PART 2

Timing of Weed Control, Weed Control Failure, and Technology for Weed Management

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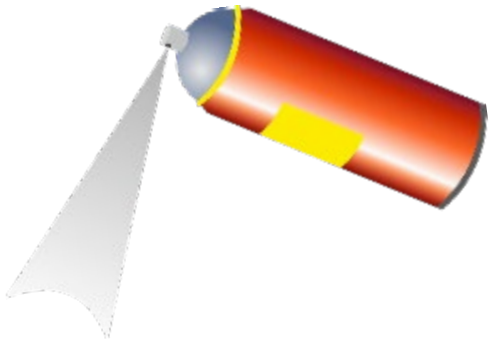
The Evolution of Herbicide Resistance



Selective forces, in this case repeated herbicide use, remove sensitive individuals

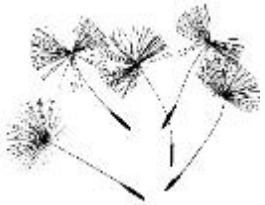
Resistant individuals survive treatments, set seed or otherwise propagate

Over time, the structure of the weed population changes so that it is dominated by resistant plants

A **B** **A** **B** **A** **A** **A**

Time

Mutations that confer resistance are already present in the population



Herbicide Resistance Worldwide

515 unique cases (species x site of action)

267 species

165 herbicides

95 crops in 72 countries

128 cases in the United States

Data from the International Herbicide-Resistant Weed Database (www.weedscience.org)

Confirmed Herbicide Resistance in New York

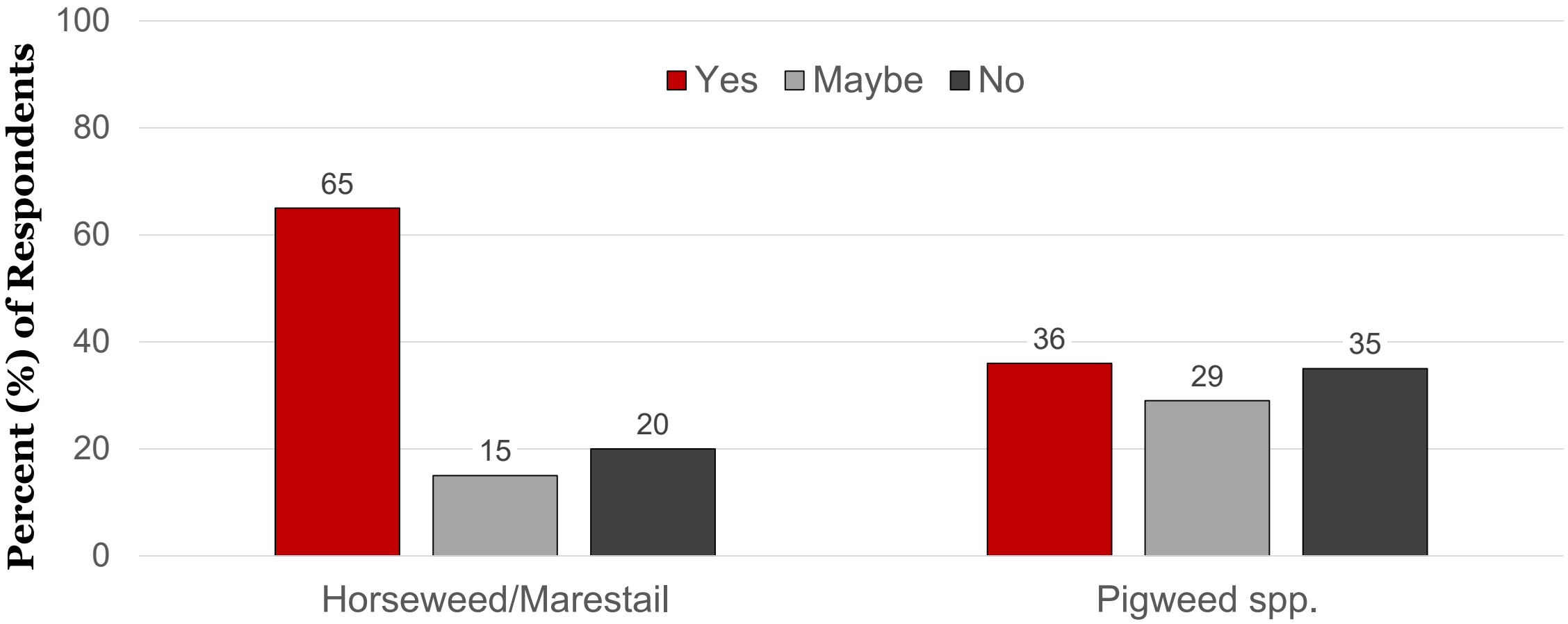
(INTERNATIONAL HERBICIDE-RESISTANT WEED DATABASE, *www.weedscience.org*)

