

Innovations in Mid-South Rice Irrigation Management

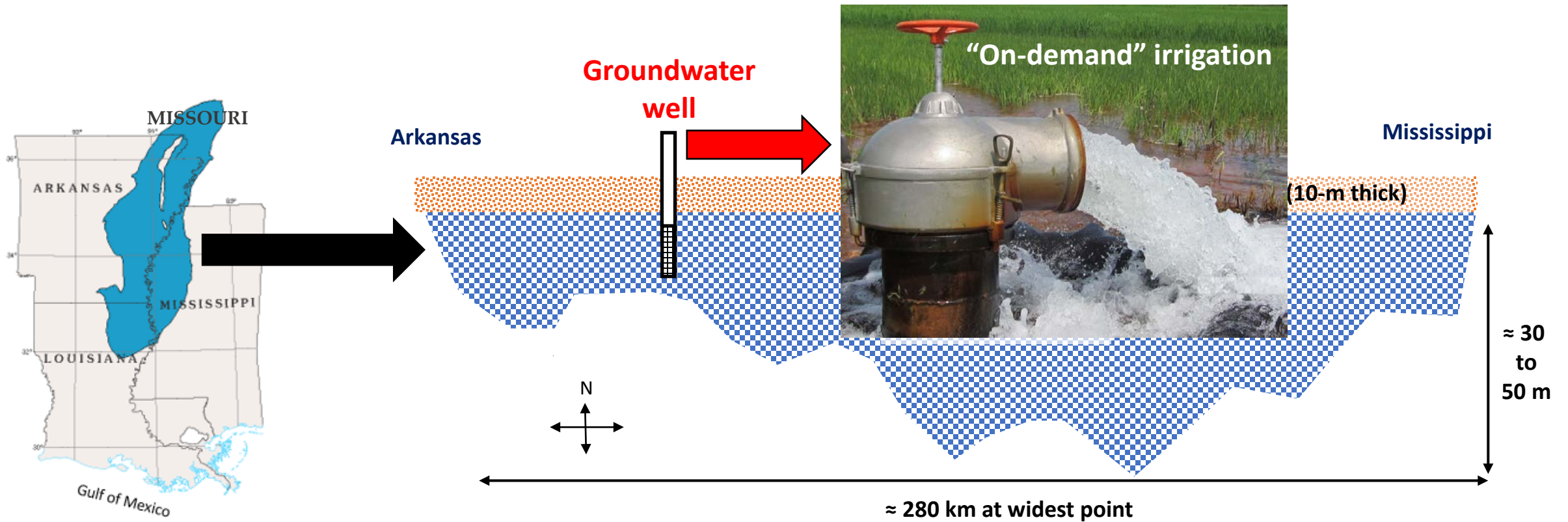
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Research Agronomist
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Outline

- I. Rice irrigation practices and trends in Arkansas (2 minutes)
- II. Forces driving innovation in rice irrigation (3 minutes)
- III. Innovation examples (8 minutes)
- IV. Findings (2 minutes)

