Evaluation of the Seed Terminator™ as a Harvest Weed Seed Control Tool in Missouri Soybean Systems

The concept of impact mills and harvest weed seed destruction has been tried, tested, and adopted in Australia as a result of widescale multiple herbicide resistance in ryegrass.

FEATURE January 16, 2018

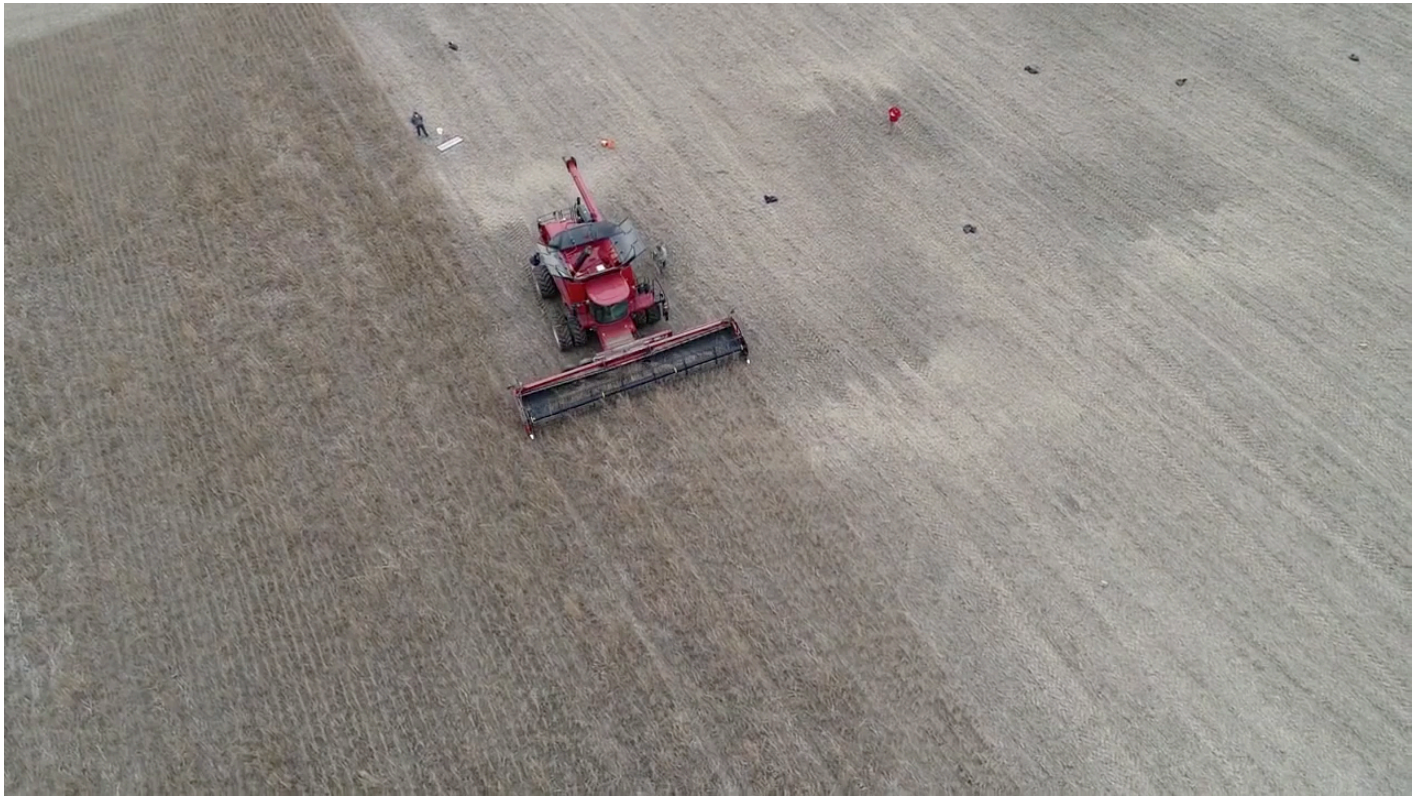
Harrington destructor keeps weeds at bay

Weed destroying innovation put through its paces during the 2017 harvesting season in NSW's Riverina region

Grower Graham Kotzur sourced a Case IH Axial-Flow 9120 header retrofitted with a prototype weed seed destructor produced by the University of South Australia, and has used it across the recent harvest on his Culcairn farm.

