

# Weed Management for Cane Fruits

Marcelo Moretti, Assistant Professor.  
[marcelo.moretti@oregonstate.edu](mailto:marcelo.moretti@oregonstate.edu)

Department of Horticulture  
Oregon State University



Oregon State  
University



Oregon State  
University

# Principles of Integrated Weed Management

- Combination of multiple strategies

## The Growers “Tool box”

*Preventive*

*Cultural*

*Chemical*

*Mechanical*

*Biological*

**Effective and Economical**

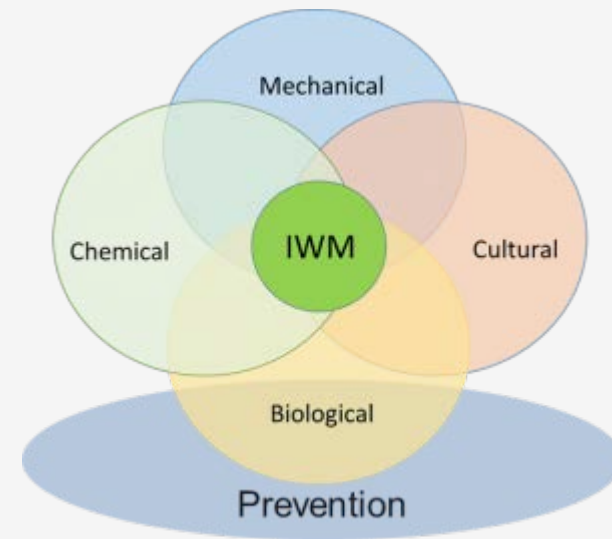


Illustration: Annie Klodd Penn State

# Examples of Integrated Weed Management tools



***Preventive:*** clean farm equipment; weed free soil amendments, control weeds in field surrounds,

***Cultural:*** mulches, planting timing, spacing, cover crops

***Chemical:*** herbicides (organic approved)

***Mechanical:*** cultivators, mowing

***Thermal :*** flaming, steaming

***Biological:*** biocontrol agents, grazing.

# Challenges in perennial cropping systems



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## ***Restricted use of certain tools:***

*crop rotation*

*tillage*

*Planting time and density*

*In row and alleyways (between row) practices*

## ***Problems are compounded over time:***

***Weed seed-bank***

***perennial weeds***

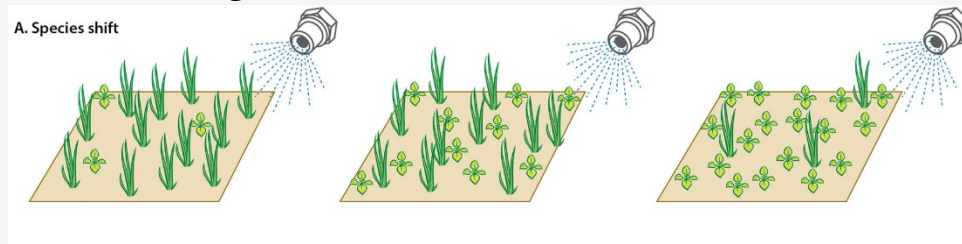
# The Weed Management Dilemma

- Agriculture is a biological system managed by economic reasoning and...
- ... weed control is viewed as cost not as an investment.

# Integrated Weed Management

*No one tool will fix all problems  
weed population will adapt to weed control  
practices*

## *Weed shift*



**SHIFT  
HAPPENS**

# Caneberry as a case study



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## *Alleyways weed control*

- *Permanent grass cover*
- *Tilled soil*
- *Bindweed is a common problem.*



# Caneberries as a case study



**Oregon State**  
University

*In row weed control*

*Herbicide*

*Standard practice*

*Mulches*

*Synthetic (plastic)*

*Biodegradable mulches (DeVetter – WSU)*



Raspberry planted with  
biodegradable mulches.  
(DeVetter, WSU)



