Bird Damage to Sunflower: Future Directions in Research and Methods Development

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USDA-APHIS-WS National Wildlife Research Center / North Dakota Field Station

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Prairie Pothole Region (36,760 mi^2)

547,341 acres of cattails

+

720,000 acres of sunflower

=

75 million blackbirds

Annual Sunflower Damage in PPR

> $5 million annually

Regional damage 2%

Local damage > 20%

The Tools

Agricultural Practices

- Synchronized sunflower planting
- Large sunflower fields
- Delayed plowing of harvested grains
- Sunflower varieties
- Control of weeds & insects within fields
- Advance harvest using desiccation
- Precision agriculture

Chemical Repellents

- Anthraquinone (AQ)
- Methyl anthranilate (MA)
- Flock Buster™

Habitat Management

- Cattail roost reduction
- Wetland restoration
- Tree pruning

Frightening Devices

- Firearms & propane cannons
- Unmanned aerial systems UAS
- Sound disrupters

Evading Strategies

- Decoy food plots
- Perennial sunflower
- Placement of crops and tools

Population Suppression

- Lethal control – avicides, surfactants, trapping
- Natural declines related to climate & habitat

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Objectives

1. Optimize application strategies of avian **repellents** to improve efficacy in sunflower

2. Develop best practices for **unmanned aircraft systems** as scare devices

Repellents – Application Strategy

How to transfer efficacy found in lab studies to the field?

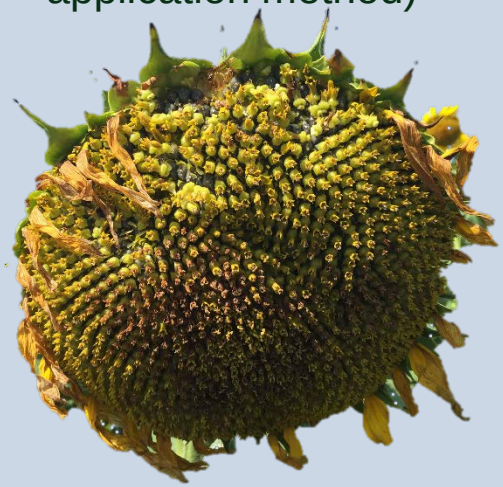
Laboratory Studies
(AQ-based repellents
80% repellency)

achenes 100% coated
disk flowers absent
loose achenes
confined birds

(Werner et al. 2009; Avery et al. 1997)

vs.

Field Studies
(dependent on
application method)



achenes 0-25% coated
disk flowers present
embedded achenes
downward facing heads
free-ranging birds

(Kandel et al. 2009; Werner et al. 2014; Niner et al. 2015)

Repellents – Field Efficacy

Efficacy of AQ-based repellent in reducing blackbird damage when applied to sunflower using drop-nozzle equipped ground rigs