But much more research is needed in order to understand the utility of these devices for use on pigweeds and other weed species in U.S. soybean.

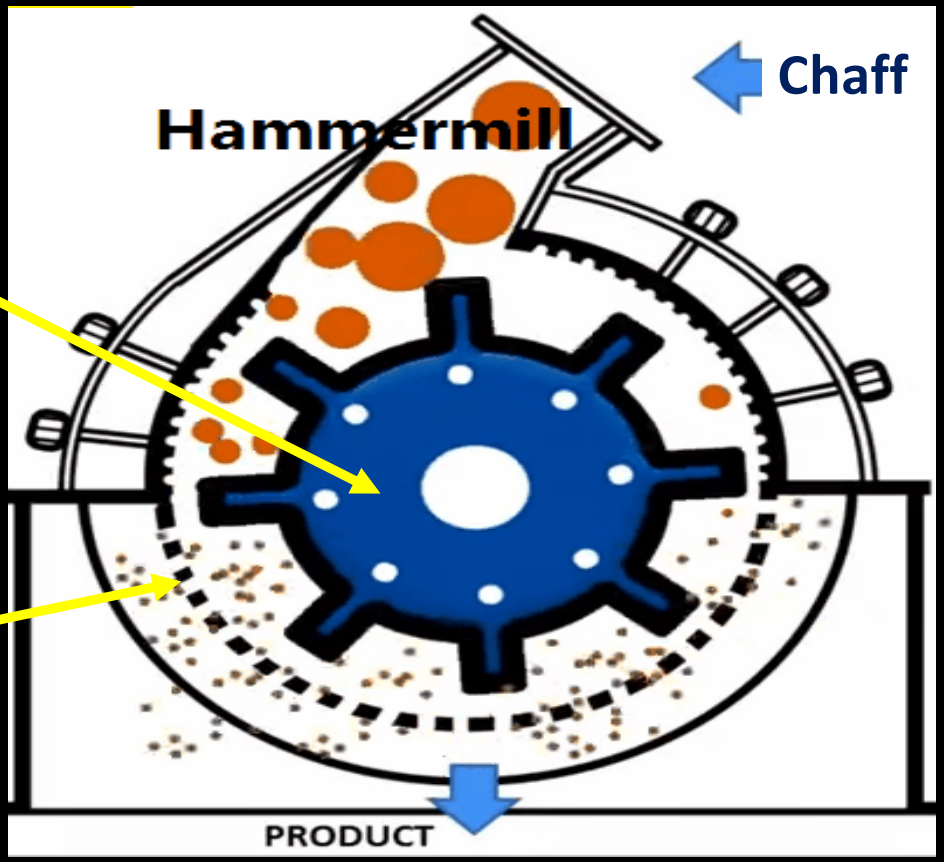
Investigating Harvest Weed Seed Control in Missouri with the Seed Terminator™



