LESA Irrigation for Dry Bean, Alfalfa, Grain and Potato Production

Treasure Valley Bean School

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Nampa, ID

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University of Idaho

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Future water-related challenges

- Less snowpack water storage
  - Lower precipitation
  - Warmer so more comes as rain
- More competition for water
- Higher temperatures
  - Higher ET
  - Longer growing season
- More demand for long-season forage crops

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For any new irrigation water application technology:

Any new center pivot or linear move water saving hardware must be compatible with all crops in the rotation

LESA Work funded by 3 years of grant support from Bonneville Power Admin. (BPA)and 1 year AB

- Co-PI's:
  - Howard Neibling, University of Idaho
  - Troy Peters, WSU
- BPA Project Support:
  - Dick Stroh, Agricultural Engineer

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BPA LEPA Demonstration Project

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BPA LESA Demonstration Project

LESA (Low Elevation Spray Irrigation)

- Spray heads with about 15 ft wetted diameter
- 6 psi regulators (10 psi with ditch water)
- Heads dropped to about 1 ft above the ground
- In-canopy in spring wheat, alfalfa, corn, potatoes
- In-canopy reduces wind drift and evap. losses by an additional 15-20% (or more)
- Drop spacing about 4-5 feet (typically double # drops)
- Applies to moderate or high intake soils where runoff is not an issue
- Cost: about $25/LESA drop

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LESA (Low Elevation Sprinkler Application)

- Save water (2013-2016)
  - 15-20% seasonal, 20-50% in-canopy
  - 30-50% savings for dry, windy conditions near desert
- Save power (less water pumped and reduce pressure regulators to 10 psi)
- Locations: Arco, Malta, Mud Lake, Rexburg, Osgood, Hazelton, NV, OR, WA, CA
- Crops tested so far: alfalfa, oats, spring grain, corn, mint, grass seed, grass hay, potatoes

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First irrigation: LESA vs. MESA (original arrangement)

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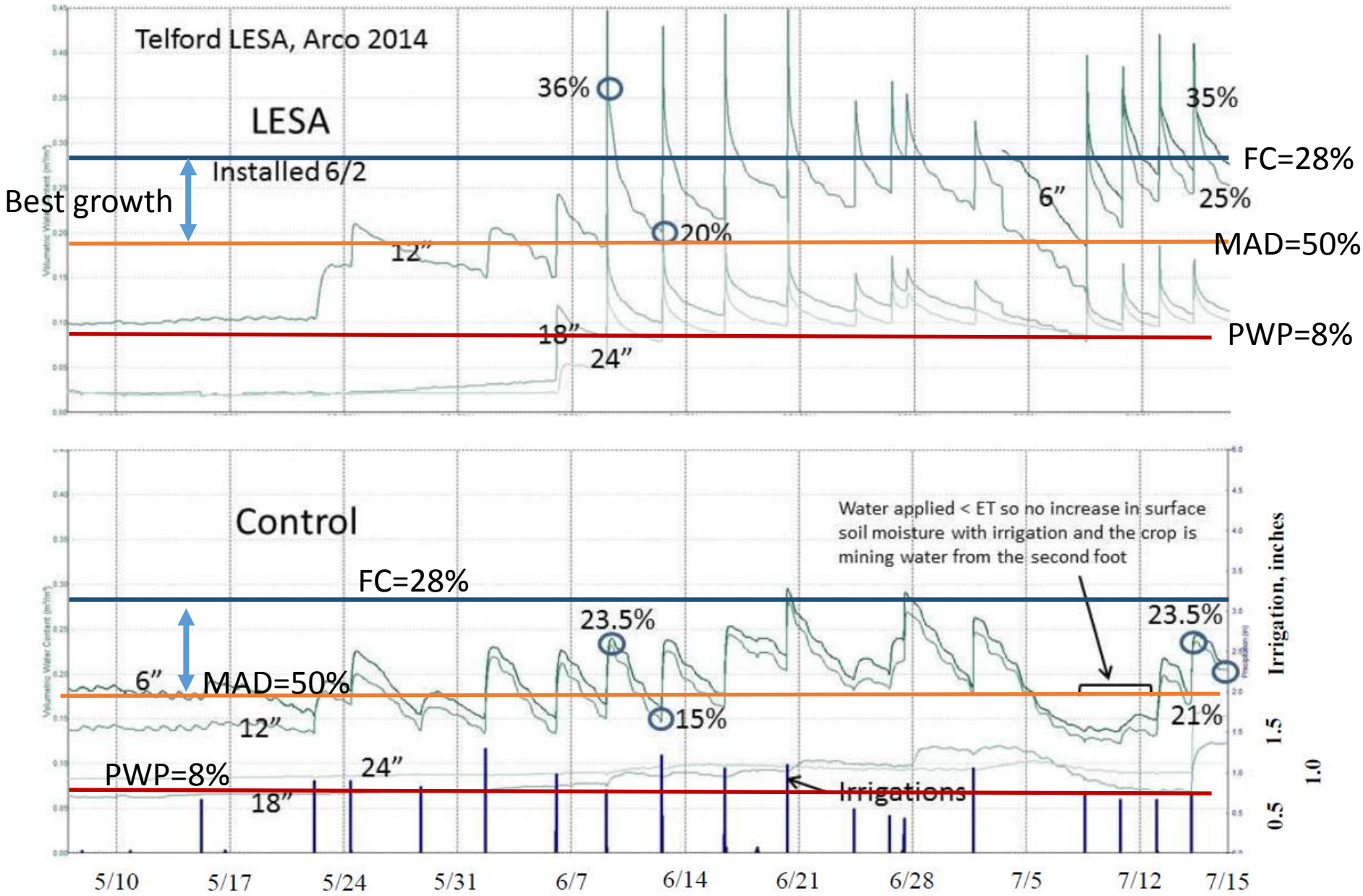

