



Autonomy is Coming

Dave Krog
Salin 247, Inc.
Ames, IA



Agriculture is the best industry on the planet – let's make it better

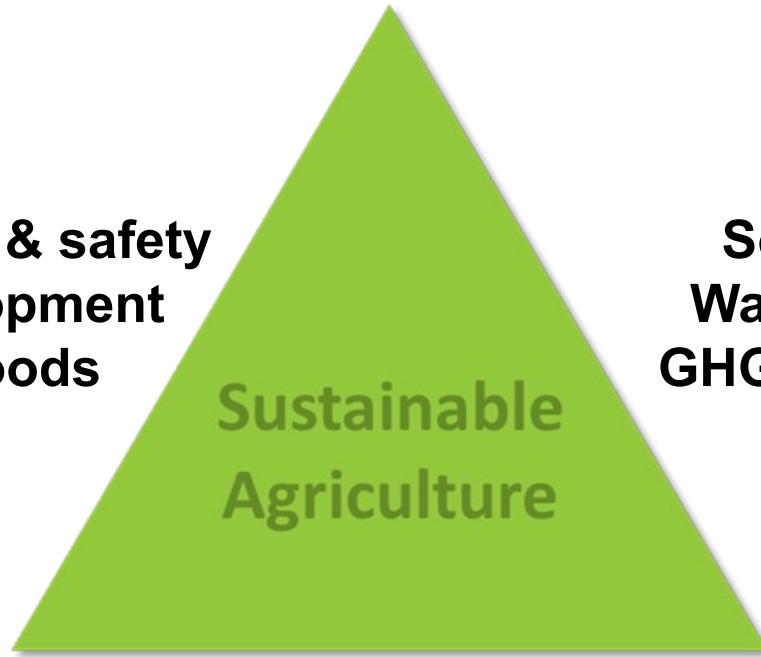


Cultivating Solutions for Growth



How do we make it better?

Farmer health & safety
Rural development
Healthy foods



Soil health
Water quality
GHG emissions

Crop yields
Production costs
Profitability & growth



Let's change the way we grow our crops

Innovation + Data



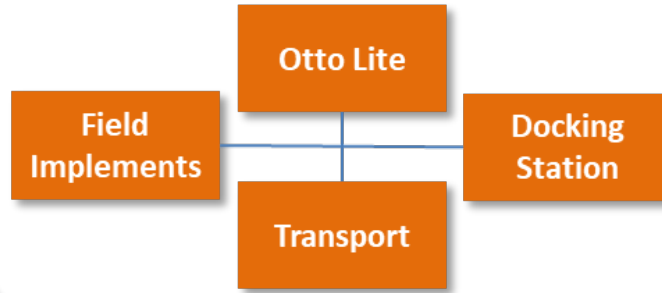
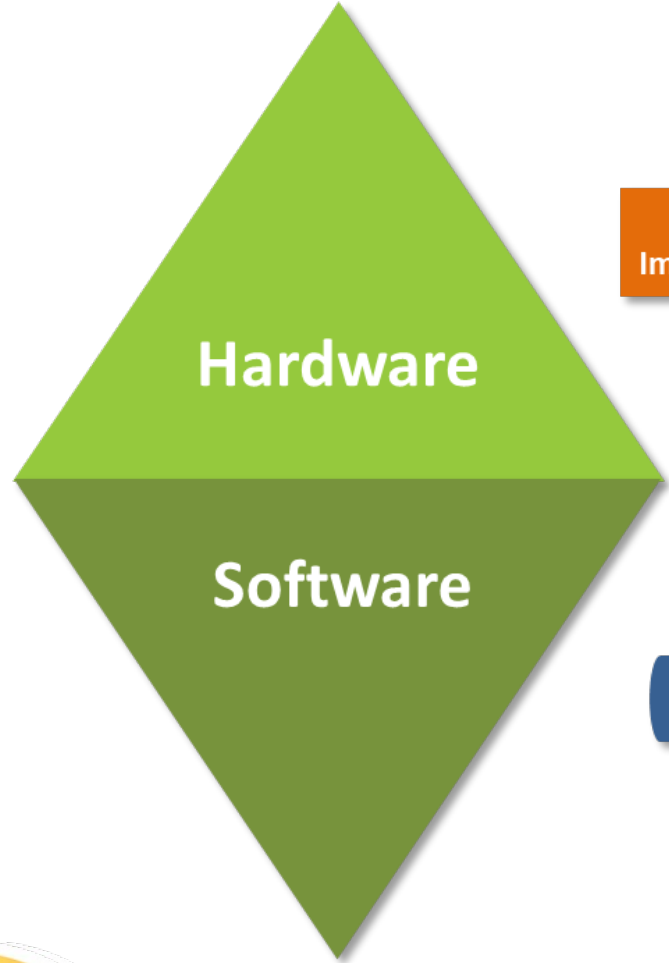
We don't need
big, heavy,
expensive
equipment



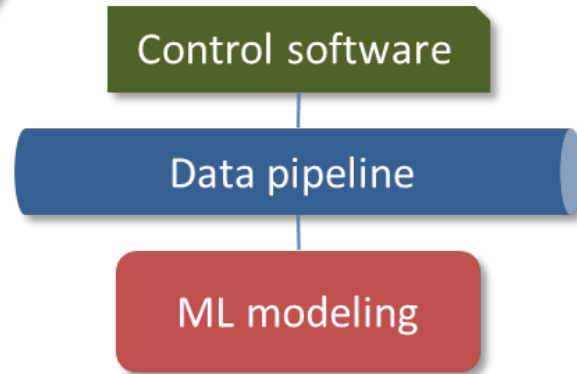
Salin 247 is building a platform for small-scale, light-weight, electric-powered, autonomous crop production machines



Salin 247 Platform has hardware & software components



Mechanical
Motors/batteries
Sensors
Controllers



Path planning
Navigation
Monitoring
Agronomic support



We use a wide range of technologies



- Robotics operating system (ROS)
- OpenAI software
- RTK GPS
- Brushless DC motors & controllers
- Lithium iron phosphate batteries
- Electric-powered hydraulics system
- Pneumatic system
- Mattrack tracks
- Custom configured on-board computer
- Wifi modem
- Precision Planting sensors & software
- Martin Till row cleaners