# A few updates on herbicides

*Rimsulfuron (Matrix and others) – Supplemental label – renewed every year.*

Important Weed Controlled by Rimsulfuron

Quackgrass

Mallow or cheeseweed (suppression)

Groundsel

Dandelion



- Quackgrass
- *Elymus repens*
- Patchy and creeping growth
- Perennial grass - rhizomes
- Auricle clasp around stem

# Rimsulfuron - Caneberry

- Rimsulfuron (Matrix) Group 2  
– rate 2 to 4 oz/A  
product (PHI 21 d)
- Use adjuvant (NIS 0.25 % v/v,  
Crop oil (1 % v/v)
- Max rate per Acre/yer – 4 oz  
product (if banding 50% of  
field)
- Crop age
- Raspberry after 1 growing  
season
- Blackberry after 2 growing  
season

# DO NOT go over the top!

- Rimsulfuron Timing and Placements are key:  
Two options for application:

1. Apply before primocane emergence
2. After primocane are 3 ft long and target lower ft of canes. (Protect growing points of canes)



Example of injury with rimsulfuron in raspberry  
(picture UC Davis repository)



# Spray nozzle selection

- Off center nozzles
  - Drift reduction options
    - AIUB (Teejet)
    - AirMix OC (Agrotop)
- Target the the plant base
- Protect new shoots



# Expected Registration in near Future Clopyralid (Stinger)

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- Mode of action: WSSA group 4 – synthetic auxin
- Targeting Canada thistle
- **Sponger Wiper**
- Less product use ~ \$
- Lower crop exposure





# Synthetic Mulches

- Plastic mulches (Weed Mat)
  - Common in blueberry
  - in-test in caneberry
- Woven geotextile mulches
- Last multiple-season – 5 yrs or more
  
- Bio-degradable mulches
  - Good results in raspberries (Zhang et al 2019)
  - Suppression of weeds
  - Promoted nematode lesion



High cost upfront – material + installation

Source: <https://smallfruits.wsu.edu/plastic-mulches/>

# Mulches have their limitations

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Weeds growing around the edges and hole.  
Cost \$\$ and added labor for maintenance  
Limits weed control options – flaming, tillage

# New tools available

- Saturated steam (Weed Technics SW900)
- Brush weeder (several manufacturers – ID David)
- Organic herbicides (few OMRI) - broadcast vs sponge wiper



ID-David

<http://vinetechequipment.com/>



<https://www.weedtechnics.com/>



<https://www.smucker.net/weed-wiper-products>



# Saturated Steam

Saturated steam

Water use: 160 gal/H (2.6 gpm)

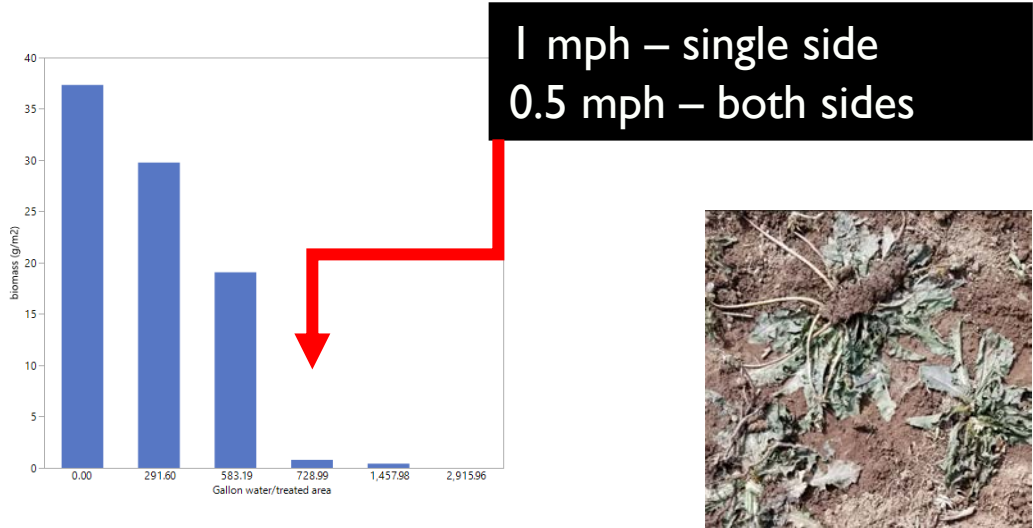
Diesel burner: 2 gal/h (250 F)

