

Technologies for weed management in berries

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Berry weed management

- ❖ **Weed management on bed tops**
- ❖ **Cover crop & weed management in the furrows**
- ❖ **Physical methods to control weeds**
- ❖ **Automation of weed removal & runner cutting**

California strawberry herbicides

- ◆ Pretransplant
 - Chateau
 - GoalTender 4L & Goal 2XL
 - Gramoxone
 - Prowl
 - Shark
- ◆ Post-transplant – directed spray
 - Chateau
 - Gramoxone
 - Prowl
 - Shark
 - Suppress (organic)
- ◆ Post-transplant – over the top
 - Devrinol
 - Dacthal
 - Poast
 - Select Max

Fallow beds



Fallow- applied herbicides

- ❖ Apply Chateau or GoalTender to a fallow bed on Sept. 15, then transplant Oct. 15.
- ❖ It is asking a lot of these herbicides last through the fall, winter, and spring without injury to strawberry.

In season

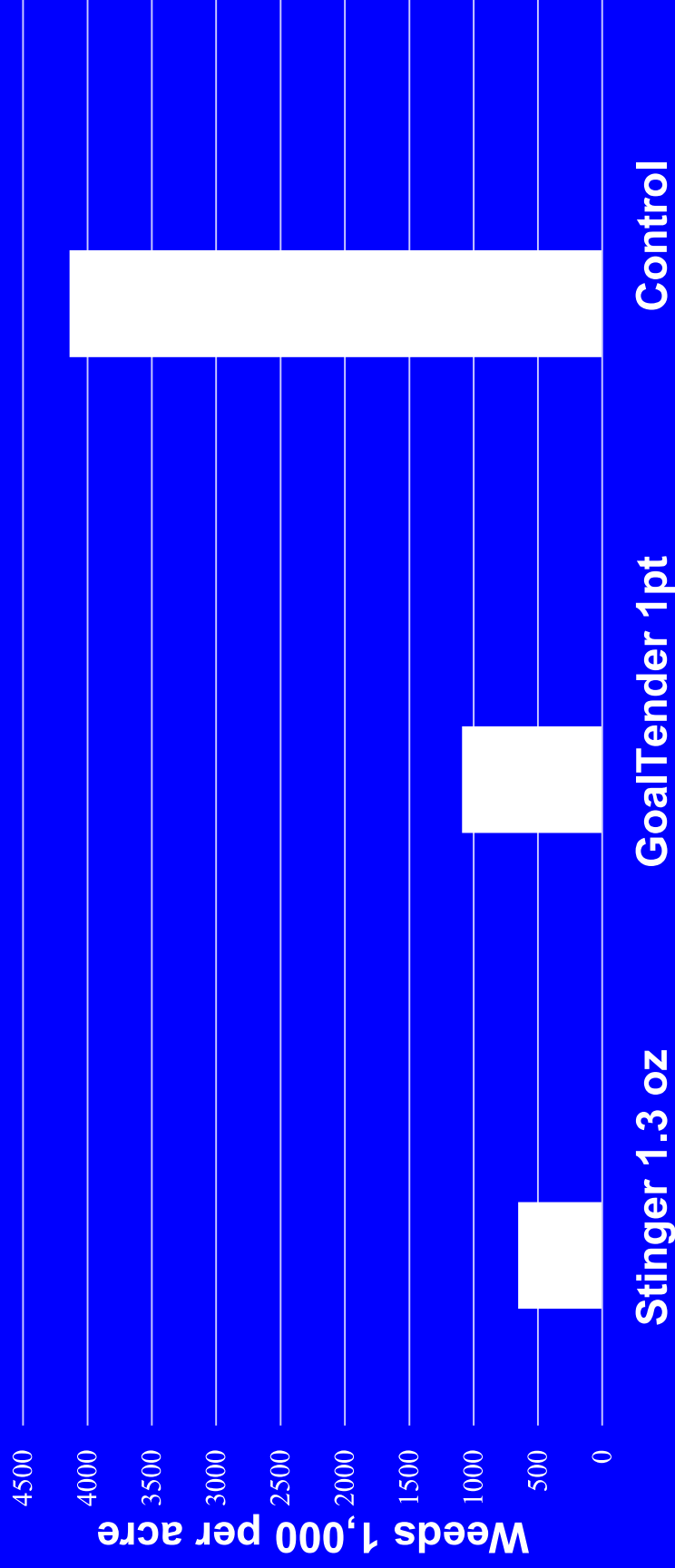


Two herbicide strategies

1. Inject herbicides through the drip system after transplanting to extend the soil residual activity
2. Utilize a slow release formulation or mechanism that releases herbicide over several months after transplanting.

