Efficacy of an avian repellent applied using drop nozzle-equipped ground rigs in reducing blackbird damage to sunflower

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547,341 acres of cattails

+

720,000 acres of sunflower

=

25 million blackbirds

Prairie Pothole Region (36,760 mi^2)

Annual Sunflower Damage in PPR

> $3.5 million annually

Regional damage 2%

Local damage > 20%

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 aircraft systems
- 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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How to transfer efficacy found in lab studies to the field?

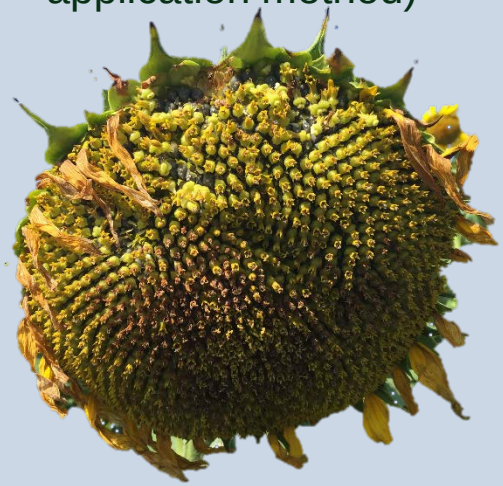
Laboratory Studies
(AQ-based repellents
80% repellency)

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)



face 14% coated
disk flowers present
embedded achenes
downward facing heads
free-ranging birds

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

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 amount of alternative diet consumed (milo)
- Assess sunflower yield (lbs/ac)

Study Site

Sunflower Plots/Bird Enclosures

Plot Size: 5 rows, 24 in rows, 11.5 x 12.5 ft

Stand Count: range = 85-122, mean = 99 ± 3

Enclosure Size: 12 x 13 x 6-10 ft

Plant Date: 2 June 2017

Spray Date: 31 August 2017

Harvest Date: 7 October 2017

Number of Birds per Plot: 10 RWBL for 23 days

Dates of Birds in Enclosures: 7-29 Sept. 2017

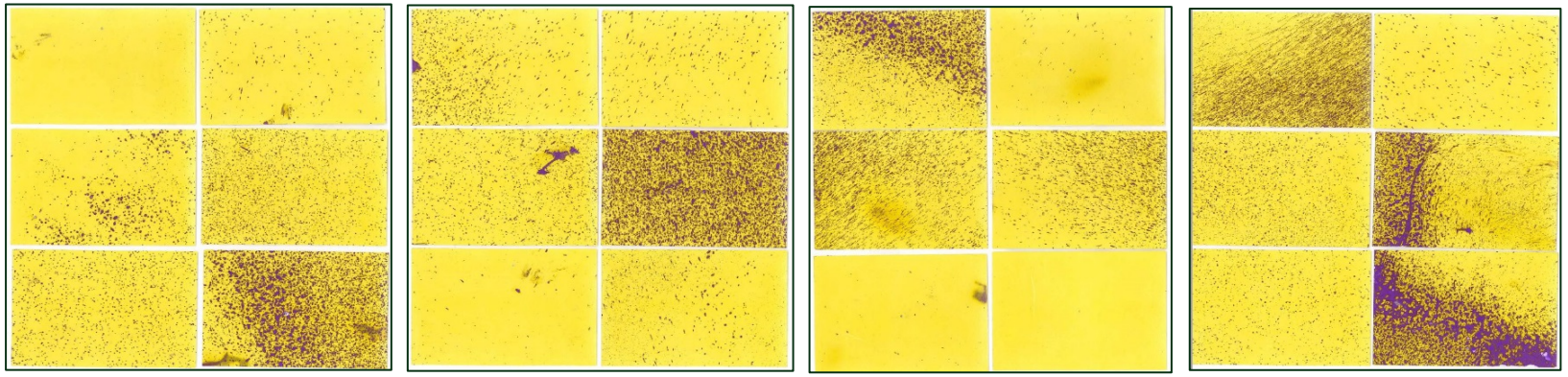
AQ-based repellent applied using a drop nozzle to maximize coverage on the sunflower face

Repellent: AV-5055 = 13% AQ and other proprietary ingredients (shown to elicit >100% repellency in lab feeding test)

Application Rate: 20 gal/ac Pressure: 60 PSI 360 Undercover Drop Nozzle:

Product Rate: 1 gal/ac Speed: 2.4 MPH side: 110º flat fan (XR11001VS); front: 80º hollow cone (TX-VK3)

Repellent coverage & residue better than aerial application, but needs improvement



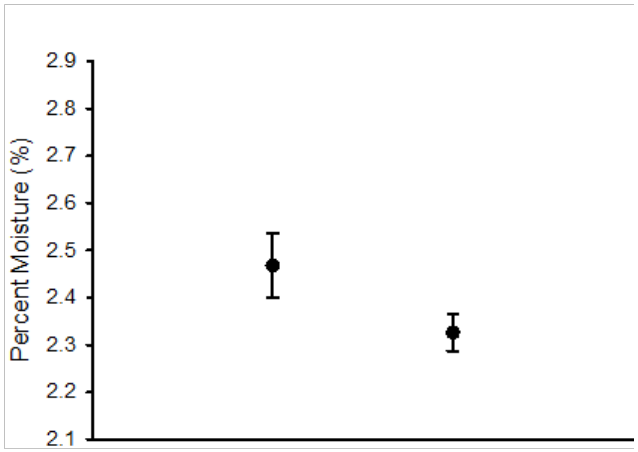
Repellent Coverage at Application:
Range = 0-61%; Mean = 14 ± 3%

Repellent Residue (AQ) at Application
Achene:
Application: non-detectable
Harvest: non-detectable