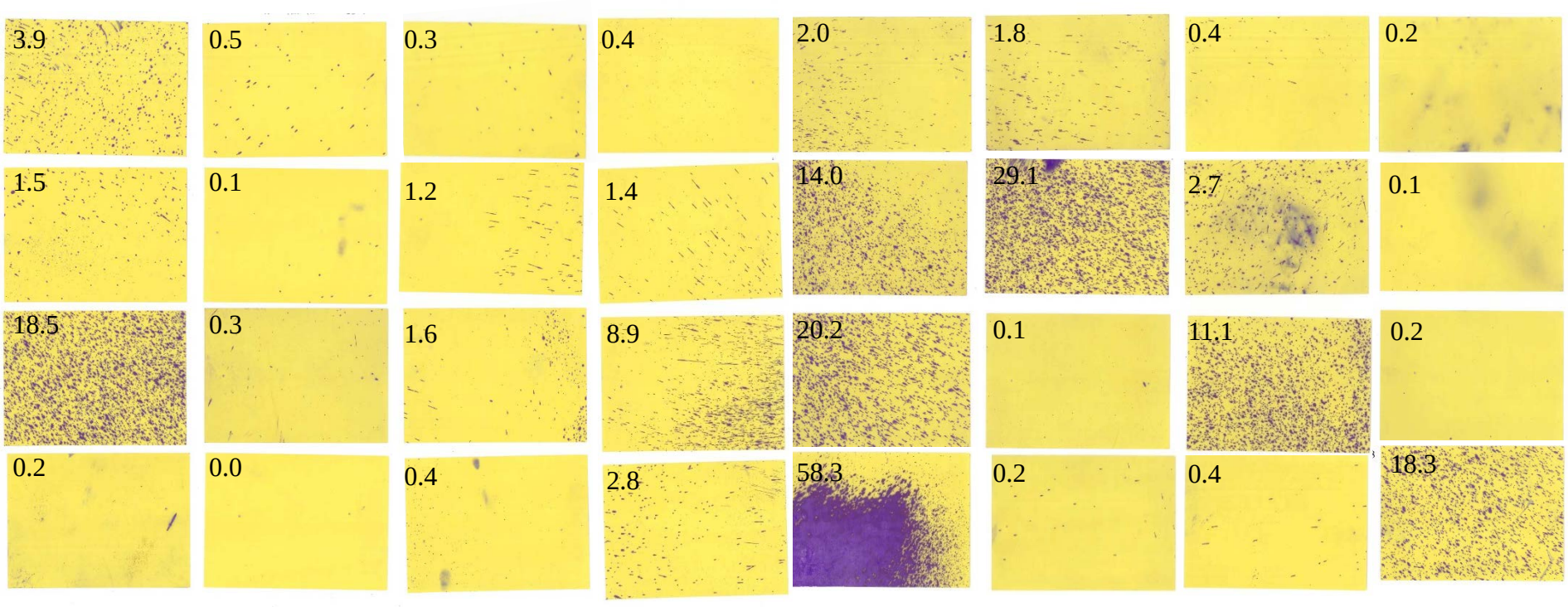
- Evaluate repellent coverage (spray cards)
- Quantify AQ residue (ppm on achenes and florets)
- Assess blackbird damage (achenes missing)
- Assess sunflower yield (lbs/ac) and test weight (lbs/bu)

360 Undercover Drop Nozzle
side ports: 110º flat fan
front port: 80º hollow cone

Repellents – Field Efficacy

Repellent Application Rate: 0.25 gal/ac, 40 psi

360 Undercover Drop Nozzle: side ports: 110º flat fan; front port: 80º hollow cone



Repellent Coverage: Range = 0.0 to 58.3%; Mean = 6.3%; Median = 2.3%

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Animal and Plant Health Inspection Service

Collaborators: Dr. Michael Ostlie (NDSU Carrington REC) and Dr. Scott Werner (USDA-APHIS-WS NWRC)

