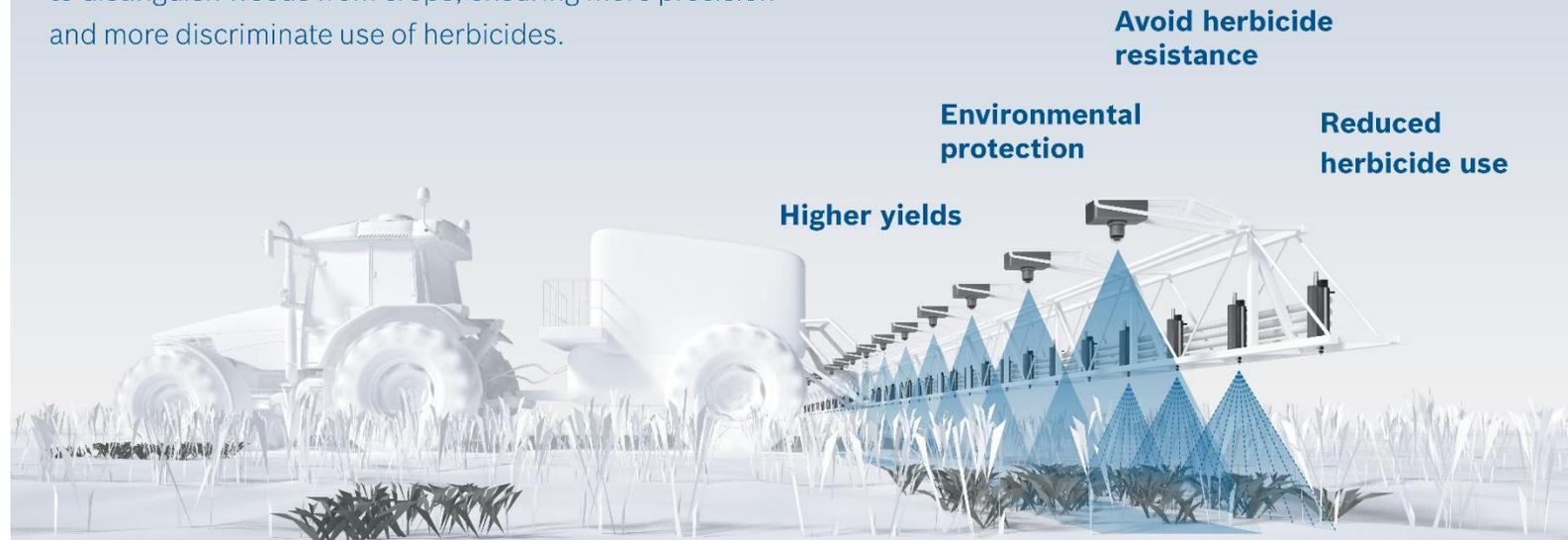


# Sensor-Controlled Spot-Spraying Technology for Arizona Cotton

Pedro Andrade and Randy Norton, UA Extension Faculty

## Smart spraying

The intelligent spraying system uses camera sensors to distinguish weeds from crops, ensuring more precision and more discriminate use of herbicides.

