Adaptation of AgRobotics for Root and Bulb Vegetable Production in High Organic Matter Soils

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The Holland Marsh

- 50-80% organic matter
- Drainage began in the 1920s
- 7000 acres of muck soil

CARROT
COUNTRY
1-877-424-1300
1-877-424-1300

CROCKETT
Beijo Seeds
Yellow Variety 2016
PROSPECTOR
Beijo Seeds

Robot Trials - 2022

Nexus Robotics – La Chèvre

- Mechanical weeder
- Scouting capabilities

Naïo – Dino

- Autonomous tool-carrying robot
- Focused on weeding

Robot Trials - 2023

Naïo – Orio

- Autonomous tool-carrying robot
- On-board RTK GPS
- Fully electric, lithium batteries
- Four-wheel drive
- 5.5km/h top speed
- 1450kg weight
- Very adaptable

orio
naïo

orio
naio
Waste Connections of Canada

Image
Quality
Stopped
-10

naïo
technologies

naïo
Technologies
orio

naïo
Technologies

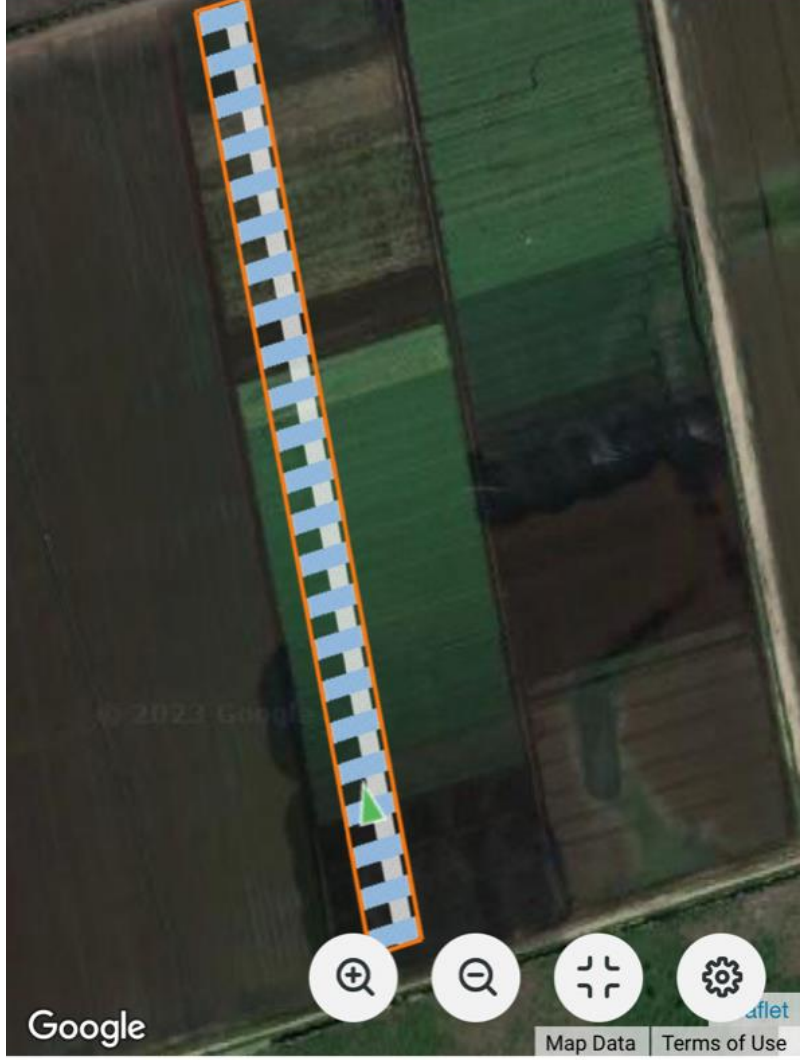
RAVEN
RATE
MASTER
RAVEN
naïo
Remote locked (100)
v23.1
Technologies

28.7
ac
11
294°
0.0
ft
9.3
mph
Coverage 1
12.2
13.0
1 2 3 4 5
RAVEN

Robot Trials - 2023

FarmDroid – FD20

- Seeding and weeding robot
- Geotags each seed
- Inter- and intra-row weeding
- 0.95km/h top speed
- Solar-powered
- 1050kg weight