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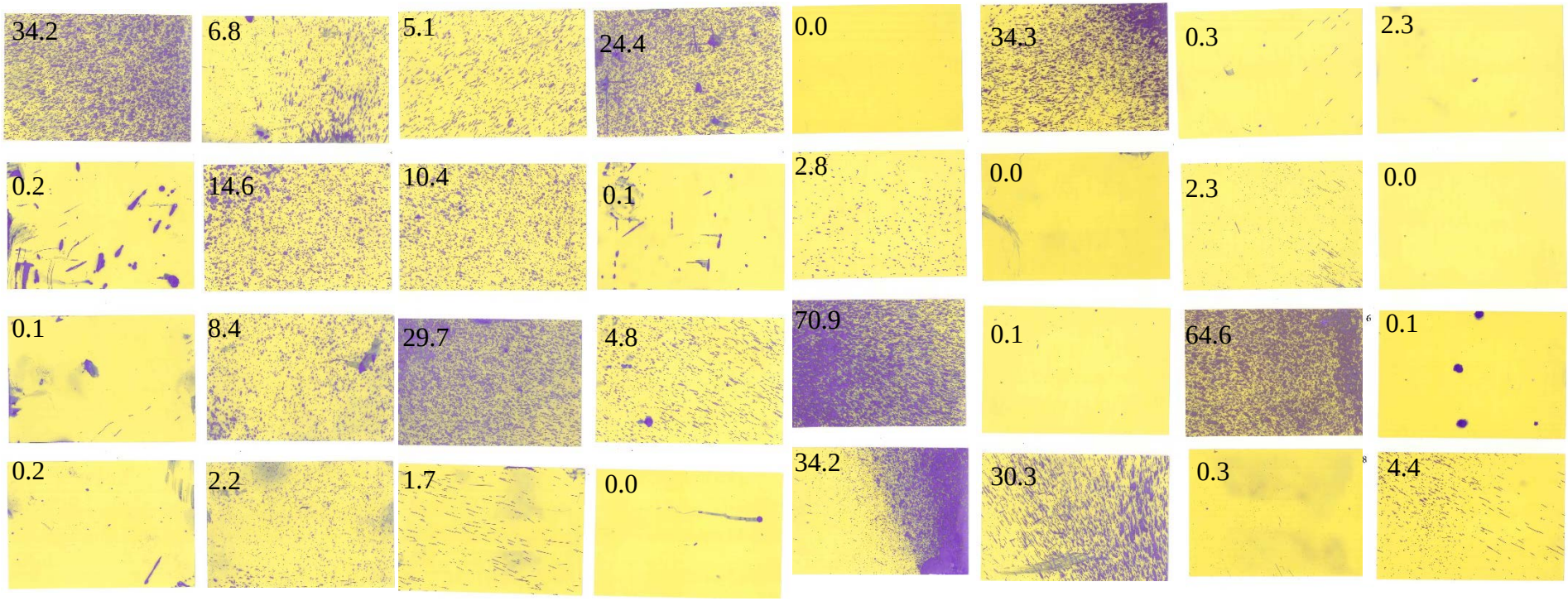
Repellents – Field Efficacy

Repellent Application Rate: 0.50 gal/ac, 40 psi

360 Undercover Drop Nozzle: side ports: 110º flat fan; front port: 80º hollow cone



Repellent Coverage: Range = 0.0 to 70.9%; Mean = 12.2%; Median = 2.5%

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Repellents – Field Efficacy

Repellent Coverage

* better than aerial application, but needs improvement

Blackbird Damage

* no difference, but does not consider desiccation to advance harvest

Sunflower Yield / Test Weight

* differences, but does not account for plot differences

360 Undercover Drop Nozzle
side ports: 110º flat fan
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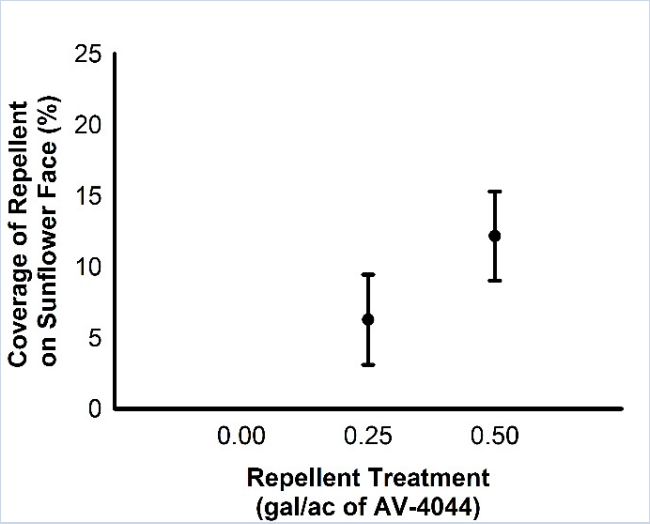