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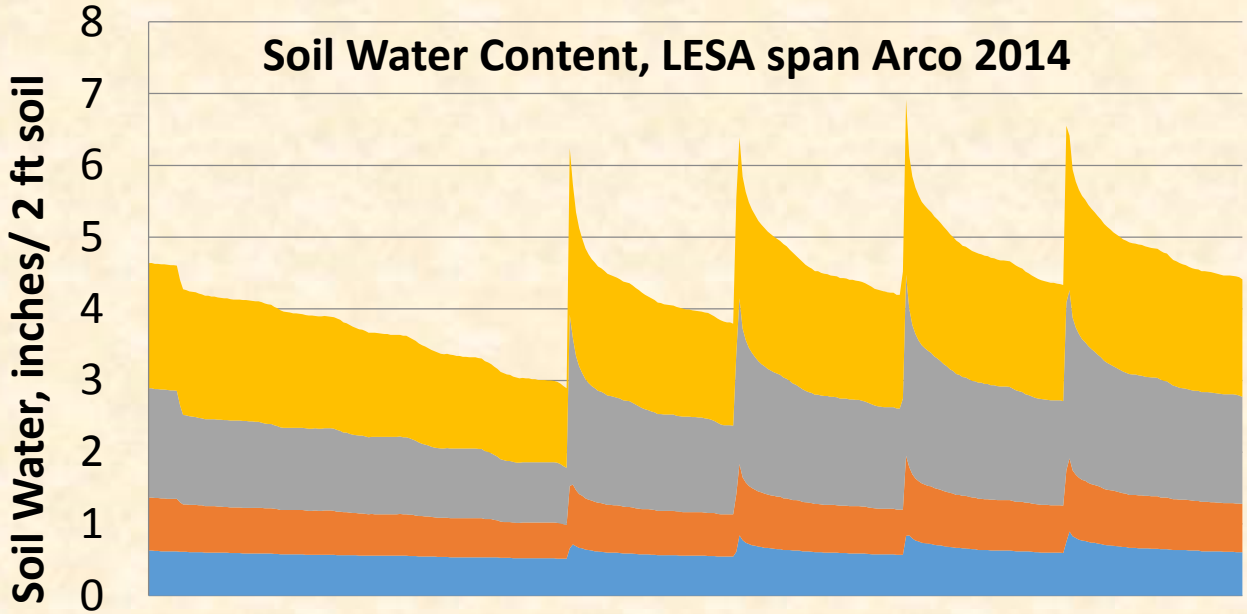