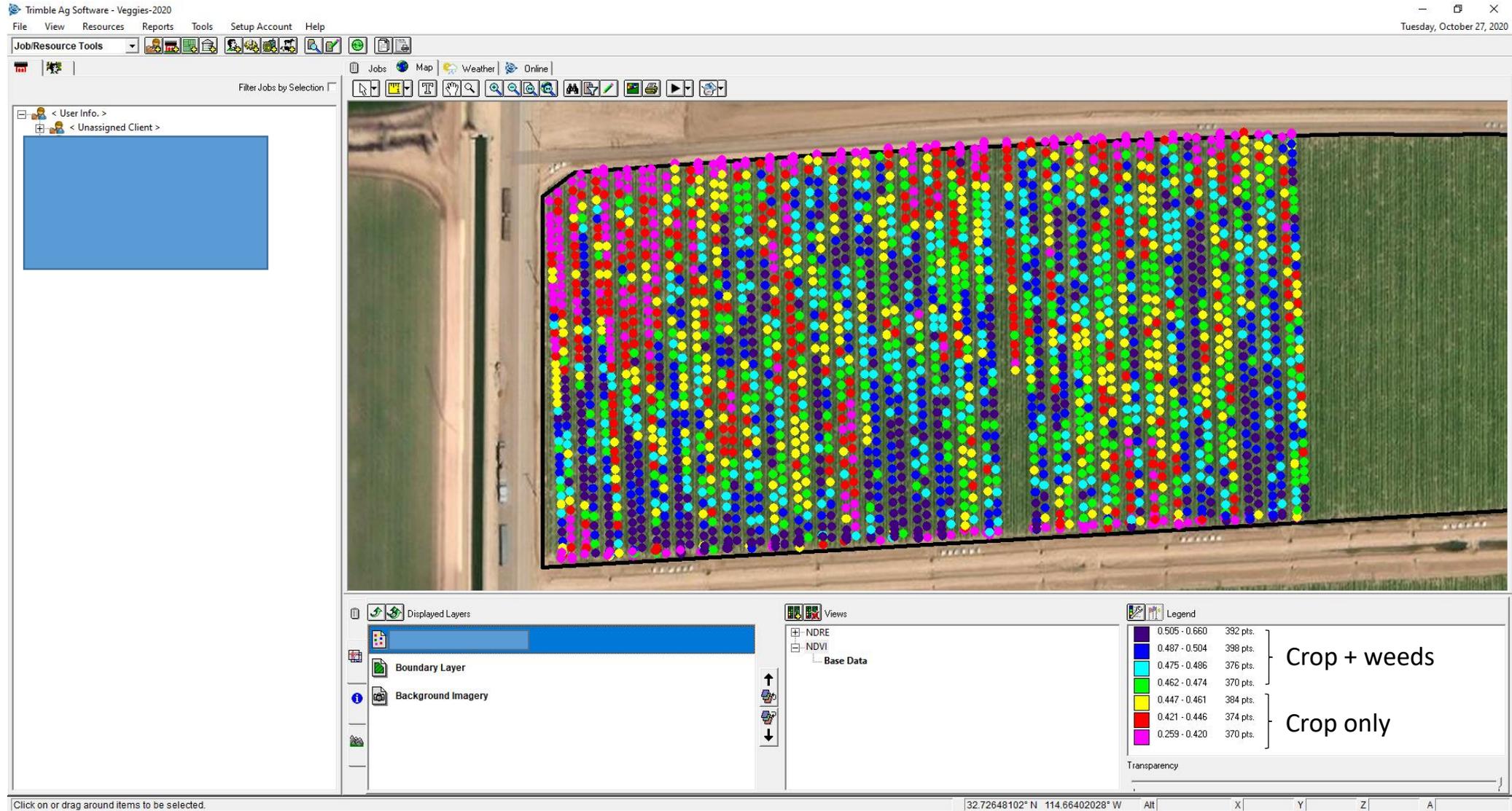


Bosch press release 07.11.2019. *Bosch and BASF expand their cooperation for digital agriculture*

October 2020 - 10th Annual Central Arizona Farmer Field Day