Stinger applied by drip – Dec: season long weed densities

Chart Title



Drip applied herbicides

- ❖ **Stinger** appears to control weeds by this method, but carryover to rotational crops is a concern.
- ❖ **GoalTender** applied by drip application is probably worth trying.

Slow release herbicides

- ❖ If an herbicide applied before transplanting could be released slowly over a 6-9 month period then it could provide season long weed control
- ❖ BayFilm was an attempt at this
- ❖ Halosulfuron was embedded in the plastic and slow released

Bayfilm – embedded with halosulfuron



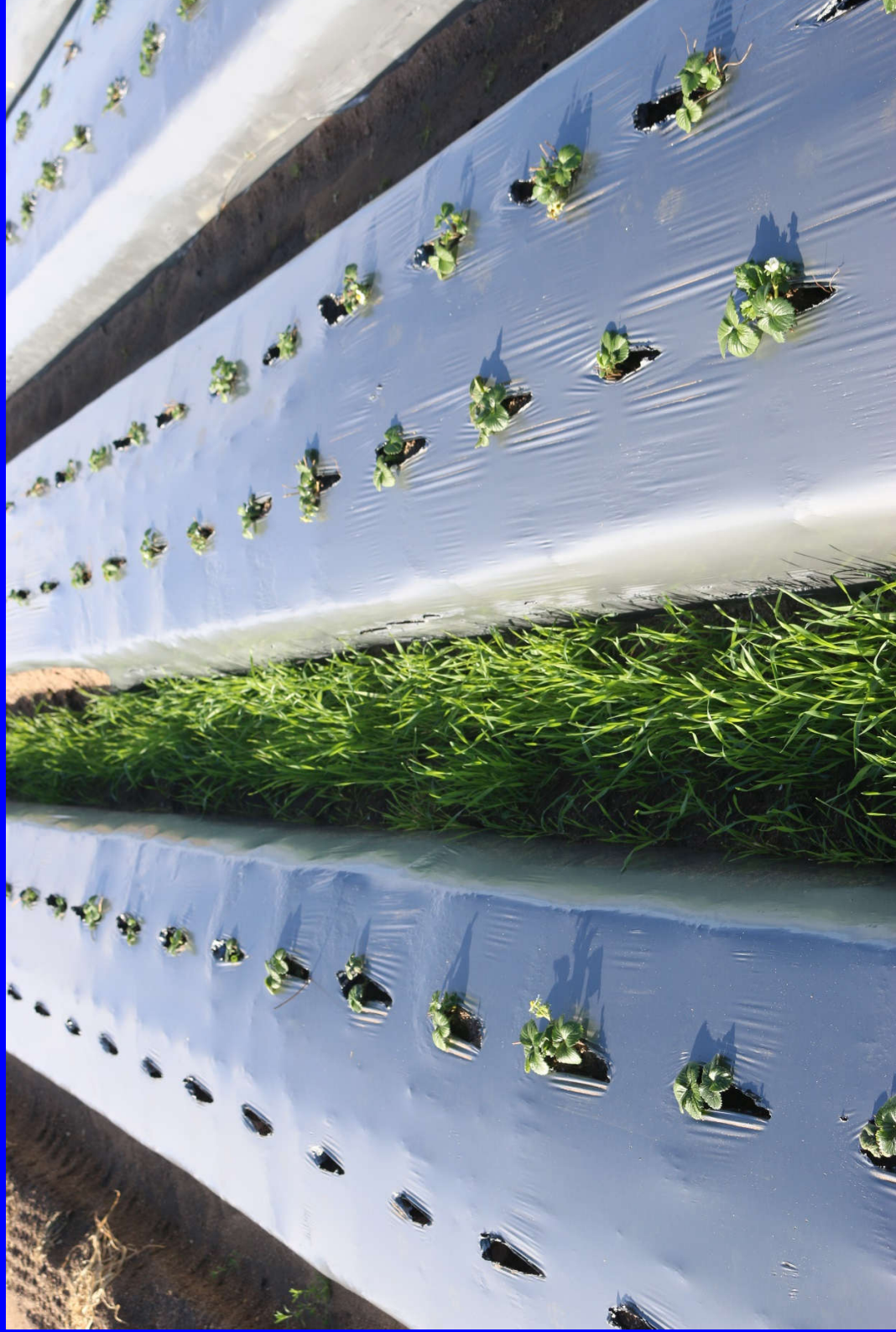
Bayfilm -- installation



Bay film

- ❖ The problem with this product was that it was made for nutsedge control in tomato
- ❖ Halosulfuron is very injurious to strawberry
- ❖ Chateau or GoalTender would be much better choices for slow release herbicides in strawberry (nano encapsulation)

Cover crops in furrows



GROUP 1 HERBICIDE



SELECTMAX[®]
HERBICIDE
 WITH INSIDE TECHNOLOGY™

Active Ingredient	By Wt
*Clethodim	12.6%
Other Ingredients	87.4%
Total	100.0%

Contains Petroleum Distillates
