Optimizing John Deere See & Spray™

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Background

John Deere has developed targeted spray technology for postemergence control of escaped weeds. The See and Spray™ targeting system uses multiple detection settings: lowest, low, medium, high and highest. The chosen setting dictates the confidence of a plant seen by cameras as a weed. The lowest sensitivity excludes small weeds, whereas the highest sensitivity detects most weeds, including small ones.

Weeds vary in size and shape. Arkansas producers have difficulty controlling certain weeds, such as pigweed (*Amaranthus spp.*), grasses, morning glories(*Ipomoea spp.*) and yellow nutsedge (*Cyperus esculentus L.*). Arguably, pigweed is the most concerning weed in corn, cotton and soybean. Given the current state of herbicide resistance across Arkansas, it is imperative that herbicide applications not miss this weed.

Research was conducted across the United States using a See & Spray prototype to determine the efficacy of treating weeds with different sensitivity settings and weed sizes. Research was conducted in Arkansas to determine the impact of preemergence residual strength and See & Spray™ applications of glufosinate on the weed seedbank in soybean over three years using the lowest and highest sensitivity settings. An earlier fact sheet FSA2180, "*Harvest Weed Seed Control – An Alternative Method for Measuring the Soil Seedbank*" discusses some of these concepts.

Results

- Larger weeds and higher sensitivity settings increase the probability of detection.

- Morning glories were missed by the spray application the least, followed by grasses, Palmer amaranth, and yellow nutsedge.

- Over a three years, the lowest sensitivity setting allowed more Palmer amaranth escapes from a glufosinate application than the broadcast application and the highest sensitivity setting.

| SENSITIVITY	PIGWEED ESCAPES AFTER 3 YEARS (#/A)
Broadcast	23
Highest	18
Recommendations	142

- The greatest reduction in postemergence herbicide use with See & Spray will be realized if a STRONG preemergence herbicide is applied at planting.

|	EARLY POSTEMERGENCE	MID POSTEMERGENCE
	Area sprayed	
Strong PRE	72%	88%
Strong PRE	99%	95%

- Use at least the high sensitivity to control pigweed or other highly competitive, resistant-prone weeds.

- Most post-emergence herbicide labels require a reapplication interval. Examples: Glufosinate reapplication is five days in soybean, seven days in corn, and 10 days in cotton. 2,4-D choline reapplication is 12 days in soybean and cotton.

- Palmer amaranth will likely be uncontrollable if missed with the first targeted spray.

- Use the lowest sensitivity when targeting volunteer crops.

- There has been no indication that speed influences the ability to hit weeds, within the range that See & Spray™ applications can occur.
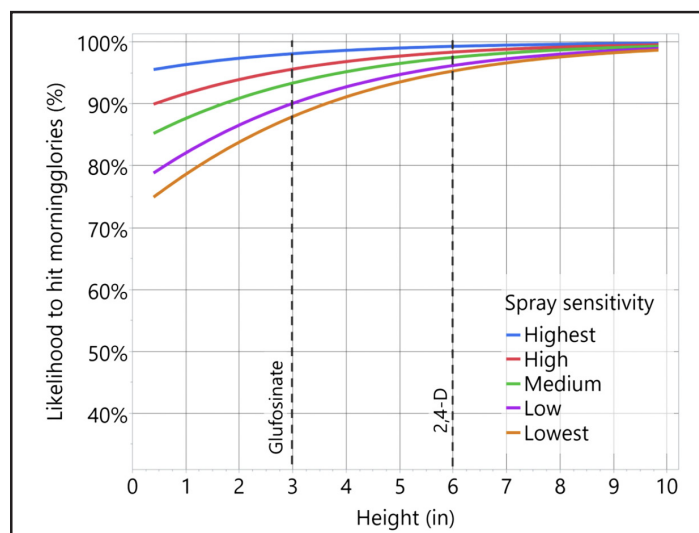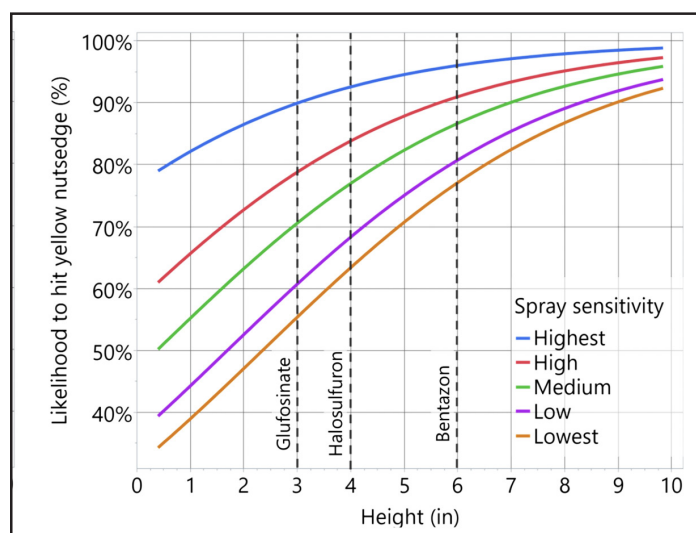

