



# Weed Seed Movement via Combines: 2019-2020 Case Study

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## TAKE HOME POINTS

- ✓ Weed seeds replenish the soil seedbank and increase opportunity for herbicide resistance. **Do not let weeds go to seed. No Seed, No Weed!**
- ✓ The part of the combine with the highest number of weed seed was the header, followed by the feeder house, rock trap and rotor.
- ✓ Most frequently observed weeds were grasses, pigweeds & lambsquarters.

## Weed Seeds in Wisconsin

Several of the common weeds (e.g., pigweeds, ragweeds, common lambsquarters) that Wisconsin grain crop farmers manage can retain their seed well into the time of harvest. When weeds are allowed to set seed, they replenish the soil seedbank creating potentially long-term problems for weed management.

## How Do Weed Seeds Spread?

Weed seeds can be moved great distances by wildlife, particularly migratory waterfowl. Seeds can be introduced to new fields through feed, seed, bedding, and spreading of manure. Tillage and planting equipment can spread seeds from field to field through the movement of soil. Harvest equipment (combines) can be extremely effective at moving seed when weeds are left to set seed in crop fields; however, not much is known on where seeds will be deposited within a combine. Additionally, harvesting multiple crops with the same combine provides opportunities for the different crop residues to catch and remove weed seed from within the equipment.

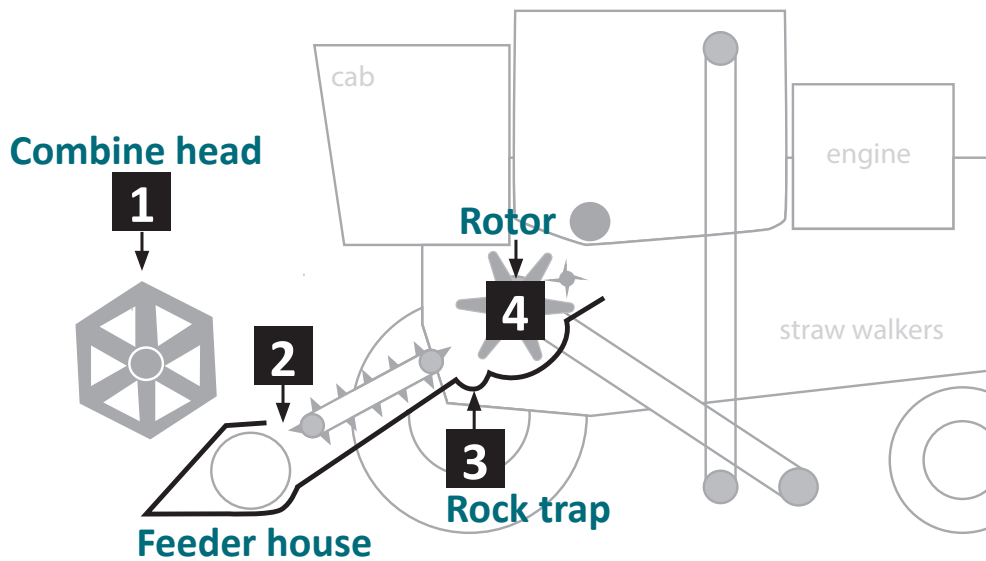
## Why Does This Matter?

Herbicide resistance occurs naturally in weed populations. Inadvertently spreading weed seed increases the opportunity for the spread of herbicide resistance. With several grain crop farmers farming fields that are located miles apart and/or relying on custom operators or shared farm equipment, there is a reason to believe that we are moving weeds across Wisconsin via combines. This has troubling consequences for them and their neighbors.

## Study Background

In the Fall/Winter of 2019, the UW-Madison Cropping Systems Weed Science Lab in conjunction with the Nutrient and Pest Management Program asked UW-Madison Extension County educator and stakeholders across Wisconsin to collect the material located in four distinct areas within their row-crop combine: 1) combine head, 2) feeder house, 3) rock trap, and 4) rotor area. In total, we received 31 samples from nine different combines. Samples were stored until study was established in August 2020 at the UW-Madison Walnut Street Greenhouse in Madison, WI. Samples were mixed with a 50:50 ratio of PROMIX HP potting mix and a silt loam soil and spread across 1.6 ft<sup>2</sup> greenhouse flats. Flats were watered daily, and weeds were monitored.





Corn and soybean plants were removed as they emerged. For ease of data collection some weed species were classified by plant family (e.g., grass, pigweed). Photos and final weed emergence counts were taken 14 days after establishment of the trial.