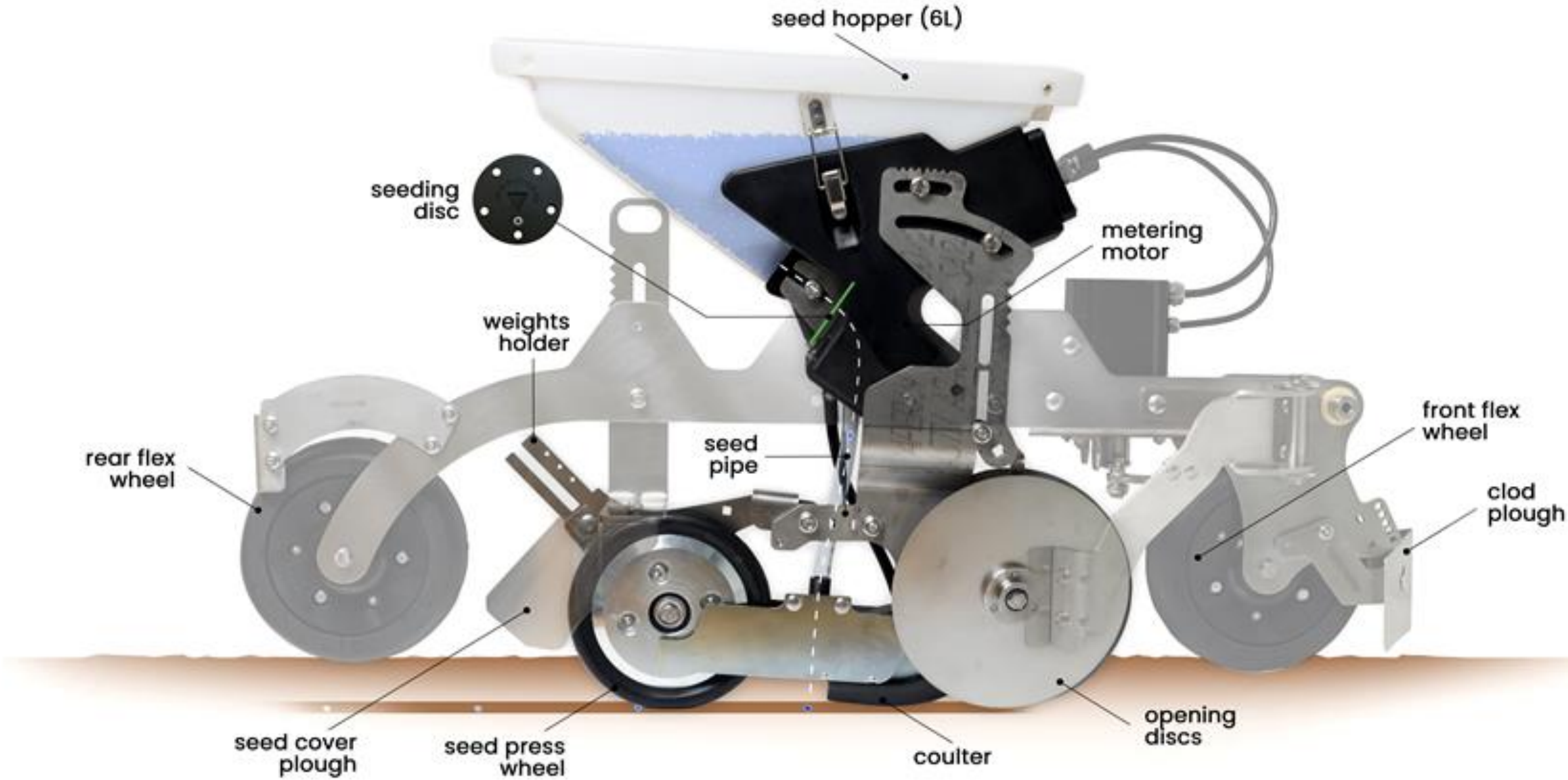


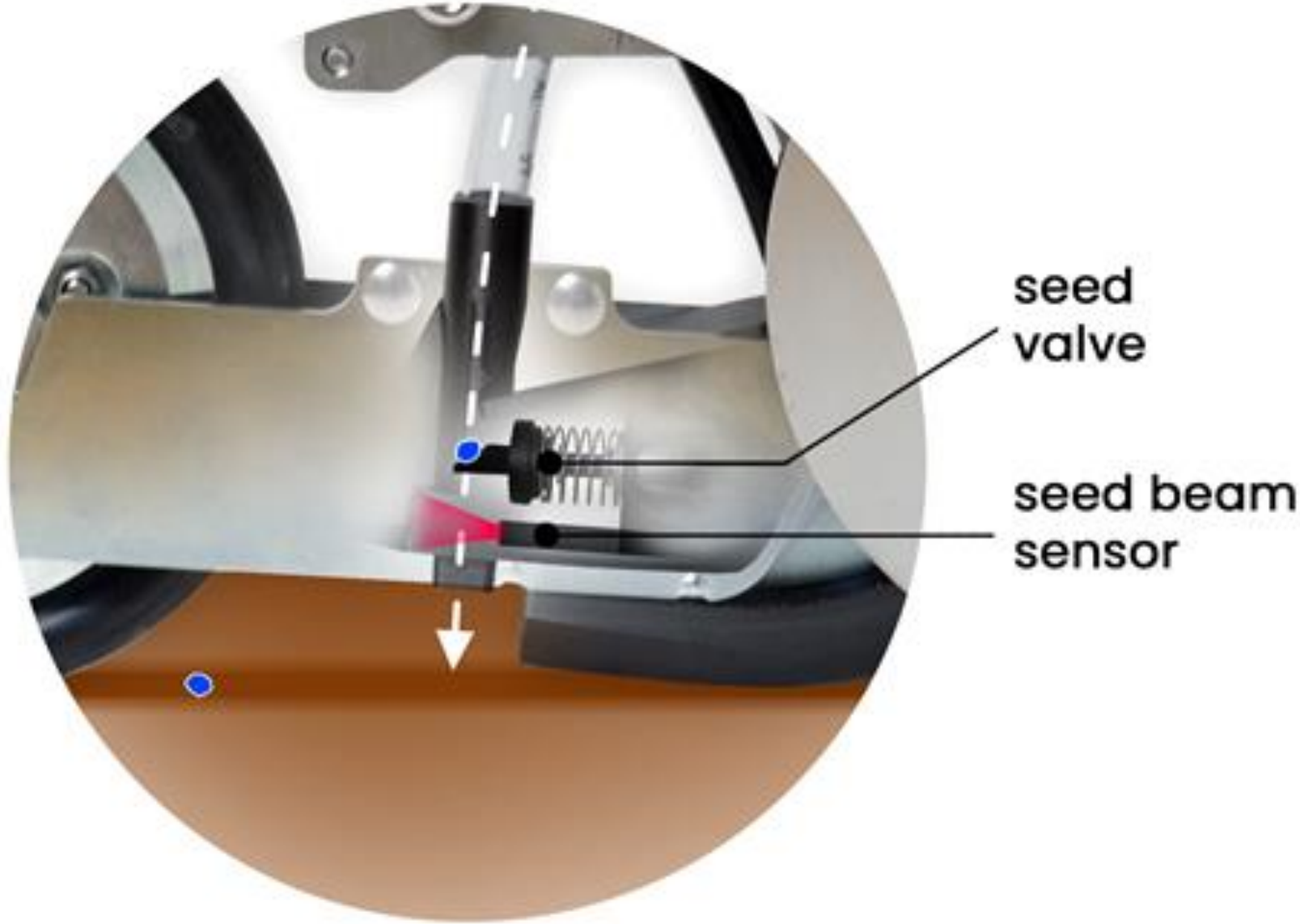
Live mode **Off**

Droid is **On**

Details | Route view | Camera | History | Settings

FARMDR JD


seed hopper (6L)
seeding disc
metering motor
weights holder
front flex wheel
rear flex wheel
seed pipe
clod plough
seed cover plough
seed press wheel
coulter
opening discs