# Sensor-Controlled Spot-Spraying Technology in Cotton

Pedro Andrade and Randy Norton, UA Extension Faculty



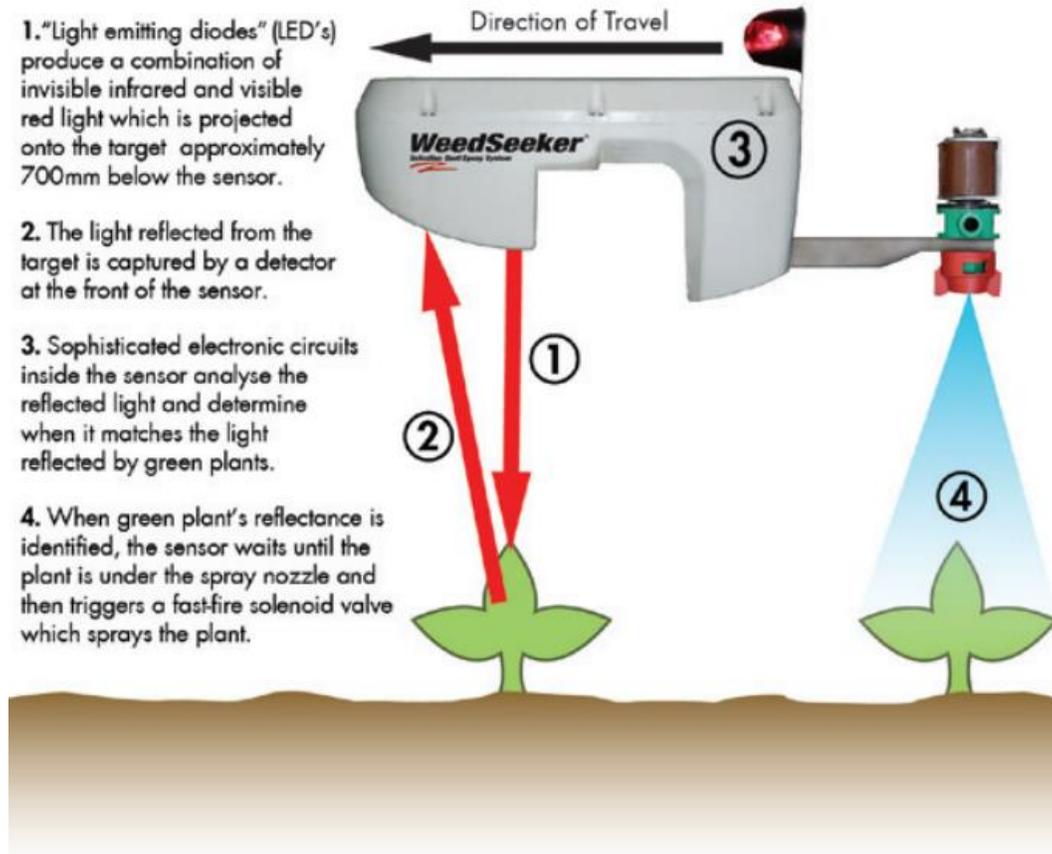
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# Sensor-Controlled Spot-Spraying Technology in Cotton