Gas pump: 0.5 gal/h

Temp @ nozzle ~ 190 F

Fast acting

Continuous flow (one or two applicators)



# Brush weeder

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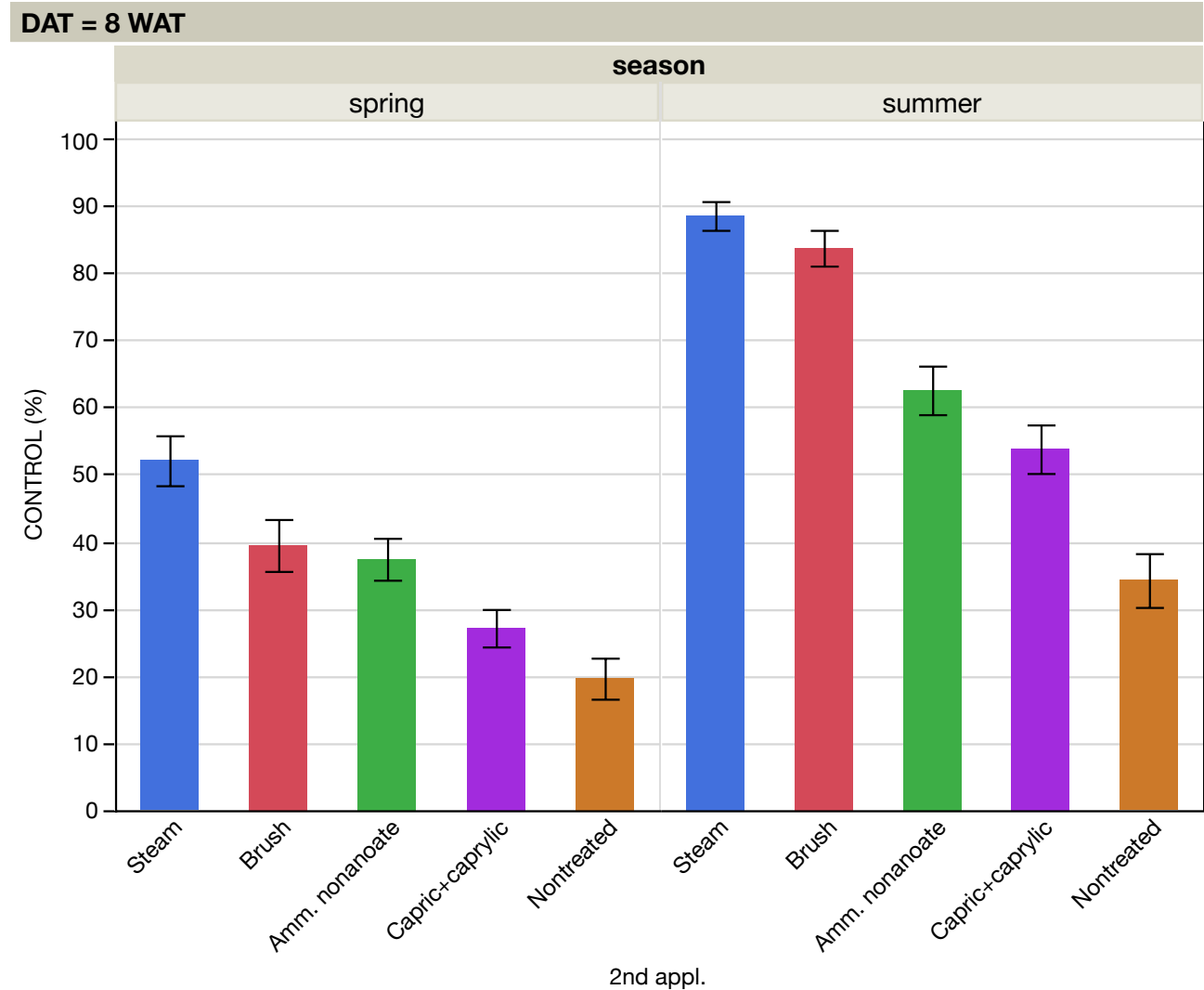
- *Mounted on the 3-point hitch*
- *Spinning shaft ~ 1100 rpm*
- *Smooth cords to*
- *Hydraulic output: 6.5 to 8 GPM  
(one or two sided)*
- *At least 40hp tractor is ideal*