seed
valve
seed beam
sensor

Seeding Methods

Single Row FD20

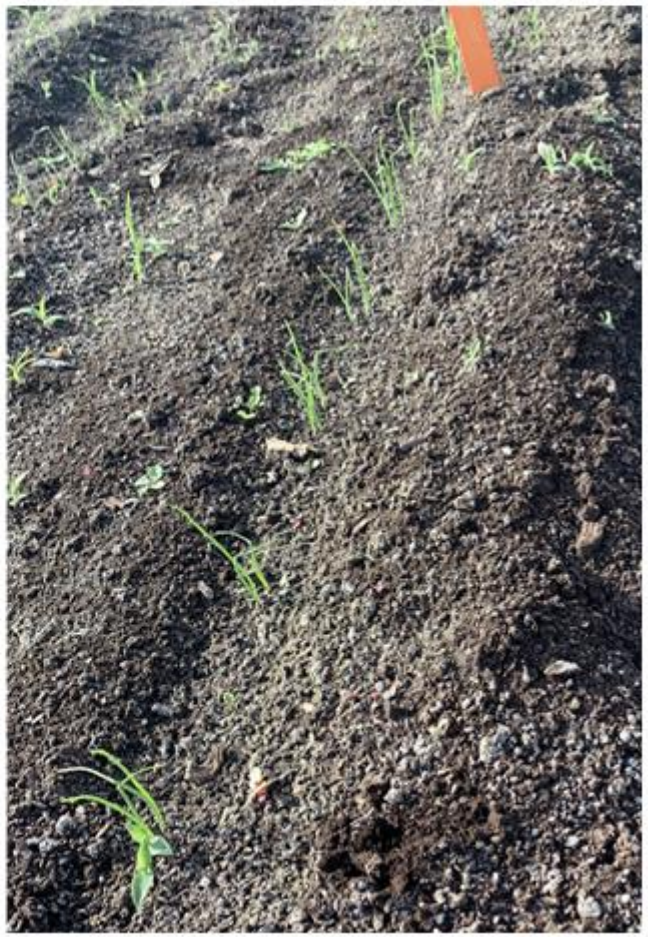
- 3.4 cm between seeds

