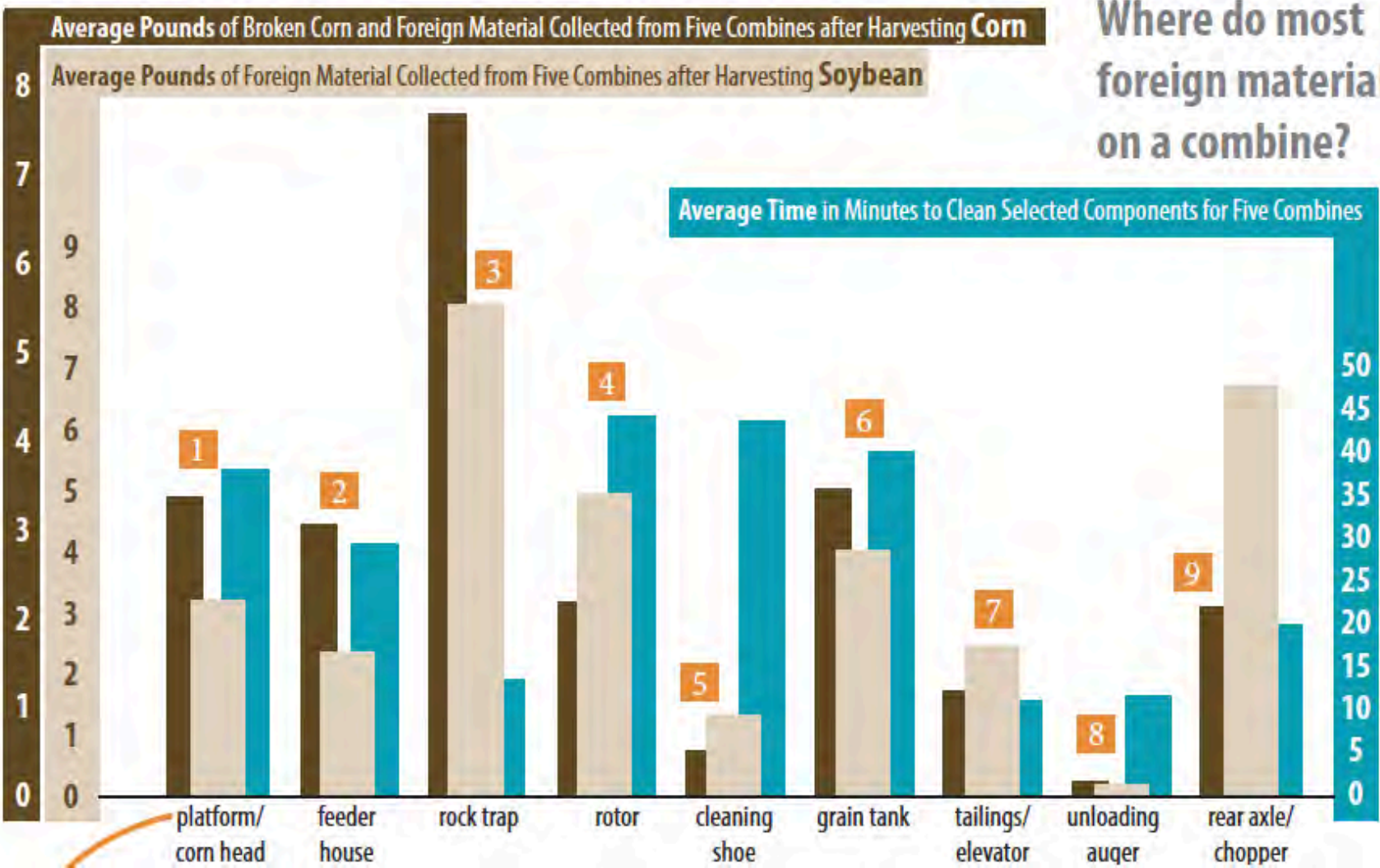
Photo: Roger Schmidt

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

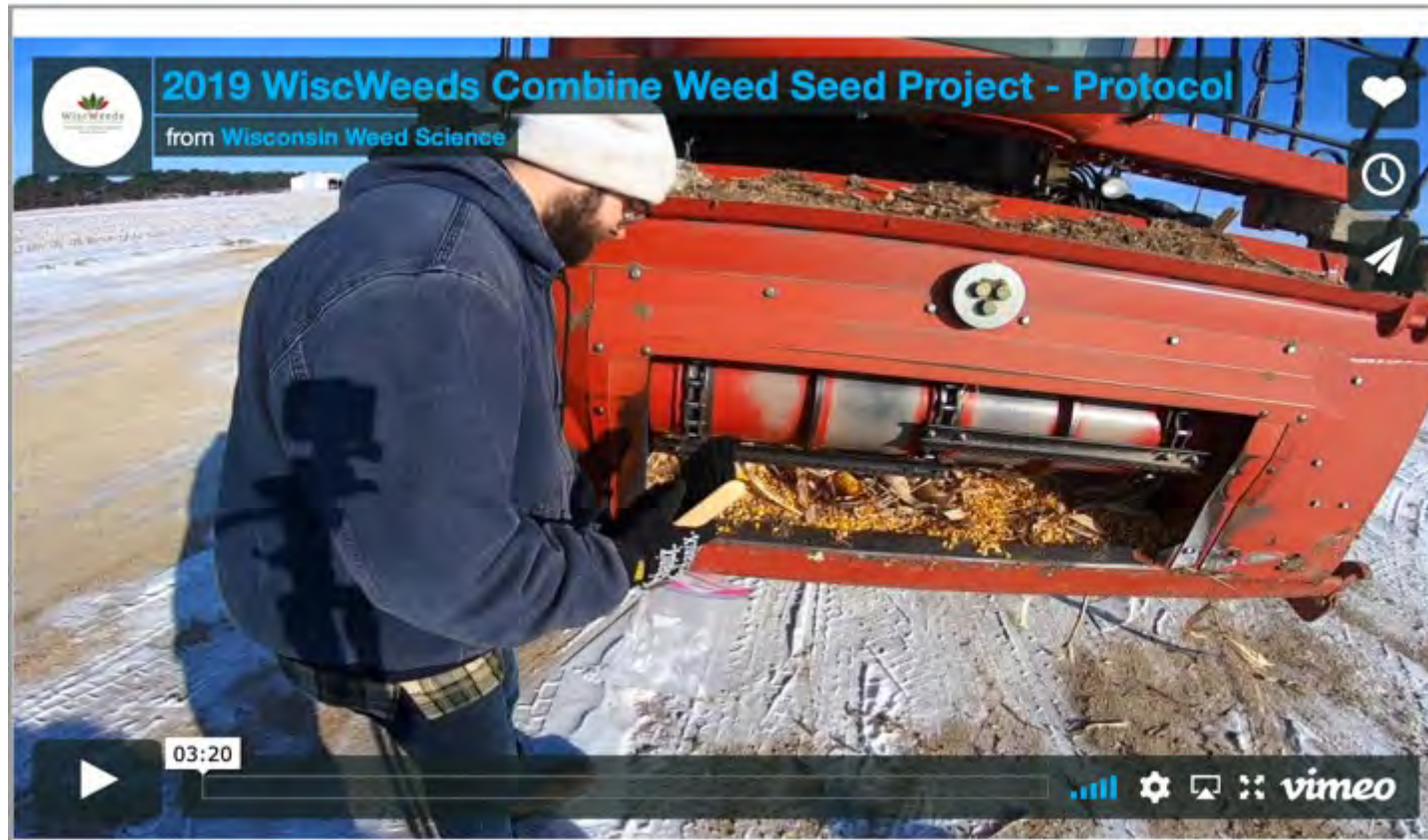