# Weed Biomass 8 Weeks after treatment

Better efficacy during summer studies

Brush and Steam effective



# Comparing Treatment Costs

Treatment	Cost band application (1/3rd of field)
Steamer	\$51
Brush weeder	\$32
Axxe (80 GPA 13 % v/v)	\$163
Suppress (80 GPA 9 % v/v)	\$126
<b>*Hand-hoeing (estimated 6 h/A )</b>	<b>\$90</b>

# Weed Control in Planting holes

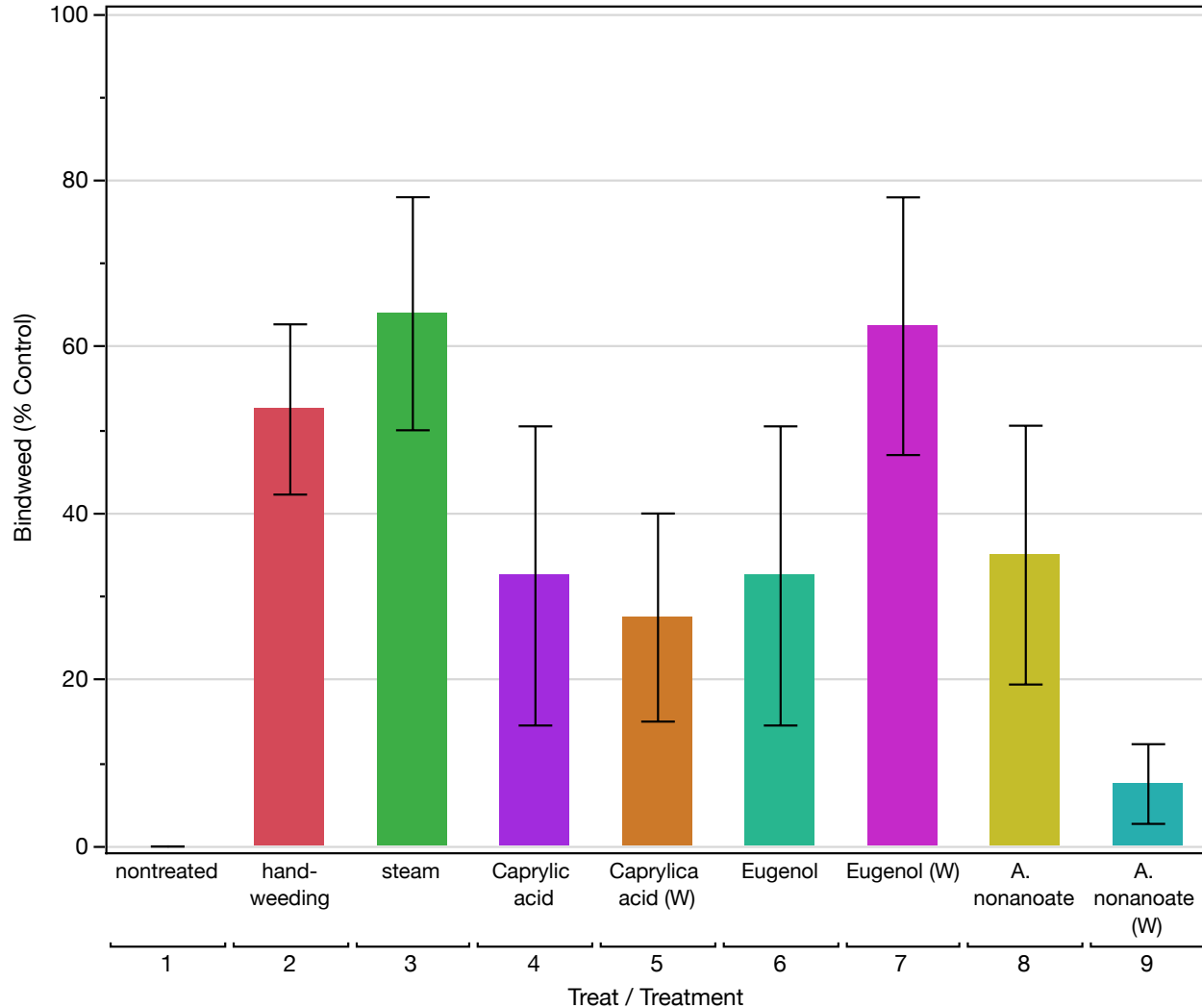
- Saturated steam
- Weed Slayer
- Suppress
- AXXE



