

# Agricultural Roundtable: August 2019



# Agricultural Roundtable Update Topics

- Team
- Top agricultural products
- Indoor agriculture
- BPA Agricultural program offers
- MESA/LESA/LPIC/LEPA/MDI
- VFD calculators
- Agricultural lighting
- Worms
- Your topics

# Agricultural Sector Team

- David Lee, Sector lead
- Andrea Weathers, Marketing support
- Dick Stroh and Tom Osborn, Engineering
- Boyd Wilson, EER
- Trade Allies/Vendors/Manufacturers
- Utilities
- Irrigators

# Top Agricultural Products

## Washington, Oregon and Idaho

- Milk: \$4.2 billion.
- Cattle calves: \$2.7 billion.
- Apples: \$2.4 billion.
- Potatoes: \$1.8 billion.
- Hay: \$1.8 billion.
- Wheat: \$1.3 billion.

*Source: 2017 Census of Agriculture as reported in the Capital Press, May 3, 2019*

## Recent Trends

- Worldwide push to become vegetarian.
- Combat global warming.
- Health benefits.
- 4.2% less CO<sub>2</sub> emissions.
- Cropping, water and fossil-fuel based nitrogen

*Source : USA Today reporting on UN World Health*

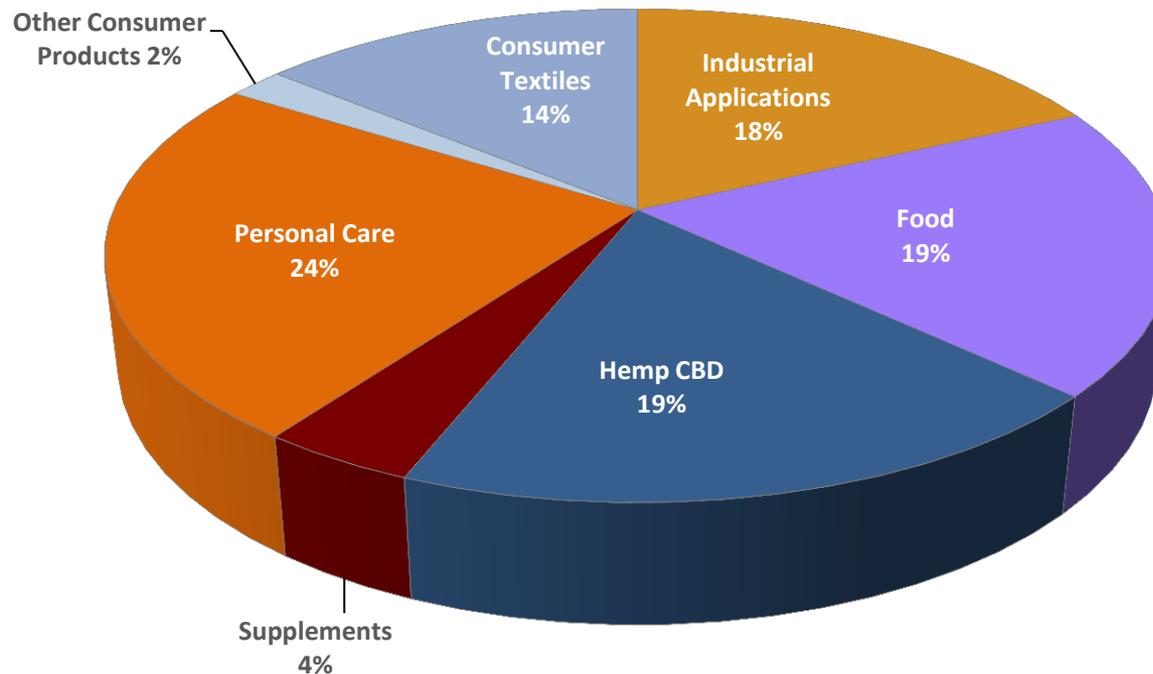
# Trend: Agricultural Hemp Production

Overall hemp market is on the increase

State	Acres (2018)	Acres (2019)	% increase
OR	7,800	25,000	220%
WA	142	6,000	4,125%
MT	22,000	30,000	36%
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# Update: Agricultural Hemp Production

**Figure 2: U.S. Hemp-Based Product Sales by Category, 2016**



\$688 million (2016)

Source: Hemp Industries Association (HIA), 2015 Annual Retail Sales for Hemp Products Estimated at \$573 Million, May 9, 2016.