 *(E)-2-[1-[(3-chloro-2-propenyl)oxy]imino]propyl]-
 5-[2-(ethylthio)propyl]-3-hydroxy-2-cyclohexen-
 1-one
 Contains 0.97 lbs clethodim per gal
 EPA Reg. No. 59639-132 EPA Est. 5905-GA-01

Strawberry	4 days	9 to 16 fl oz	12 to 16 fl oz	NIS at 0.25% v/v	None	Do not apply more than 16 fl oz/A in a single application. Do not apply more than 64 fl oz/A (0.5 lb ai/A) per season. For repeat applications make on a minimum of a 14 day interval.
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Poast[®]

herbicide

Strawberry

- **PHI** - 7 days
- **Maximum Single Application Rate** - 2.5 pints/acre
- **Maximum Seasonal Application Rate** - 2.5 pints/acre
- **DO NOT** allow livestock to graze or feed treated field.
- **DO NOT** feed livestock anything from treated field.
- Aerial and ground application allowed.
- **EXCEPTION: DO NOT** apply by air in California.



Select 16 fl oz/Ac: bed + furrow

Treatment (3/1/17)





Gramoxone (L) Suppress (R)



Herbicides

- ◆ Herbicides allow you to control weeds when and where needed better than any fumigant.
- ◆ Herbicides allow you the freedom to use clear tarps.

