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Opportunity Costs to Consider when Adopting See & Spray™ Technology

Tristen Avent
Ph.D. Graduate - Weed Science

Jason Norsworthy
Distinguished Professor - Weed Science

Lawton Nalley
Department Chair, Agricultural Economics and Agribusiness

Tom Barber
Professor - Weed Science

Bob Scott
Professor - Weed Science

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Background

Equipment value, herbicide costs, dynamic subscription fees and field area treated are all drivers of potential herbicide savings with targeted spray technologies. When considering adoption, producers need to understand some of the important dynamics and ways to improve those savings without compromising weed control in the process.

Currently, John Deere offers two targeted sprayer platforms designed for spraying in crops: See & Spray Premium and See & Spray Ultimate. See & Spray Premium is a single-tank system that can either broadcast or target-apply pesticides in a single trip across the field. See & Spray Ultimate is a dual-tank system that keeps tank solutions separated until they are sprayed from the nozzles, allowing producers to perform both broadcast and targeted applications simultaneously.

Both systems have been tested and adopted across Arkansas, with affordability making the Premium platform more popular. Additionally, See & Spray Premium can be retrofitted onto

existing John Deere sprayers that meet certain criteria. This upgrade can cost between $25,000 and $100,000, depending on the existing sprayer. See & Spray Ultimate cannot be retrofitted and must be purchased new or used. The two systems also have different speed restrictions, which can be defaulted back to broadcast (fallback setting) if traveling too slowly or too quickly. Targeted applications with See & Spray currently have a maximum speed of 12 mph with Premium and 15 mph with Ultimate.

What to Expect

John Deere has provided the Division of Agriculture with results from approximately 16,000 fields treated with commercial See & Spray equipment from March 2023 to January 2025, across

multiple crops in the United States. Using these data, we have estimated what one can expect in terms of savings with this technology. John Deere See & Spray machines covered 1.26 million acres and sprayed 524,000 acres during this period.

CROP	MEAN	50% RANGE
	--- Area treated (%) ---	
Corn	44.6	24 to 64
Cotton	46.9	29 to 64
Soybean	46.1	25 to 66
Fallow	44.9	22 to 67

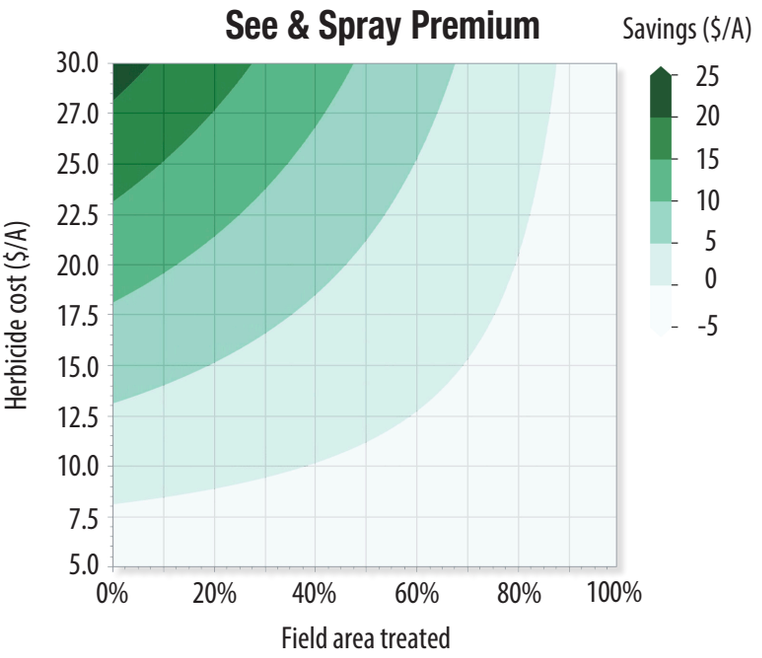
Table 1 Below. Average Return on Investment at Different Herbicide Costs.