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## How a **WeedSeeker®** sensor works

1. "Light emitting diodes" (LED's) produce a combination of invisible infrared and visible red light which is projected onto the target approximately 700mm below the sensor.
2. The light reflected from the target is captured by a detector at the front of the sensor.
3. Sophisticated electronic circuits inside the sensor analyse the reflected light and determine when it matches the light reflected by green plants.
4. When green plant's reflectance is identified, the sensor waits until the plant is under the spray nozzle and then triggers a fast-fire solenoid valve which sprays the plant.



McIntosh Distribution Tamworth. [www.mcintoshdistribution.com.au](http://www.mcintoshdistribution.com.au)

# Sensor-Controlled Spot-Spraying Technology in Cotton

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Weed-Seeker hooded sprayer in Arizona cotton planted after wheat. *Conservation tillage in Arizona cotton. 2004 Agricultural Experiment Station Research Report.*



Weed-IT hooded sprayer in Arizona cotton. Field performance testing during 2020 season. UA-MAC.

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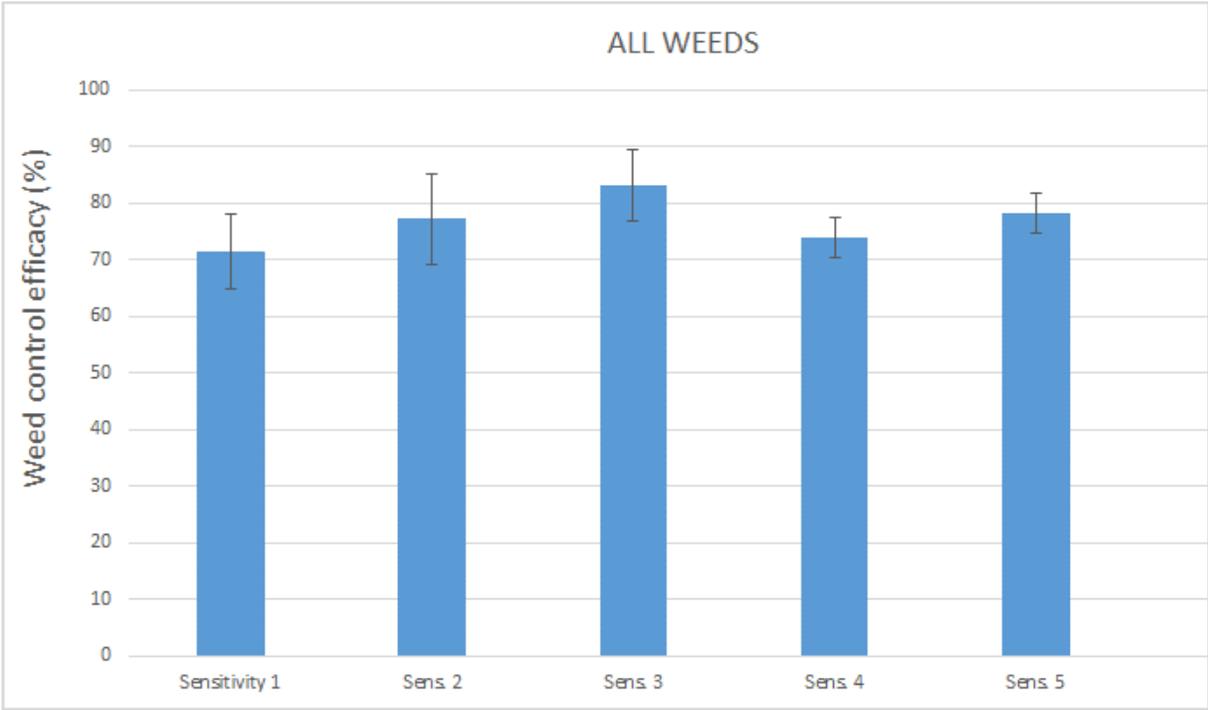
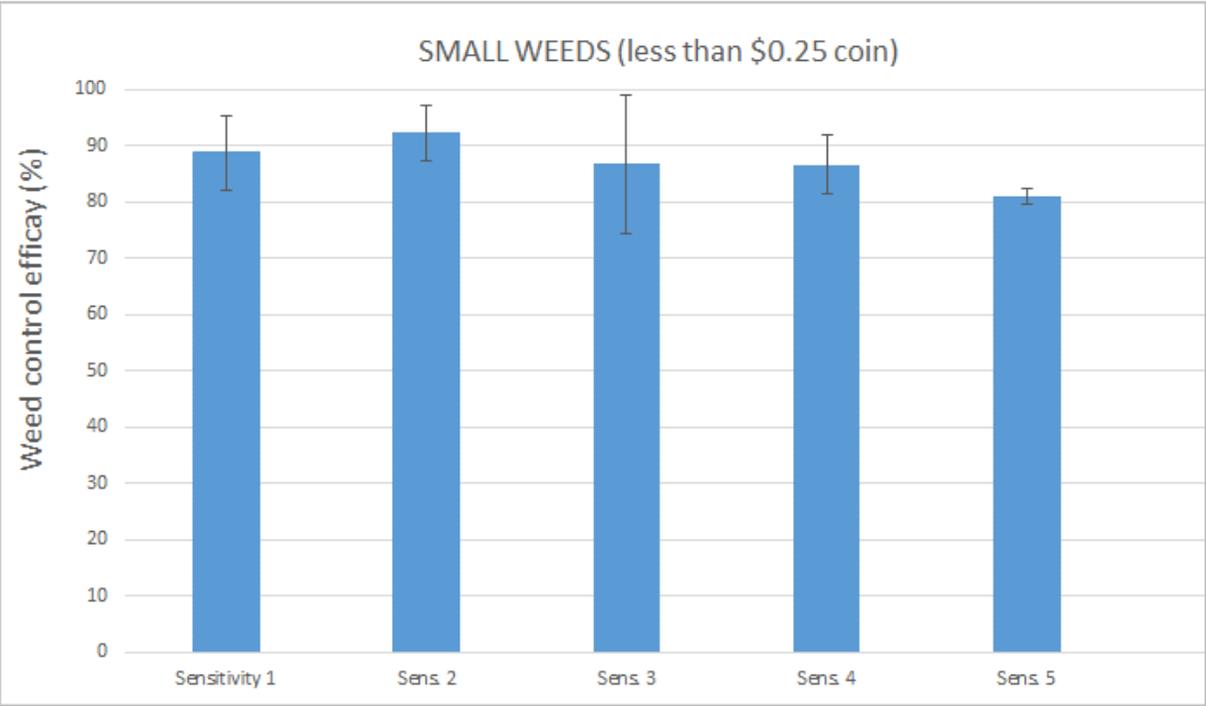
- Improvements in sensitivity for weed detection through firmware algorithms ✓
- Improvements rate control (PWM) ✓
- Current field performance testing focused on generate information to guide adaptations needed to fit Arizona cotton farming systems
  - Hardware configurations (i.e. hood options)
  - Operational parameters (i.e. sensor height)