Rice irrigation practices and trends in Arkansas

Primary source of irrigation water in Arkansas: Ground water

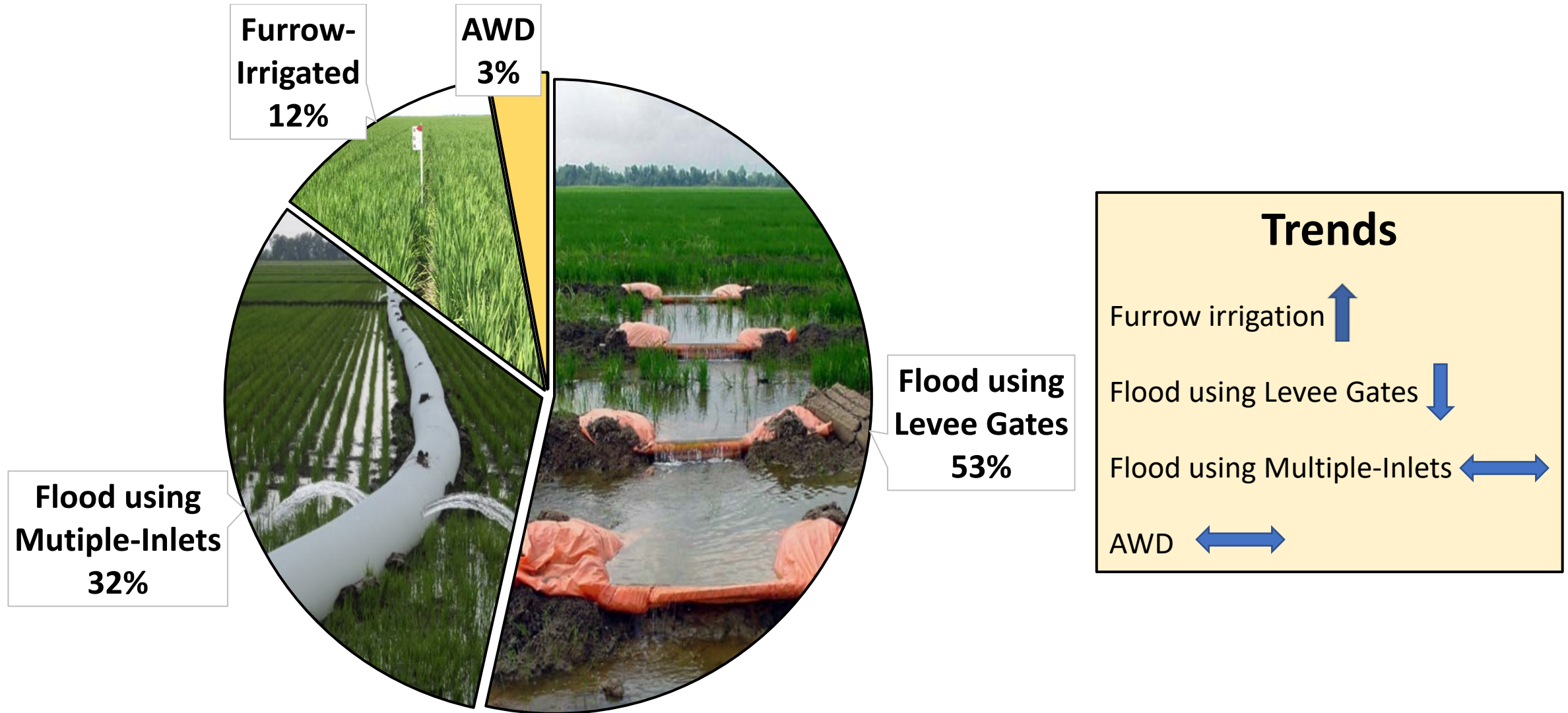


Mississippi River Valley alluvial aquifer

≈80% of irrigation in Arkansas is derived from groundwater pumped from the MRVAA.