### Study Summary

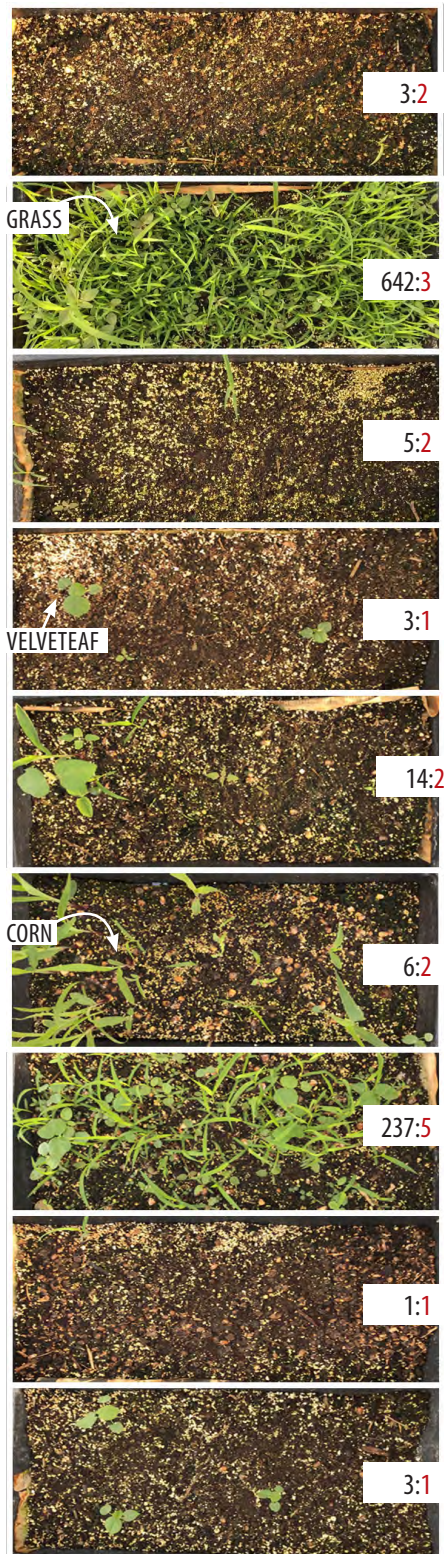
- ✓ **97%** of the 31 samples contained viable weed seed.
- ✓ **Combine head samples contained ~49%** of the total weeds emerged, followed by the feeder house ~30%, rock trap ~19% and rotor ~2%.
- ✓ **Observed weeds in % of samples were grass ~68%, pigweeds ~55%, common lambsquarters ~55%, velvetleaf ~23%, dandelion ~13%, common ragweed ~10%, smartweed ~7%, thistle ~7% and hemp ~3%.**
- ✓ In the 9 of the 31 samples, viable soybean plants were found.
- ✓ In the 15 of the 31 samples, viable corn plants were found.

### Tips for Reducing Spread of Troublesome Weeds

- ✓ Remove weeds that have set seed from fields before harvest.
- ✓ Harvest clean (weed free) fields first and move to weedy fields at the end of harvest order.
- ✓ Use an air compressor or leaf blower to force air through and clear debris from critical portions of the combine.
- ✓ Run a bag of wood shavings through the combine to clean rotor/ auger area.
- ✓ Be strategic with where you clean combines.
- ✓ *When time is limited and based on the results from this study, we believe that prioritizing the front of the combine (head and feeder house) would provide the most benefit in reducing weed seed spread by combines.*

**Safety First!** Read and understand all manuals for cleaning procedures and wear recommended personal protective equipment (eye, ear, and respiratory protection).

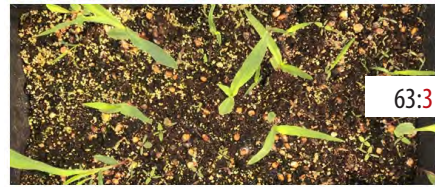
### 1 Combine Head WEEDS



# of total weeds emerged; # of weed species  
Captured photo area: 1.6 ft<sup>2</sup>



## 2 Feeder house WEEDS



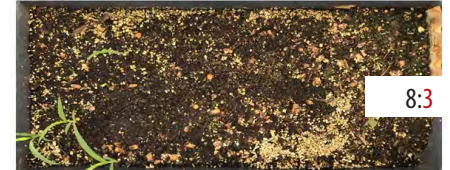
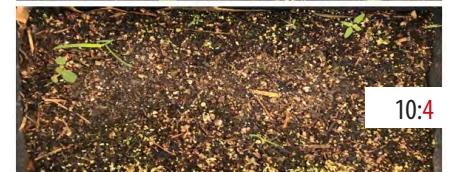
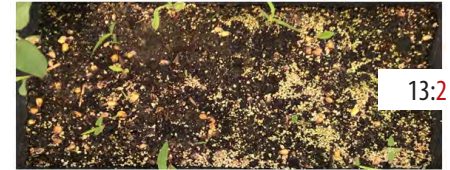
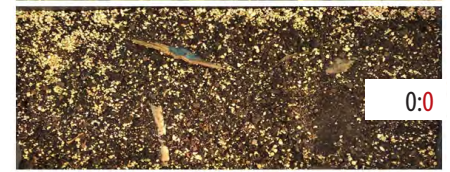
# of total weeds emerged; # of weed species  
Captured photo area: 1.6 ft<sup>2</sup>

## 3 Rock trap WEEDS



# of total weeds emerged; # of weed species  
Captured photo area: 1.6 ft<sup>2</sup>

## 4 Rotor WEEDS



# of total weeds emerged; # of weed species  
Captured photo area: 1.6 ft<sup>2</sup>

Follow [this link](#) for  
a how-to video on  
combine cleaning!



For more information on this  
and other **Wisconsin Cropping  
Systems Weed Science** projects,  
please visit:

[www.wiscweeds.info](http://www.wiscweeds.info)



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### Additional Resources

- Hanna HM, Jarboe D, Quick GR. 2008. *Grain Residuals and Time Requirements for Combine Cleaning*. *Applied Engineering in Agriculture*, 25:6:851-861. DOI:10.13031/2013.29231
- Anderson M, Jarek K, Johnson A, Ohnesorg W, Hanna M. 2017. *Harvest Helpline: Combine Clean-Out*. *North Central Agriculture and Natural Resource Academy*. [https://crops.extension.iastate.edu/files/icm/between-field\\_combine\\_clean-out\\_fact\\_sheet\\_1.pdf](https://crops.extension.iastate.edu/files/icm/between-field_combine_clean-out_fact_sheet_1.pdf)
- DeWerff R, Arneson NJ, Werle R. 2019 *Wisconsin Weed Science Research Report*. <https://www.wiscweeds.info/post/2019-wisconsin-weed-science-research-report/>
- Ess DR, Fleck NA, Maier, DE. *Where Grain Hides in a Combine*. *Purdue University Extension*. <https://www.extension.purdue.edu/extmedia/GQ/GQ-49-W.pdf>