*Broadcast vs sponge wiper*



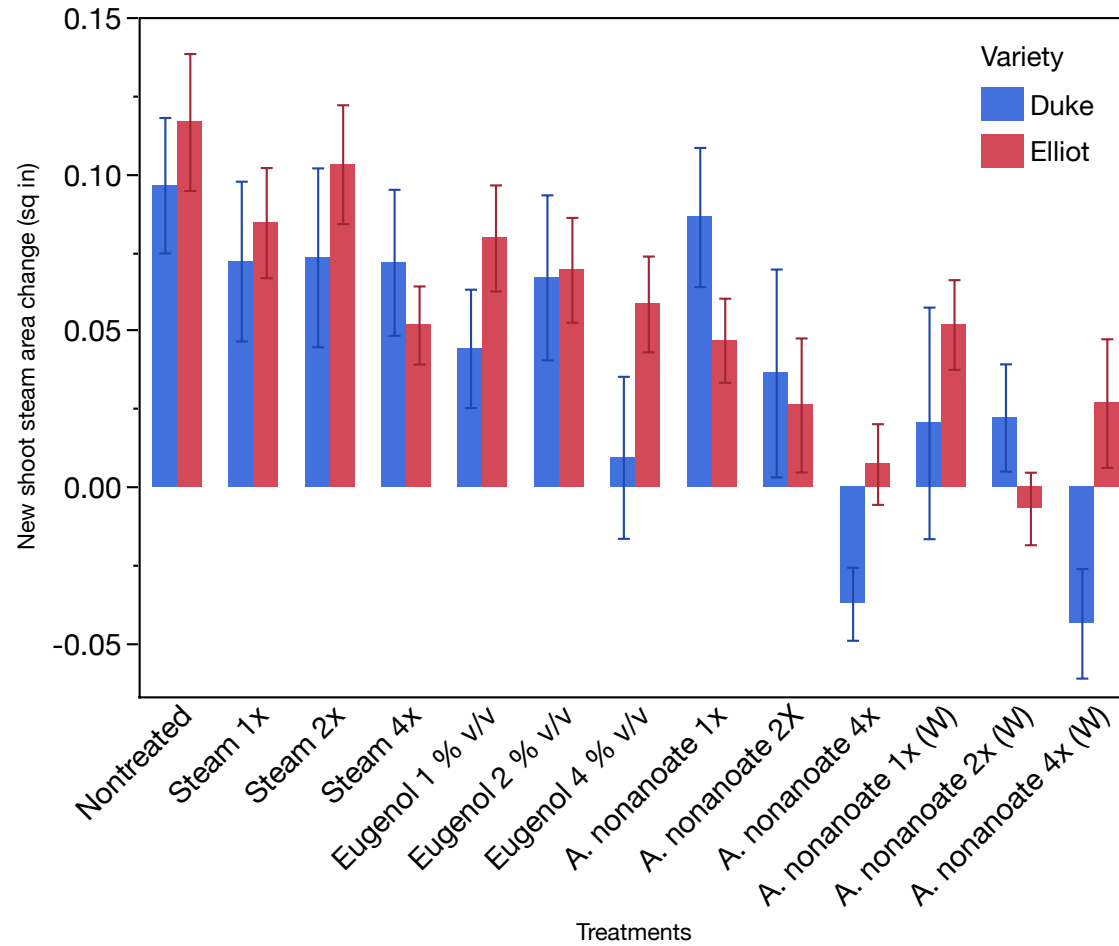
# Saturated Steam applied to field bindweed