Weed Seed Movement Through Combines: 2020 Study

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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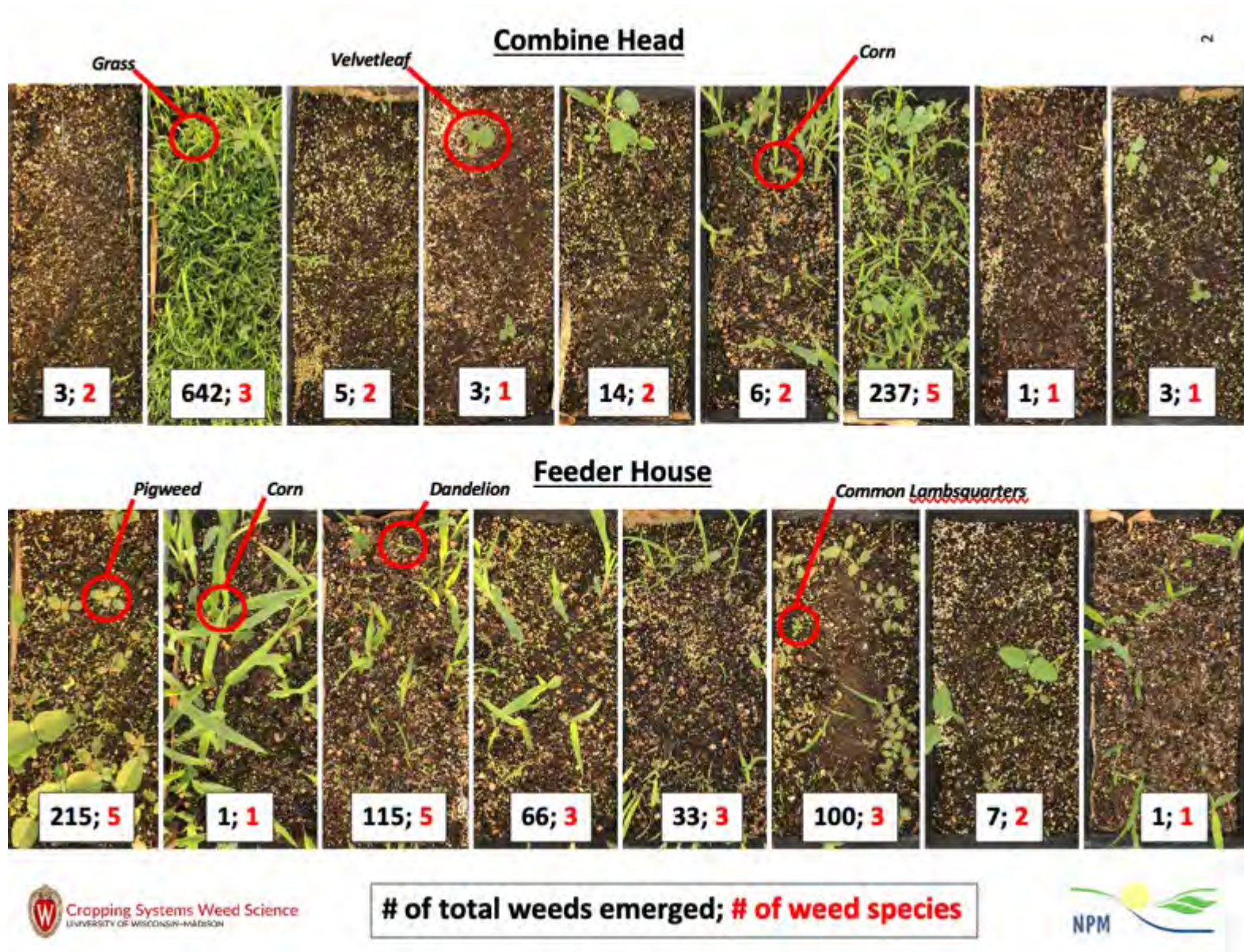
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Weed Seed Movement Through Combines: 2020 Study