Questions we are working to answer

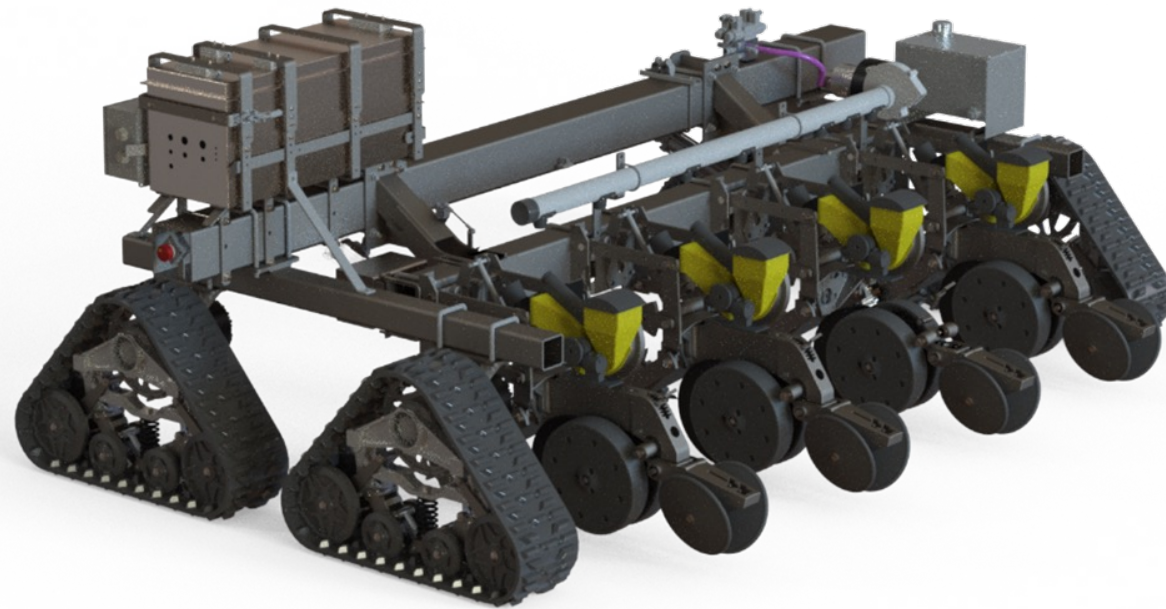
- Will all crops eventually be grown with autonomous machinery?
- Will farm machinery get smaller over time?
- Will farm machinery be electric-powered?
- How will farmers be supported in their use of autonomous farm equipment?
- What will be the role of machine learning with autonomy?



First time in 85 years this field planted without a tractor



What does the future look like?



Small
Light weight
Electric
Autonomous

Growers will decide



Thank you

Dave Krog, CEO
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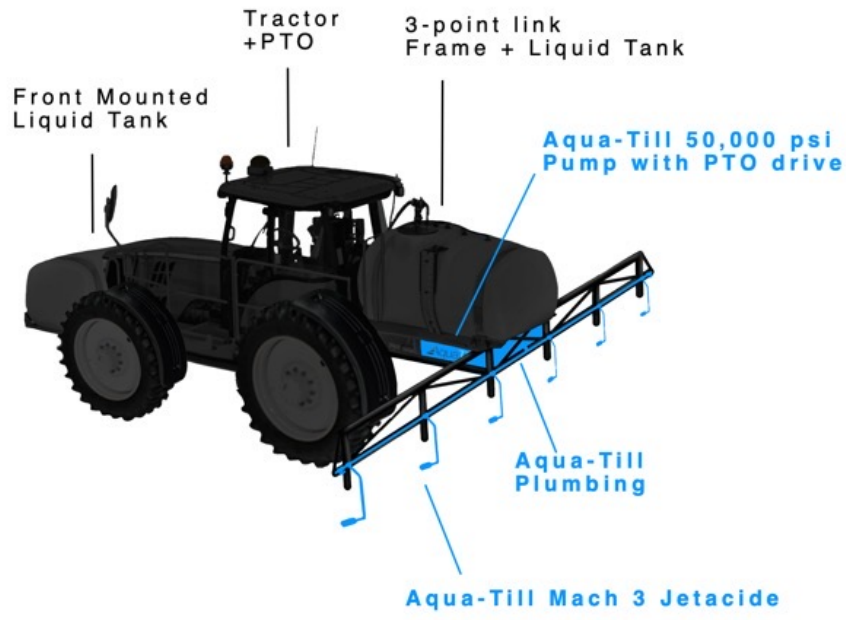
AquaTill

David McGavin



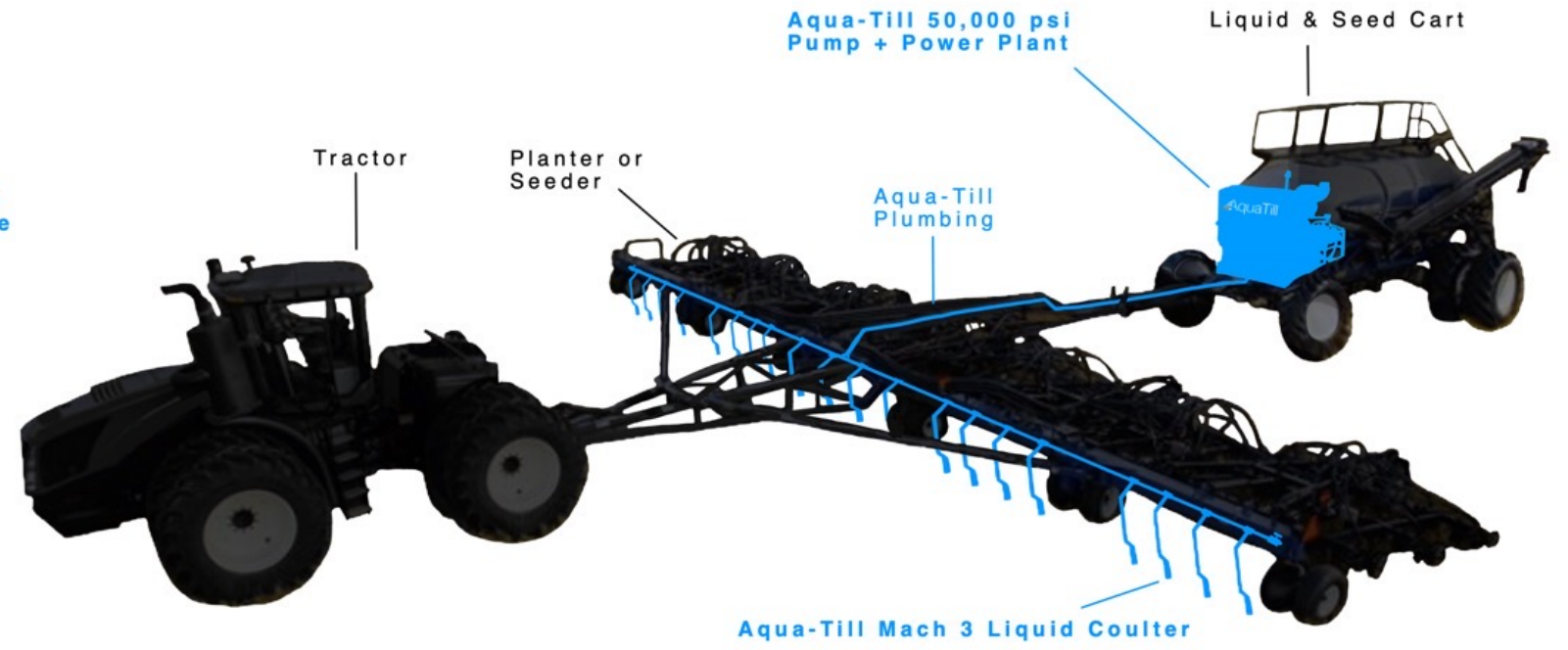
Ag Leader





Jetacide™

Example: Inject herbicide to terminate cotton ratoon.