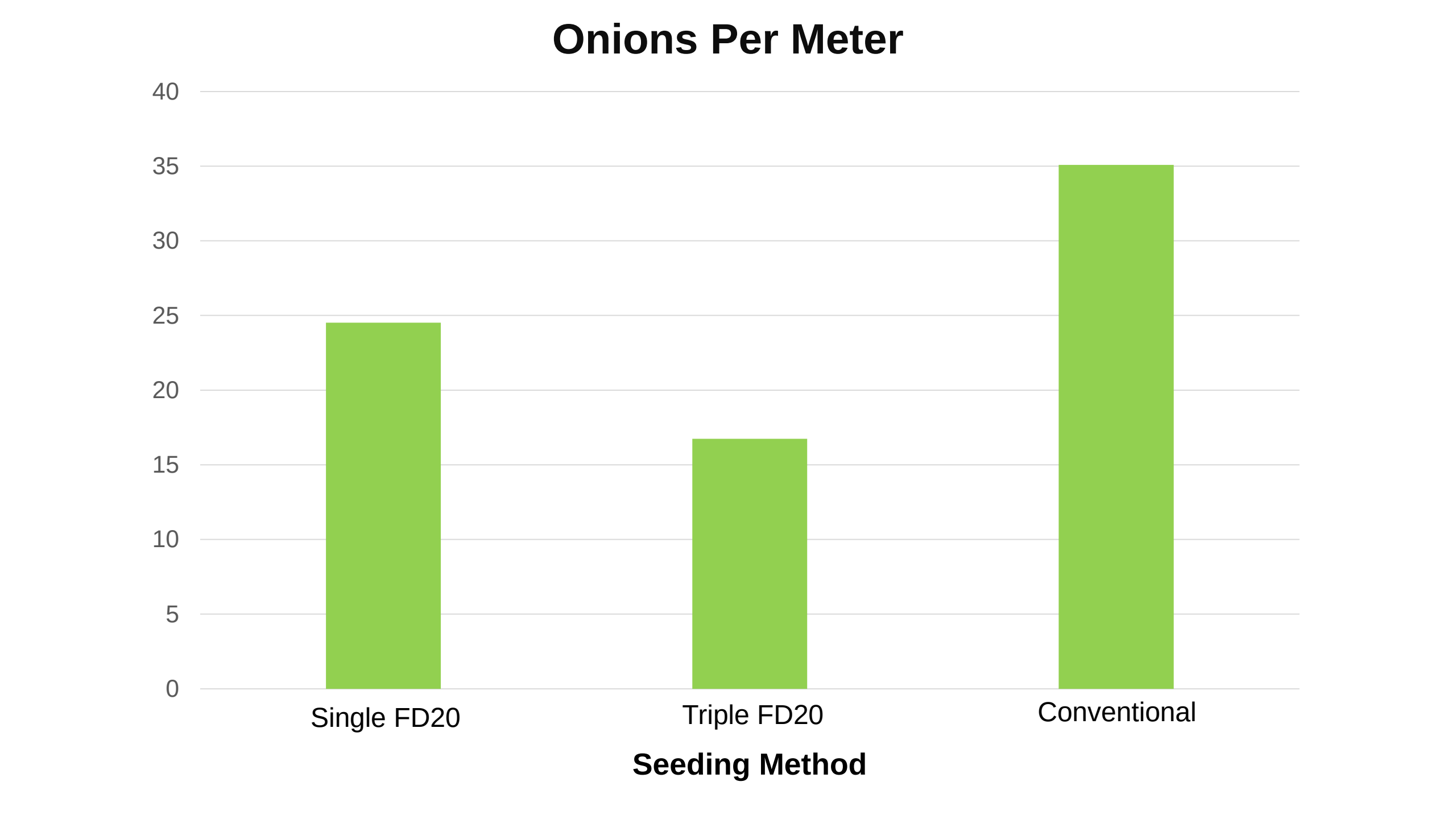
Conventional

- 5 cm between seeds
- Double row

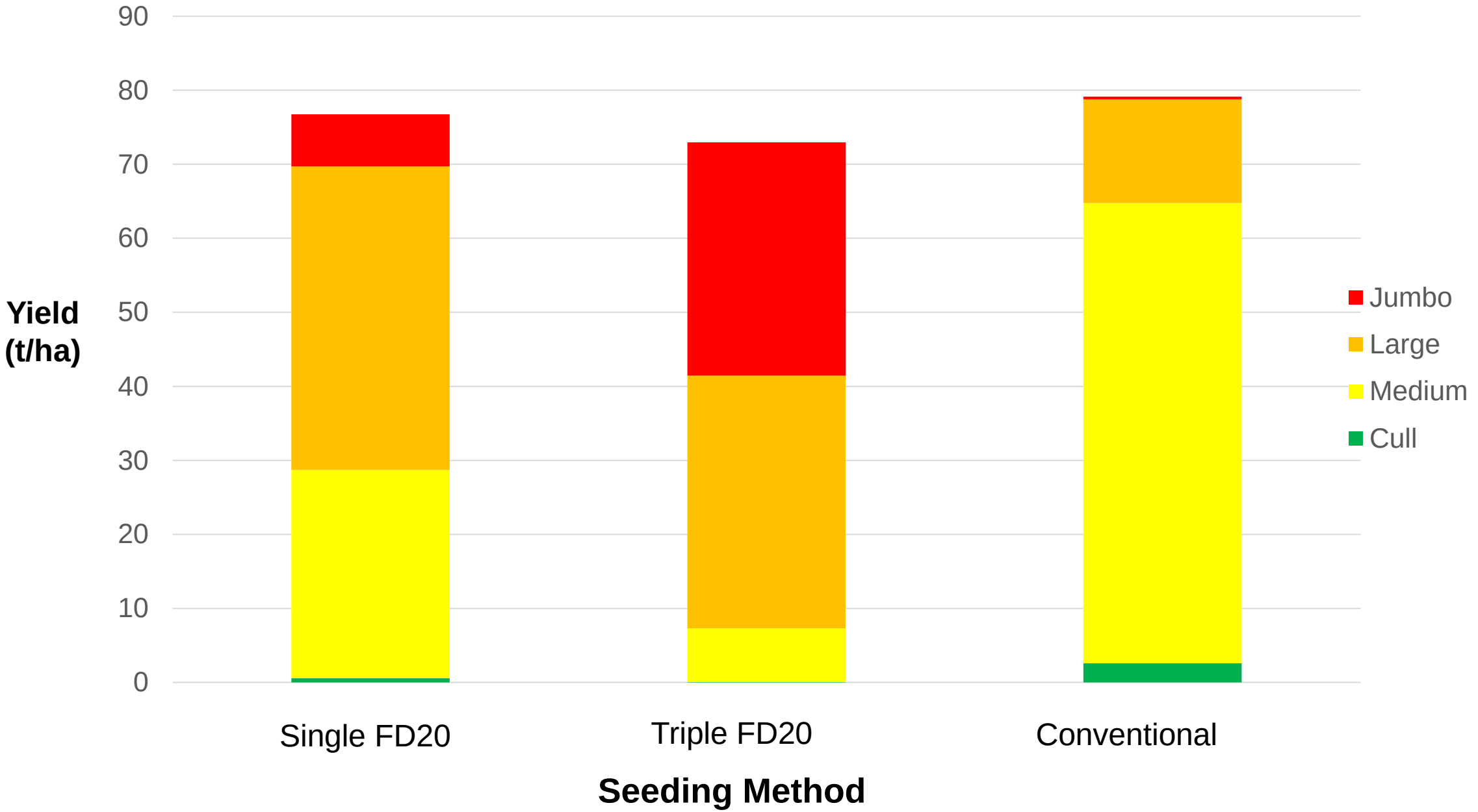
Triple Cluster FD20

- 12 cm between clusters