# Update: Agricultural Hemp Production

- Hemp must be <0.3% tetrahydrocannabinol (THC).
- Gross revenue: \$50k – 100k per acre.
- Cost approximately \$15k per acre.
- CBD oil at \$50 – \$125 per ounce.
- Many challenges with hemp production:
  - Certification, regulation, labeling, transport and processing.
- Oregon State University is investing in agricultural research.

# Indoor Agricultural Research

## POD FARM

Example size:  
320 sq.ft.

Average lettuce yield per week:  
95 to 140 lbs /  
approx. 500 5oz heads per week

Average electrical service required:  
60 Amp, 120/240V

Typical daily energy consumption:  
100-150 kWh

## VERTICAL FARM/WAREHOUSE

Example size:  
10,000 sq.ft.

Average lettuce yield per week:  
4600 to 4700 lbs /  
approx. 15,000  
5oz heads per week

Average electrical service required:  
600 Amp, 120/240V

Typical daily energy consumption:  
1-10 MWh

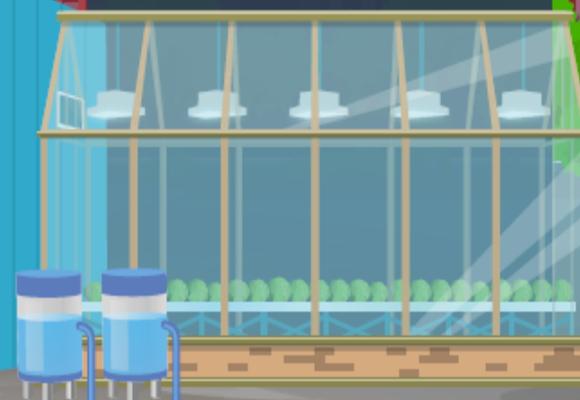
## AUGMENTED GREENHOUSE

Example size:  
3,000 sq.ft.

Average lettuce yield per week:  
450 to 500 lbs / approx.  
1,600 5oz heads per week

Average electrical service required:  
300 Amp, 120/240V

Typical daily energy consumption:  
500-1,000 kWh



Typically water savings\*:  
70-95%

\*actual production varies based on  
crop, type of farm, and farm design



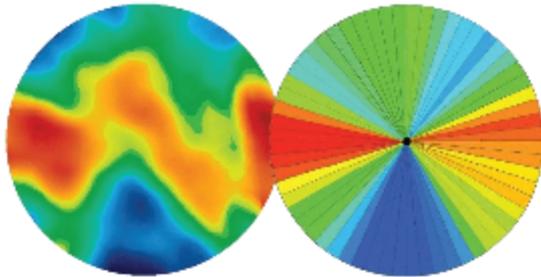
# Zonal Variable Rate Irrigation



# Zonal Variable Rate Irrigation

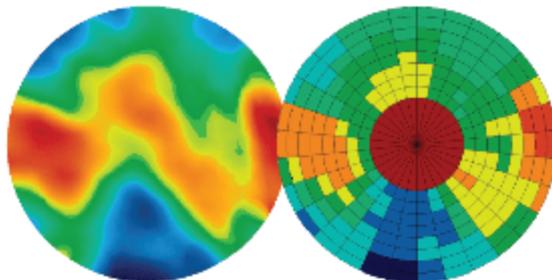
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## LEVEL I - SECTOR VRI



Speed VRI is economically accomplished by segmenting the pivot path into multiple pie-like slices (sectors). Each unique irrigation depth is accomplished by altering the pivot speed at each slice. The Rx may concentrate on the outer 30% to 50% of the pivot circle, which accounts for 50% to 75% of the total area within each slice. Each slice can be accurately proportioned down to one tenth of a degree (3,600 increments), to provide maximum control of the water being applied. Base Application depth can be easily adjusted higher or lower without changing the Rx.