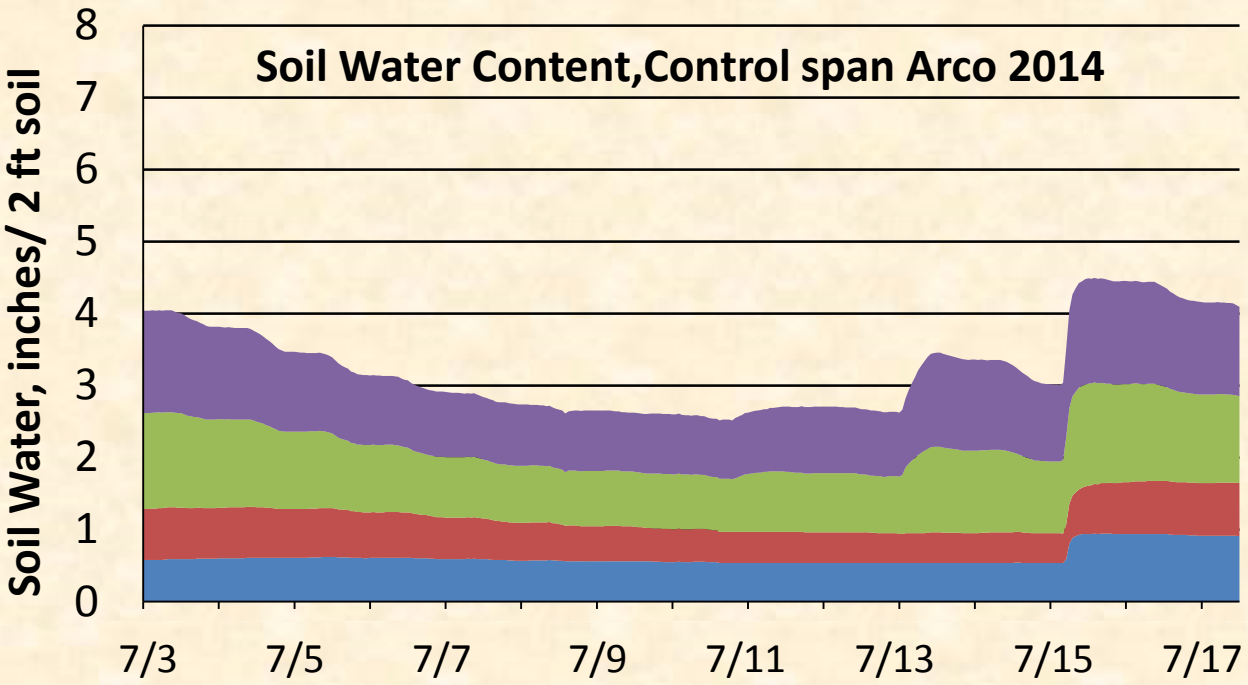

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BPA LEPA Demonstration Project

Double goose-necks and truss-rod hose slings.