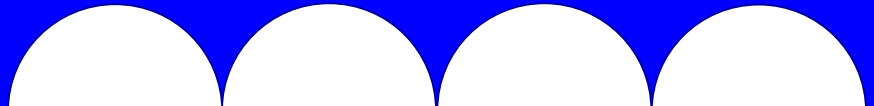
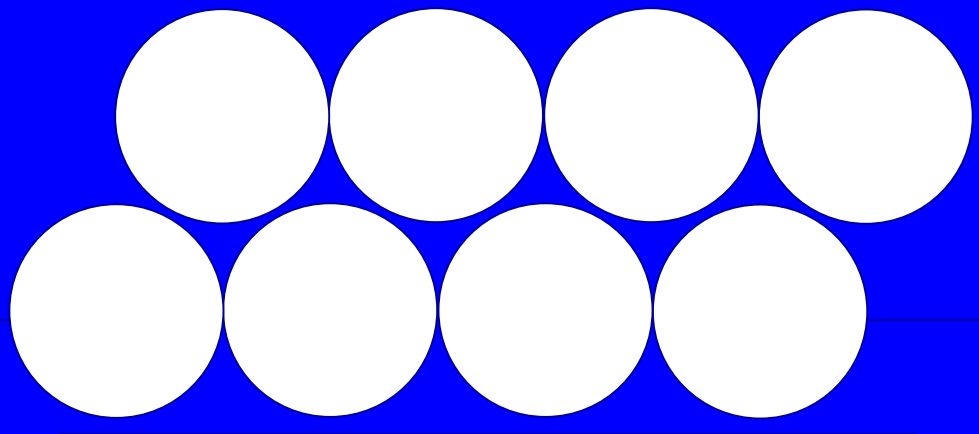
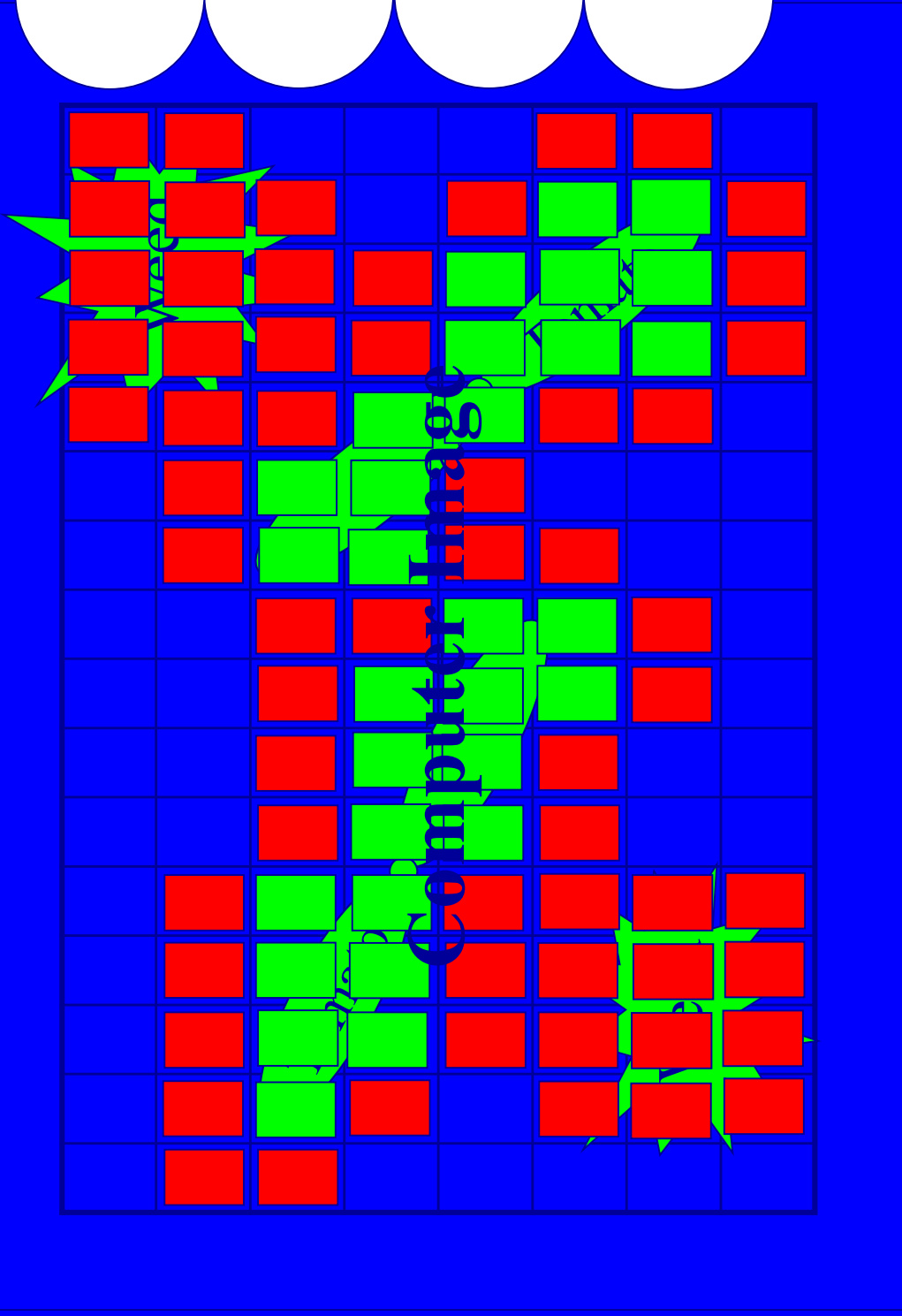
New technologies

