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

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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-acting solenoid valve which sprays the plant.

McIntosh Distribution Tamworth. www.mcintoshdistribution.com.au

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*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)
Preliminary testing – Safford Agricultural Center, September 2020
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Arthur Radebaugh. *Closer Than We Think* series, 1958-1963

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1980’s Micro-computer
- 1.6 x 10^6 bits/s
- Increase the information processing capacity of individuals engaged in agriculture


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<table>
<thead>
<tr>
<th>Operation</th>
<th>Current energy use, joules per hectare</th>
<th>Possible energy savings, joules per hectare</th>
<th>Information handling energy, joules per hectare</th>
<th>Energy saved per unit of information handling energy</th>
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<td>402</td>
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<td>Traction wheelslip control</td>
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<td>Cotton gin management</td>
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TABLE I. SUBSTITUTING INFORMATION FOR ENERGY: EFFICIENCY IMPROVEMENT EXAMPLES
We recognize the institutional and financial support provided to our work

Thank-you for your attention!!