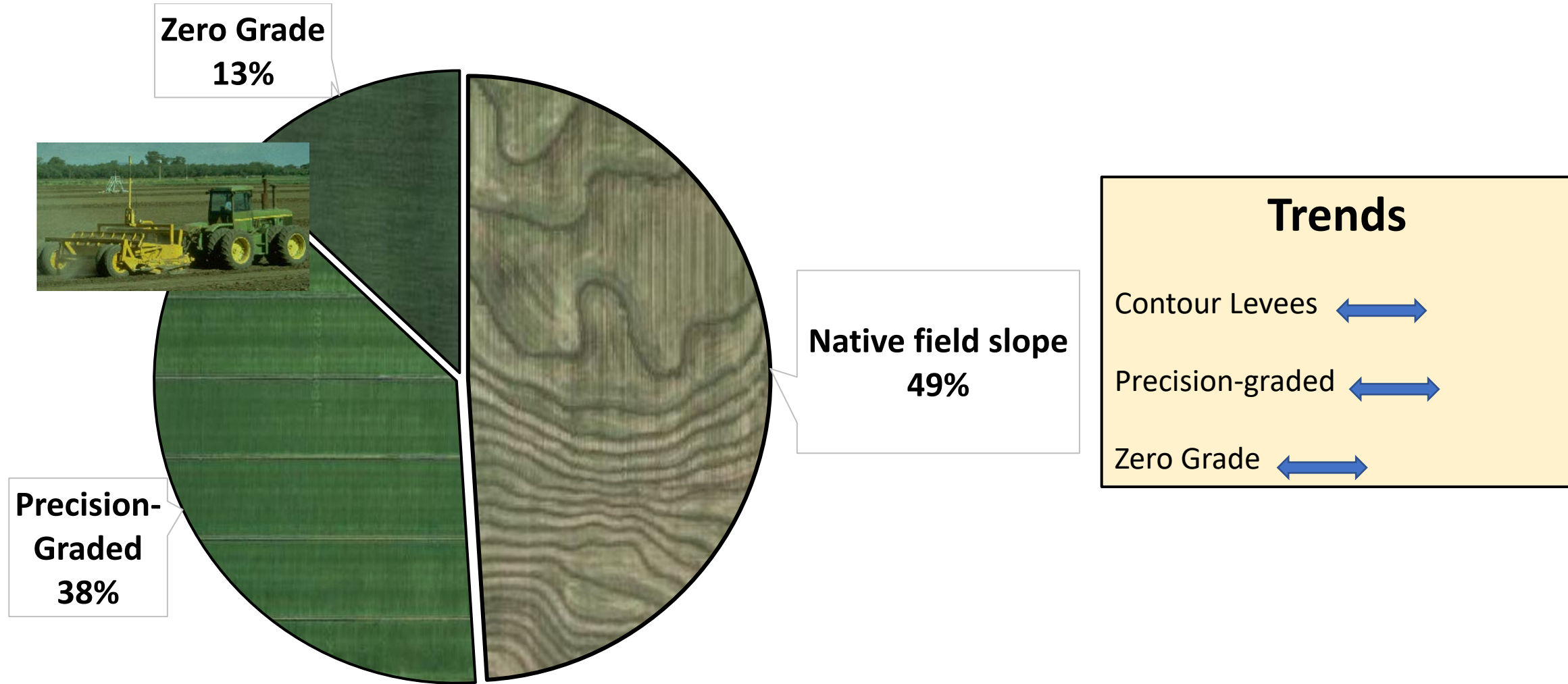
Rice Irrigation Methods Used in Arkansas

(2018–2020 averages)



Rice Land Management Used in Arkansas

(2018–2020 averages)



Forces driving innovation in rice irrigation

Forces driving innovation in rice irrigation

Farmer Challenges

- Widespread, chronic farm labor shortages
- Economics (rising input costs; volatile markets)
- 'Quality of life' issues for younger farmers
- Changing weather patterns
- Concerns of water scarcity and future 'regulation'
- Concerns regarding global warming-rarely expressed

