Intelligent Weed Control Systems

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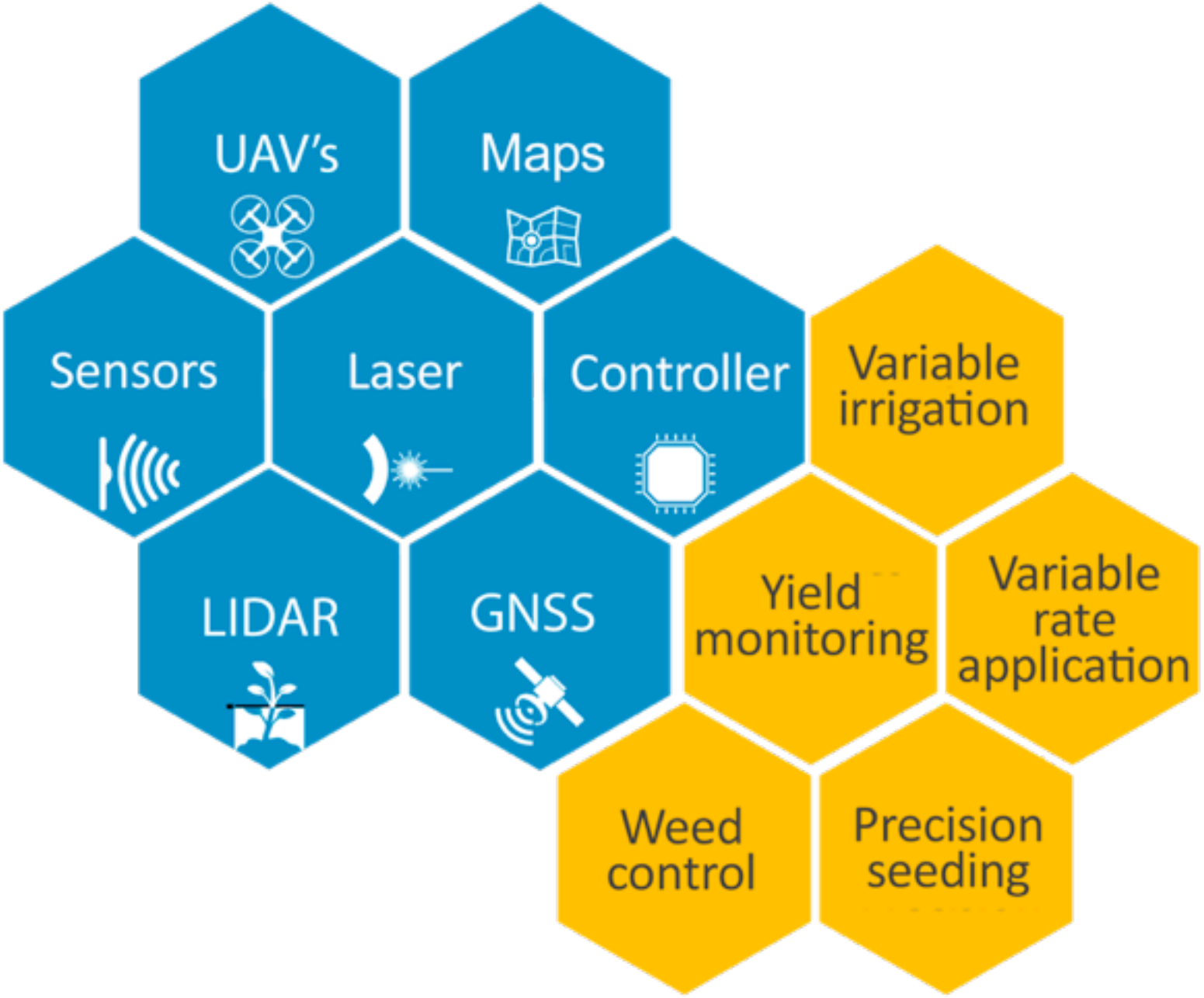

UAV's
Maps
Sensors
Laser
Controller
Variable irrigation
LIDAR
GNSS
Yield monitoring
Variable rate application
Weed control
Precision seeding

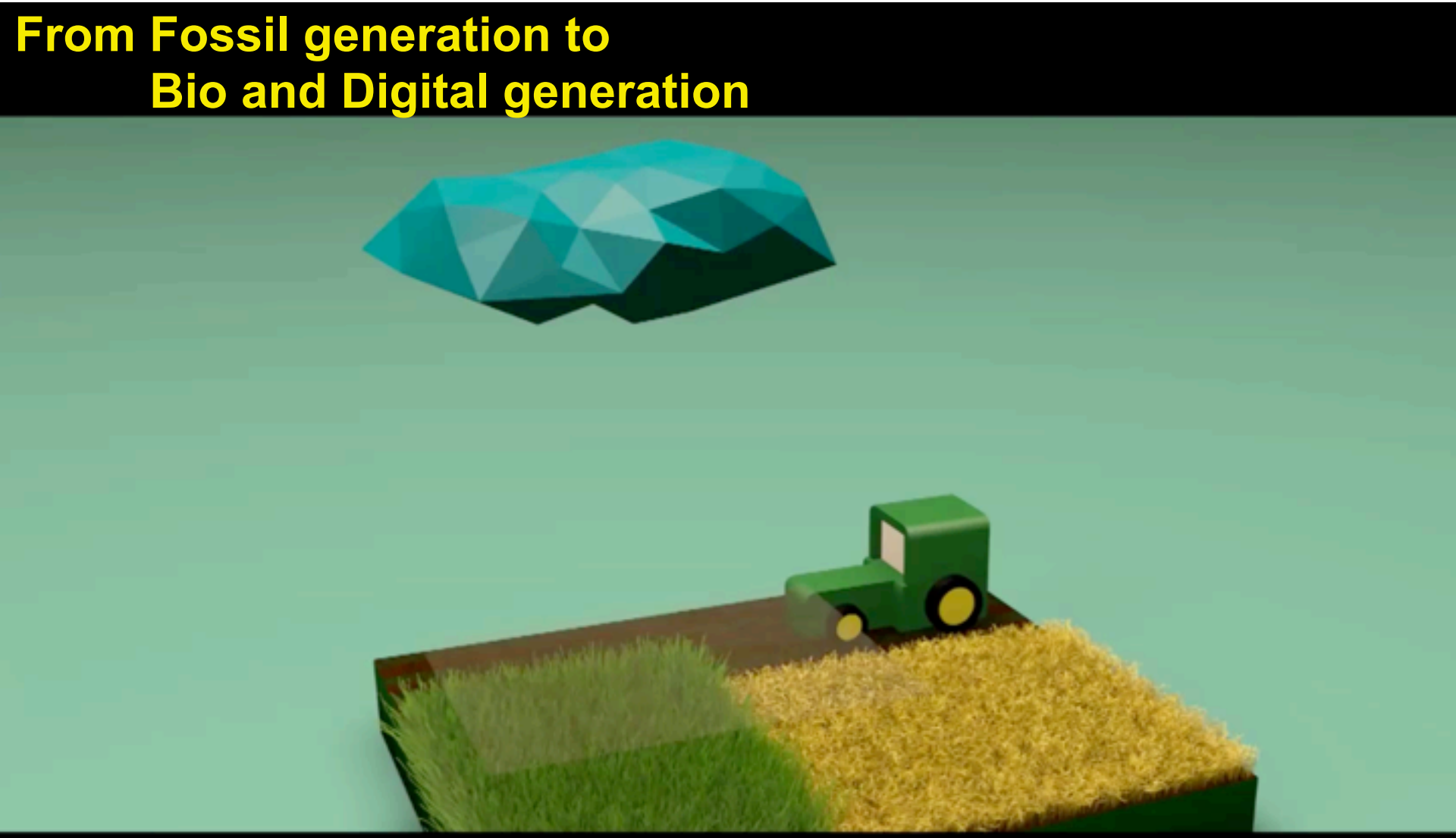
The farmer of the year 2031 works at his large flat-panel television (1931).

The Country Gentleman magazine

che colgono oltre cento kg di pasta in una sola pianta 1896. (Fototeca Georgofili – Fondo R.E.D.A.)

From Green Revolution (increased agricultural production) to Smart Agriculture (sustainability)

From Fossil generation to Bio and Digital generation



Unsustainable weed control:

Unsustainable weed control:

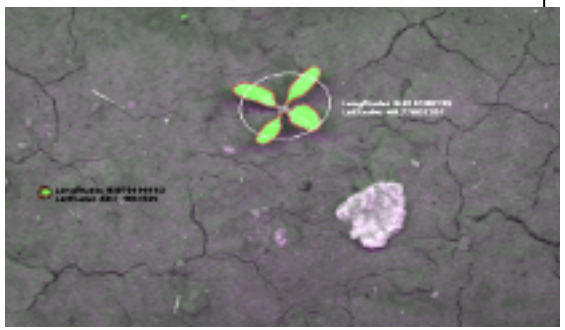
California 2014

Sevilla 2015

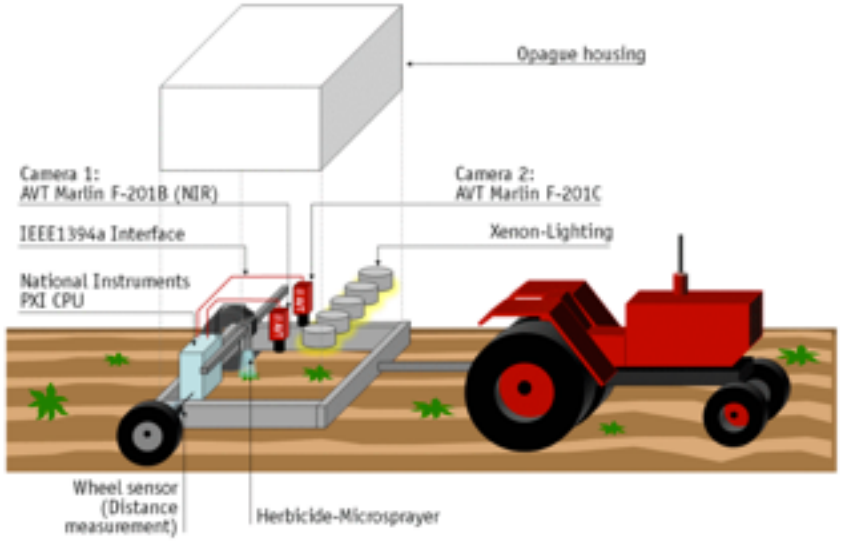
¿Precision Farming?