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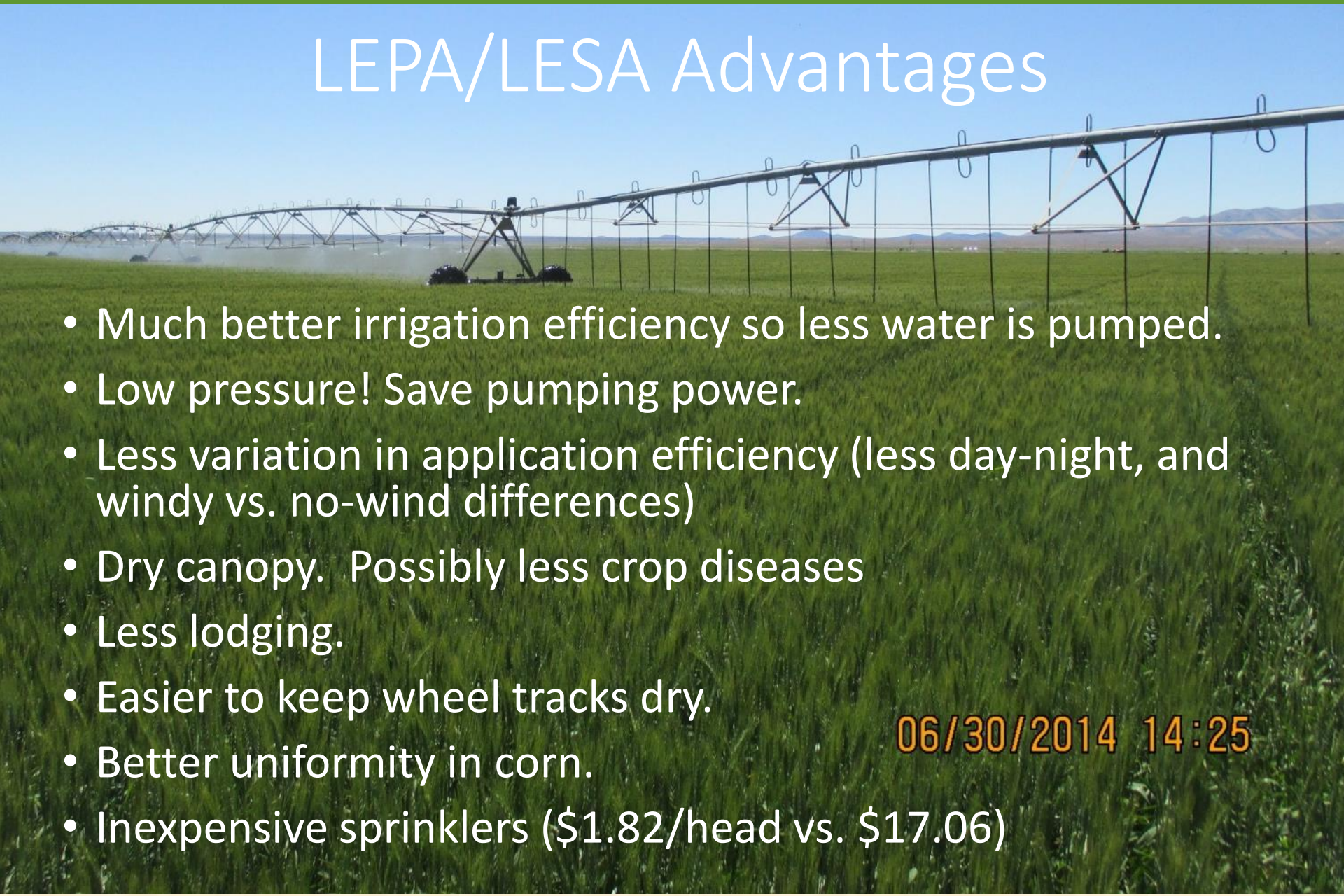
Photo: Troy Peters, WSU

LEPA/LESA Advantages



- Much better irrigation efficiency so less water is pumped.
- Low pressure! Save pumping power.
- Less variation in application efficiency (less day-night, and windy vs. no-wind differences)
- Dry canopy. Possibly less crop diseases
- Less lodging.
- Easier to keep wheel tracks dry.
- Better uniformity in corn.
- Inexpensive sprinklers ($1.82/head vs. $17.06)

LEPA/LESA Challenges

- High application rates.
  - Tight soils. Steeps slopes. Probably not for you.
- Chemigation.
  - Raise drops slightly.
  - Switch to chemigation plate.
- Small nozzles.
  - Requires clean water.

2016 Work

- LESA spans on 3 pivots of malting barley
- LESA span on 1 linear span on potatoes
- LESA span on one span of alfalfa
- 2 paired LESA – Control pivots on alfalfa in Eureka, NV

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Brad Reed LESA / Control 07/06/16

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2016 LESA Rob Webster Malting Barley