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Mike Sullivan

4th gen farmer

1st crop = 1984

Farm size: 1000 ha

Ryan Sullivan

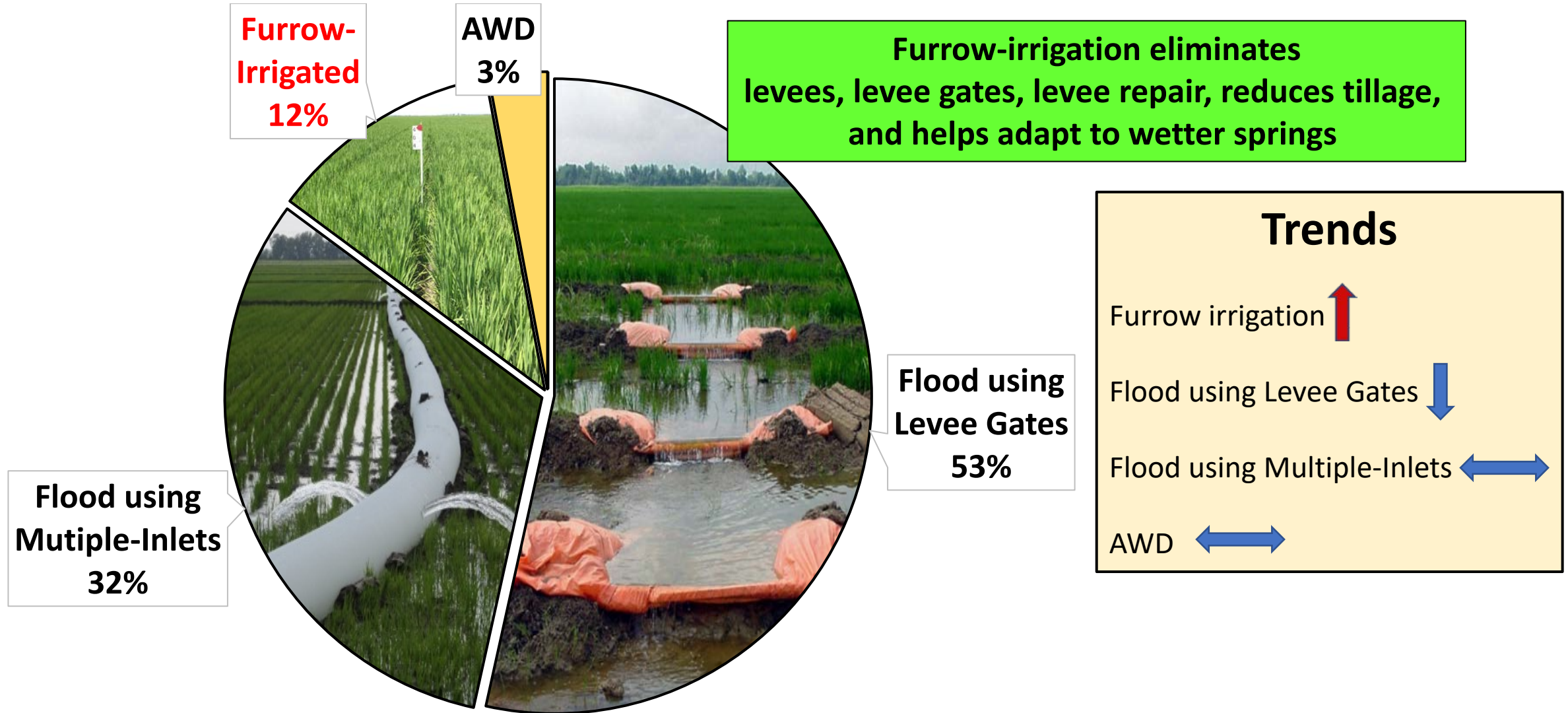
5th gen farmer

1st crop = 2019

Farm size: >4000 ha

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(2018–2020 averages)



Forces driving innovation in rice irrigation

Farmer Challenges

- Widespread, chronic farm labor shortages
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The more of these issues that an innovation addresses, the more likely it is to be adopted.