- Steam was as effective as hand weeding
- Eugenol (Weed Slayer) effective as wiper application

# Crop safety

New shoot growth after  
two consecutive  
treatments over two  
years



# Examples of crop injury



**Steam 4X**



**AXXE (wiper)**



**Weed Slayer (wiper)**



# Recent Developments – Agro Gold (Weed Slayer part B) exposed

## Sales stopped in CA, OR, WA

1/6/2021

News Releases | Washington State Department of Agriculture

**FOR IMMEDIATE RELEASE: 12/17/2020**

 **CONTACT:** [Hector Castro](#)

**MEDIA INQUIRIES:** 360-464-0118

**PUBLIC INQUIRIES:** (509) 990-6518

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## STATEWIDE STOP SALE ORDER ISSUED FOR AGRO GOLD WS

OLYMPIA – The Washington State Department of Agriculture (WSDA) yesterday issued a statewide Stop Sale, Use and Removal Order for “Agro Gold WS,” a product sold for use in organic agriculture but found to contain active pesticide ingredients. Any organic operation that continues to use the product risks losing its organic certification.

Agro Gold WS is labeled as an organic biological soil amendment, meaning it was approved for use in organic agriculture production. Normally, it is sold with the herbicide Weed Slayer, which is registered for use in Washington state. As a soil amendment, Agro Gold WS does not have to be registered for distribution or use in Washington, but because it was found to contain pesticide ingredients that were not listed on its label, WSDA considers it a misbranded, unregistered pesticide.

# Weed Management in Organic systems - blueberries

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## **Outcomes:**

- Saturated steam and brush weeder most effective options (<\$50/A) as compared to organic herbicides (>\$150/A).