- **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%)**



Weed Seed Movement Through Combines: 2020 Study



Weed Seed Movement Through Combines: 2020 Study

Figure 3: Percent (%) of Total Weeds Emerged – Combine Areas (# of samples) –

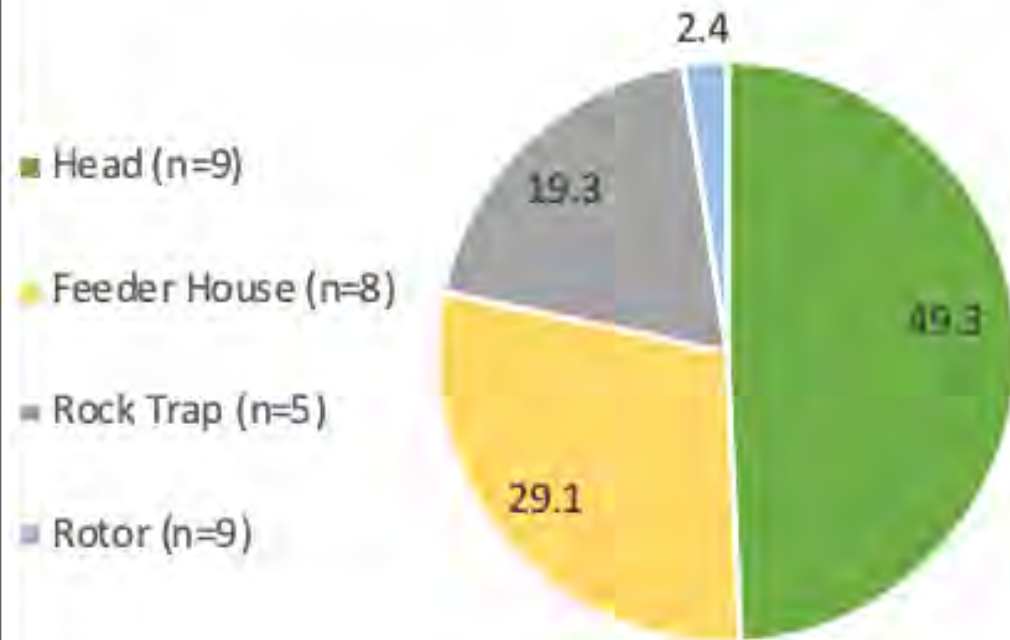
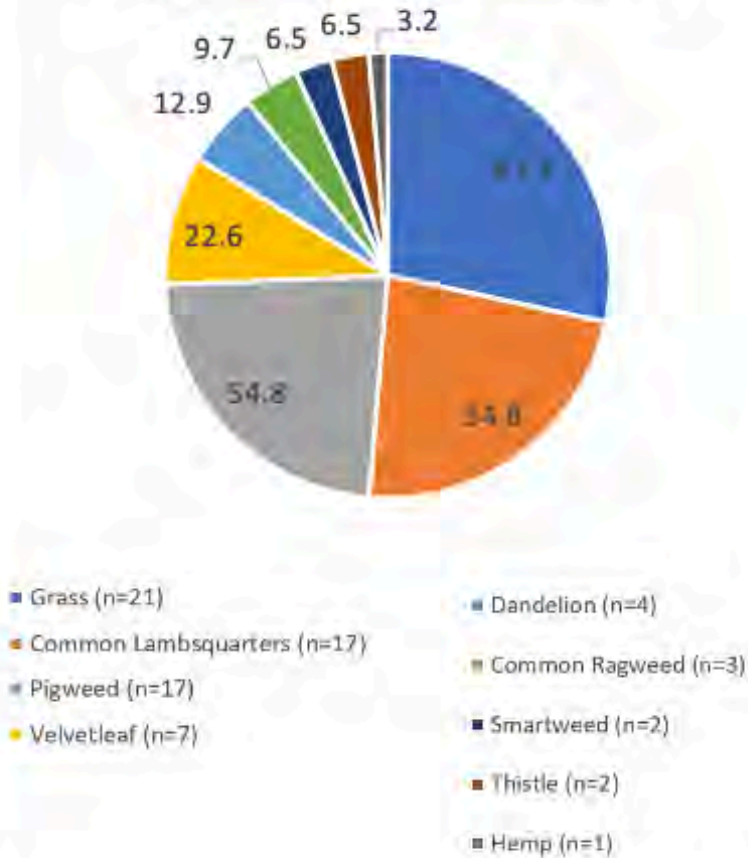


Figure 4: Percent (%) of Samples Present – Weed Species (# of samples) –



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Waterhemp Seed Dispersal: Feed, Seed, and Bedding



CERTIFIED OATS			
PURE SEED	99.38%	TOTAL GERM & HS:	90%
OTHER CROP SEED	.01%	GERMINATION:	90%
INERT MATTER	.60%	HARD SEED:	
WEED SEED	.01%	TESTED:	JAN 2017
ORIGIN:	MINNESOTA	NET WT:	50 LBS (22.6)
Noxious Weed Seed: NONE FOUND		AMS	2352