“apply the right treatment in the right place at the right time”
(Gebbers and Adamchuk, 2010)

What is working.....?



Vision based, mechanical weed control

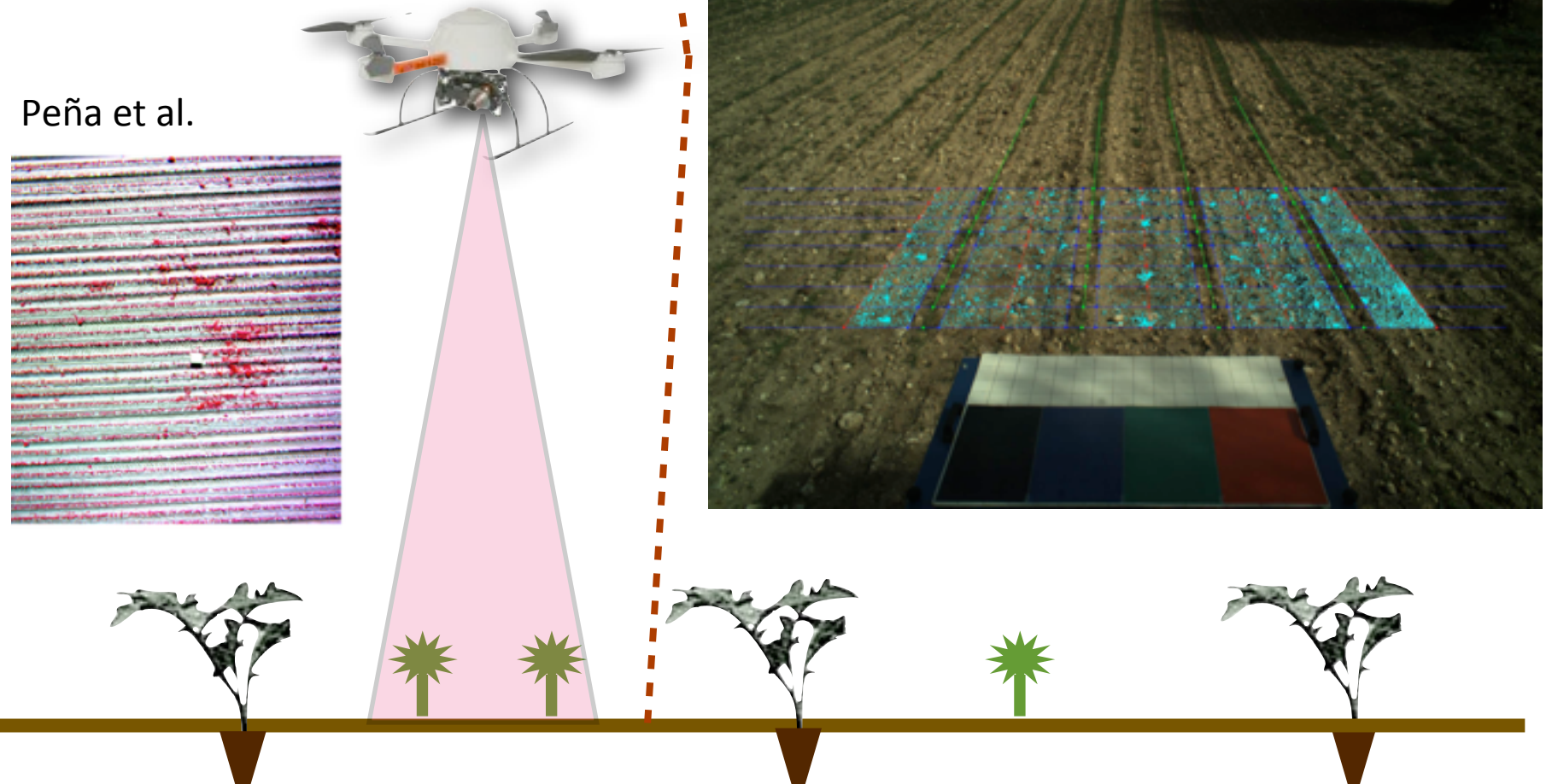


Mechanical stamping actuator

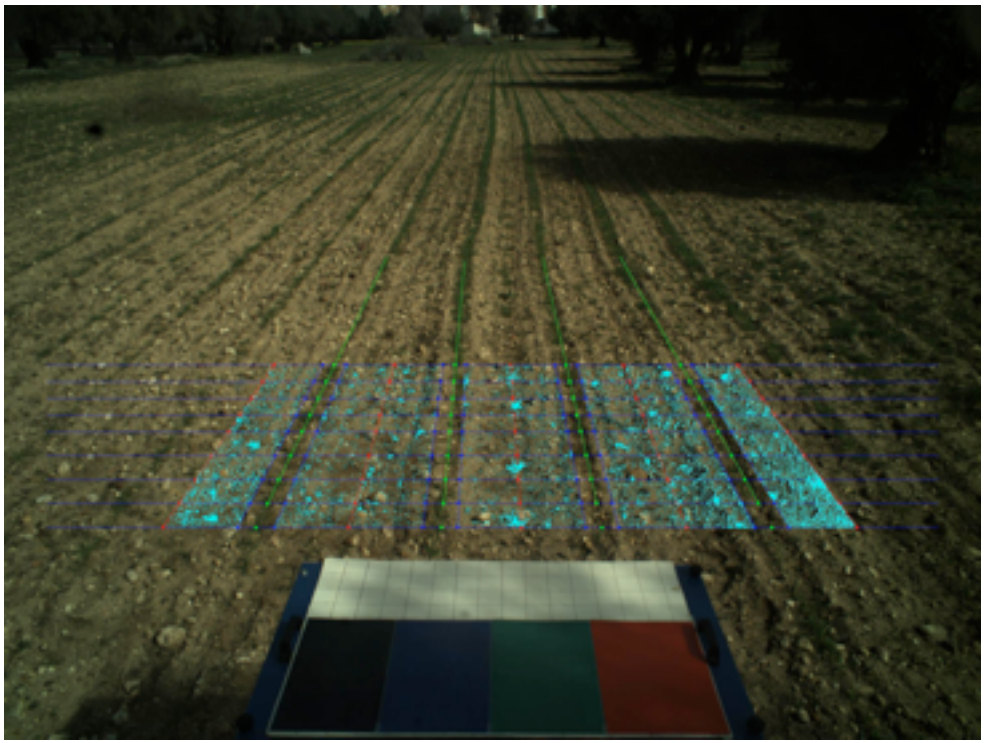
Monitoring tools

Prescription maps (weed infestation map)

Peña et al.