## LEVEL II - ZONE VRI



Zone VRI divides the pivot coverage area into two or more rings (zones) around the pivot point. Reinke VRI can control as many as 84 zones. When combined with the segmenting sectors, an even higher level of precision is made possible by the creation of several to more than 300,000 independently managed zones within the field. Irrigation rates are achieved through individually controlled sprinkler banks, allowing an almost unlimited number of precision water application combinations.

# Zonal Variable Rate Irrigation



## Other Current Measures

- Freeze-resistant stock water tanks.
- Thermostatically controlled outlets.
- Thermostatically controlled stock tank deicers.
- Transformer de-energization.
- Irrigation hardware.
- Irrigation pump VFDs.

## MESA, LESA/LPIC, LEPA and MDI

- Some hardware measures dropped.
- Others remain but changed.
- Retrofit is preferred (how low can you go?).
- LESA/LPIC, LEPA and MDI.
- BPA offers to keep maintenance measures.

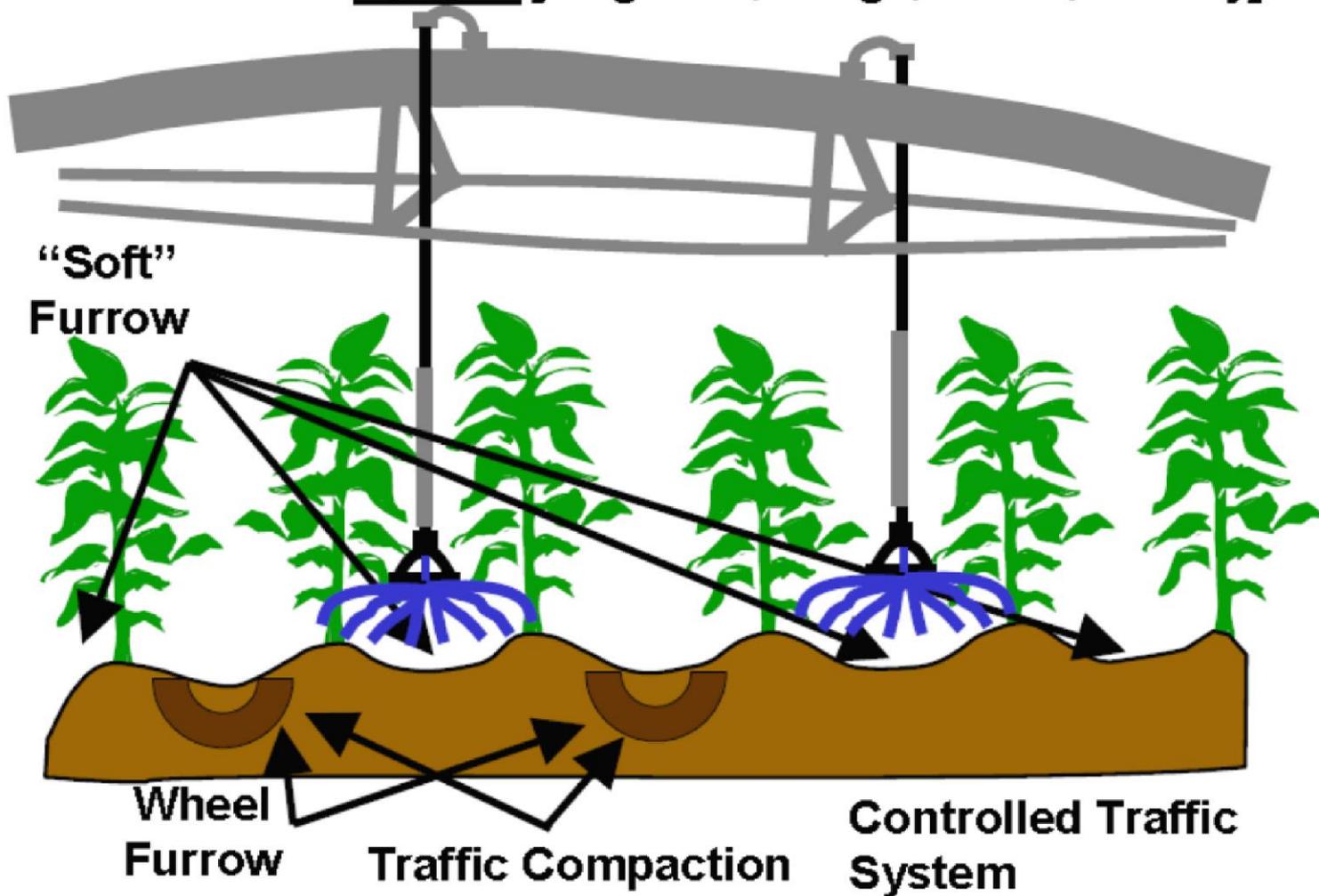
# Sprinklers on top: Conversion opportunity?