Liquid Coulter™

Example: Slice through crop residue with aqueous fertilizer.





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**Precision
Planting**



**The
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Sound



**MidWest
Bio-Tech**



DAWN







Australian Government





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Yetter
FARM EQUIPMENT
SINCE 1930

Ag Leader

exapta.
solutions, inc.

Precision
Planting

MonTag

The Andersons

GS3
GS3 QUALITY
SEED

Sound

Martin Till

**MidWest
Bio-Tech**
INC.

aea

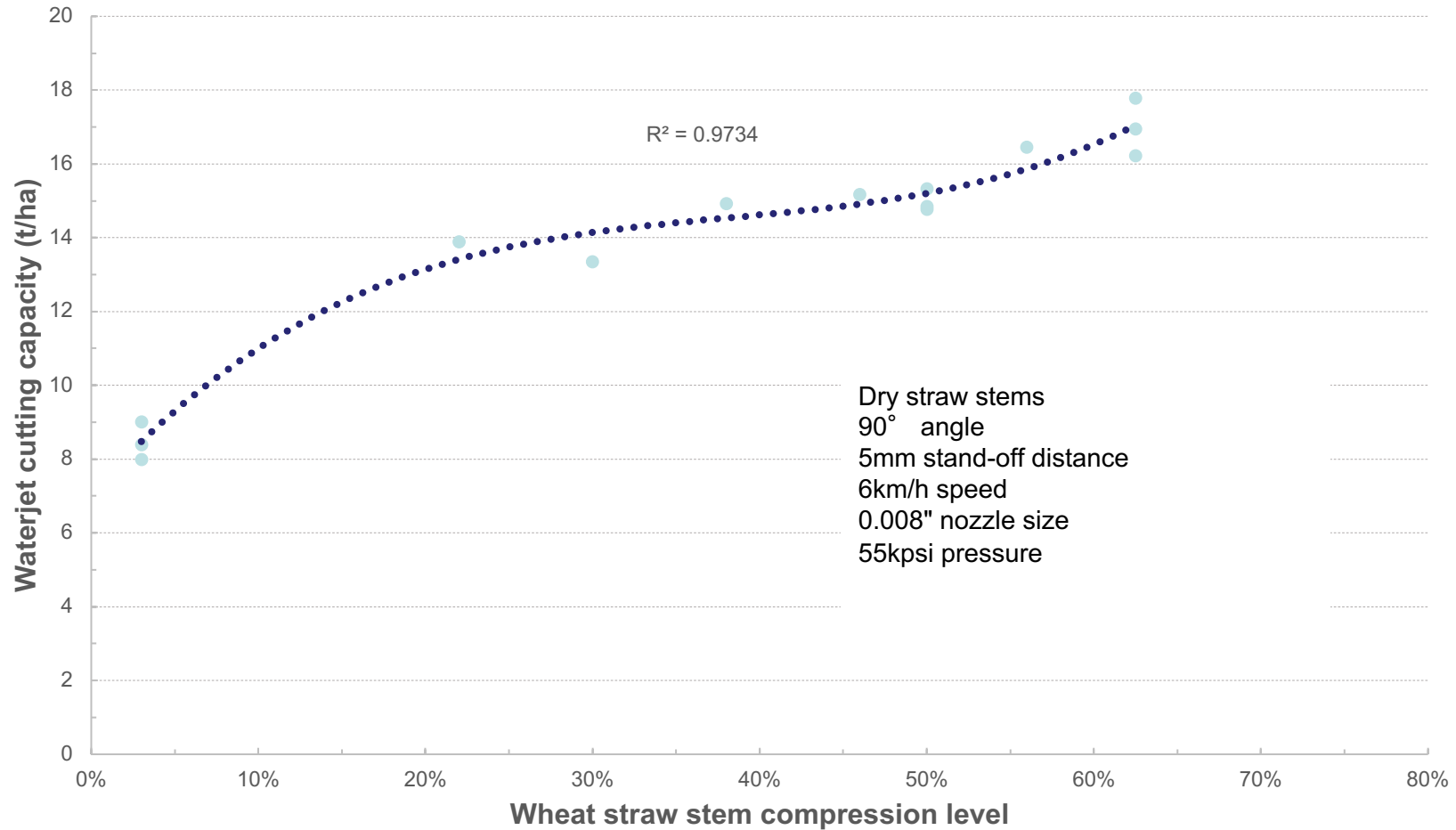
LAFORGE

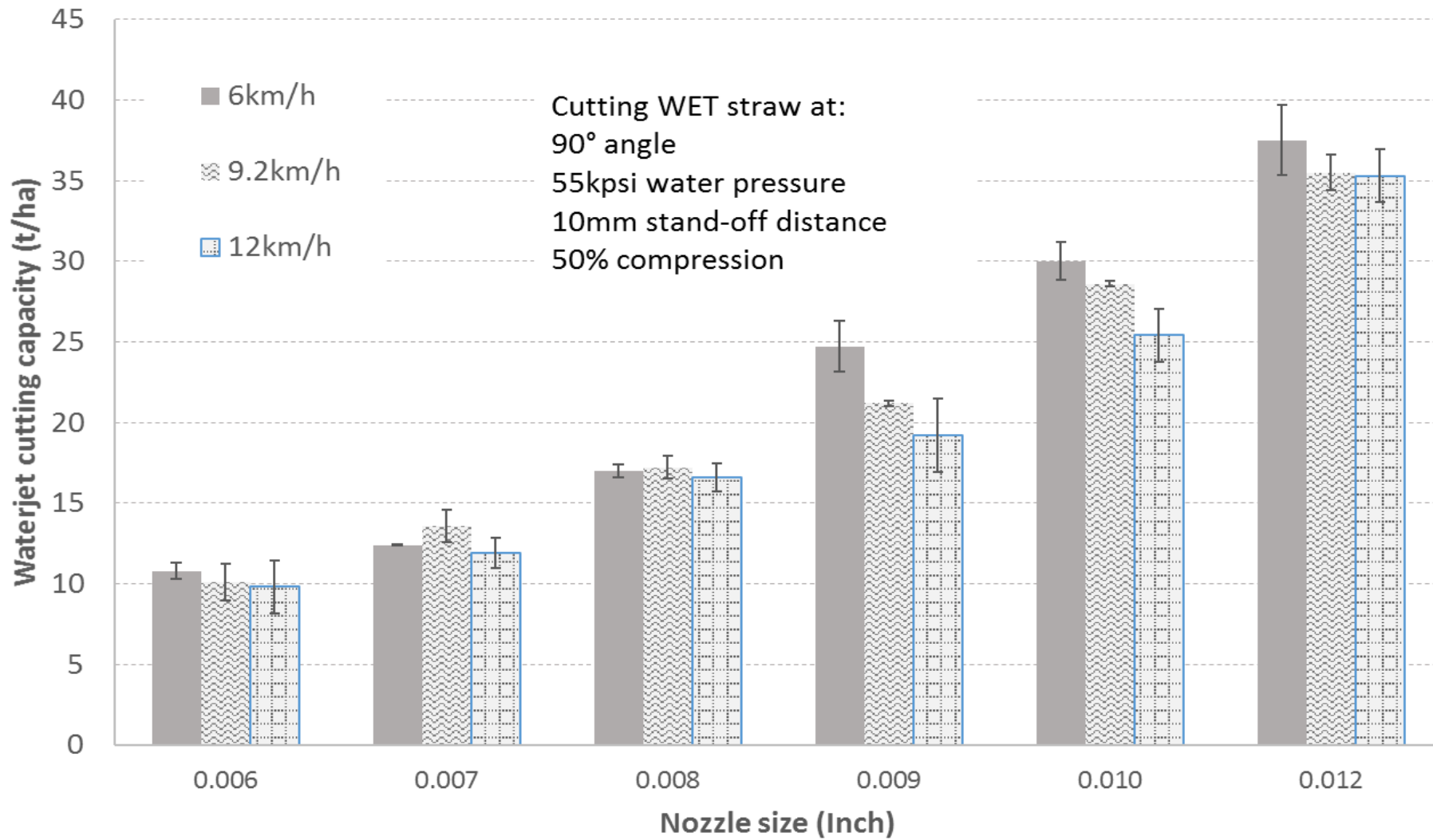
wearparts
TILLAGE TOOLS
Cultivating Solutions for Growth

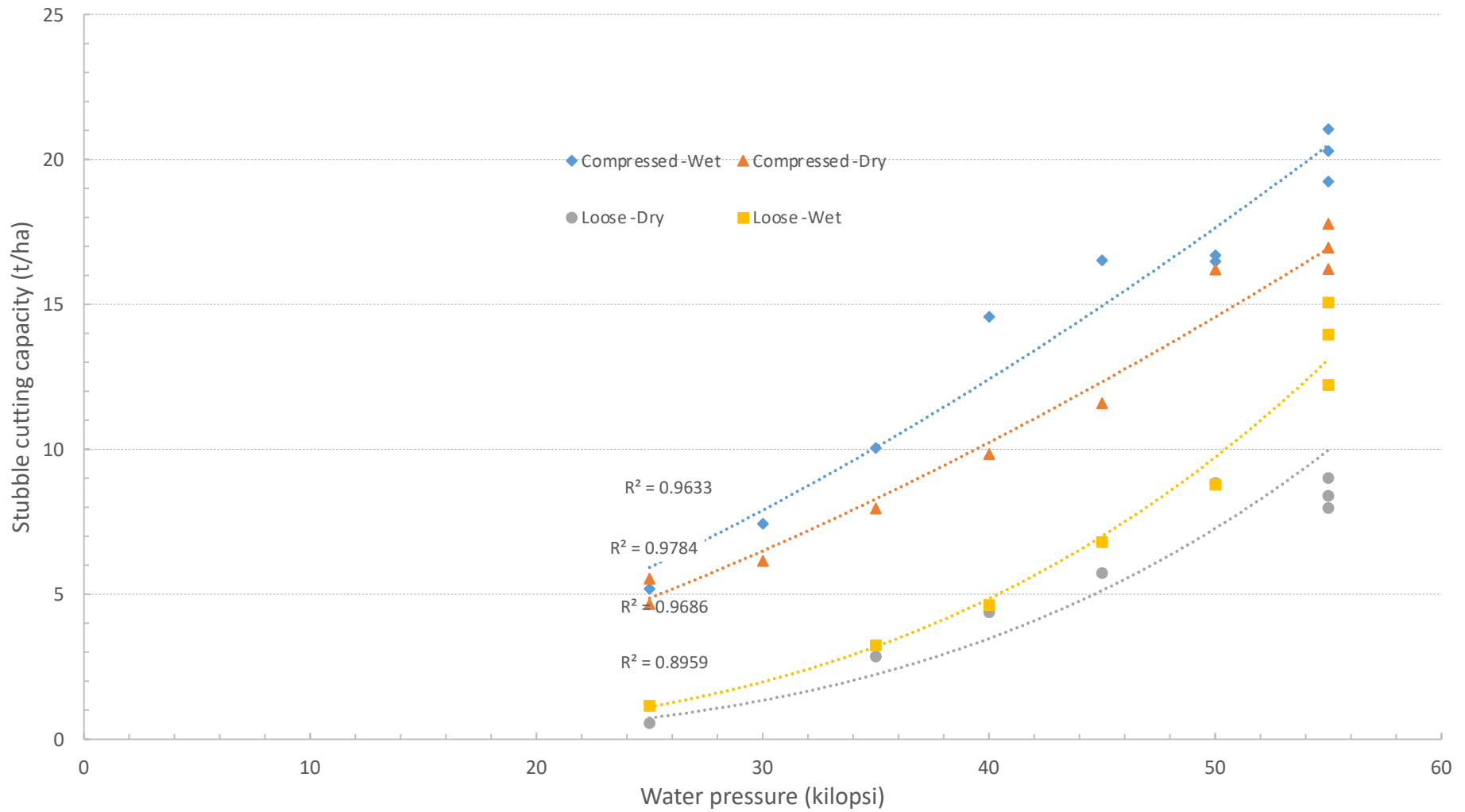
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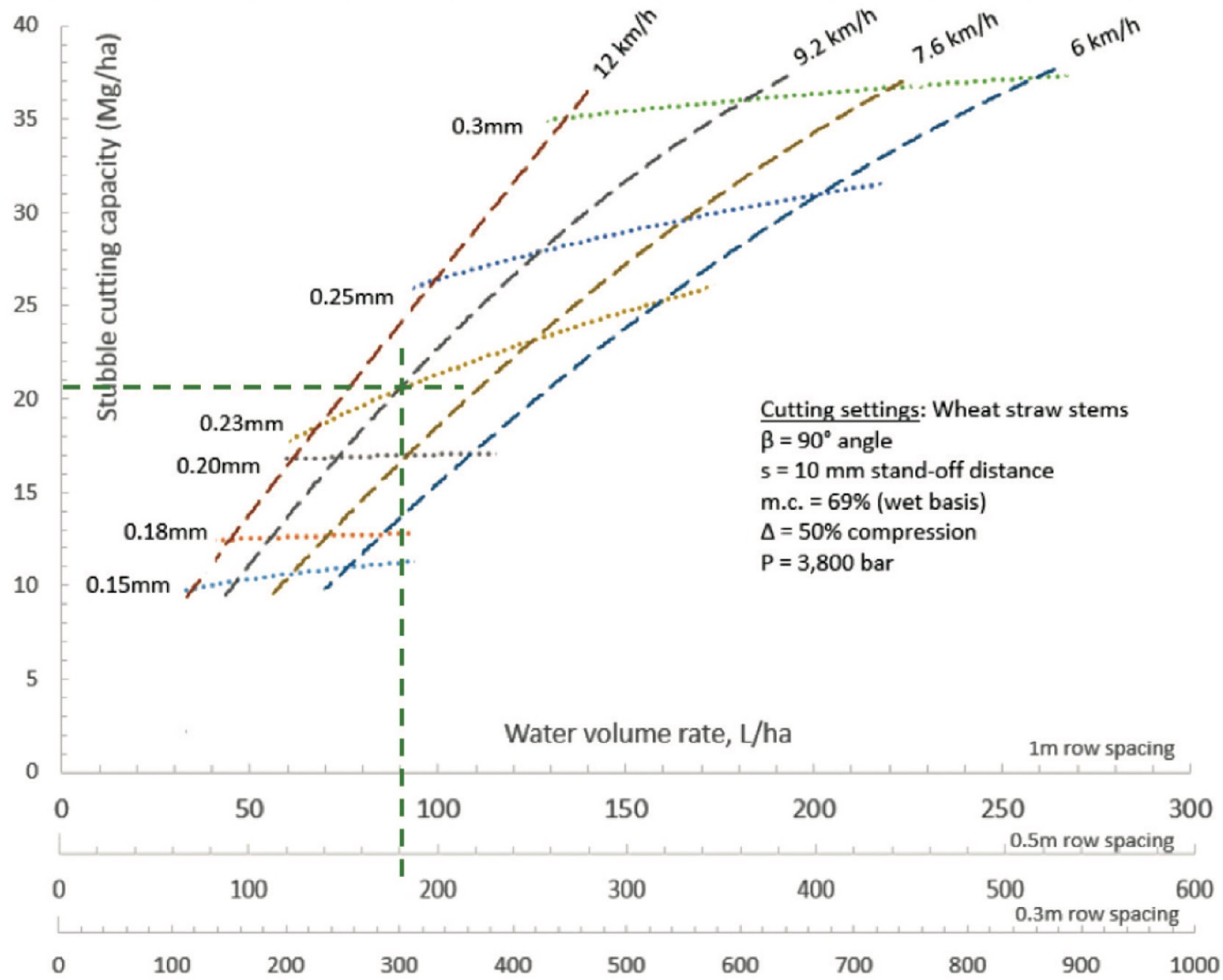
HELM