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Forces driving innovation in rice irrigation

Opportunities

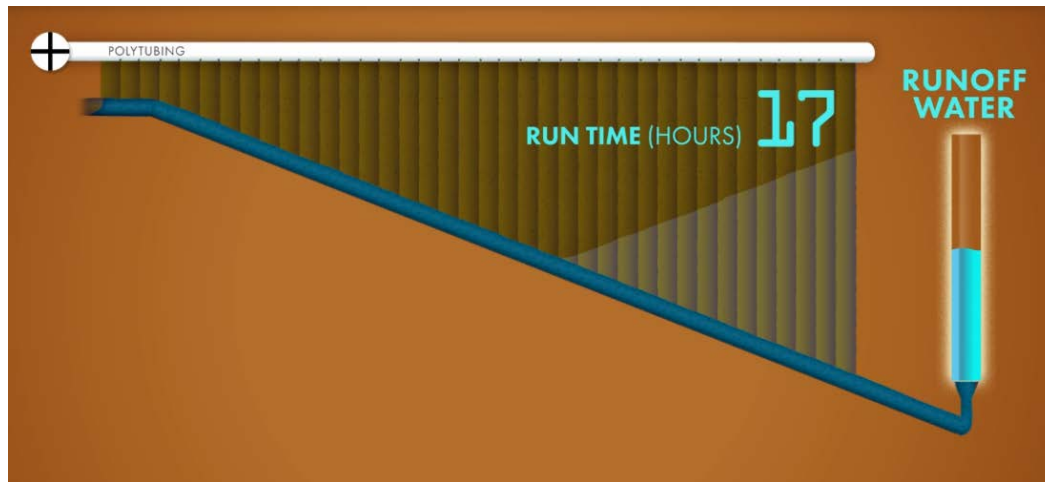
- Government and commodity board investments (e.g., USDA NRCS programs; USDA NIFA & ARS and DOE research funds)
- Irrigation management is “ripe” for improvements
- Internet of Things (IoT)
- Entrepreneurs and investors focusing on agriculture
- Corporate sustainability programs
- Specialty markets

Innovation Examples

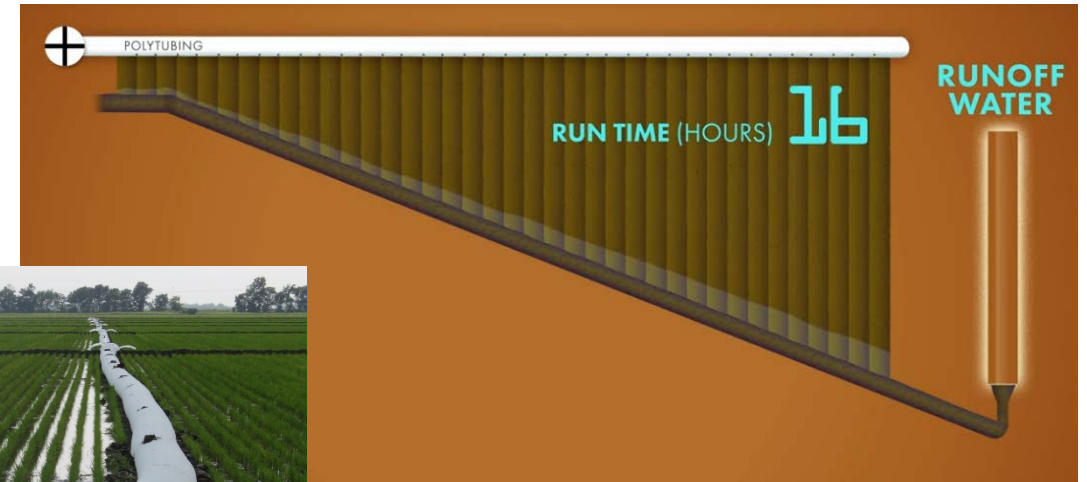
Computerized Hole Selection (CHS)

*Pipe Planner Software**

33% of Arkansas multiple-inlet and furrow-irrigated rice using poly-tubing uses hole designs created by *CHS* software (Hardke et al., 2021)