# Sensor-Controlled Spot-Spraying Technology in Cotton

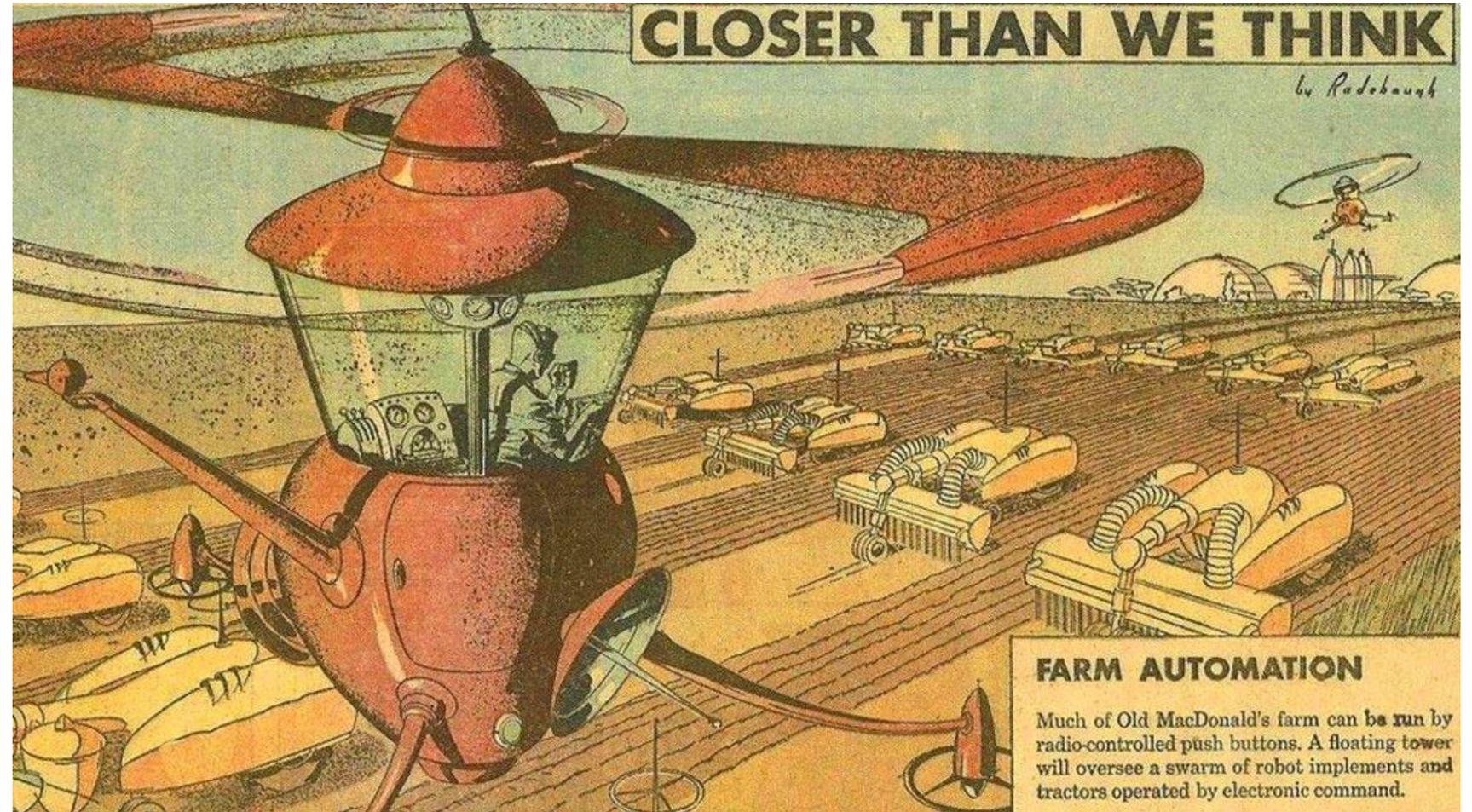
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## Preliminary testing – Safford Agricultural Center, September 2020



## Sensor-Controlled Spot-Spraying Technology in Cotton

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Arthur Radebaugh. *Closer Than We Think* series, 1958-1963

# Sensor-Controlled Spot-Spraying Technology in Cotton

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1980's Micro-computer

- $1.6 \times 10^6$  bits/s
- Increase the information processing capacity of individuals engaged in agriculture

**TABLE 1. SUBSTITUTING INFORMATION FOR ENERGY, EFFICIENCY IMPROVEMENT EXAMPLES**

Operation	Current energy use joules per hectare	Possible energy savings		Information handling energy, joules per hectare	Energy saved per unit information handling energy
		joules per hectare	percent		
✓ Tractor transmission control	4 019	402	10	6.2	64
✓ Traction wheel slip control	4 019	523	13	7.4	70
✓ Irrigation water application	31 686	6 009	19		
✓ Fertilizer placement	11 238	4 487	40		
Control of tobacco curing	120 189	18 028	15	362.9	49
✓ Cotton gin management	1 444	183	13	1.6	867

W. Chancellor. 1981. Substituting information for energy in agriculture. Transactions of the ASAE. 24(4): 802-807

# Sensor-Controlled Spot-Spraying Technology in Cotton

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We recognize the institutional and financial support provided to our work



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THE UNIVERSITY OF ARIZONA

Cooperative Extension



Arizona Cotton  
Growers Association

Thank-you for your attention!!