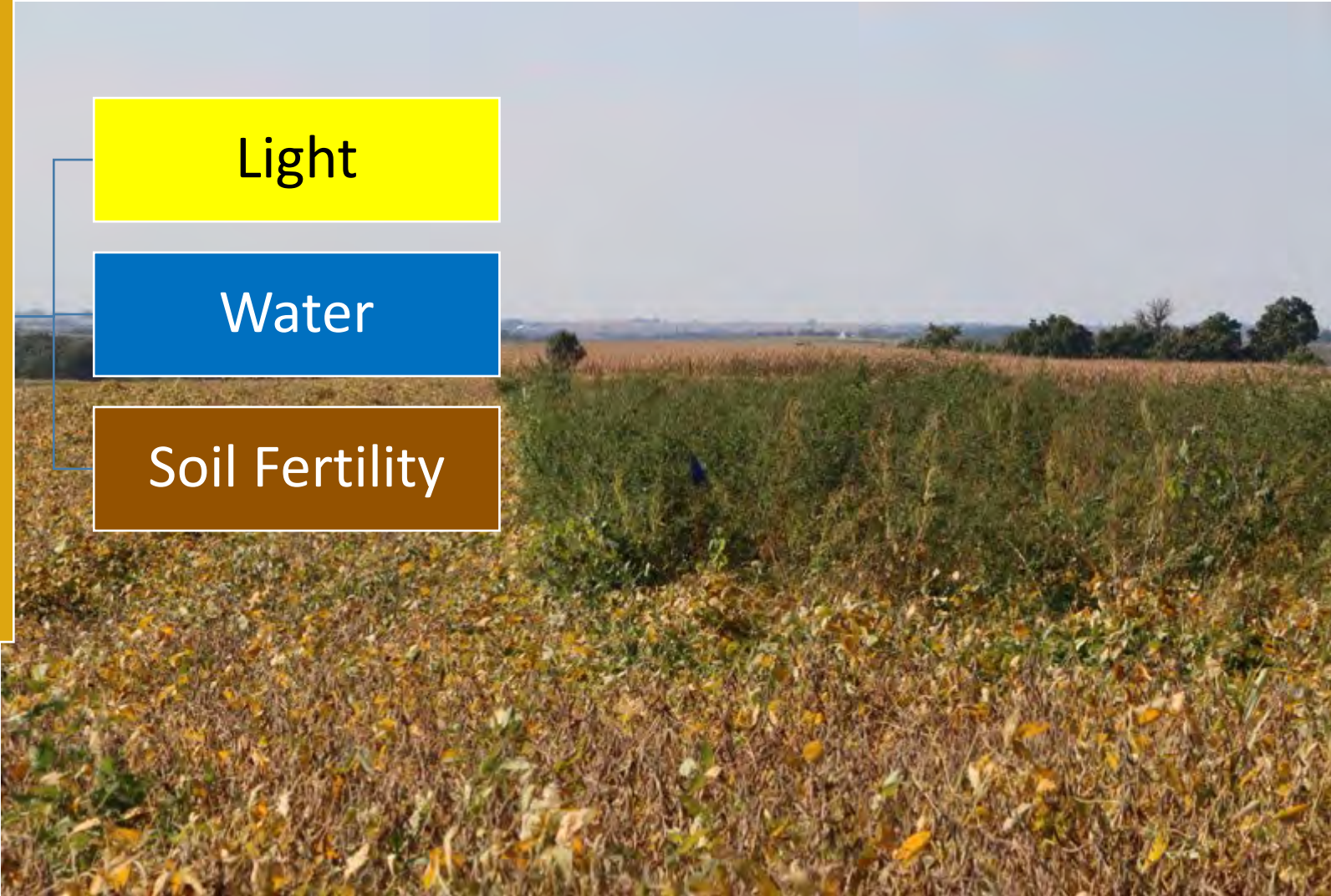
Cost of Spreading Waterhemp Seed

Yield Loss

Light

Water

Soil Fertility



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Future Harvest Weed Seed Control Tactics

FARM JOURNAL
AGWEB

News Markets Weather Opinion Topics Events Video

CROP PRODUCTION

Blue Light: A Proven Weed Destroyer



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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Disclaimer: Any use of trade names is for descriptive purposes and does not represent an endorsement by the author.

Dedicate Time to Fall Weed Seed Management



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Additional Resources



How to Clean a Combine to Limit the Spread of Weed Seeds

2,387 views • Dec 21, 2017



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12.2K subscribers

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HARVEST HELPLINE: COMBINE CLEAN-OUT



Recommended Procedures for a Between-field Combine Clean-out

By: Meghan Anderson, Iowa State University Extension; Kevin Janik, University of Wisconsin-Madison Extension; Angie Johnson, North Dakota State University Extension; Wayne Ohlberg, University of Nebraska-Lincoln Extension; Mark Hanna, Iowa State University



Combine Clean-out Series—
Between-field
Recommendations

An Ounce of Prevention is Greater than 150 Pounds of Unwanted Biomaterial

Combines are one of the largest and most impressive machines on a farm. These large machines effectively remove crops from fields and separate grain from other material to be spread back in the field. Following harvest of an individual field, combines retain significant material. As much as 150 pounds of biomaterial is retained, including chaff, grain, and weed seed. This material may remain in tight spaces within the machine or in obvious places, such as the gathering head and grain tank.

While it is impossible to remove all material from a combine, effort following the harvest of fields can be valuable in reducing movement of weed seed and other material from one field to another. Most farmers can point to fields with specific problems that other fields do not have, such as burrhead, Palmer amaranth, or other difficult-to-manage issues like herbicide-resistant weeds. Sanitation and appropriate combine clean-out when working with these fields should be a top priority to prevent spread of issues.



Figure 1. Material removed from clean grain elevator and tailings elevator when initially opened.



Plant material caught in the sickle of the cutting platform.



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An aerial photograph of a rural landscape. In the foreground, a farm with several buildings and a tall silo is visible. The middle ground shows a winding road and patches of green and yellow fields. The background consists of rolling hills under a hazy sky.

Thanks!

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Questions?