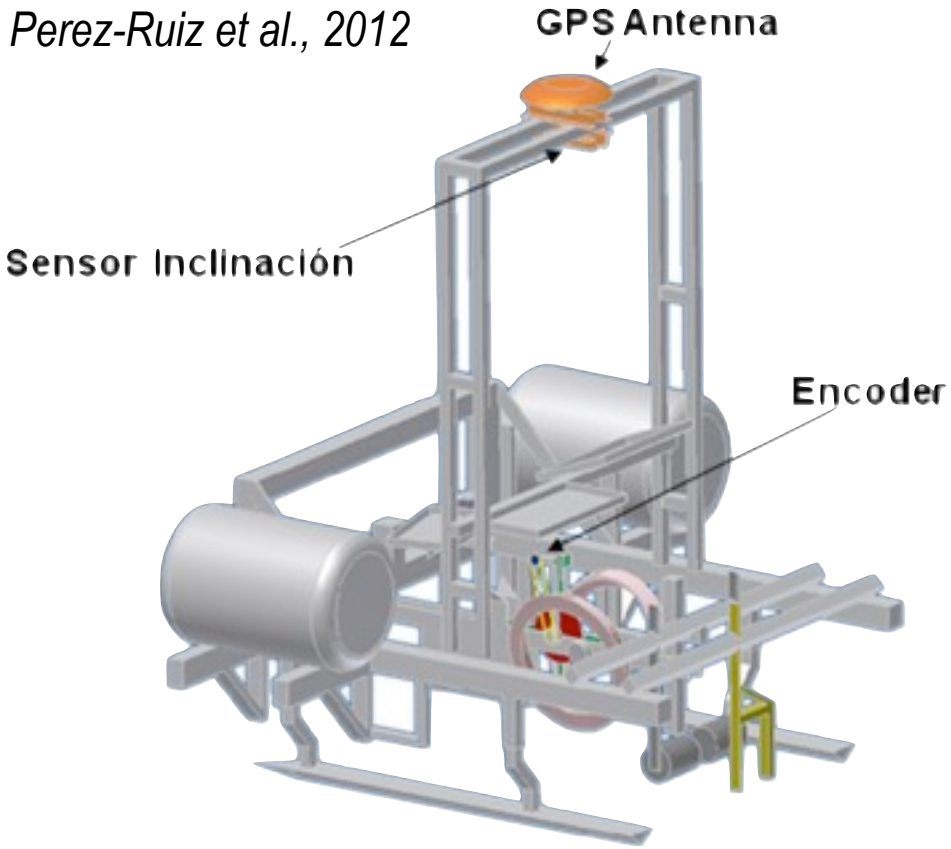


Vision Technology

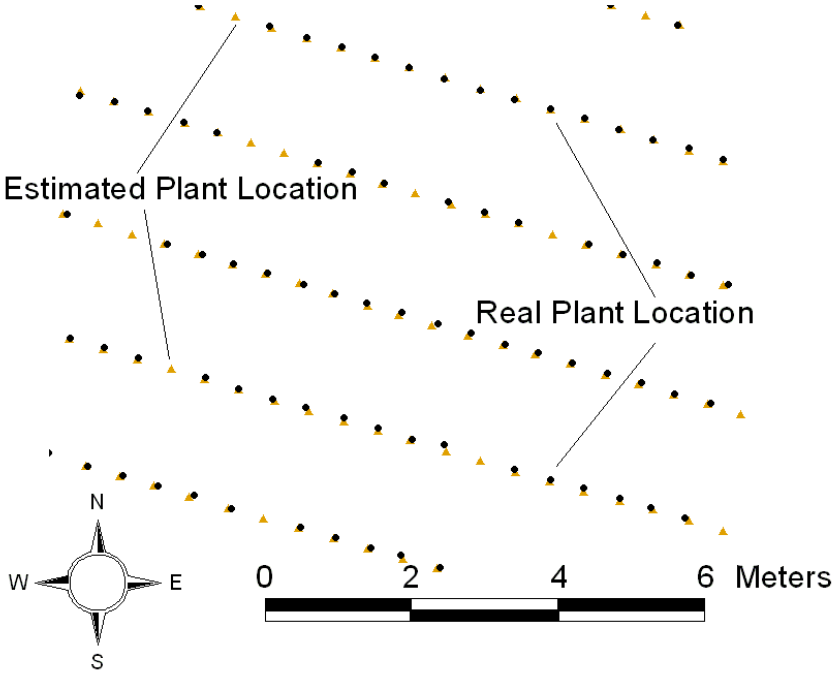


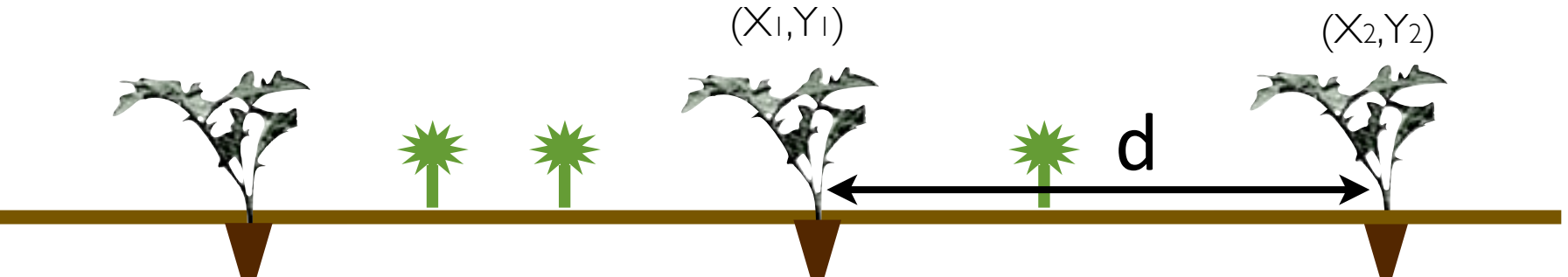
Monitoring tools

Sun et al., 2010
Perez-Ruiz et al., 2012



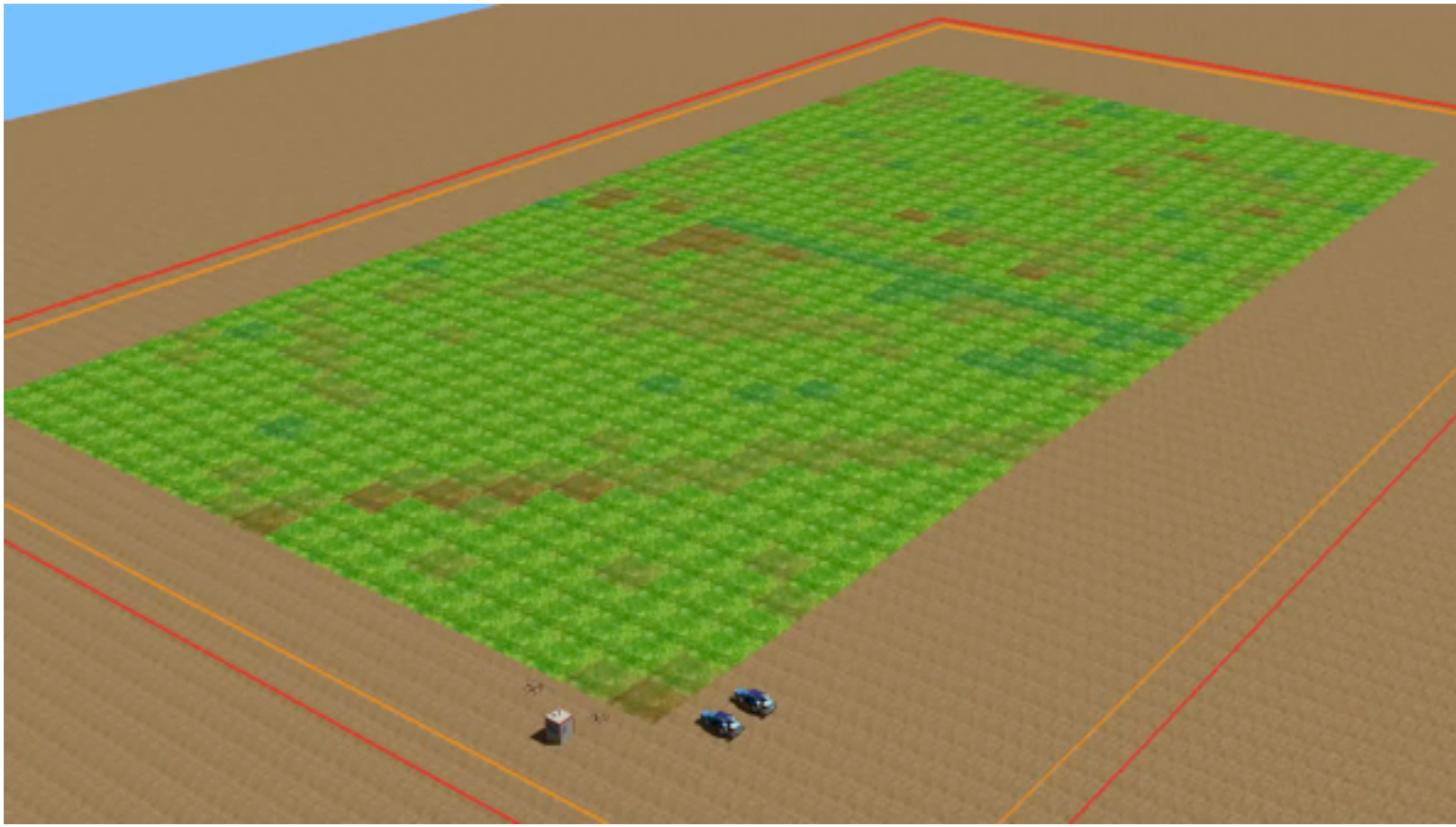
GNSS & Odometry





Precision spray application system

Robot Fleets For Highly Effective Agriculture and Forestry Management (RHEA)-2014



RHEA-Simulation

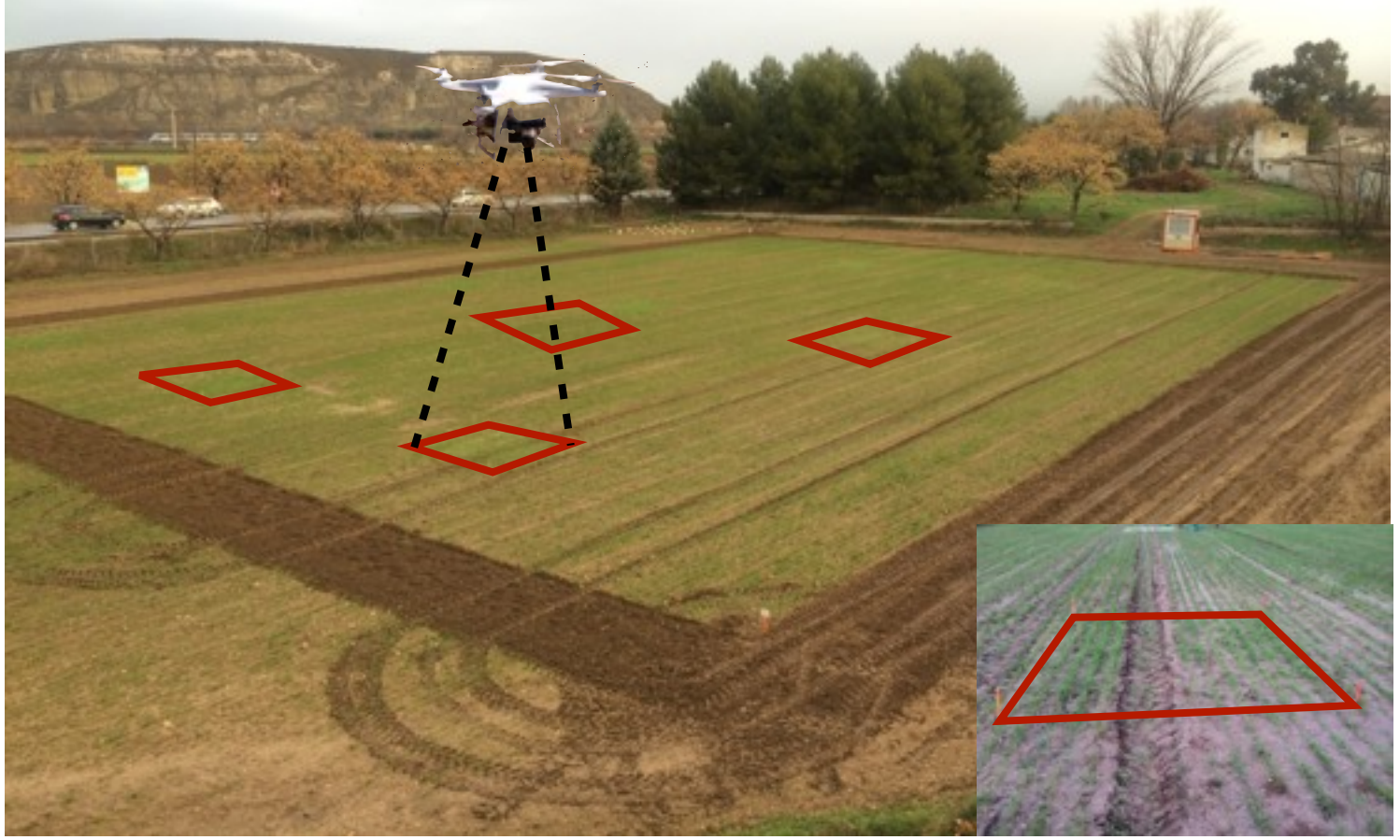
Precision spray application system

UAV weed detection

(3.4 % of the field weed infested)