Year	Species	Mode of Action	Actives
1977	Lambsquarters *Chenopodium album*	PS II inhibitors	atrazine, cyanazine, simazine
1980	Smooth Pigweed *Amaranthus hybridus*	PS II inhibitors	atrazine, metribuzin, simazine
1991	Common Groundsel *Senecio vulgaris*	PS II inhibitors	atrazine, simazine
1993	Common Ragweed *Ambrosia artemisiifolia*	PS II inhibitors	atrazine, cyanazine, simazine

Current records are incomplete

2022 NYS Herbicide Resistance Survey

70% of 149 respondents believe they are dealing with herbicide-resistant weeds



CornellCALS College of Agriculture and Life Sciences

Glyphosate top concern (70% of respondents)

Glyphosate
ALS-inhibitors
Paraquat

Horseweed

Glyphosate
ALS-inhibitors

Palmer amaranth

Glyphosate
ALS-inhibitors

Waterhemp

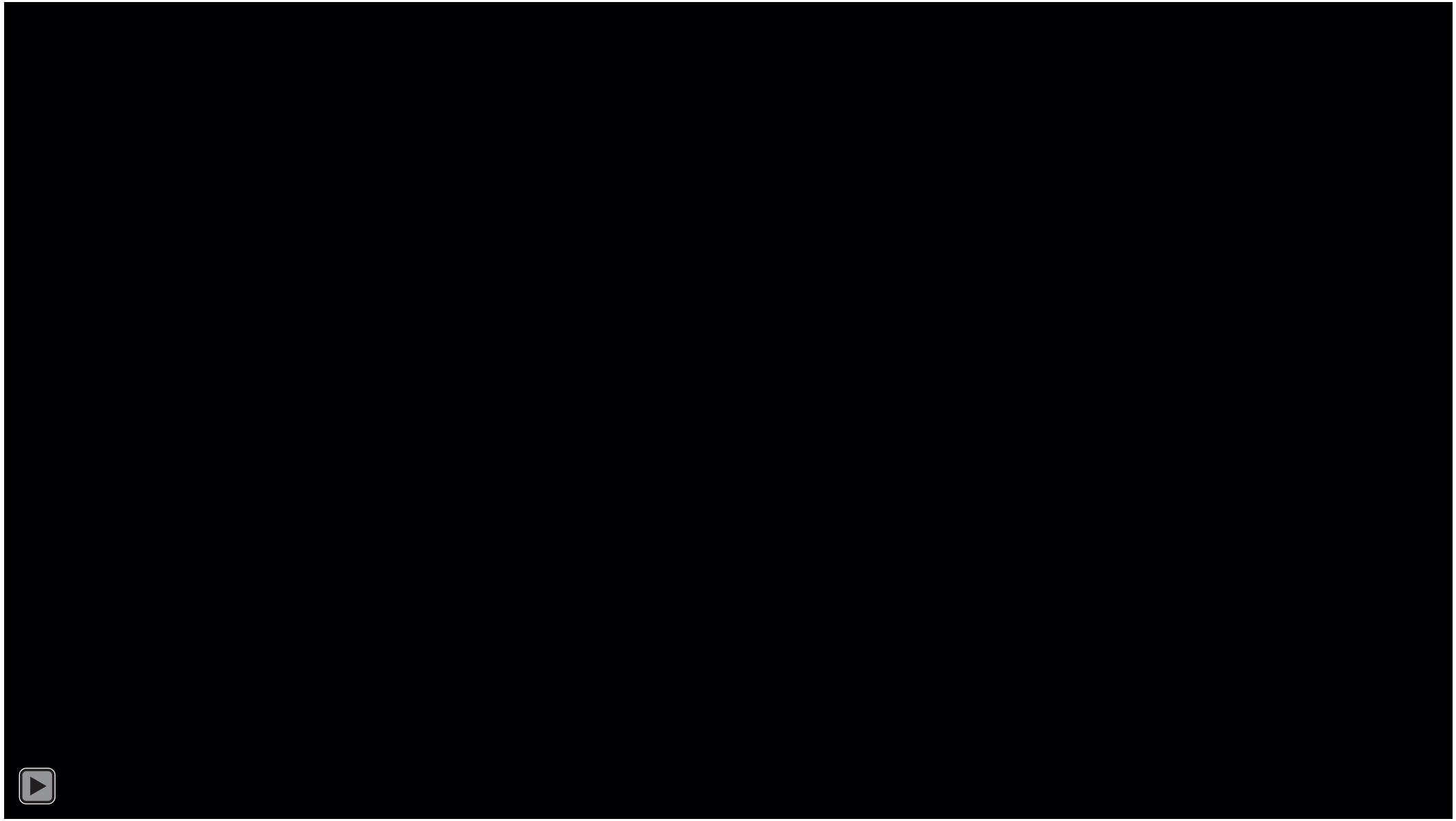
Novel Technology for Weed Management

Injury Potential/Environmental Concerns

Consumer Perceptions/Regulatory Hurdles

Weed Zapper™ is a tractor-towed, PTO-driven unit that produces electricity that charges a front-mounted metal bar
Weeds above the canopy that contact the bar are electrocuted

Funding provided by NYFVI



Funding provided by NYFVI

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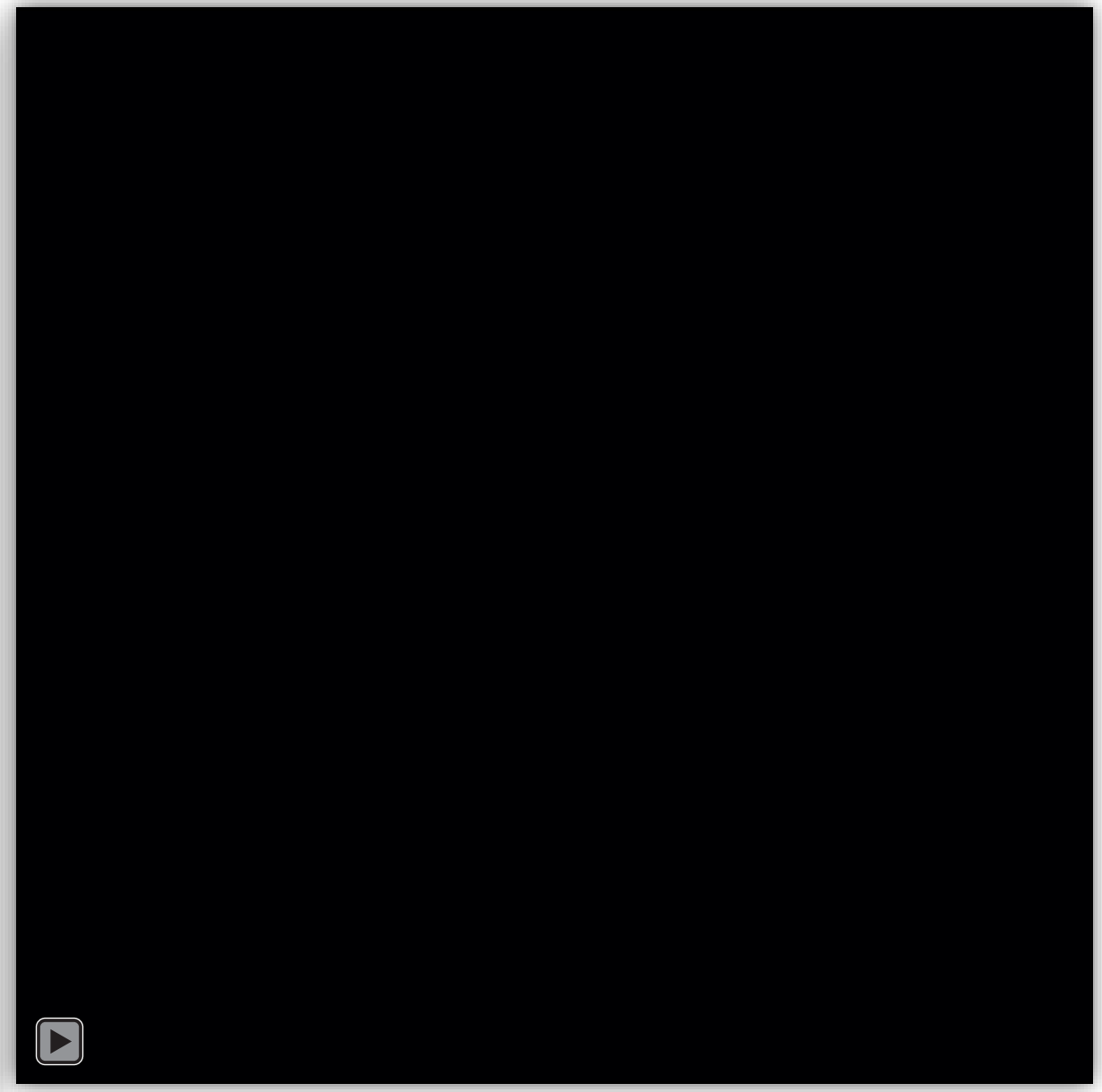
Rise of the Robotic Weeders