Graph 1. Likelihood of See & Spray™ to treat morningglories effectively.
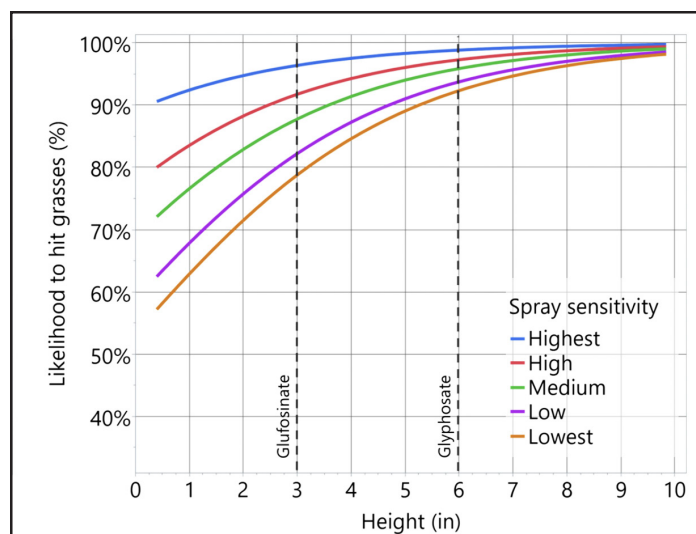
Graph 2. Likelihood of See & Spray™ to treat grasses effectively.
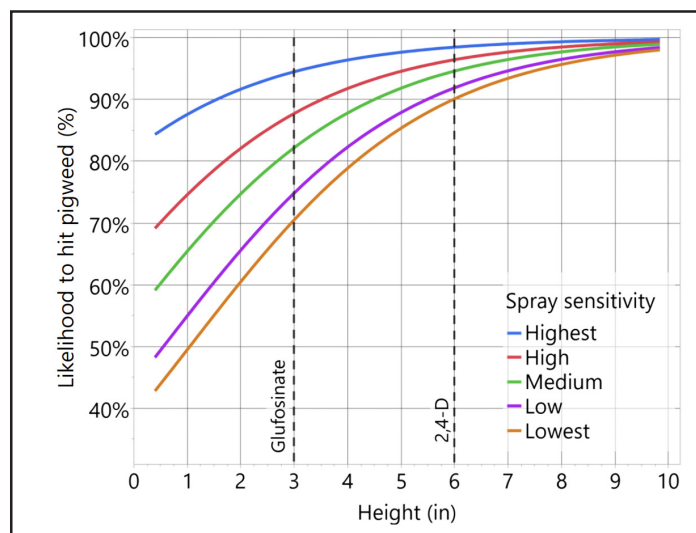
Graph 3. Likelihood of See & Spray™ to treat pigweed effectively.

Graph 4. Likelihood of See & Spray™ to treat yellow nutsedge effectively.

The graphs show the likelihood of treating morningglories (graph 1), grasses (graph 2),

pigweed (graph 3), and yellow nutsedge (graph 4) with See & Spray™. The different lines represent the different spray sensitivities, and herbicides are provided as a reference for maximum weed sizes recommended by the label. To interpret the graph, pigweed has a 70%, 82% and 95% likelihood of being treated if it is 3 inches tall at the lowest, medium, and highest sensitivities, respectively.

References

Anonymous (2022) *Basagranherbicide*. UPL NA Inc, King of Prussia, PA, EPA Reg. No. 70506-434.

Anonymous (2024) *Enlist One herbicide*. Corteva Agricience, LLC, Indianapolis, IN, EPA Reg. No. 62719-695.

Anonymous (2023) *Liberty 280SL herbicide*. BASF Corporation, Research Triangle Park, NC. EPA Reg. No. 7969-448.

Anonymous (2017) *Permit herbicide*. Gowan Company, LLC, Yuma, AZ, EPA Reg. No. 81880-2-10163.

Anonymous (2020) *Roundup PowerMAX3*. Bayer CropScience, LP, St. Louis, MO, EPA Reg. No. 524-659.

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FSA2221-PD-6-2025