Field size: 2400 m^2

Patch area: 81 m^2

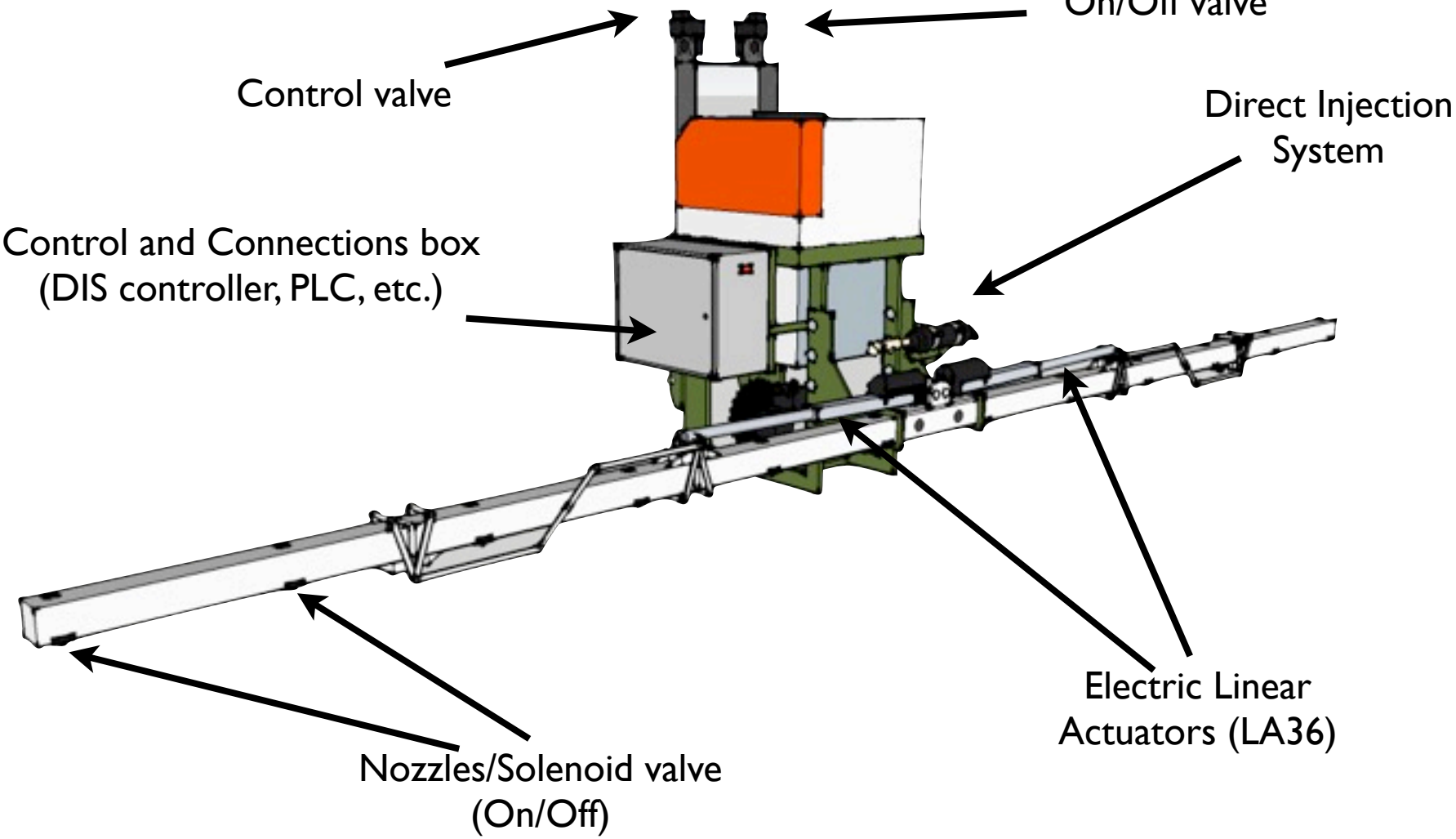


Precision spray application system

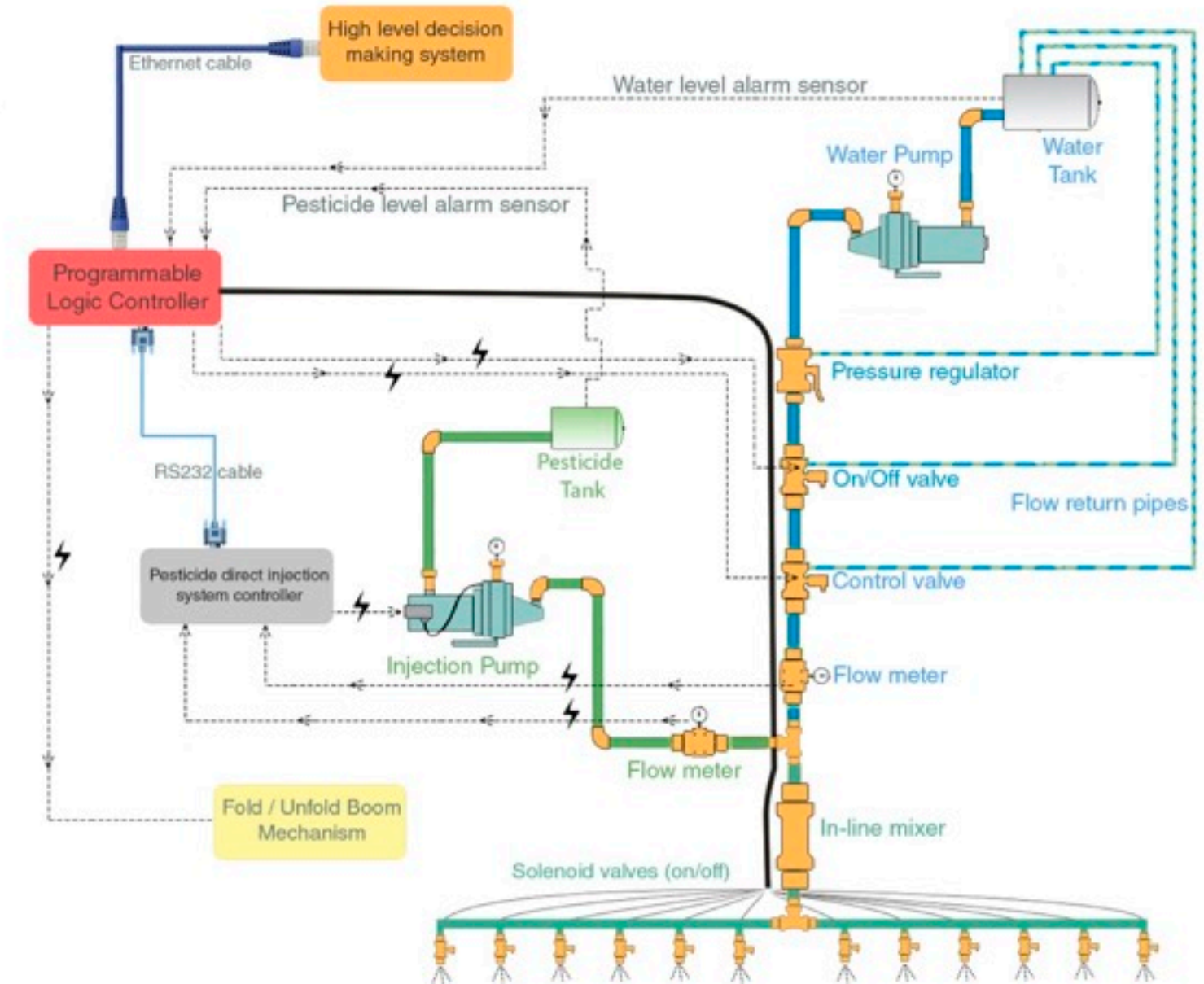
Autonomous tractor

Precision spray application system

Intelligent sprayer



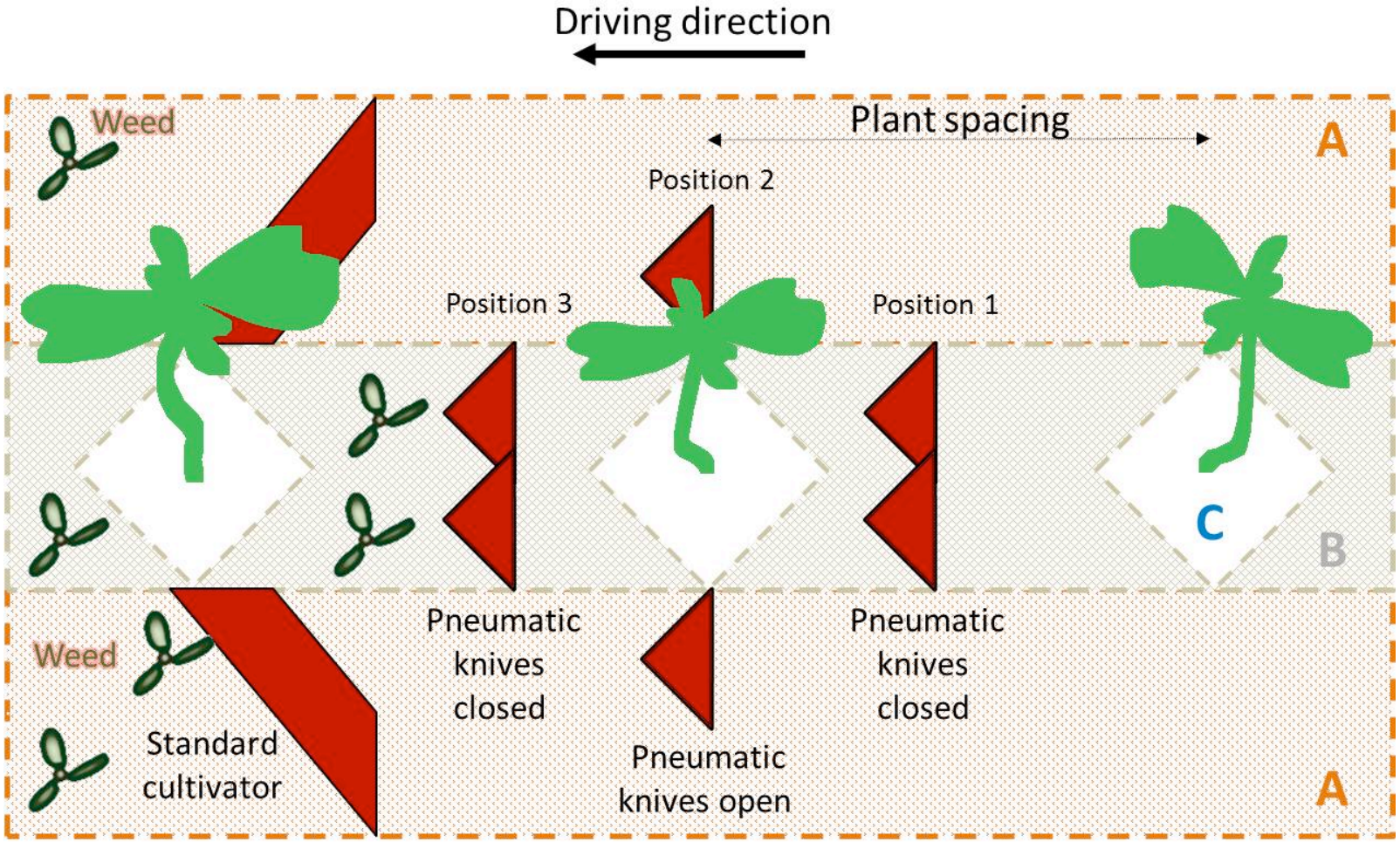
Precision spray application system



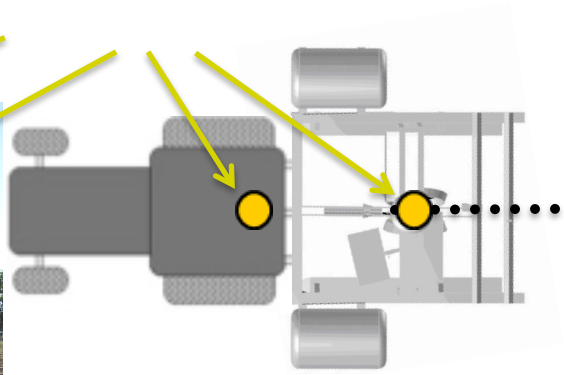