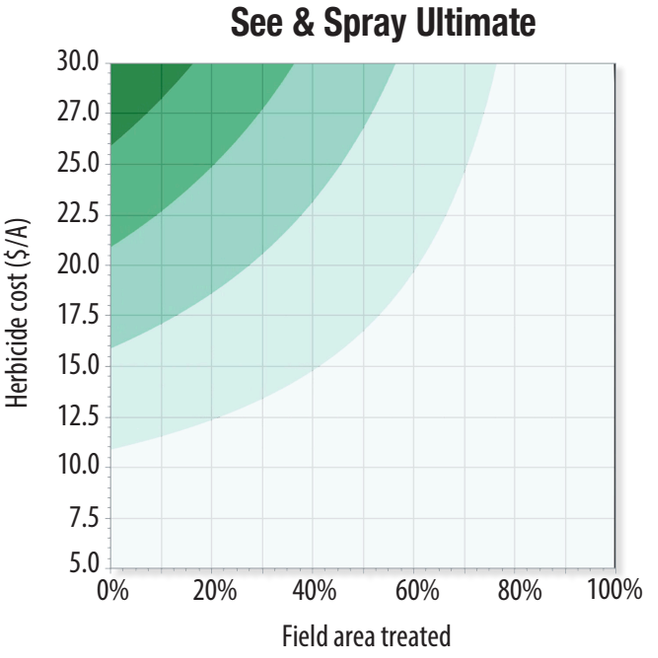
Applicators in Arkansas are expected to treat a similar percentage of fields and experience similar savings as other producers across the United States. The mean represents the average area sprayed for the different crops, and the range represents the savings one should expect 50 percent of the time. Spraying areas outside of this reported range can and will occur; however, other factors can be adjusted to improve herbicide savings with this technology.

Economic Comparisons

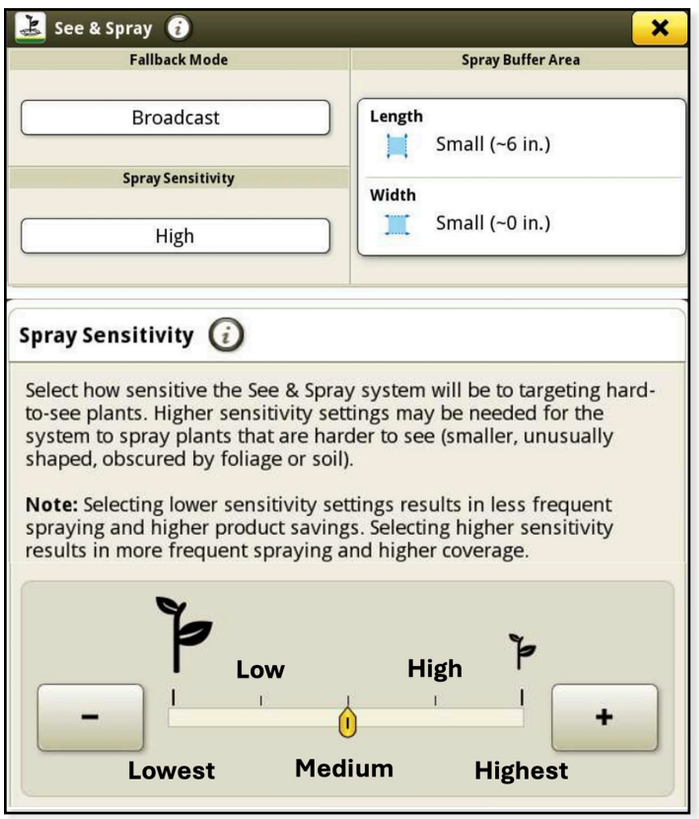
The opportunity cost of purchasing a new base model sprayer compared to a new See & Spray Premium or Ultimate was calculated using the UADA enterprise budgets and the mean area sprayed from the commercial John Deere data.

HERBICIDE COST ($/A)	SAVINGS FROM SEE & SPRAY PREMIUM ($/A)				SAVINGS FROM SEE & SPRAY ULTIMATE ($/A)			
	CORN	COTTON	SOYBEAN	FALLOW	CORN	COTTON	SOYBEAN	FALLOW
5	**-3.07**	**-3.07**	**-3.07**	**-0.87**	**-5.84**	**-5.84**	**-5.84**	**-3.64**
6	**-2.51**	**-2.54**	**-2.53**	**-0.32**	**-5.28**	**-5.31**	**-5.30**	**-3.09**
7	**-1.96**	**-2.01**	**-1.98**	0.25	**-4.73**	**-4.78**	**-4.75**	**-2.52**
8	**-1.41**	**-1.48**	**-1.46**	0.78	**-4.18**	**-4.25**	**-4.23**	**-1.99**
9	**-0.84**	**-0.94**	**-0.92**	1.37	**-3.61**	**-3.71**	**-3.69**	**-1.40**
10	**-0.30**	**-0.41**	**-0.40**	1.89	**-3.07**	**-3.18**	**-3.17**	**-0.88**
11	0.25	0.11	0.16	2.47	**-2.52**	**-2.66**	**-2.61**	**-0.30**
12	0.80	0.62	0.71	2.99	**-1.97**	**-2.15**	**-2.06**	0.22
13	1.32	1.18	1.26	3.55	**-1.45**	**-1.59**	**-1.51**	0.78
14	1.90	1.74	1.77	4.19	**-0.87**	**-1.03**	**-1.00**	1.42
15	2.49	2.22	2.32	4.64	**-0.28**	**-0.55**	**-0.45**	1.87
16	3.06	2.79	2.79	5.16	0.29	0.02	0.02	2.39
17	3.61	3.30	3.37	5.79	0.84	0.53	0.60	3.02
18	4.15	3.80	4.00	6.27	1.38	1.03	1.23	3.50
19	4.65	4.36	4.50	6.83	1.88	1.59	1.73	4.06
20	5.24	4.91	4.96	7.46	2.47	2.14	2.19	4.69
21	5.77	5.39	5.56	7.87	3.00	2.62	2.79	5.10
22	6.37	6.04	6.07	8.46	3.60	3.27	3.3	5.69
23	6.81	6.49	6.55	9.02	4.04	3.72	3.78	6.25
24	7.39	6.97	7.09	9.60	4.62	4.20	4.32	6.83
25	8.01	7.67	7.69	10.24	5.24	4.90	4.92	7.47
26	8.55	8.05	8.26	10.54	5.78	5.28	5.49	7.77
27	9.08	8.71	8.77	11.19	6.31	5.94	6.00	8.42
28	9.71	9.16	9.34	11.83	6.94	6.39	6.57	9.06
29	10.28	9.56	9.88	12.47	7.51	6.79	7.11	9.70
30	10.74	10.22	10.52	13.04	7.97	7.45	7.75	10.27