Basic Hammer Mill/Cage Mill Concept

Rotating Bars

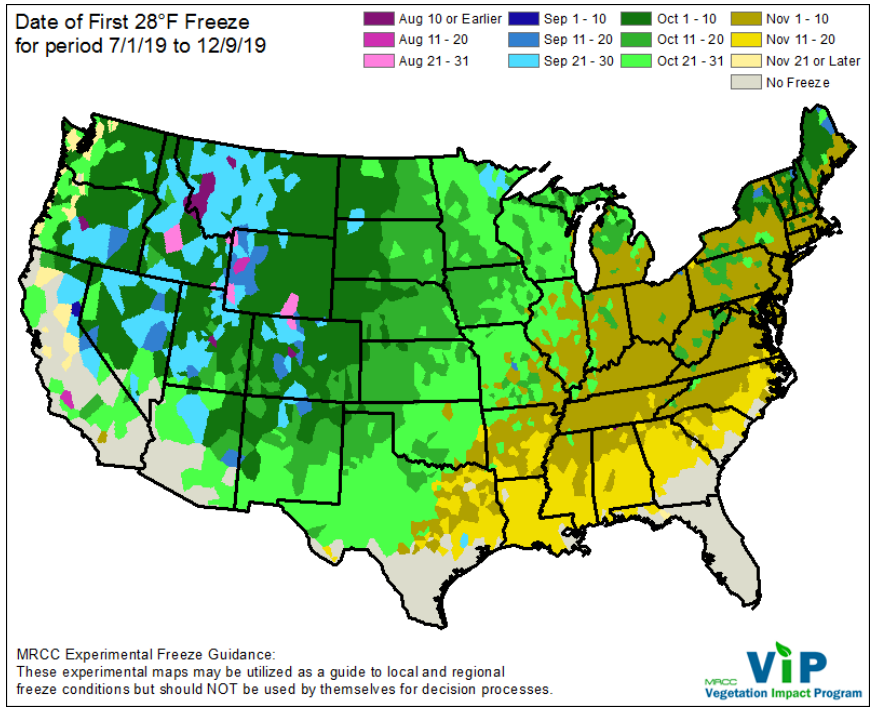
Stationary Bars



slide provided by Dr. Tom Barber, University of Arkansas

Initial Impressions of On-combine Impact Mills for use in U.S. Soybean

Date of First Freeze, 2019



1. The earlier the frost(s), the better. "Green" weeds with high moisture content have proven difficult.

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2. Some degree of header loss of weed seed is likely to occur.

Header Loss of Waterhemp Seed (2019 Trials)

Location	Average Waterhemp Density of Field Harvested (#/m^2)	Average Header Loss of Waterhemp Seed (#/m^2)
Columbia	3.6	650
Hallsville	2.2	2,133
New Florence	5.6	1,622
Montgomery City	1	131

Mizzou weed science


Where are all the places waterhemp seed could exit the combine?
?
33.3%
66.6%
Percentages shown are representative of “normal” combines without any seed destruction device; results are an average of 4 harvested locations in 2019.

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3. Significant weed seed loss is also likely to occur out of the straw spreader.