Precision spray application system

GNSS-based mechanized weed control

Three weed control zones have been defined in relationship to the crop plant

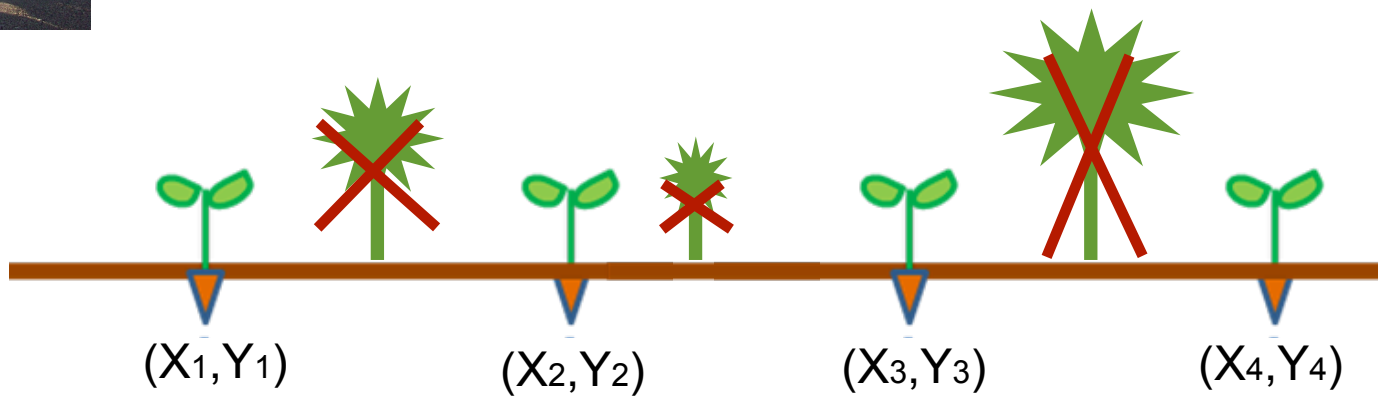


GNSS-based mechanized weed control

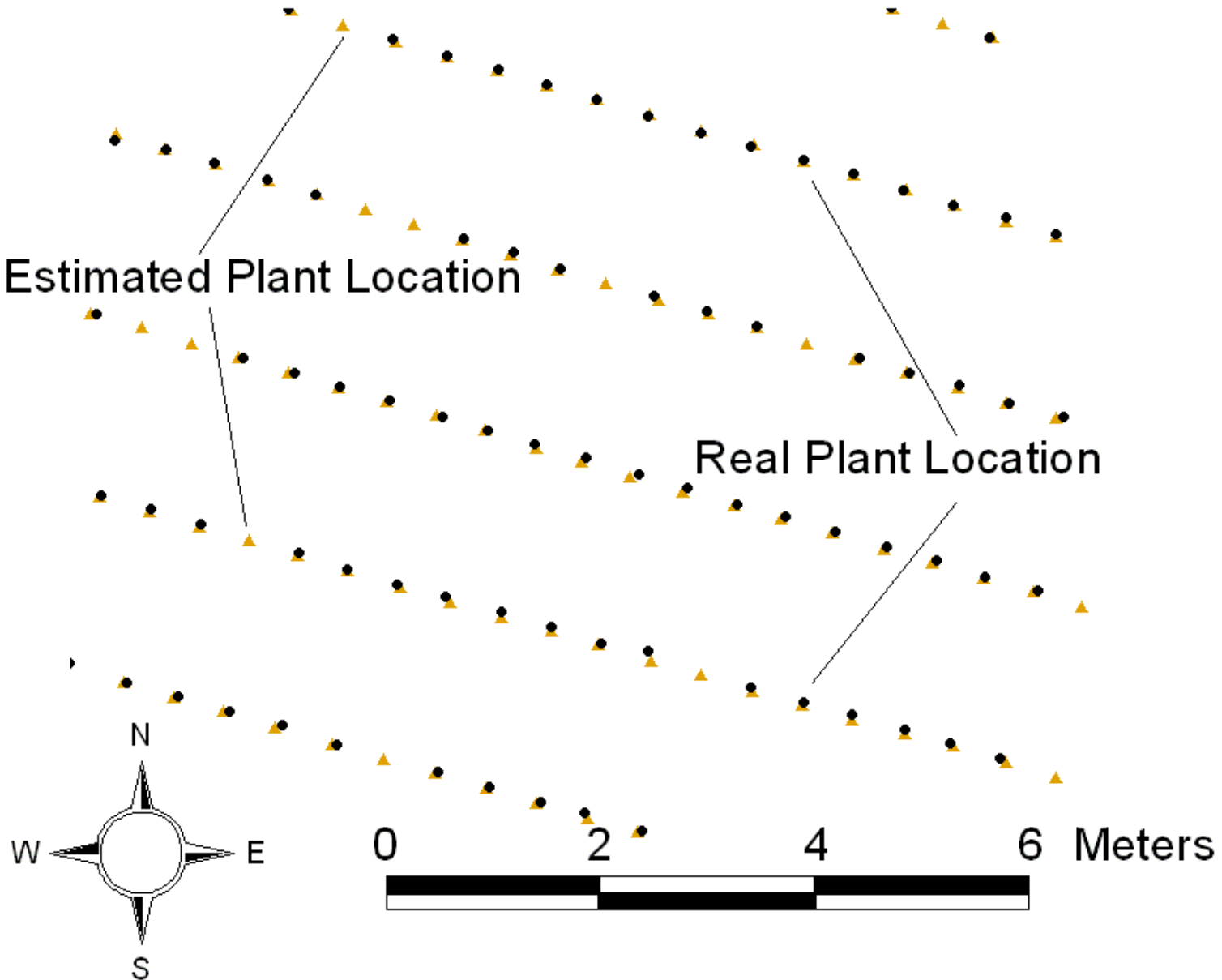


Sun et al., 2010
Perez-Ruiz et al., 2012

Mean total error 2 cm

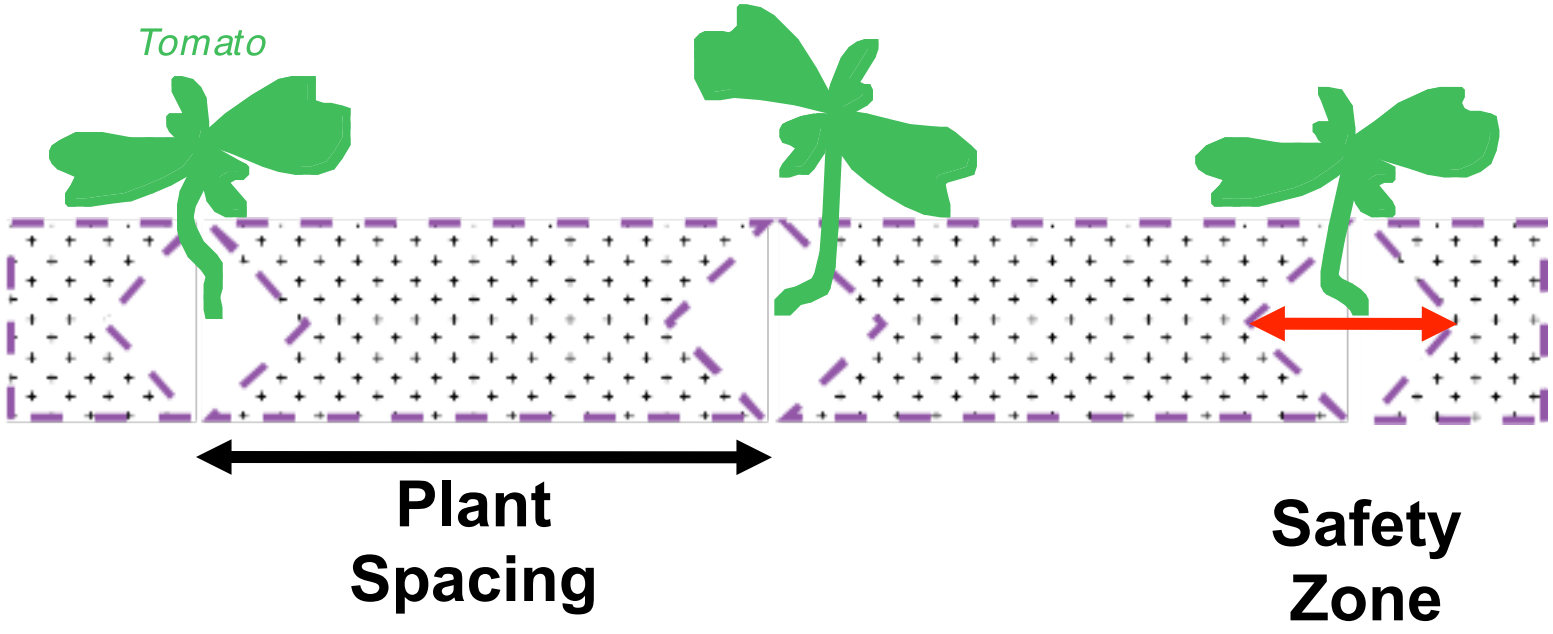