## **Limitations (steamer):**

- Water consumption
- Operational capacity vs weight
- Equipment maintenance

## **Limitations (brush):**

- Dust
- Long-term Impact on weed mat
- Incompatible with sawdust



# Is saturated steam a viable alternative for weed control ?

## Sometimes



### Crop

- Effective control
- Crop safety
- Compatible with mulches



### Economics

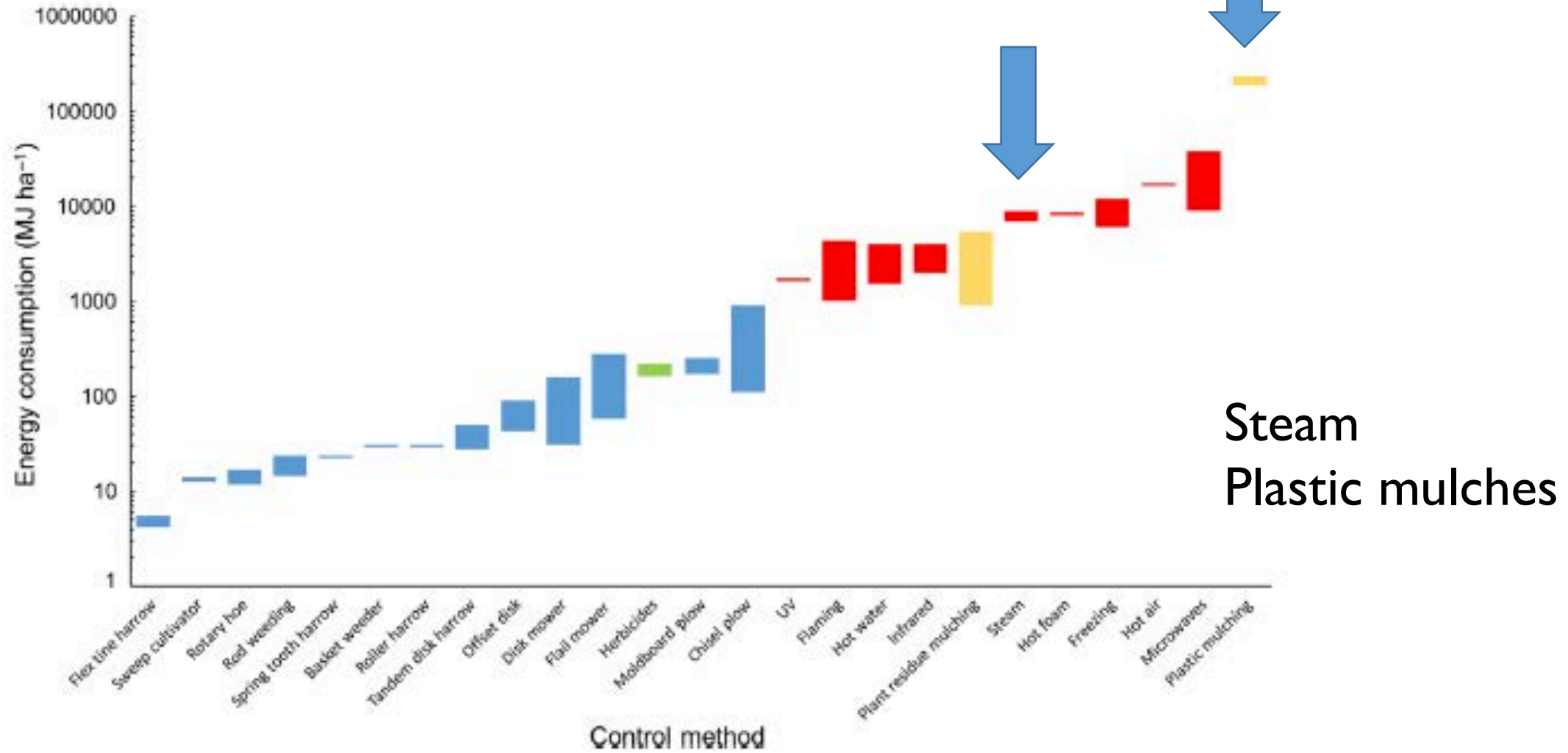
- Lower costs with targeted applications



### Environment

- Lower product input
- No soil tillage
- No residues

# Energy requirements for Weed Control.



**Figure 3.** Total energy requirement estimates for mechanical (blue), herbicidal (green), mulch (yellow), and thermal (red) broadcast weed control methods when used to target 2-leaf-stage seedlings at a density of 5 plants m<sup>-2</sup>. Bar length represents the range of energy consumption values estimated.

# New Research Project – Electric Weed Control

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Just starting...



# Thank you

## Funding

## Oregon Blueberry Commission

## USDA NIFA ORG award 2017-51106-27004

## NCSFR



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