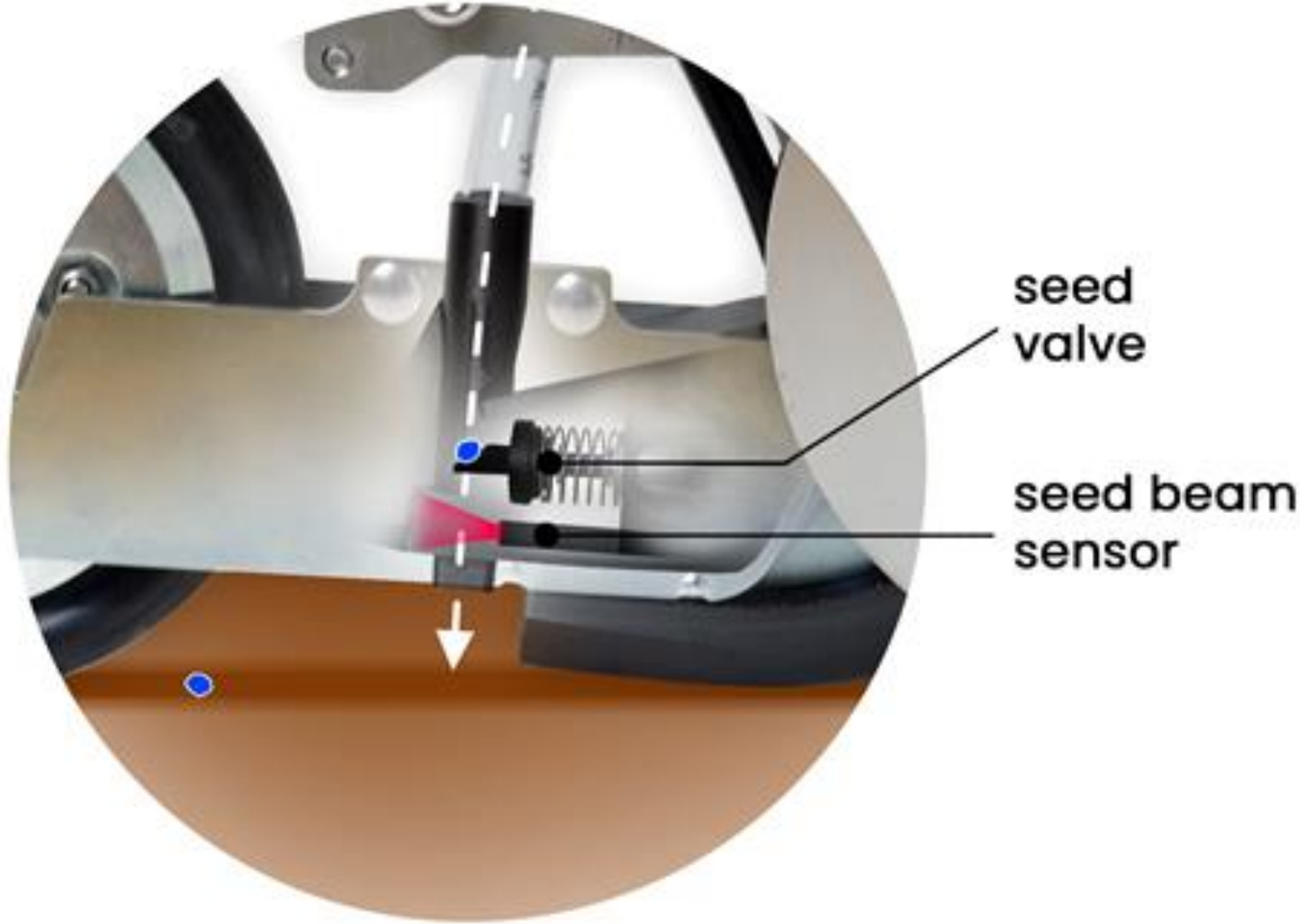



Onions Per Meter
40
35
30
25
20
15
10
5
0
Single FD20
Triple FD20
Conventional
Seeding Method