Sugarcane



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Linseed



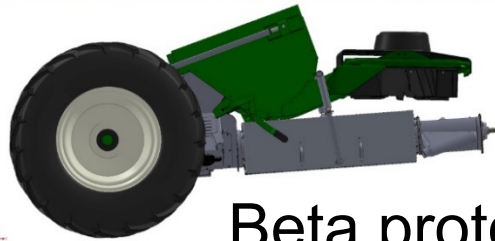


Using light energy to control weed seeds

Jon Jackson, Global Neighbor



Weed Seed Destroyer

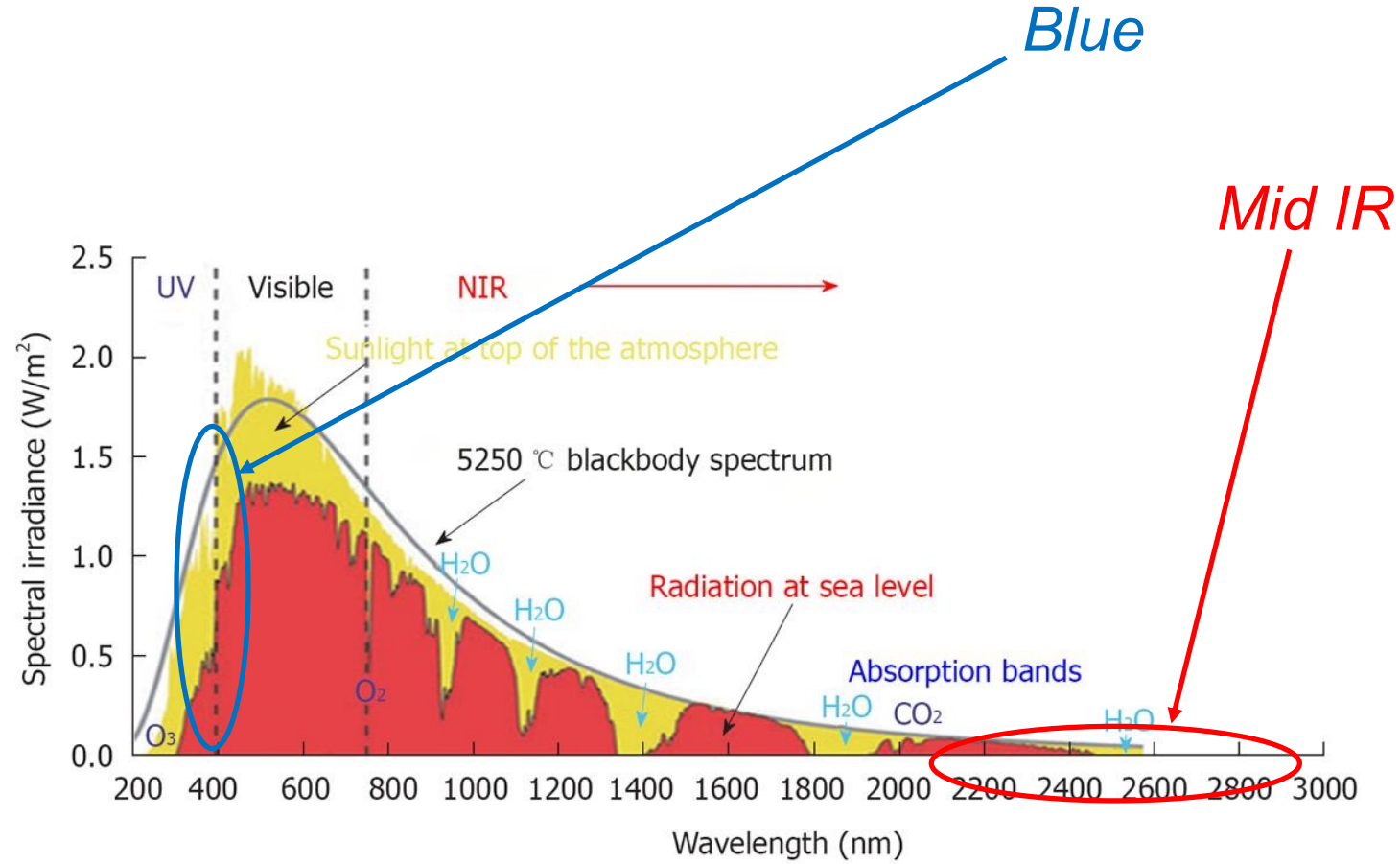


Beta prototype



Light Energy Flora Control

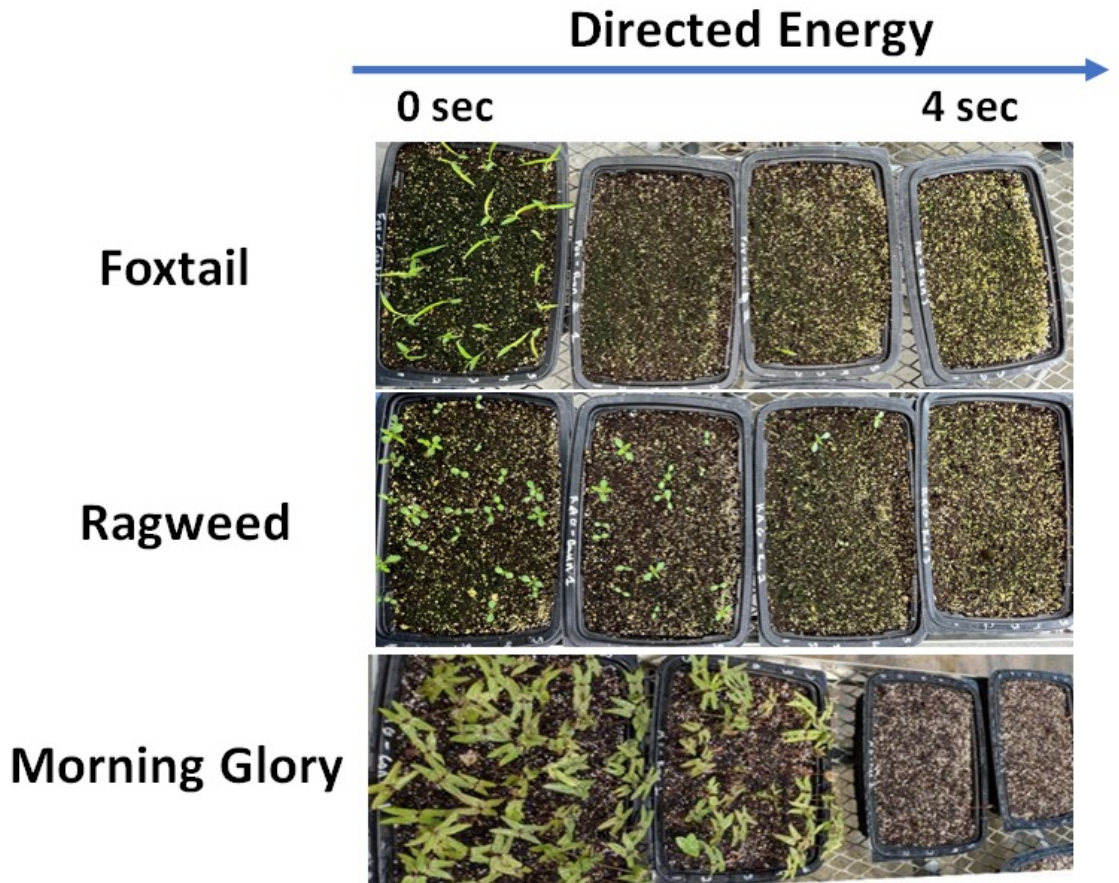
- Apply energy (light) to plants or seeds
- Short durations of light
 - 2-10 seconds
- Wavelength Combinations:
 - Peak of Photosynthesis A or B: **Blue**
 - At high concentrations: 10X to 70X sunlight
 - Unnatural (not in sunlight): **Mid IR**
- Alter plant and seed growth:
 - Beneficial at low levels
 - Damaging at higher levels