Before



After

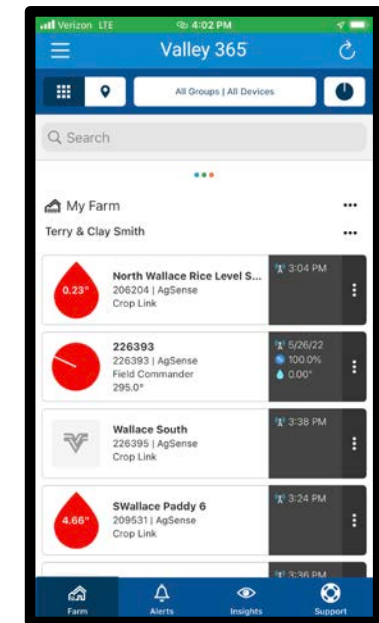
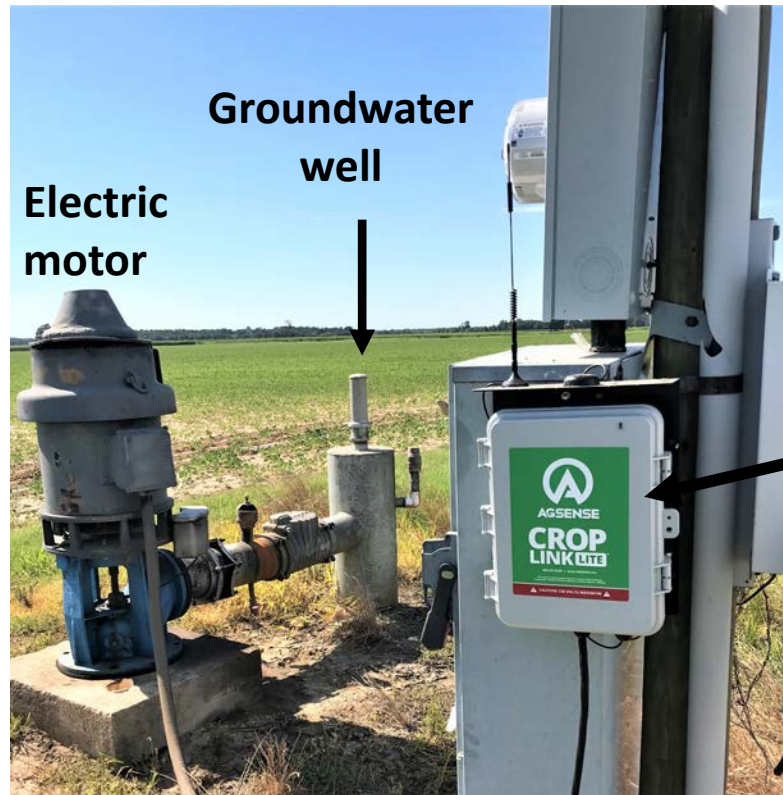


Improves irrigation distribution uniformity,
saving water and reducing runoff

(*) <https://www.deltaplastics.com/pipe-planner>

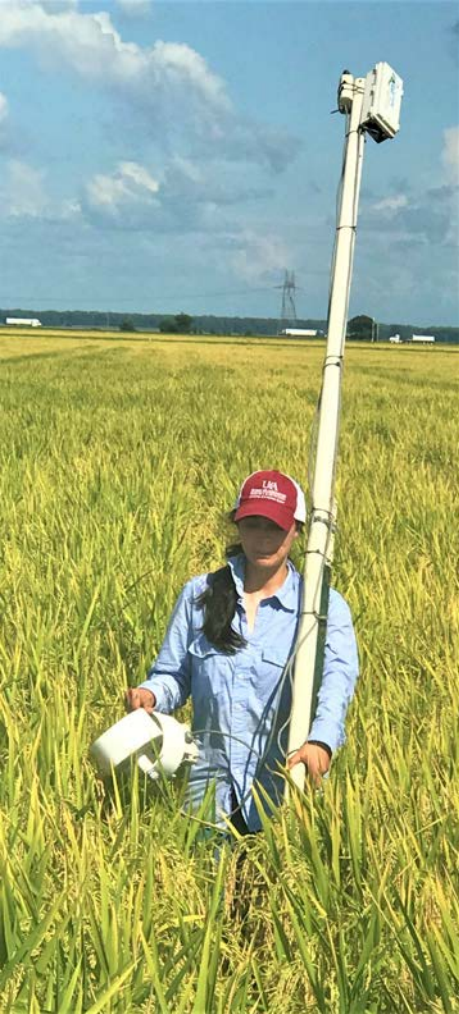
Automation

Owing to the large scale of irrigated crop production in the Mid-South and chronic labor issues, further improvements in irrigation efficiency will likely require some use of automation