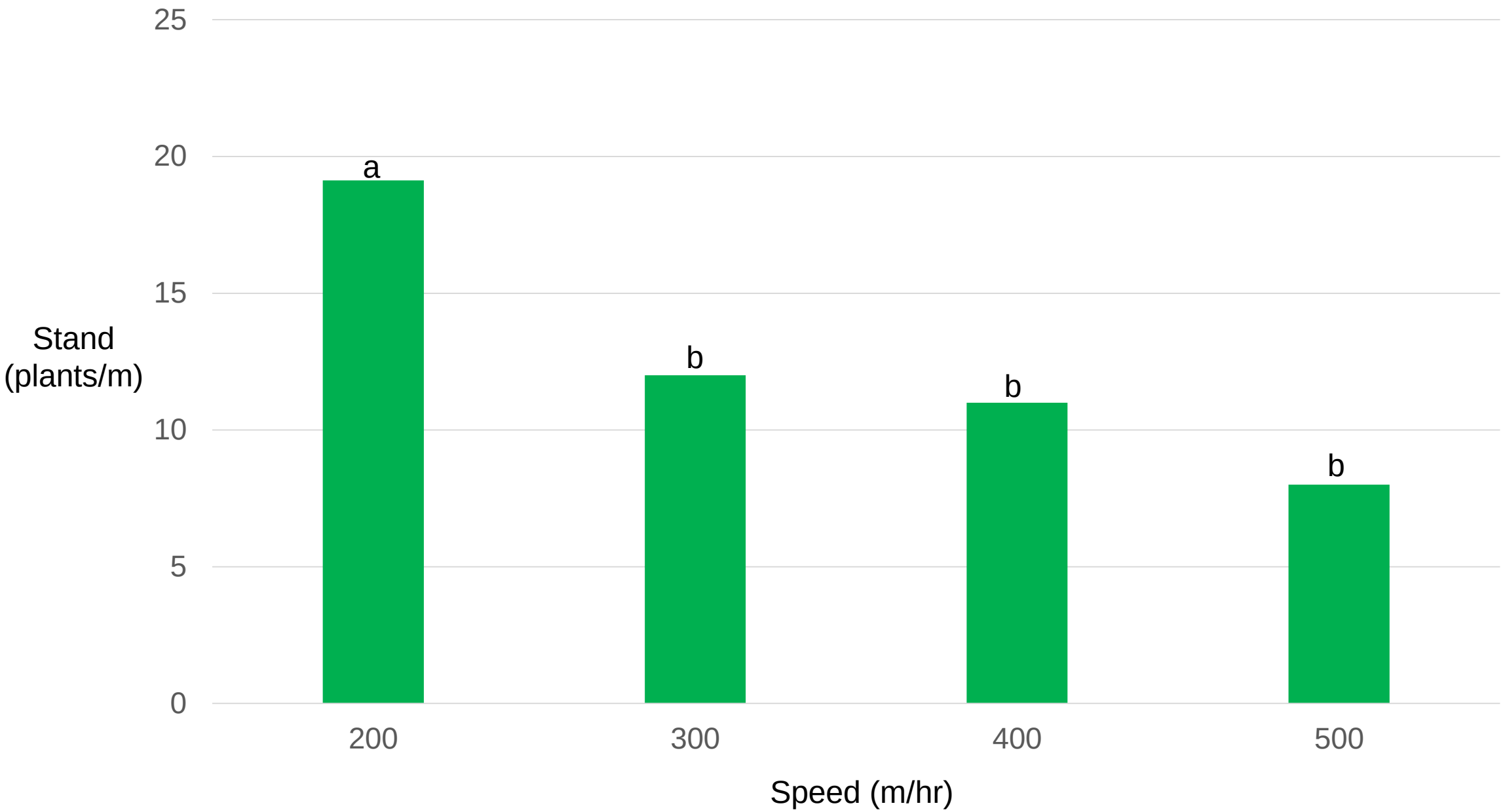
Onion Yield and Size Distribution



FD 20


seed
valve
seed beam
sensor

Onion Emergence



FD 20

Future Work

FarmDroid – FD20

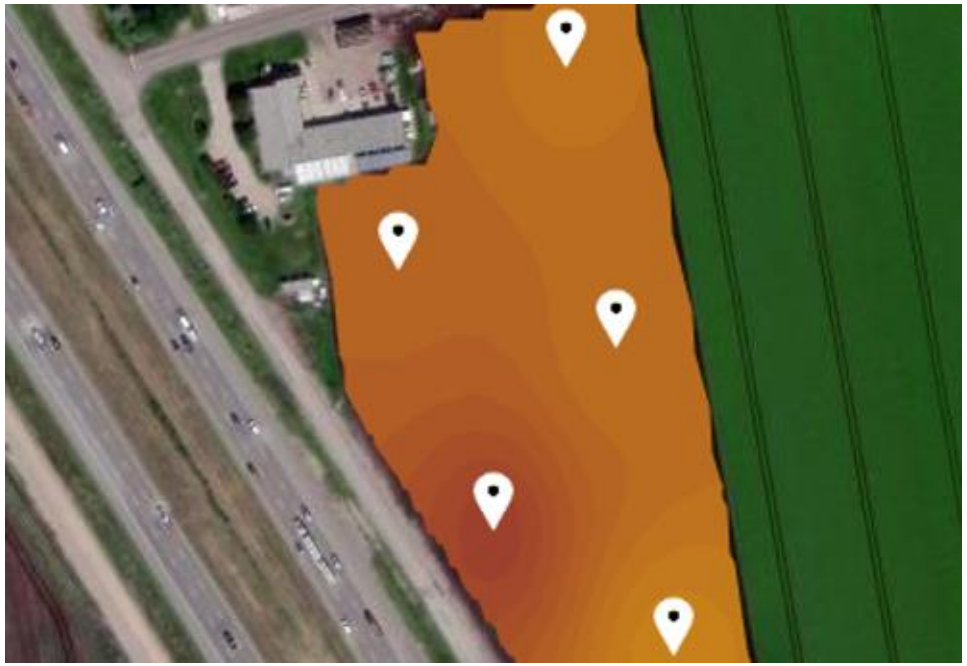
- 4 wheels instead of 3