Crop geoposition map



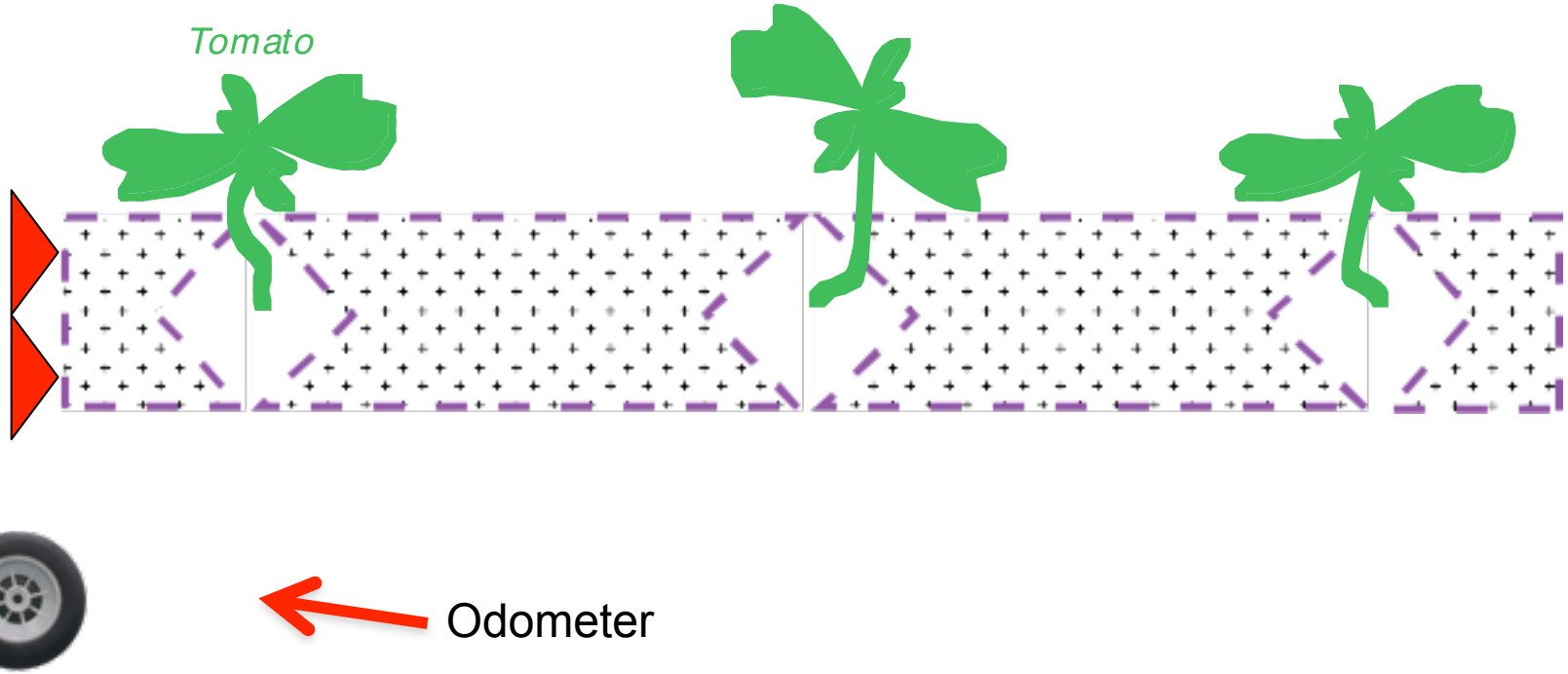
Odometry- based mechanized weed control

➡Operator enters plant spacing and the size of the safety zone



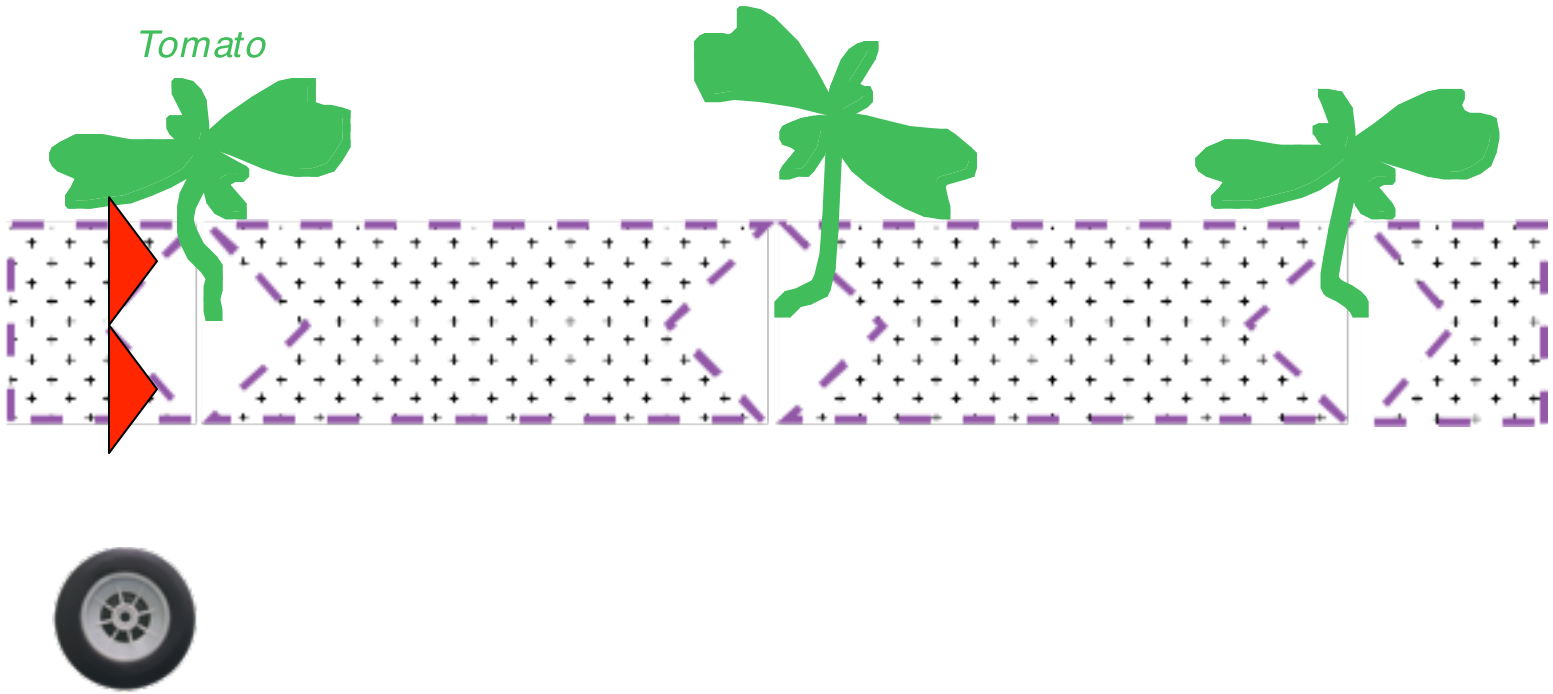
Odometry- based mechanized weed control

➡Low cost ($30) controller monitors the odometer during cultivation



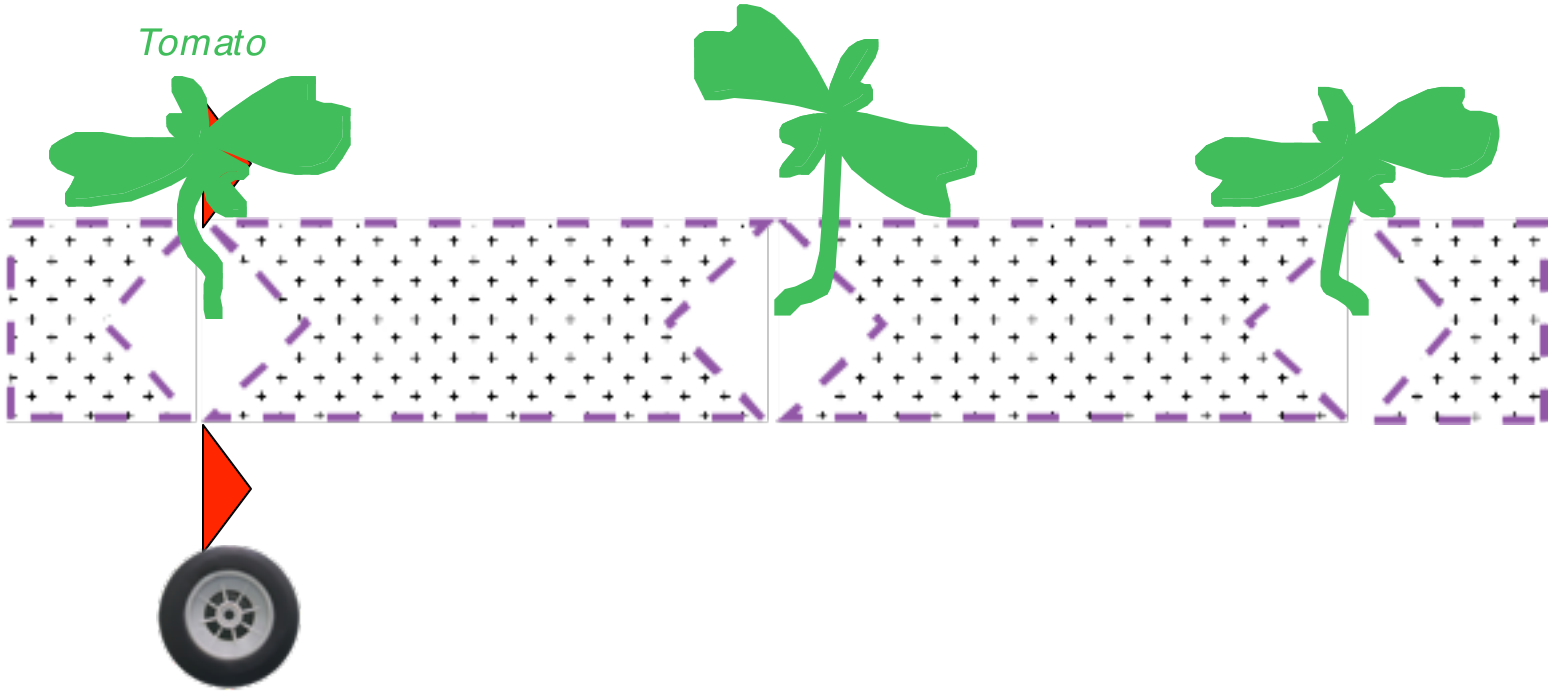