# LESA and MESA demo



**LESA / LPIC System [irrigation, tillage, traffic, fertility]**



**Figure 4.** Illustration of the "agronomic system" concept involving irrigation, controlled tillage, fertility, etc.

# LEPA



# MDI



# VFD and Sprinkler Calculators

- Available on the Implementation Manual Document Library on bpa.gov  
 (<https://www.bpa.gov/EE/Policy/IManual/Pages/IM-Document-Library.aspx>)

- Spreadsheet

Irrigation System Conversion and Sprinkler Packages Tool						
<b>Instructions:</b> Complete this conversion and sprinkler tool for <u>each</u> irrigation system for which sprinkler packages were replaced or which was converted to a more efficient system. Green fields are required for calculations. This tool is for Sprinkler Package and Irrigation System Conversion Measures only. Other eligible measures may apply. <b>This is not a required form for BPA measures. This is provided as an optional tool for invoicing and auditing.</b>						
<b>A. FARM AND PRACTICES INFORMATION</b>						
Farm Identifier:	Bob's farm		Account No:	12345		
Irrigation System Type:	MESA	If system conversion, previous system type:	MESA			
Movement type:	Center pivot	If system conversion, previous movement type:	Center pivot			
Water Source:	Surface	Describe type:	Solenon xyzobraz			
<b>B. SPRINKLER PACKAGE INFORMATION</b>						
Component (all components of a sprinkler package must be replaced)	EERC	Total \$ Replaced	kWh saved each	Utility incentive	Sprinkler kWh saved	Sprinkler Incentive
<b>Sprinkler Package (MESA)</b>	<b>AIRHA4021</b>	110	20	\$ 6.00	3,080	\$ 660.00
Nozzle		110				
Rotating or multi-trajectory sprinkler		110				
Lap pressure regulator		110				
<b>C. IRRIGATION SYSTEM CONVERSION INFORMATION</b>						
Irrigation System Conversion Type	EERC	\$ drops converted	kWh saved each	Utility incentive	Conversion kWh saved	Conversion Incentive
<b>Not Eligible for Sprinkler Conversion</b>						
				Total Payment	\$	660.00
				Total Savings (kWh)		3,080

## Other Measures

- Truck engine block heaters.
- Pump testing and system analysis.
- Custom projects for pipelines, friction loss reduction, changing pump arrangements, etc.

# Dairies

- LED lighting and controls.
- Screw air compressor VFD.
- VFD on vacuum pumps.
- Heat exchangers (use well water to cool milk).
- Cow cooling (evaporative, drench, fan VFDs).
- All are fairly easy custom projects.

# Worms clean the wastewater



# Questions?

- Contact your EER.
- Or, call your BPA engineer.