One span on each of 3 sites

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2016 Rob Webster 7/6/16

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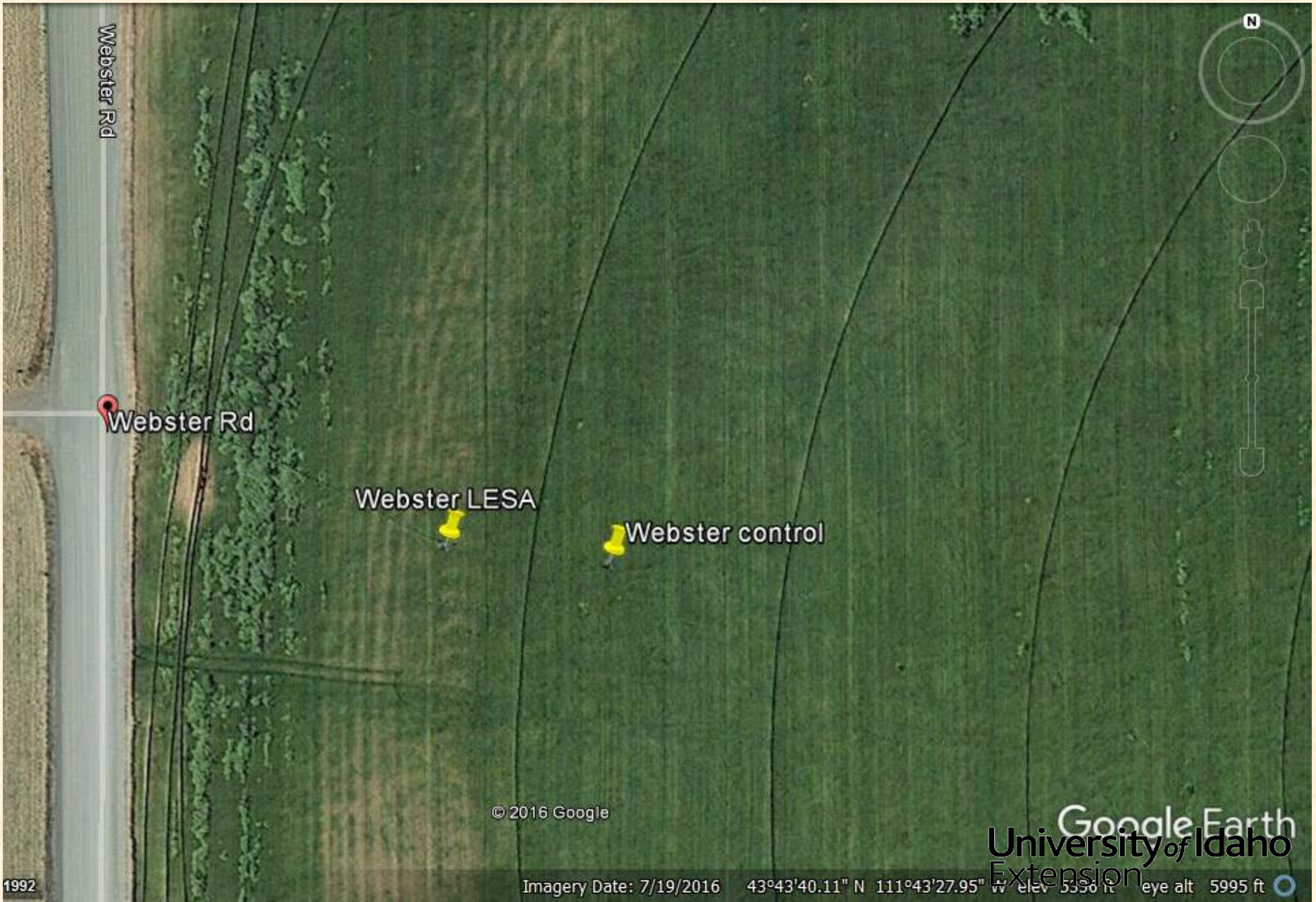
Webster Malting Barley 7/19/16

Webster Malting Barley 7/19/16



Preliminary 2016 Malting Barley Results (LESA vs. Control)

- Grain yield and quality about the same on 2 of 3 sites. Third site had more severe streaking but yield not available due to hail before harvest.
- Less lodging on some sites
- No runoff problem
- “bubbler” mode seemed to reduce streaking