Stopping weed seeds from germinating

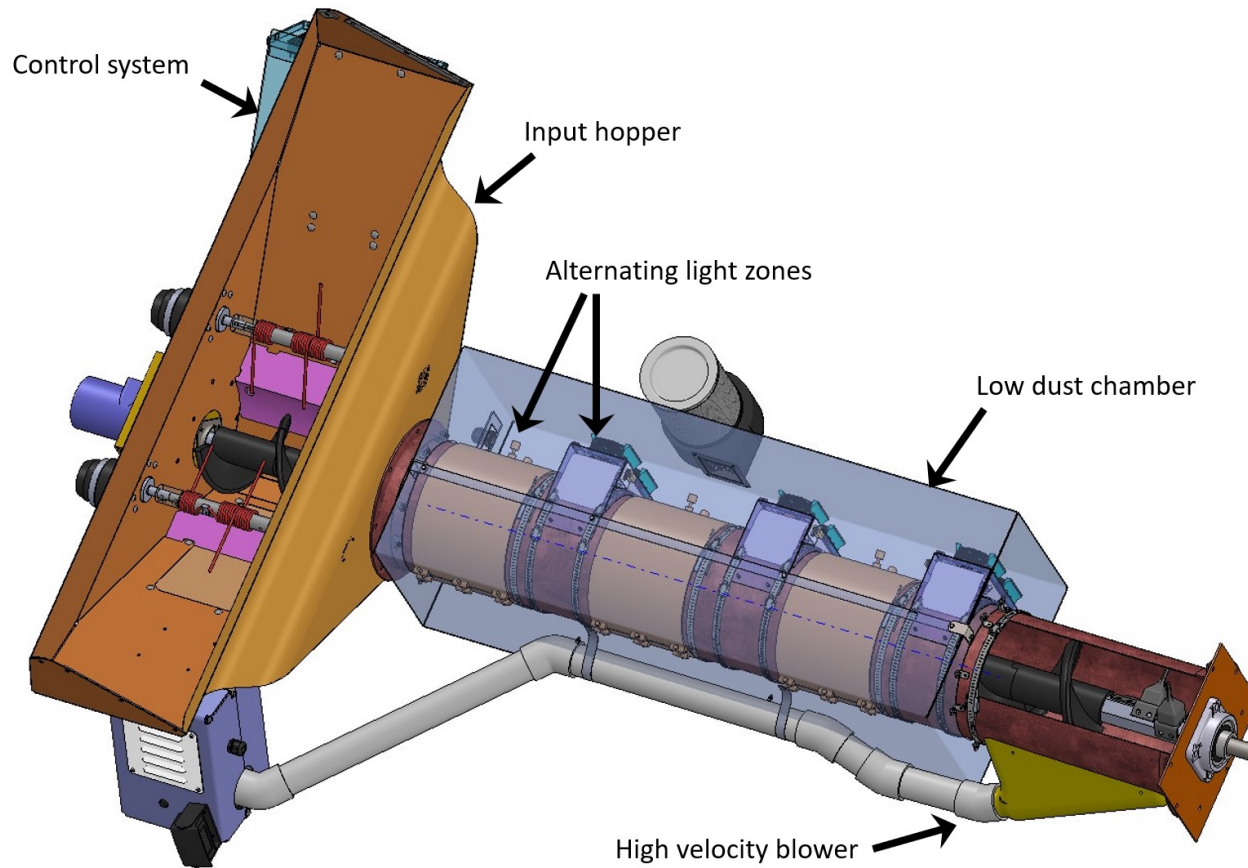
- Efficacy Studies:

- Ohio State Study: > 99% efficacy on pigweed seeds
- Central State Study: 97-99% efficacy on common weed species
- Others studies show > 95% efficacy



CONFIDENTIAL