Farmwise


Naio

Weed IT



Trials in place with Rutgers, Arkansas to evaluate in annual specialty crops

STOUT

MECHANICAL WEED CONTROL | SOLUTIONS ORGANIC WEEDING | SMART CULTIVATOR (STOUTAGTECH.COM)

STOUT

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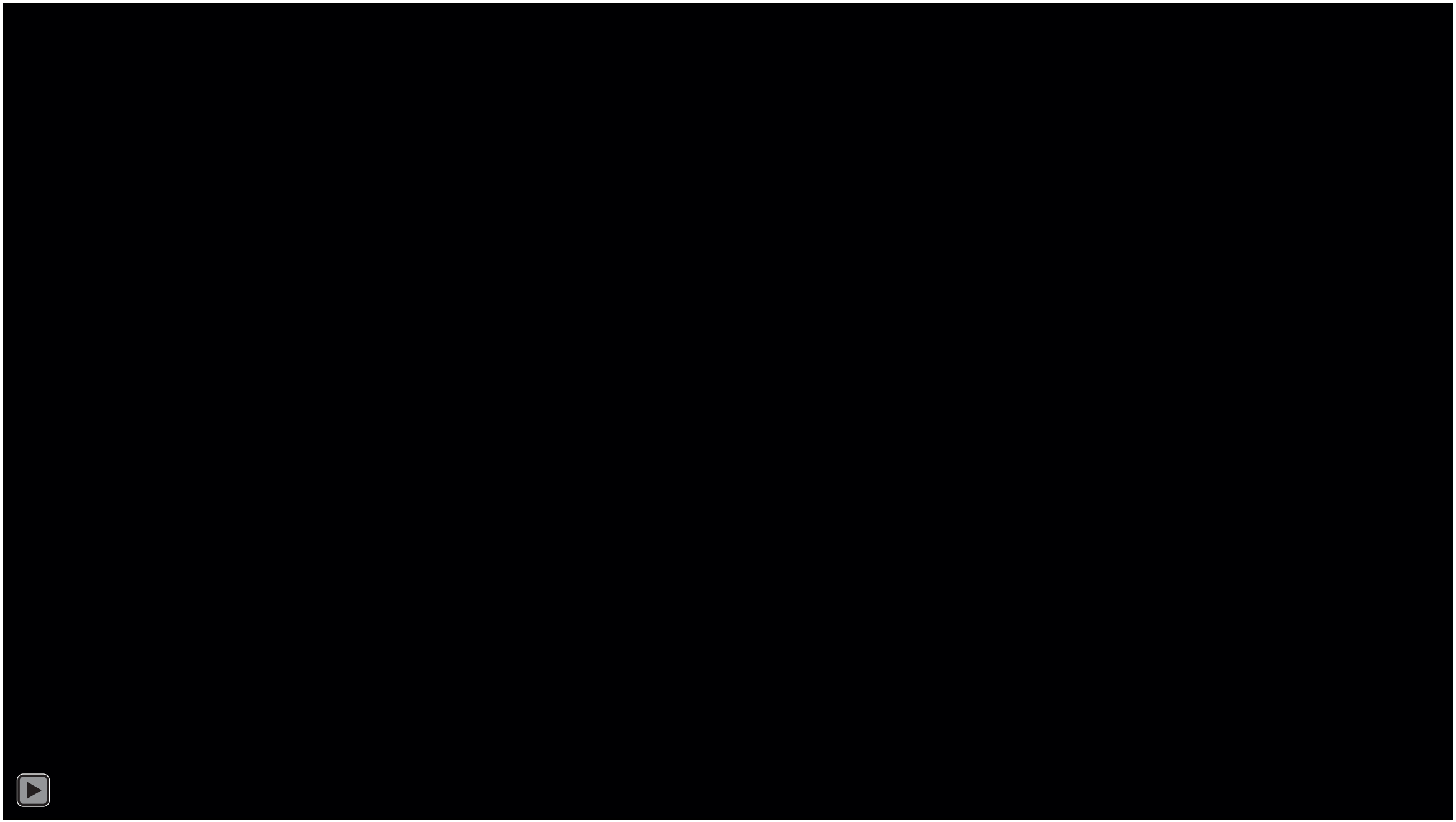
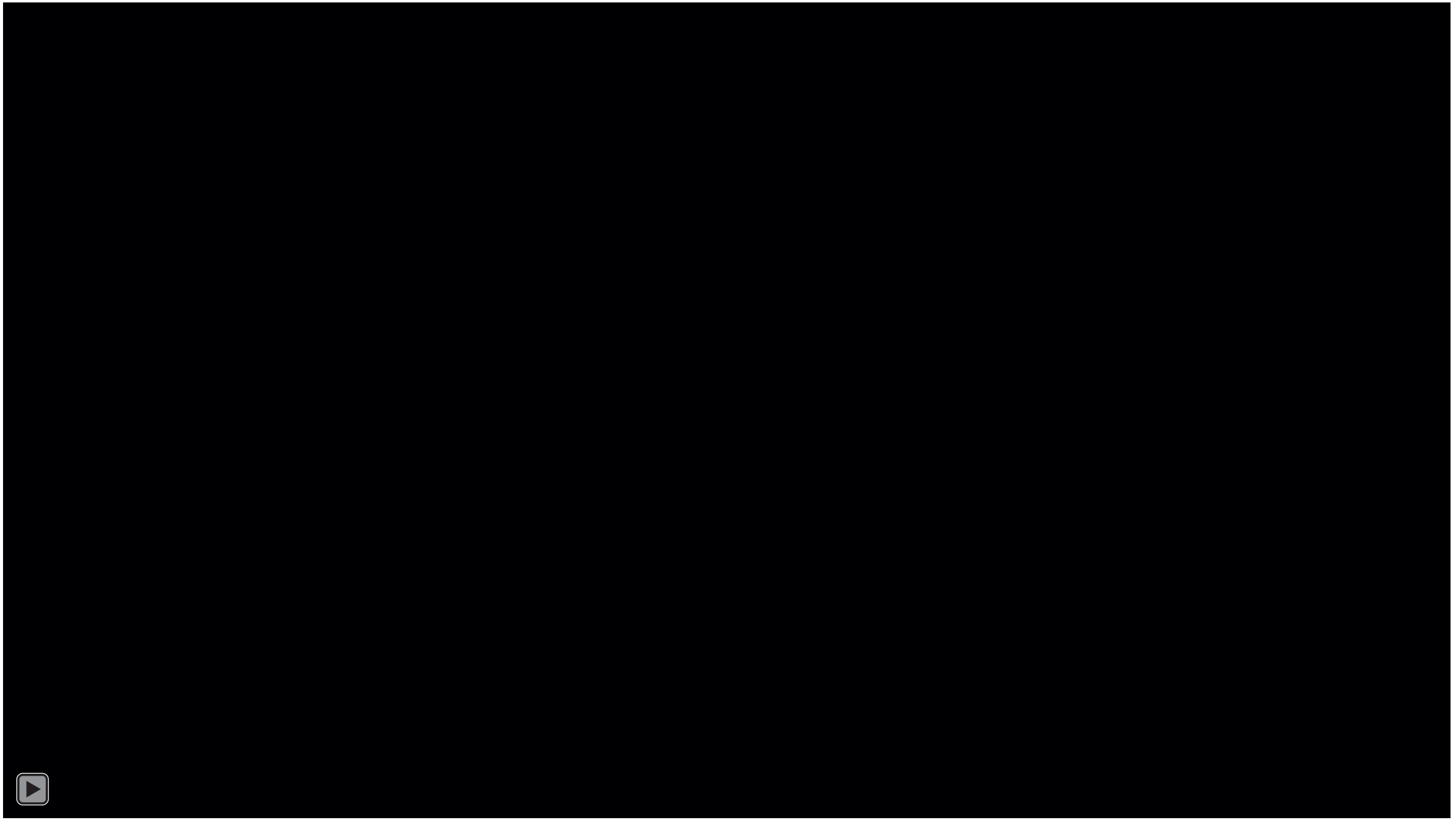
BEFORE