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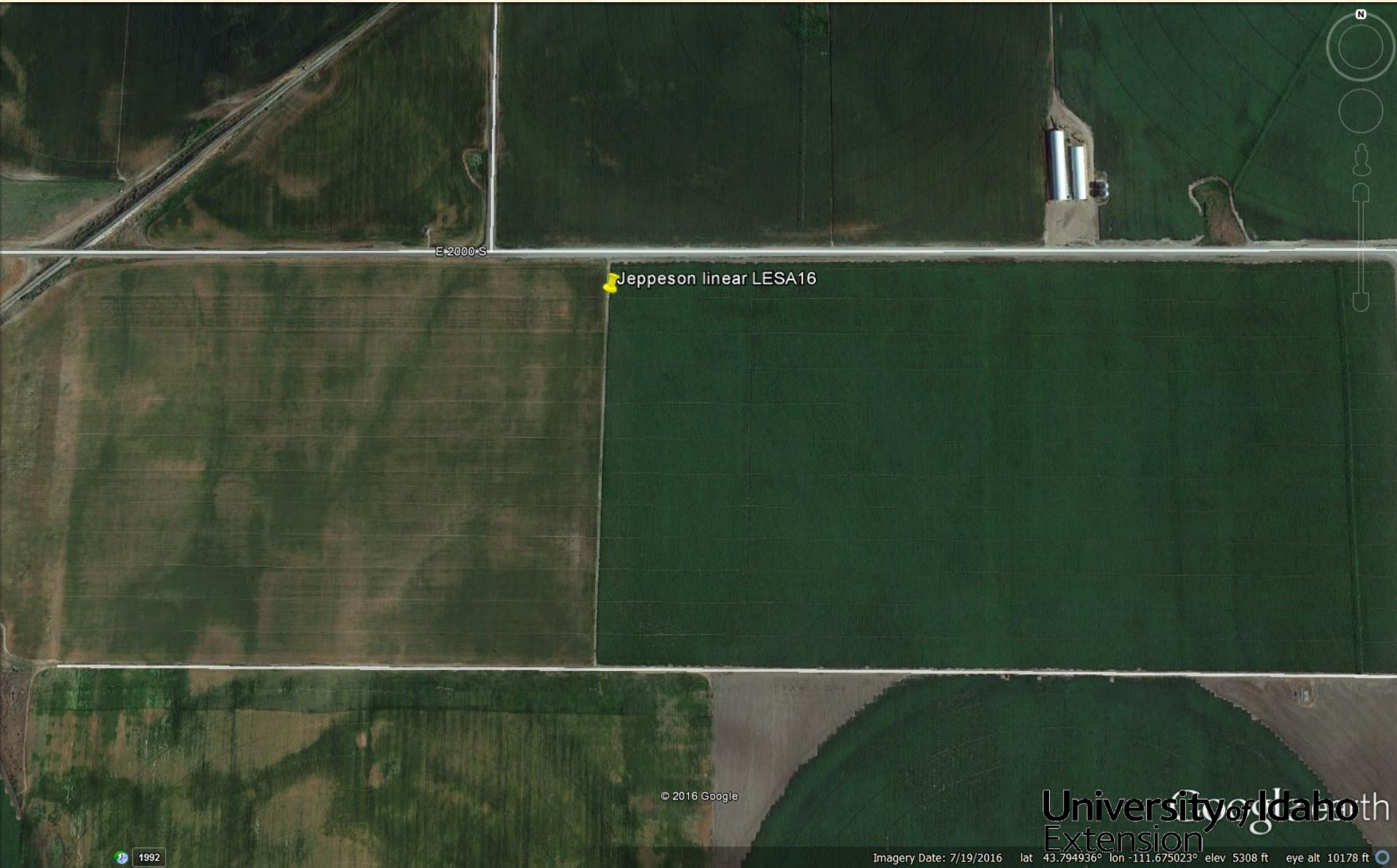
Rexburg Bench Linear LESA /MESA spans, 7/19/16



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Rexburg Bench LESA / MESA 7/6/16

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Rexburg Bench LESA /MESA, 7/6/16

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Preliminary Results (LESA vs. Control)

- Potato yield: no significant difference
- Potato quality: no significant difference
- Grain yield: about 5 bu/ac less with LESA (130 bu/ac)
- No runoff problem
- Water savings: about 10-15%

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LESA modifications for 2017

- Reduce drop spacing from 4-5 feet to about 36-40 inches if potatoes or high-yield malting barley or wheat is in rotation
- Or: use “bubbler” mode
- Or: raise sprinkler heads to just above canopy (some less efficiency gain but may be least-cost vs. water saved solution)

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Drop spacing typically 60, 40 or 30 inches, depending on crop, soils,…

Precisionag.com

Kansasagland.com

irrigationdistributors.com

Spacing:
Every-other-furrow for row crops planted in a circle
Every row: water-sensitive, high demand crops, or low infiltration soils
Usually 30 inches on alfalfa, small grains or other closely planted crops

PMDI (AE=95%) may work better than LESA (AE=92%) for low infiltration soils

Life-Cycle Cost Analysis

Costs/year. (5 year life span)

	LESA	Control
Equipment	$ 902.16	$ 768.85
Labor/Maintenance	$ 617.72	$ 284.15
Annual Pumping Costs	$ 3,344.17	$ 5,115.60
Total/year	$ 4,864.05	$ 6,168.60
Difference/year	**$ 1,304.55**	

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The End -- Questions?