Odometry- based mechanized weed control

➡At the safety zone, the controller opens the knives



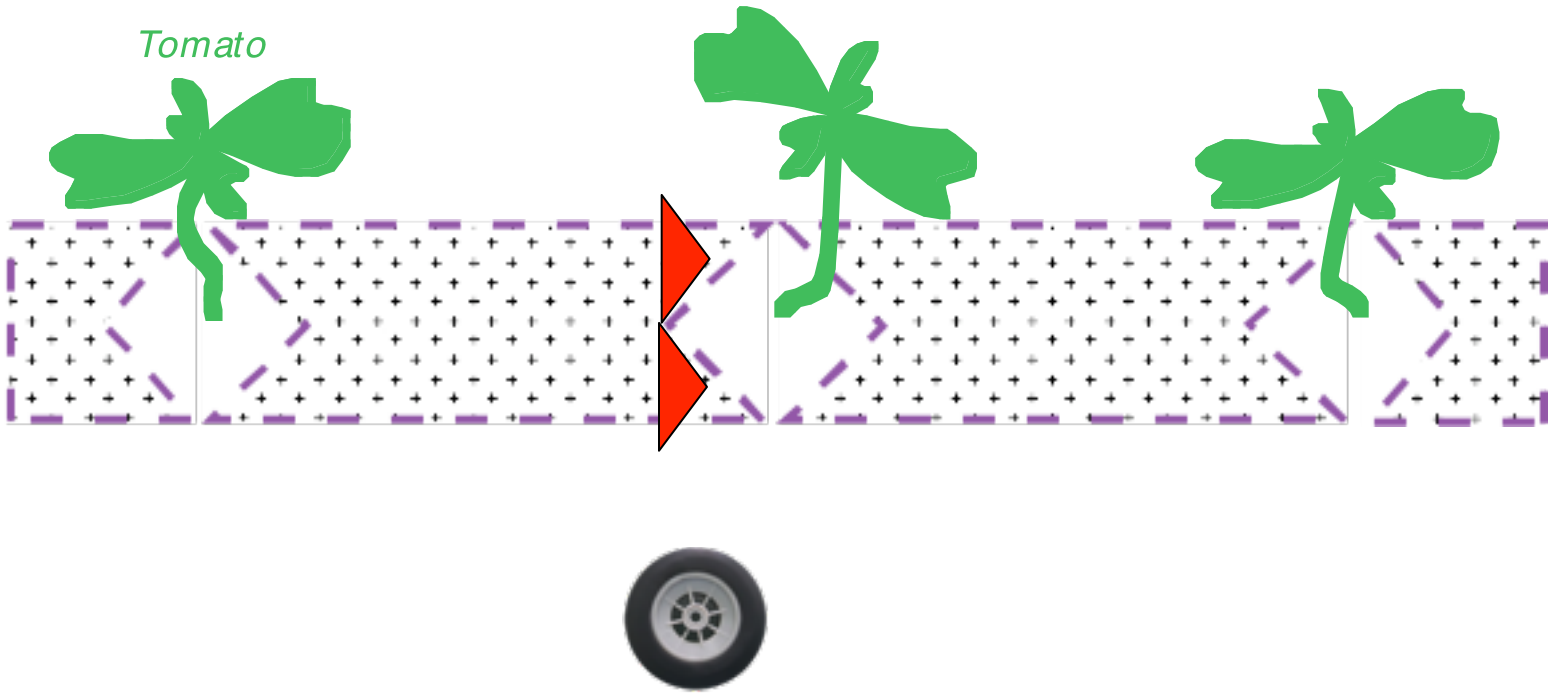
Odometry- based mechanized weed control

➡Closing the knives as it passes the plant



Odometry- based mechanized weed control

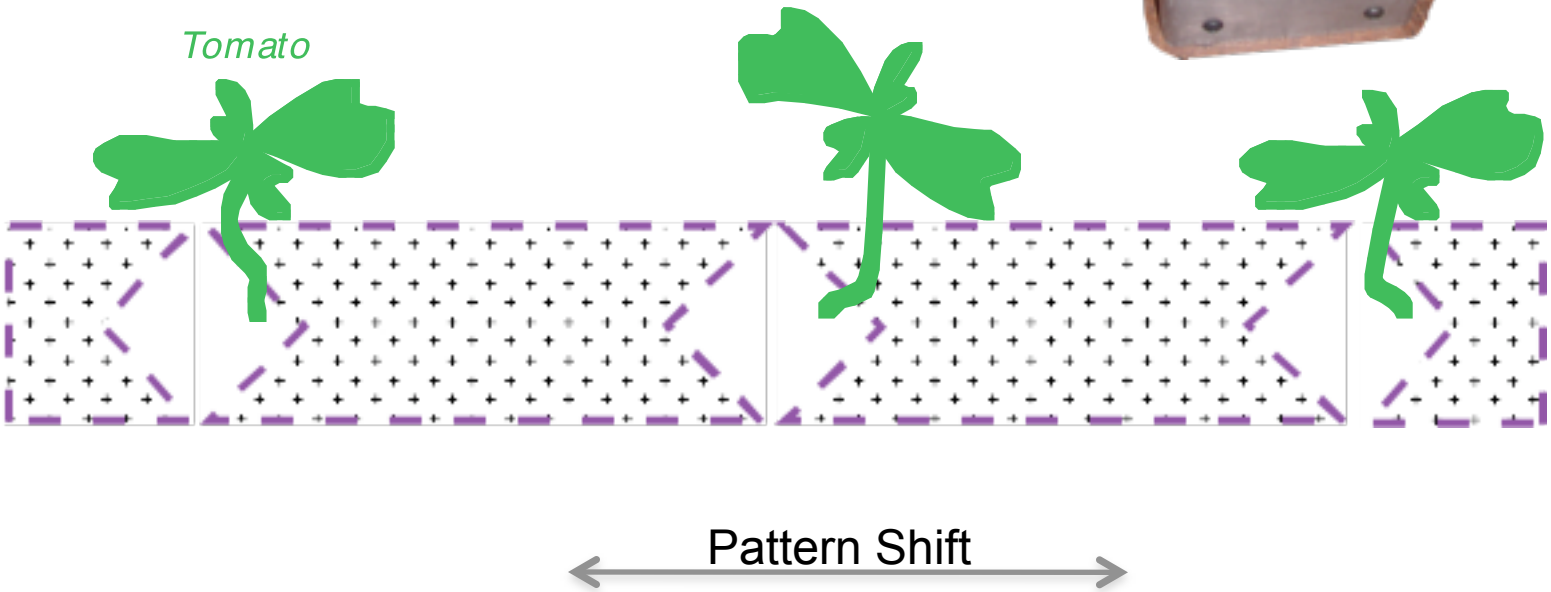
➡The pattern repeats, without operator intervention