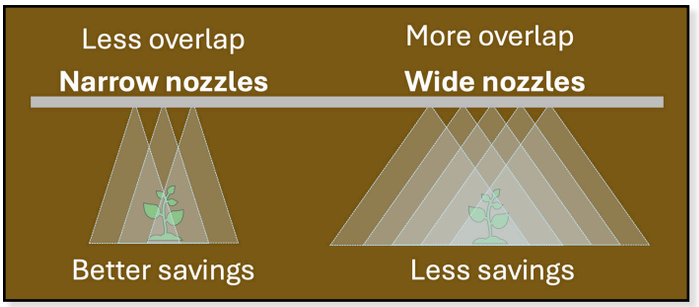
The cost of operating a new John Deere sprayer, valued at $650,000, at 18 mph, was compared to that of a See & Spray Premium, valued at $750,000, at 12 mph and a See & Spray Ultimate, valued at $900,000, at 15 mph. The average return on investment listed on the previous page accounts for the subscription fees ($5/acre for crops and $1/acre in fallow) on the area not sprayed, accounting for the efficiency of the different sprayers. The table shows the opportunity cost of purchasing a new sprayer. Bolded numbers in the table indicate losses with See & Spray. With the contour plots, shaded regions represent savings from See & Spray. Find where the herbicide costs and areas sprayed intersect to determine savings, and avoid the region with the lighter shades, which represents losses. Darker shaded regions represent a higher return on the investment.



Ways to Improve Savings

Machine Settings

- **Spray sensitivity:**
  - Lower spray sensitivities detect fewer weeds.
  - Medium sensitivities balance the area sprayed and the area detected as weeds.
  - Higher sensitivities spray more of a field by detecting smaller weeds.
- **Spray buffer area:**
  - This setting adjusts the number and duration of nozzles that are activated.
  - Small buffers will improve savings.
  - Medium and large buffers are designed to maximize coverage.
- **Nozzle selection:**
  - Narrower nozzles can reduce the area sprayed by 25%.



- **Operator errors:**
  - Proper speed: traveling too fast will cause the machine to broadcast.
  - Boom height: If the boom is too low, the machine will default to broadcast. If too high, more nozzles than necessary will be activated or the machine will default to broadcast.

Things to Consider

- Lower sensitivities will improve savings, but small weeds will be missed.
- If targeting residuals, use higher sensitivities and consider increasing the buffer size setting.
- Spending more on residuals will reduce weed emergence and improve targeted herbicide savings.
- If targeting herbicides $20/acre, a producer could expect See & Spray Premium to pay for itself in 13,400 to 20,400 acres compared to a broadcast sprayer.
- The same scenario for Ultimate: 53,300 to 117,000 acres.
- **Endangered Species Act Mitigation Points:**
  - How often should you expect points?
  - 2 points: 96%
  - 3 points: 79%
  - 4 points: 44%

TRISTEN AVENT is a graduate assistant with the University of Arkansas System Division of Agriculture, Fayetteville. **JASON NORSWORTHY** is a distinguished professor in weed science at the University of Arkansas System Division of Agriculture in Fayetteville. **LAWTON NALLEY** is the department chair of a Fryar Price Risk Management Center of Excellence, Fayetteville **TOM BARBER** and **BOB SCOTT** are both professors of weed science and are located in Lonoke.
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