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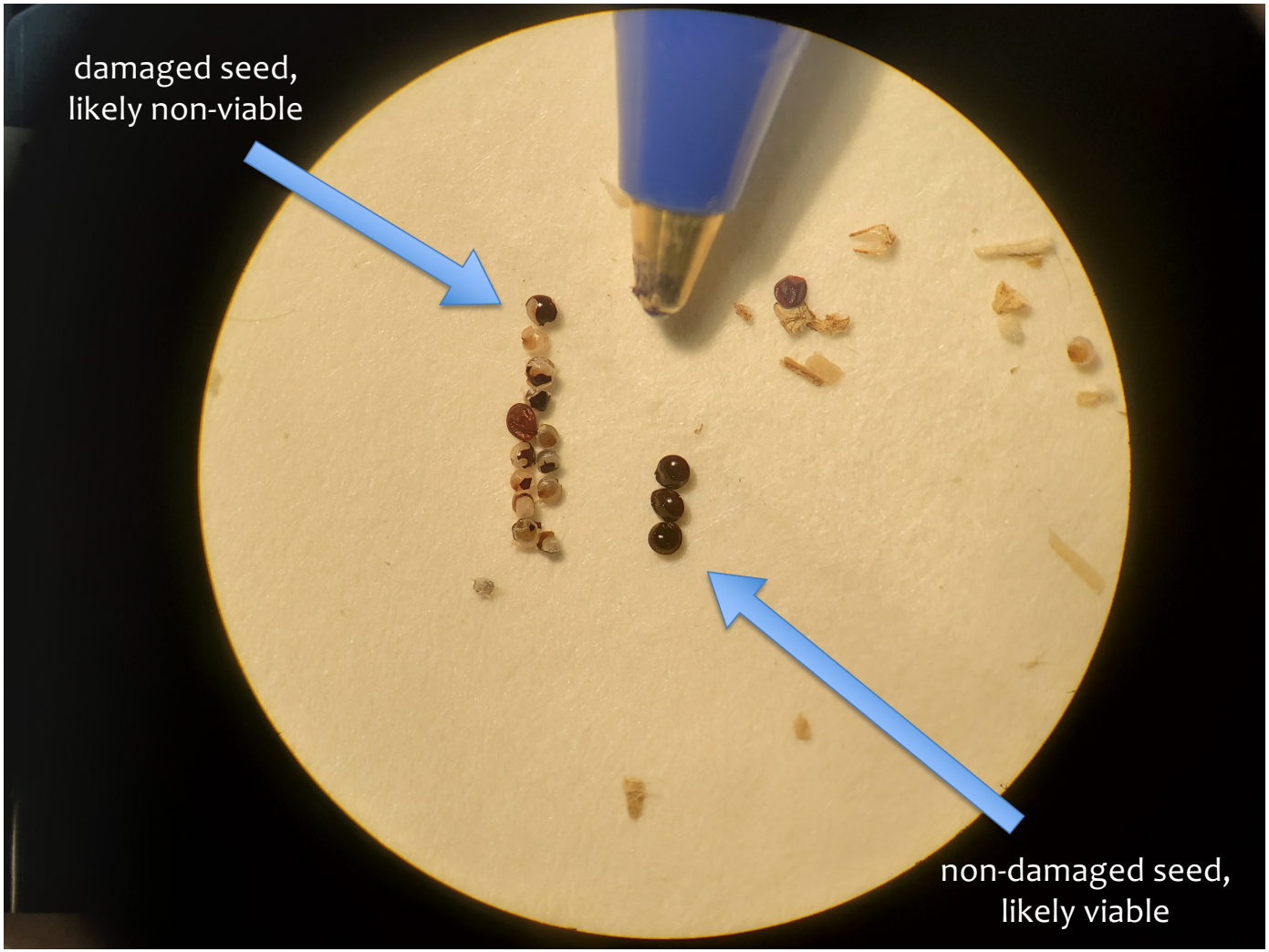
4. Most (but not all) of the weed seed that enters the combine appears to make it into the seed terminator. Most of any weed seed that comes out of the Seed Terminator are damaged (= non-viable). The efficacy of the Seed Terminator appears to be even higher for any seed bigger than the *Amaranthus* species.

Loss of Waterhemp Seed out of the Seed Terminator™ (2019 Trials)

Location	Non-Damaged Waterhemp Seed #/m² (% of total)	Damaged Waterhemp Seed #/m² (% of total)
Columbia	52 (22%)	180 (78%)
Hallsville	11 (1.3%)	839 (98.7%)
New Florence	22 (1.4%)	1586 (98.6%)
Montgomery City	2 (7.6%)	24 (92.4%)

On average, 91.9% of the waterhemp seed that passed through the Seed Terminator™ were damaged