- ❖ There are many constraints to getting new herbicides labelled for strawberry
- ❖ Weed control devices appear more promising

Precision "Spray" Map Concept

Robot's Spray
Array

ray



Intelligent sprayers – lettuce thinning



Blue River, Salinas, CA 6.19.15

Robovator on 80 inch beds



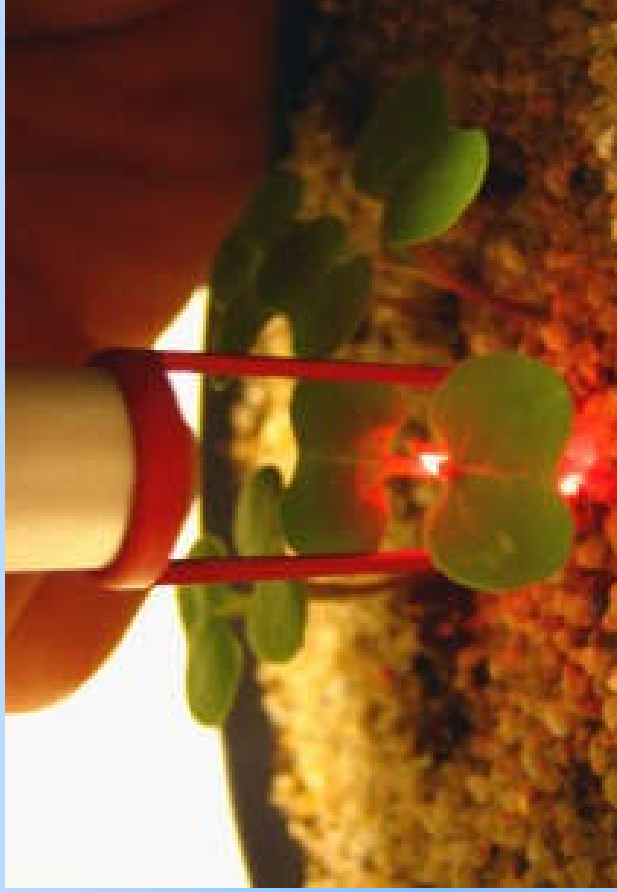
AUTONOMOUS VEHICLES - SWISS



AUTONOMOUS VEHICLES - FARMWISE



PHYSICAL DEVICES

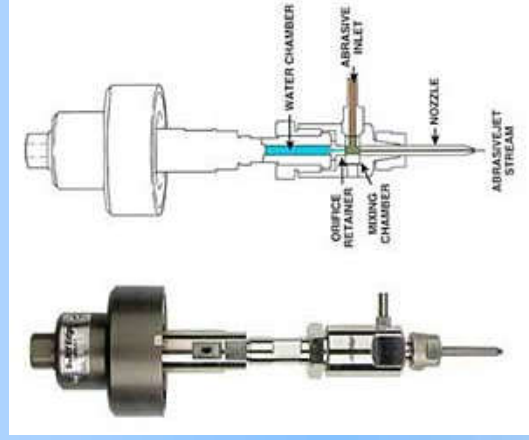


Laser



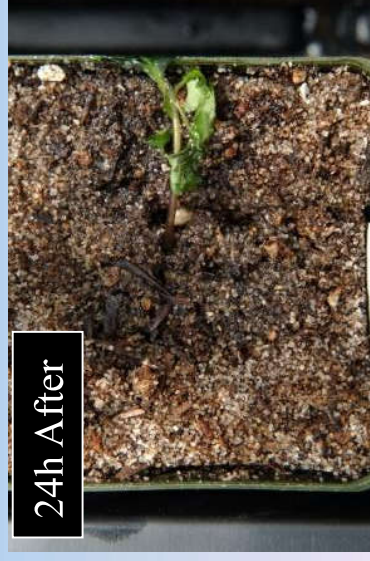
Abrasion

WATER JET & HOT OIL



High pressure water stream
30,000-90,000 PSI

Canola oil >150°C



Challenges

- ❖ Need systems to differentiate weeds from crop
- ❖ Need a grid applicator that can selectively identify and remove weeds within a complex scene

Runner cutting

- ◆ Harvest Moon from Winchester, MA has patented a runner cutter.