Odometry- based mechanized weed control

➡Periodically, the operator can shift the pattern, if needed

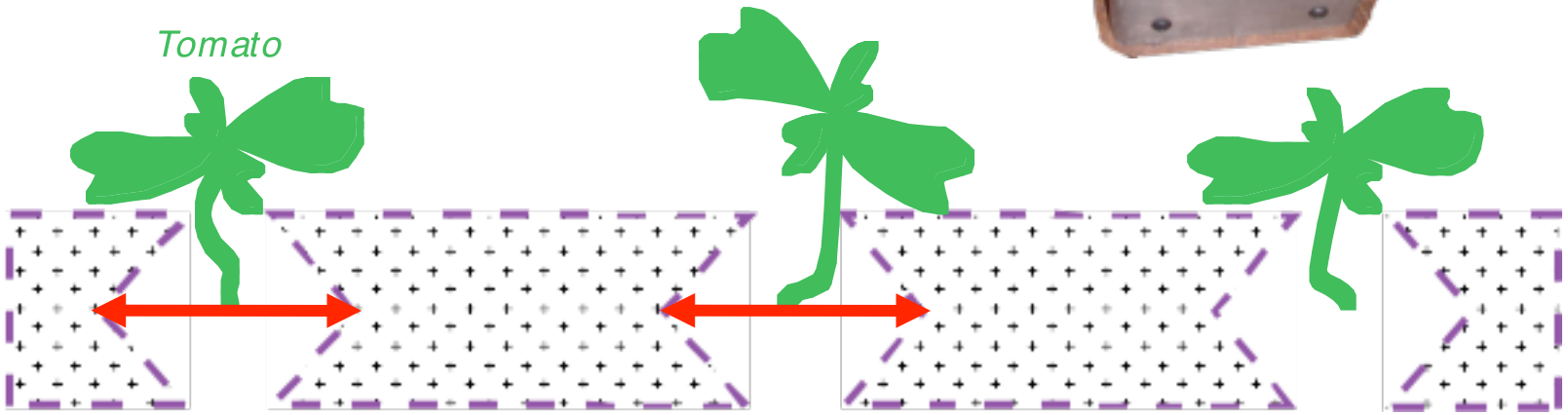
Shift wheel



Odometry- based mechanized weed control

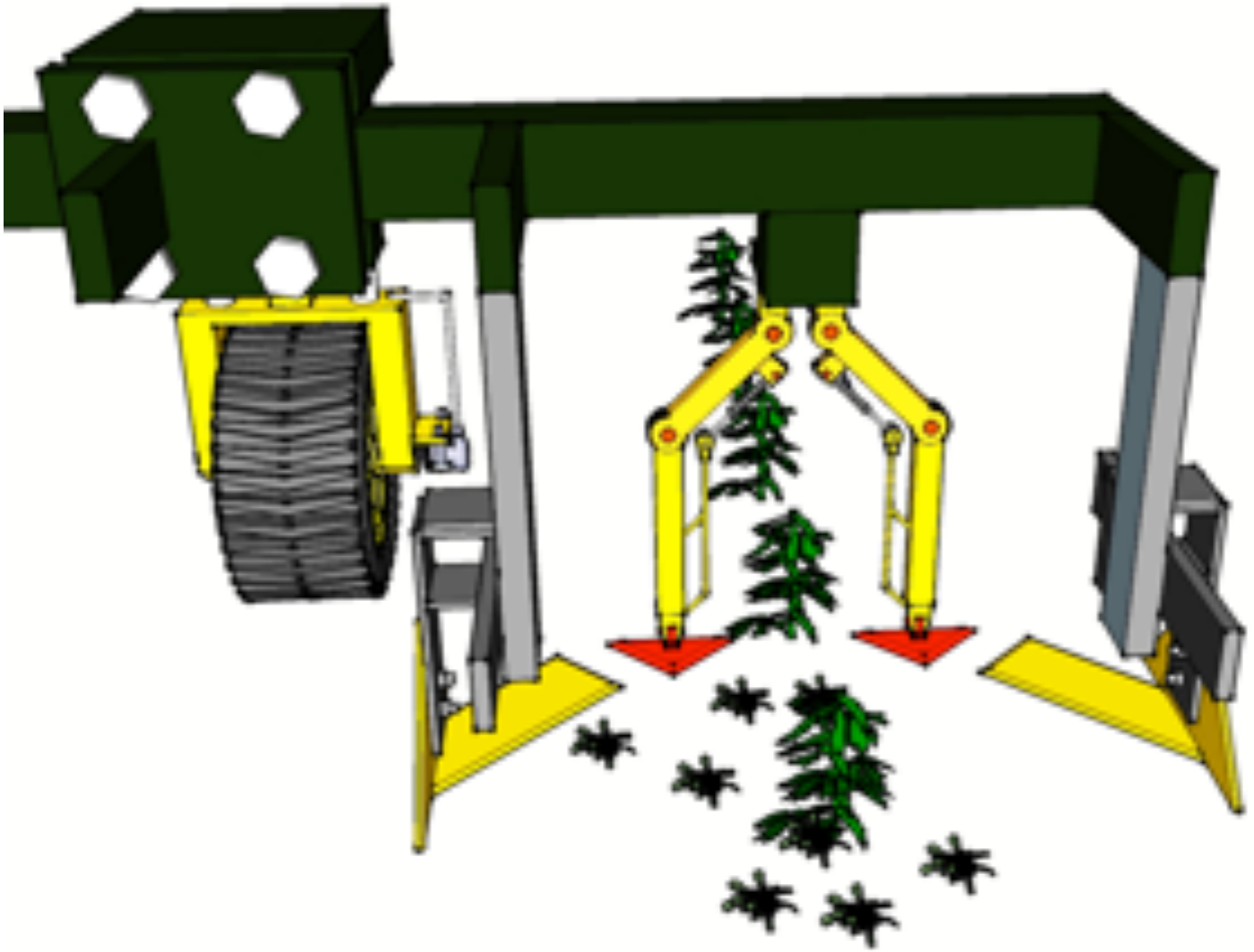
➡Or change the size of the safety zone

Safety zone wheel



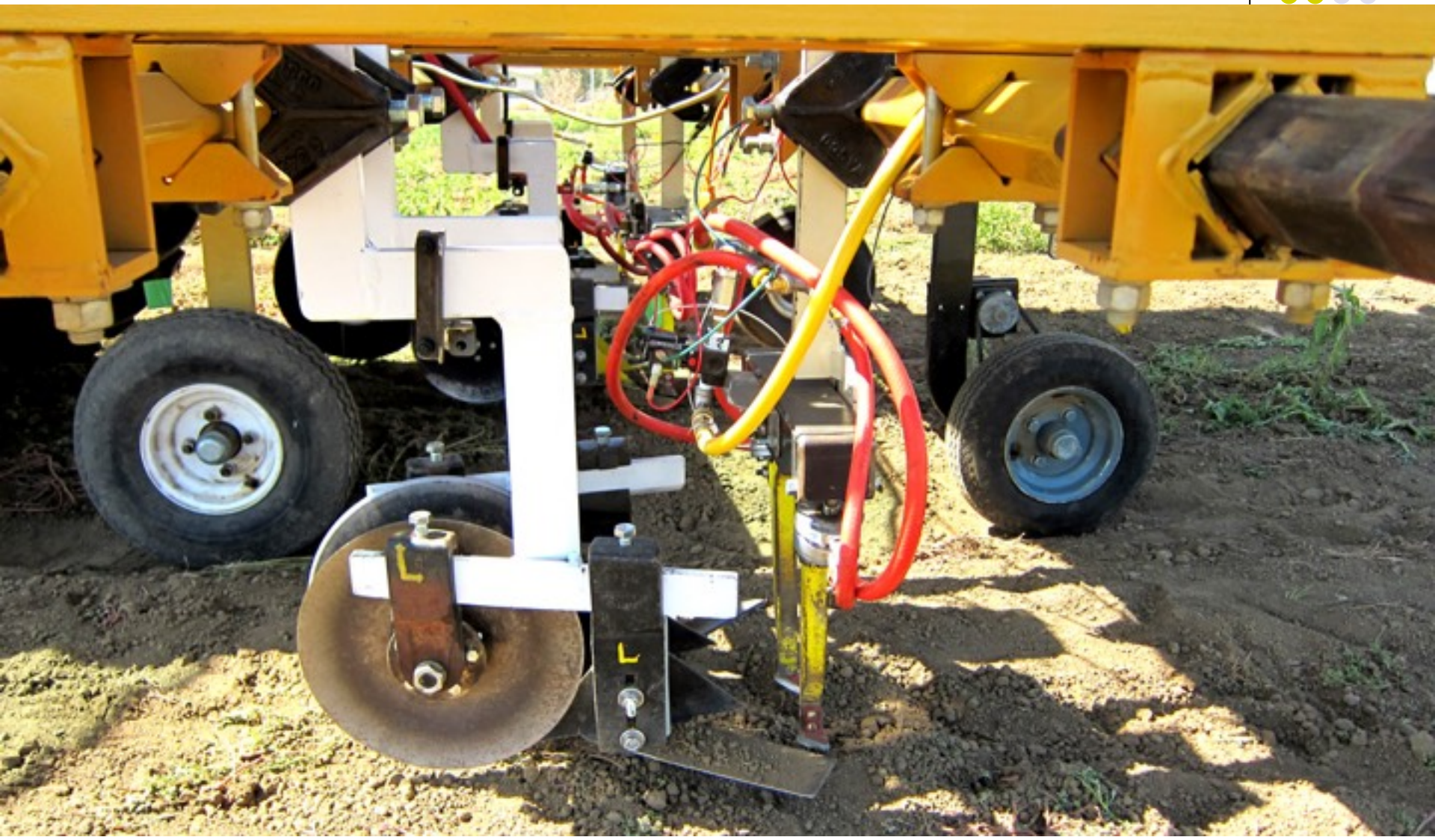
Safety Zone

Odometry & GNSS- based mechanized weed control



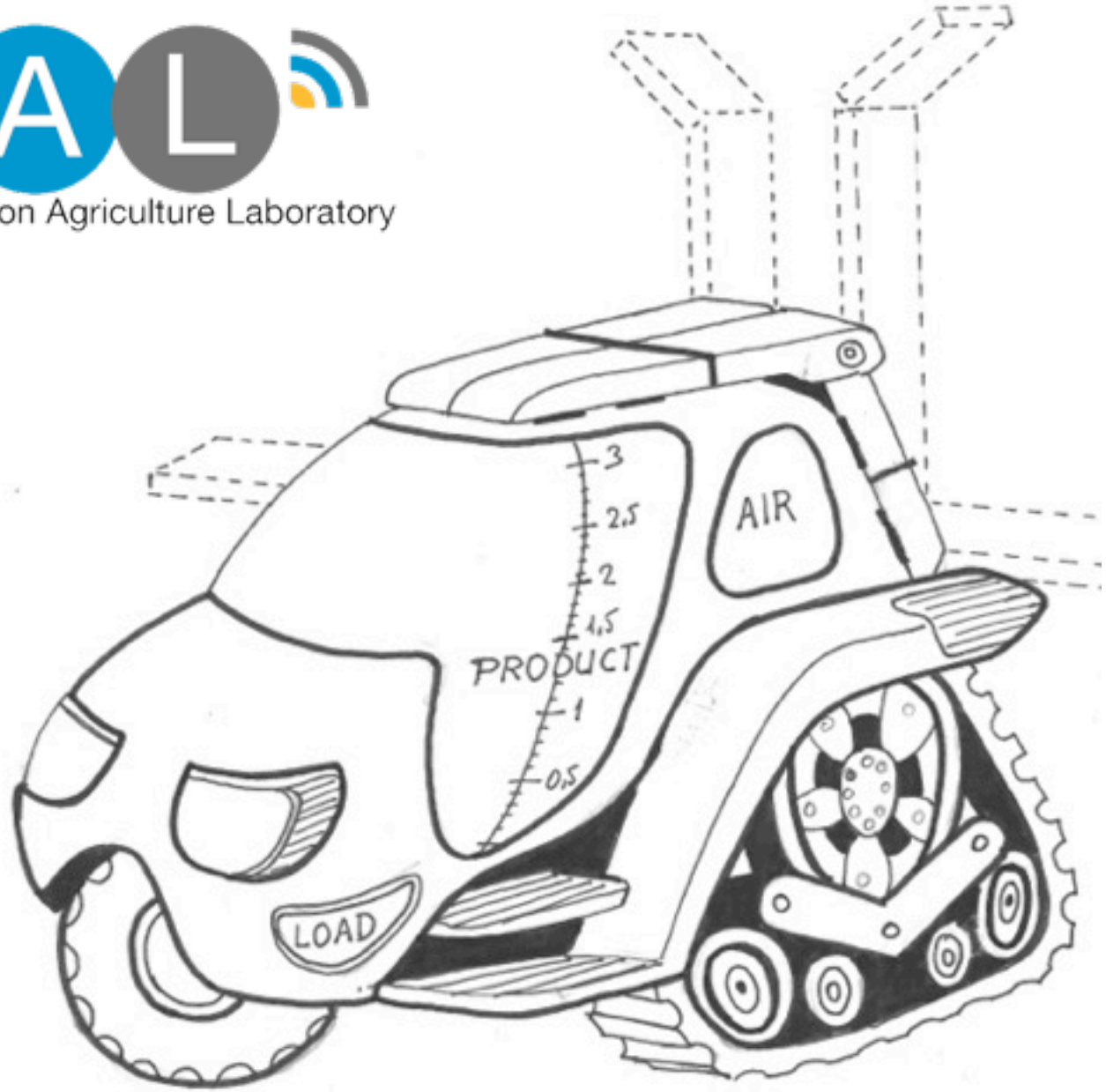
Odometry & GNSS- based mechanized weed control

Odometry & GNSS- based mechanized weed control



What does the future look like????

Precision Agriculture Laboratory



What does the future look like????

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