Mizzou weed science


damaged seed,
likely non-viable
non-damaged seed,
likely viable

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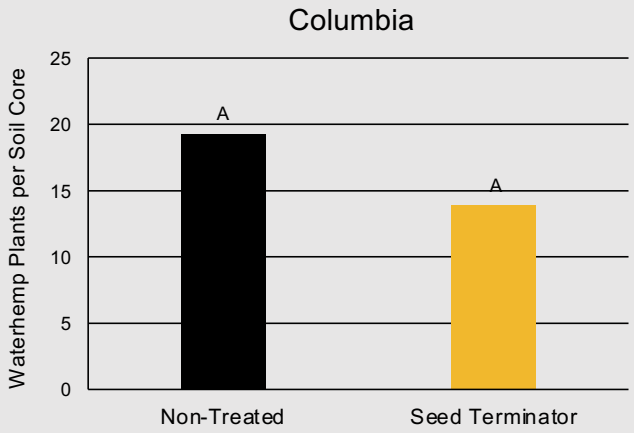
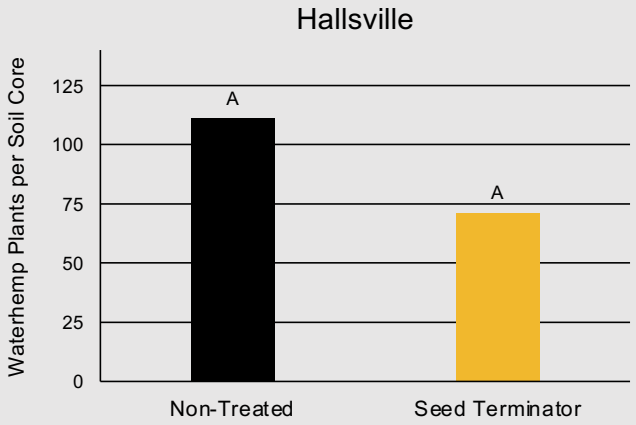
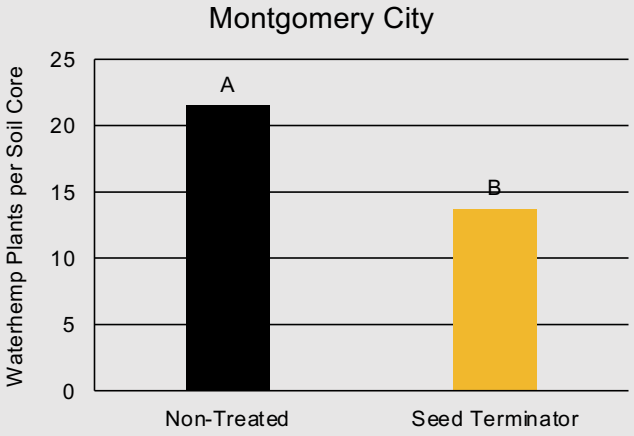
Location (2019)	Status of Seed Terminator™	Engine Load (%)	Fuel Consumption (gal/hour)
Columbia	On	89 a	24 a
	Off	79 b	19 b
Hallsville	On	99 a	24 a
	Off	85 b	21 b
New, Florence	On	96 a	23 a
	Off	61 b	15 b
Montgomery City	On	73 a	18 a
	Off	63 b	16 b

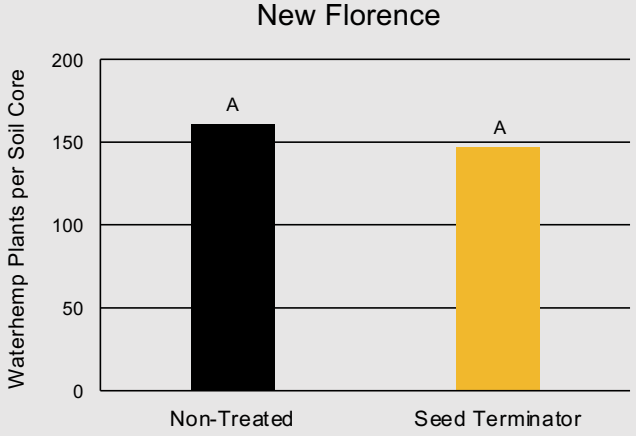
5. We did not plug (in soybean), and this class 8 combine handled the dual mills with virtually no problems. On average, fuel consumption was 4.1 gal/hour greater and engine load was 17.6% higher when Seed Terminator™ was on.

Waterhemp Density the Spring Following 2019 Harvest









*Bars within a location followed by the same letter are not different, P<0.05

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6. For locations with already high #s of waterhemp seed in the soil, it is likely that several consecutive seasons of use will be required before substantial reductions can be observed.

Closing Thoughts

Any tool that keeps weed seed from returning to the soil will be a valuable tool for U.S. farmers.

These implements will clearly have a fit in the future, we just need more research and (perhaps) modification to make them more suitable for our environmental conditions and weed problems in U.S. soybean.

This research would not have been possible without cooperation/funding from the following:

Mizzou®

weed science

weedscience.missouri.edu

App: Herbicide InjuryID

Email: bradleyke@missouri.edu

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