- Improve tooling for weeding
- Optimize seeding methods

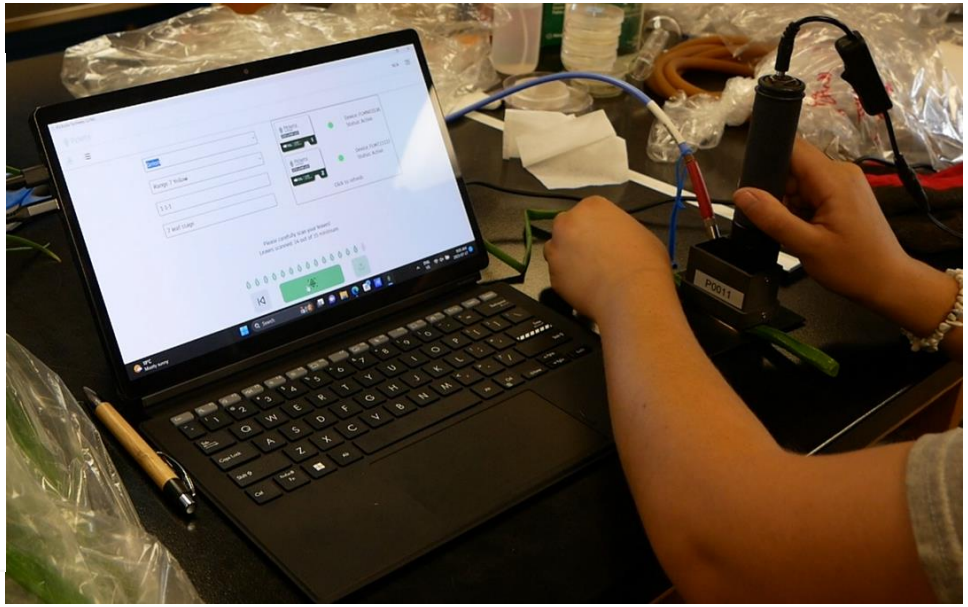
Naïo – Orio

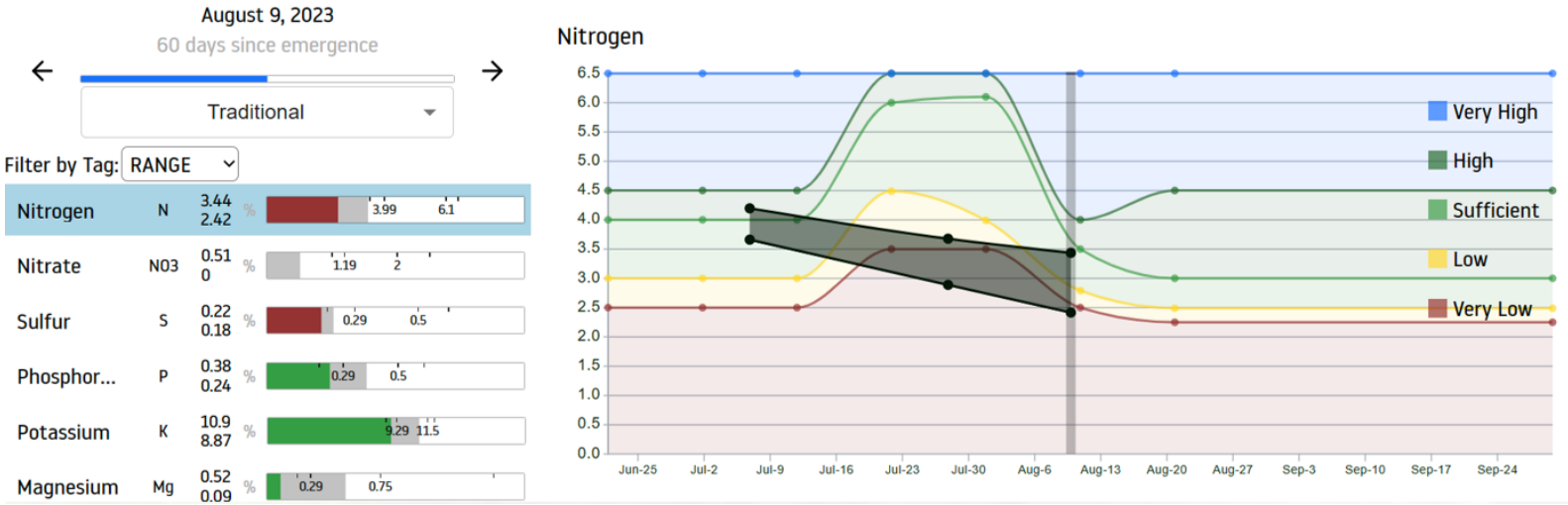
- Compare against tractor
- Figure out seeding implement
- Work in onions and other crops