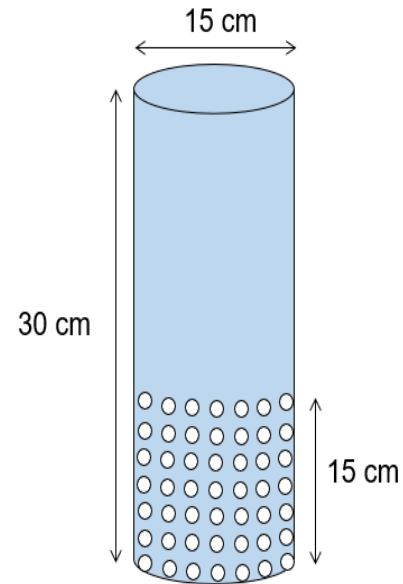
iPhone app

What level of automation is most helpful to farmers?

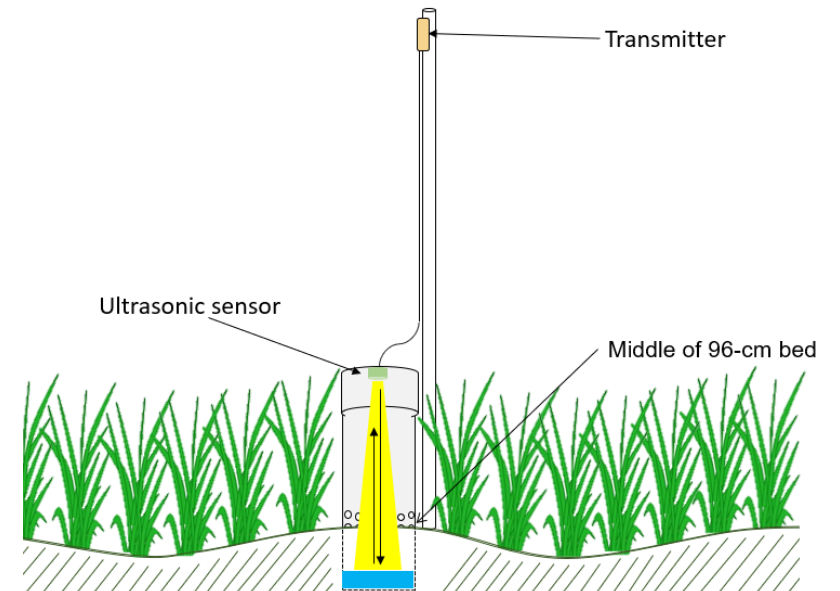


Thais Jardim
MS Student

IRRI Field Tube



Ultrasonic sensor



“Pit-Less Recirculation System” for Furrow-Irrigated Rice

Chris Henry, University of Arkansas



330 mm irrigation applied to rice
240 bu/A (13 t/ha) rice grain yield
9.77 bu/in (4.5 kg/m³)

Photographs courtesy of Chris Henry, Univ of Arkansas Div. of Agriculture

Findings

Farmers will find new uses for technology

- ✓ A farmer uses a remote pump shutoff when punching holes in poly-tubing, allowing him to install tubing by himself.



- ✓ Another farmer found that soil moisture sensors, by confirming that he could wait one more day before irrigating, helped him prioritize the tasks that he needed to do for the day, reducing stress.



Thank you &
Welcome to Arkansas!