AFTER



Verdant Robotics

Carbon Robotics



Novel Technologies in Perennial Crops

Electrical Weeding
Support from USDA-OREI

Targeted, Vision-Guided Spraying
Support from IR-4, NYWGF

PTO-driven generator

Front-mounted weeders

Metal, flexible finger-like electrodes

AC, 180 hz Frequency 30 kW power, 3 to 12 KV

Italian Ryegrass Trials in Oregon

Research trials at Oregon State, UC Davis and Cornell

Hazelnuts, grapes, apples, almonds and blueberries

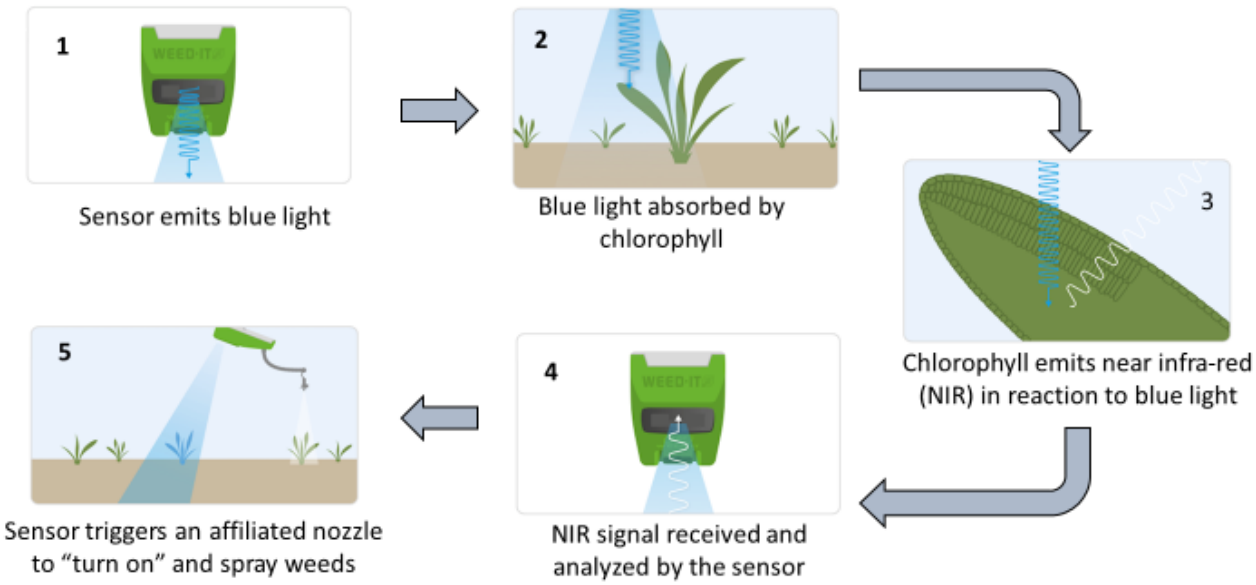
Effects of travel speed and unit setting on effective energy “dose”

Responses of annual and perennial weed species

Effects of electrical weeding on soil microbial activity, soil microarthropods, soil weed seedbank germinability

Economic analyses

Bringing Row-Crop Targeted Spray Technology to Tree and Vine Systems



No crop-weed discrimination so fast when weeds and sensitive commodity tissue are separated in time/space

Research trials at Rutgers and Cornell in grapes and blueberries to evaluate POST weed control, investigate the safety of novel active ingredients when using precision spray technology, reduce total herbicide use

Grape sucker control

Thank You!

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