Picketa - LENS

- LENS – Leaf Evaluated Nutrient System
- Estimates nutrient content for 13 macro and micronutrients
- Model is currently being built for onions
- Could be mounted to a robot in the future







Acknowledgements

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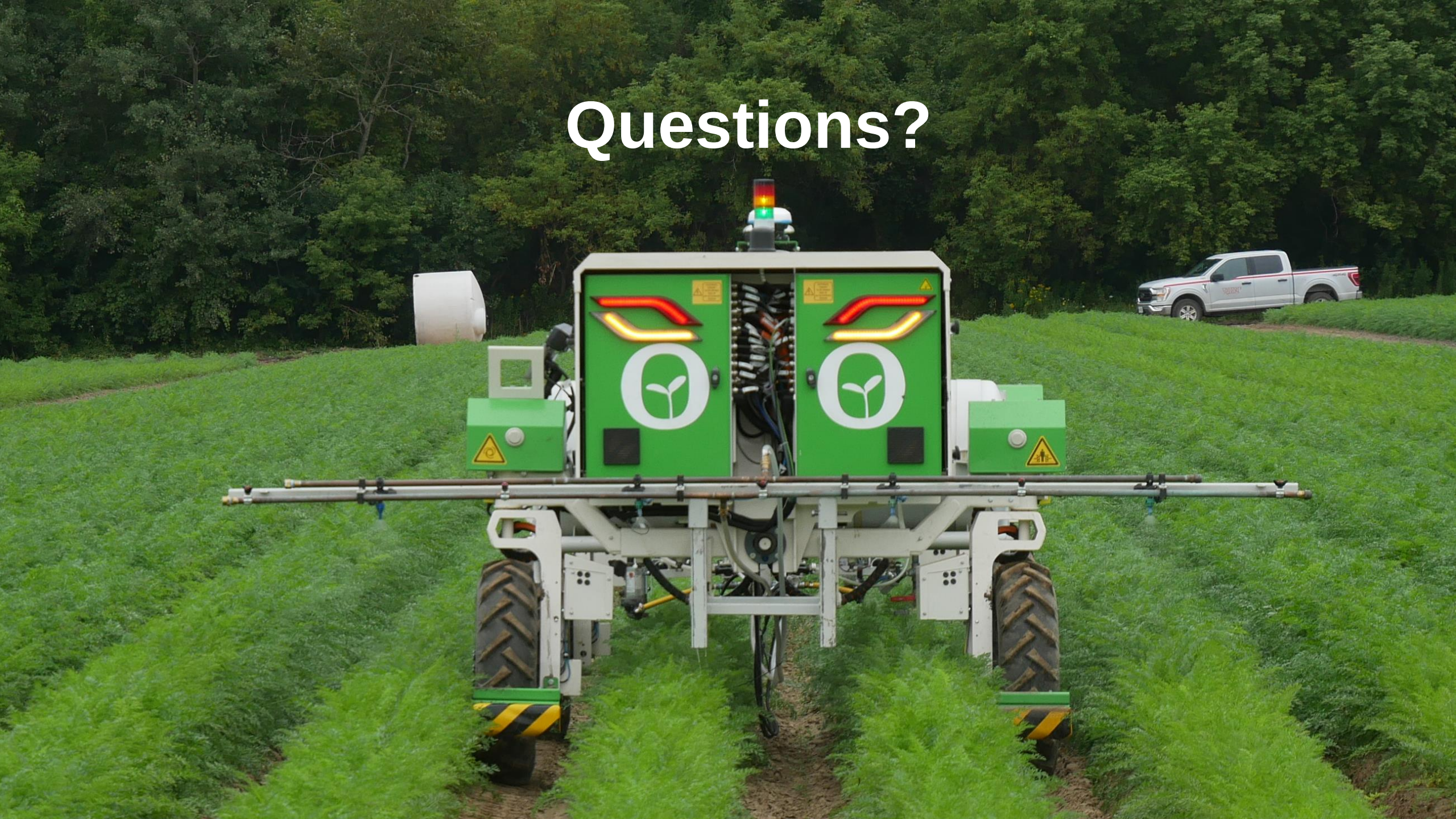
Questions?