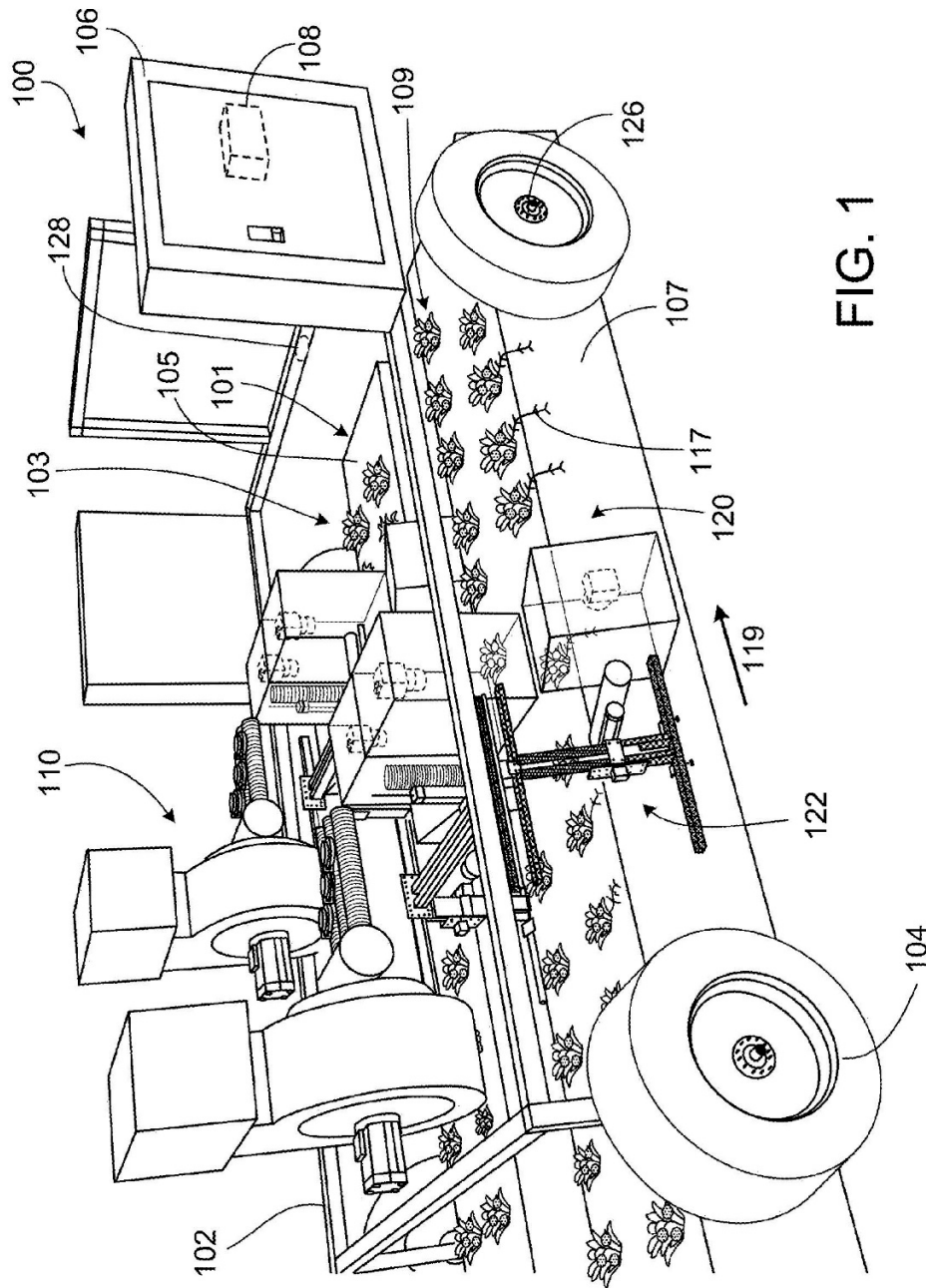


FIG. 1

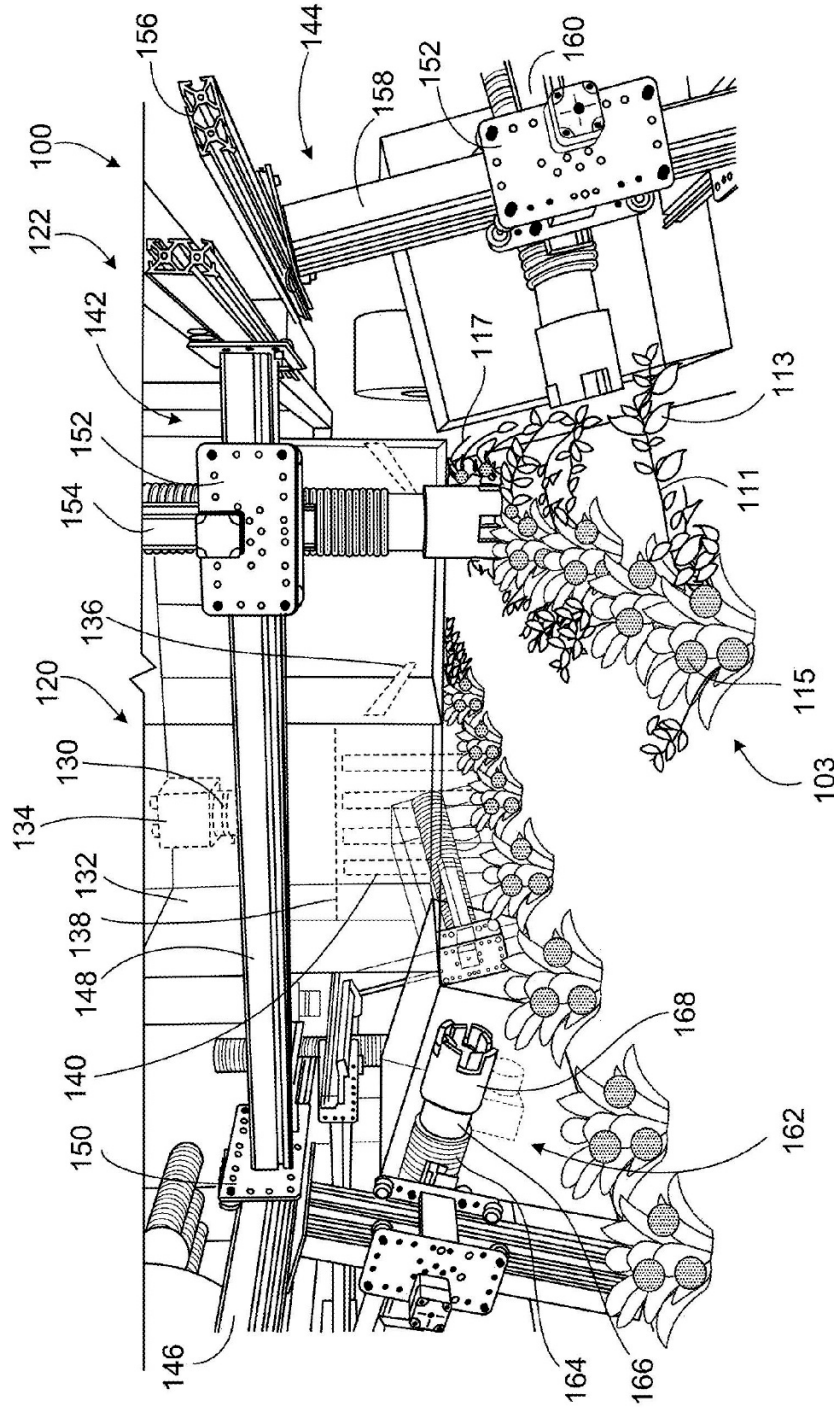


FIG. 2

Summary

- ❖ **There is still potential for innovation with herbicides**
 - ❖ **Slow release formulations**
 - ❖ **Organic weed control**
- ❖ **Automation will play a larger role in the future by mechanizing tasks**
 - ❖ **Automated weed removal**
 - ❖ **Automated runner cutting**