Weed Seed Destroyer



- Runs chaff only through light tube
- Damages certain cells without destroying whole seed
- Uses only 10HP on 32' head
- Only moving part is auger

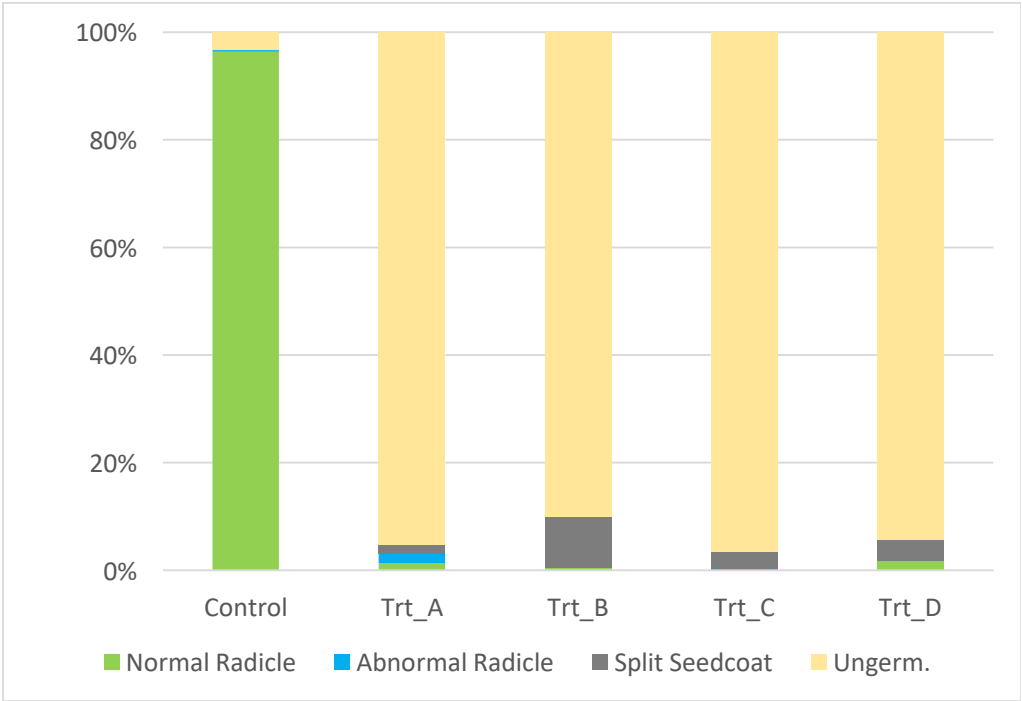
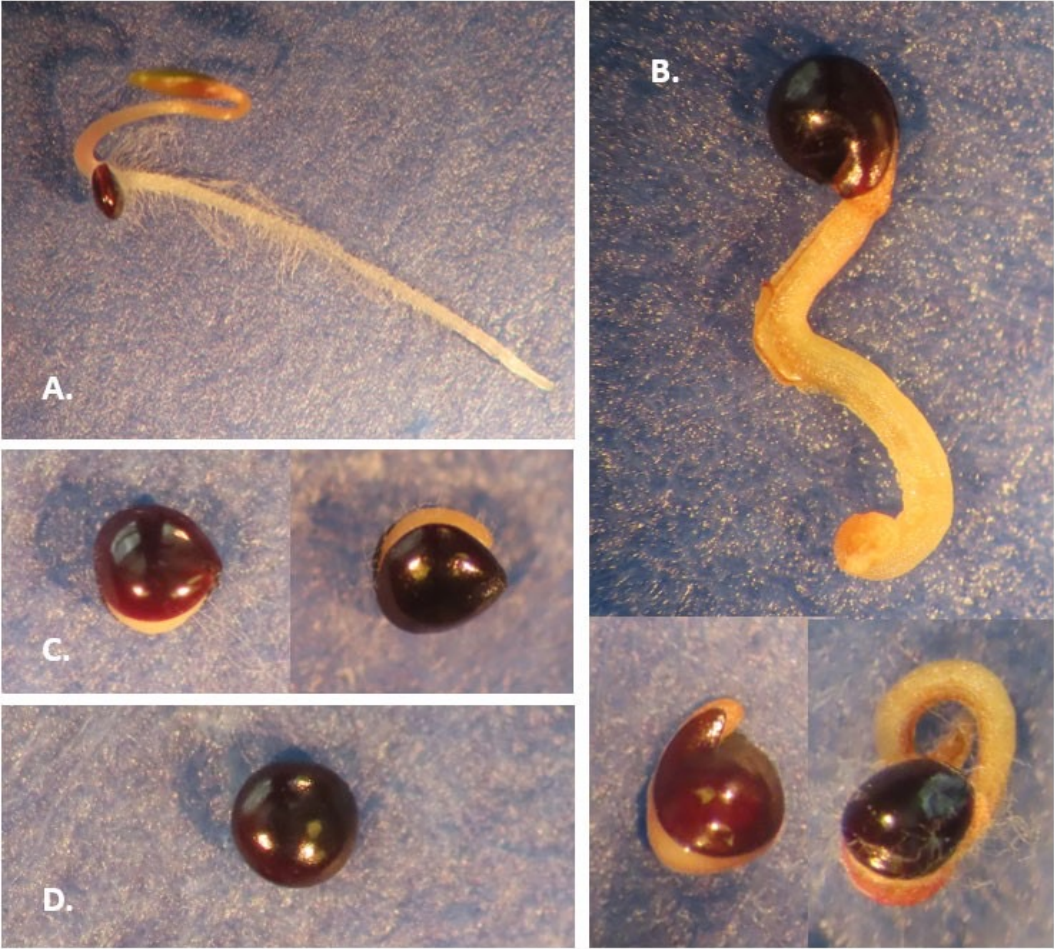