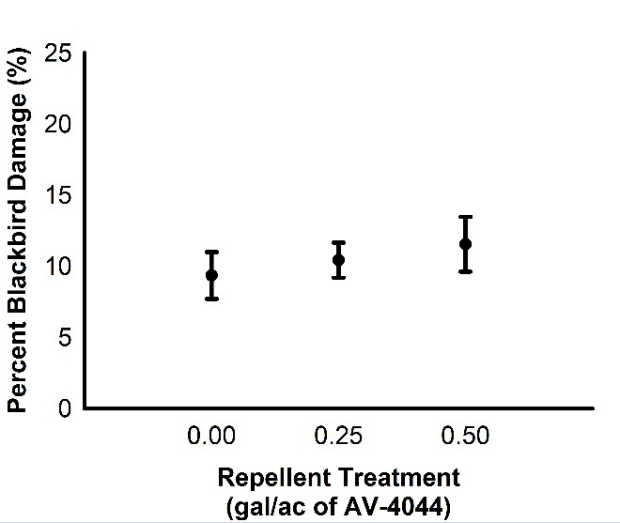

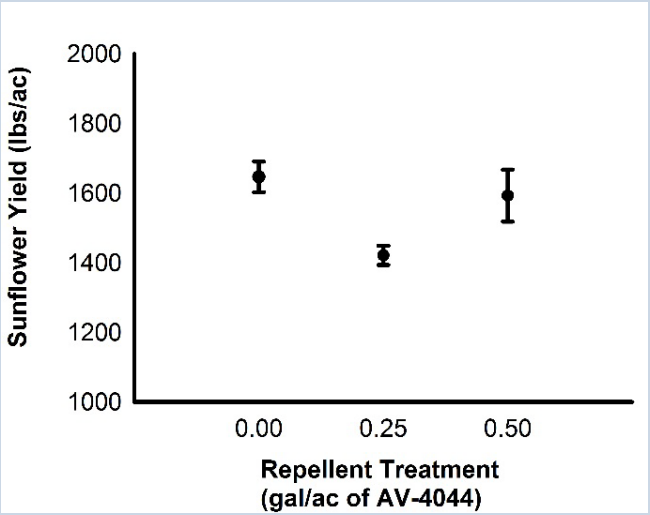

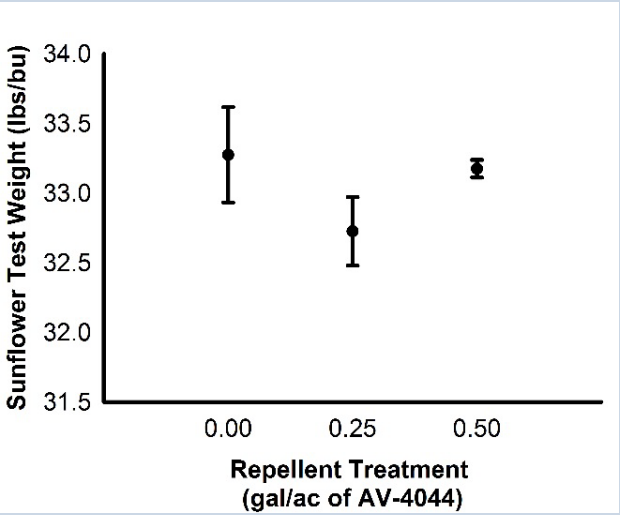

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Repellents - Feeding Behavior

Evaluate blackbird feeding behavior on sunflower to inform repellent application strategies

Brandon Kaiser
NDSU Biological Sciences

- Efficacy of AQ-repellent on sunflower plant with variable coverage
- Compare foraging behavior between treated and untreated sunflower

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UAS: Scare Device

Evaluate blackbird response to UAS to inform best practices for field use

UAS design: quadcopter vs. fixed wing, color and shape, speed, flight dynamics etc.

Efficacy (range of effectiveness in space and time)

Cost-effectiveness (labor)

Future technology (real-time detection system)

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Thank You!

National Sunflower Association
John Sandbakken, board of directors, and sunflower producers

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