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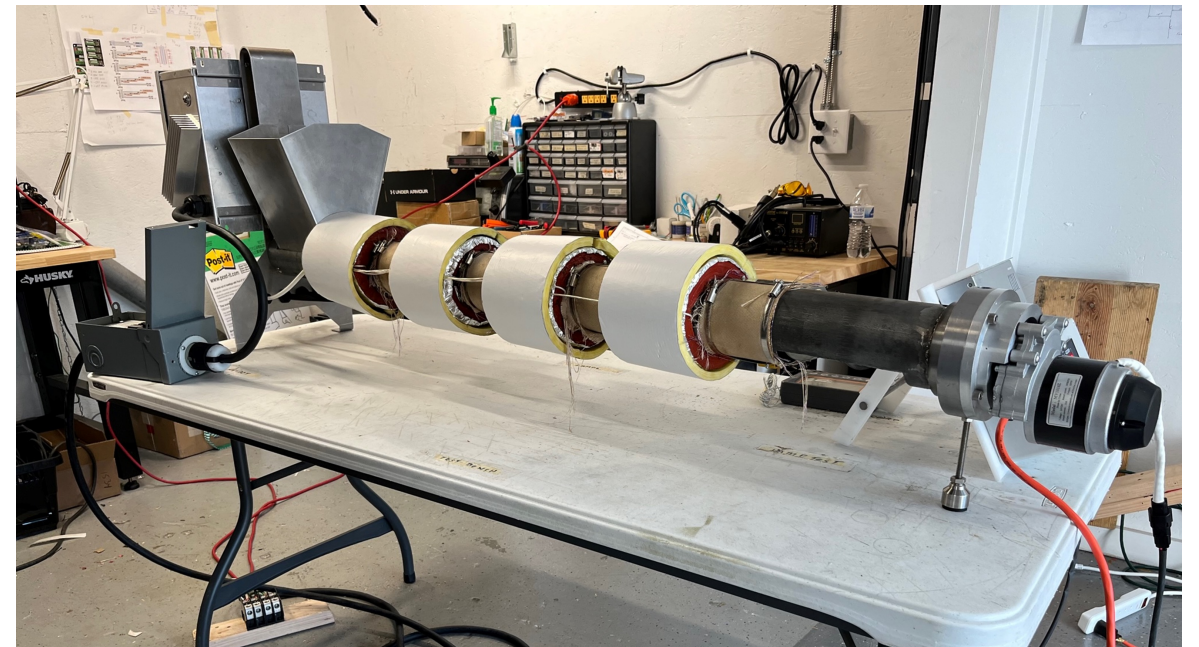
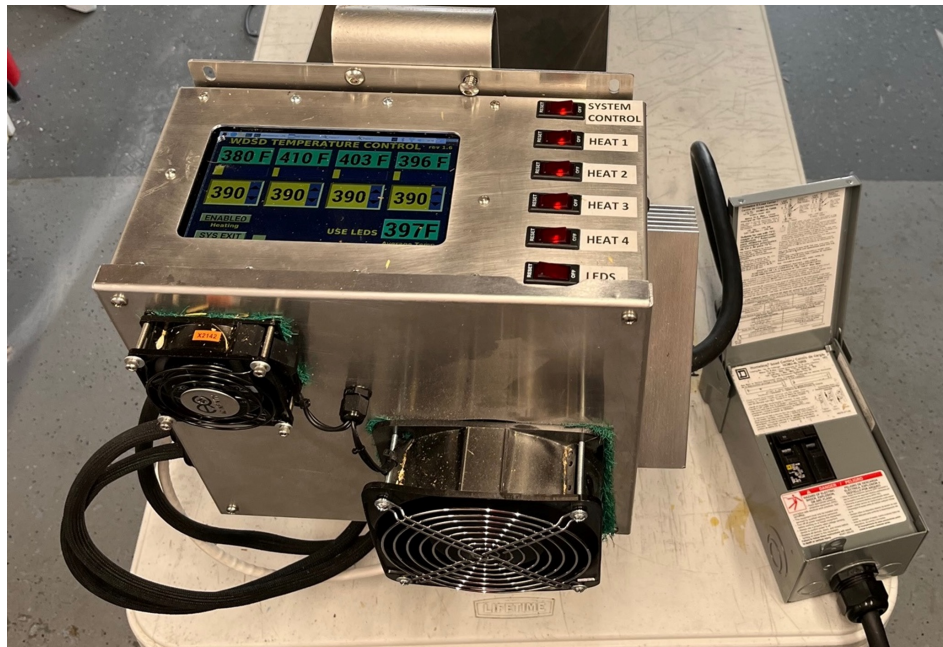


Effects on Germination of Redroot Pigweed Seeds

Doug Doohan & Cathy Herms, HCS, OARDC/OSU, 1680 Madison Ave, Wooster, OH 44691



Research Collaborations: Texas A&M, LSU, Central State, U-Idaho, and others



Development Status

- Tested on soybean, wheat, rice chaff
- Morning Glory, Fox Millet, Ragweed and Pigweed, hemp Sesbania, Johnsongrass, Prickly sida, Barnyardgrass, annual rye grass
- Flow and efficacy verified through independent testing

- First field unit on JD680 in TN
- Next unit JD670 in IA

- Research units at Texas A&M, U of Idaho, Central State

- Interest from most areas of US, Europe, Australia





Thanks and any questions?

Jon Jackson, Global Neighbor