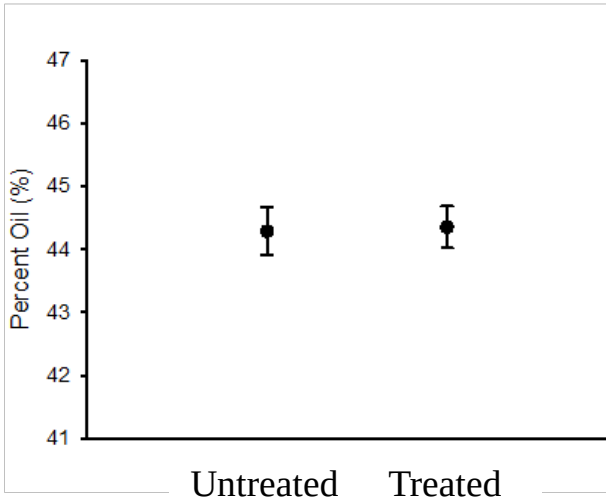
Floret:
Application: Range = 21.7 – 58.0 ppm; Mean = 36.9 ± 6.1 ppm
Harvest: Range = 11.5 - 125.3 ppm; Mean = 64.1 ± 16.0 ppm

Treated and untreated plots do not have differences in agronomic factors, thus any difference in yield would be due to bird predation

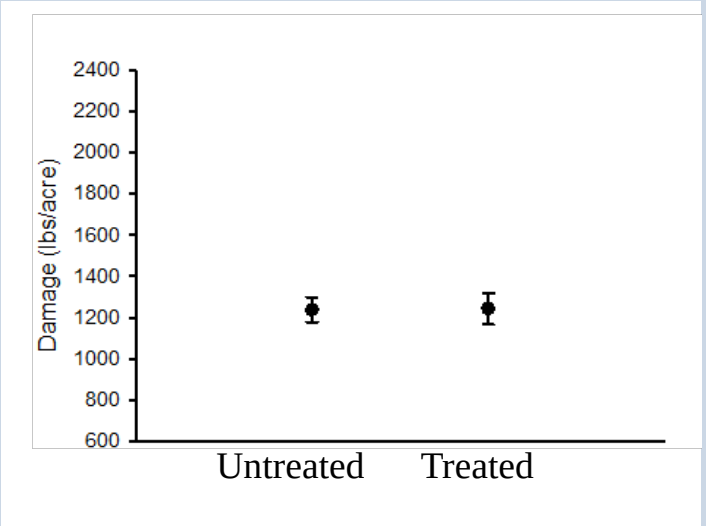
Untreated Treated

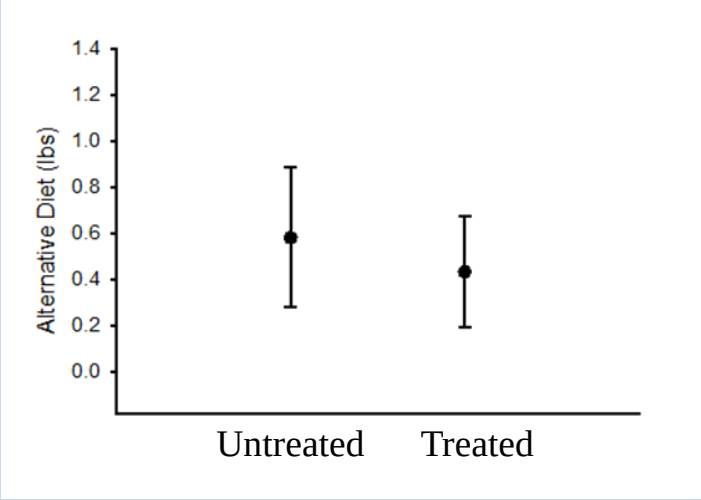


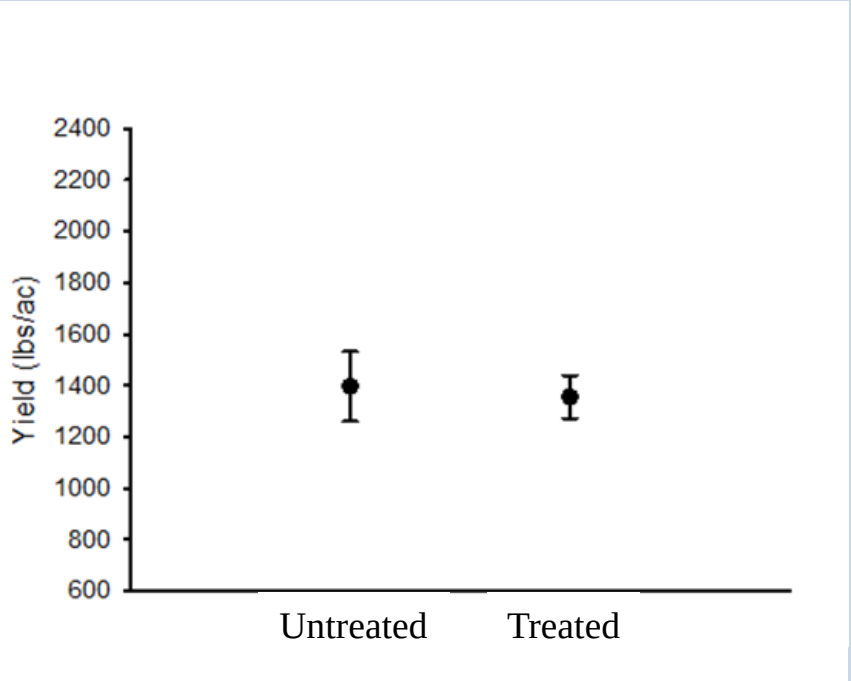
Untreated Treated

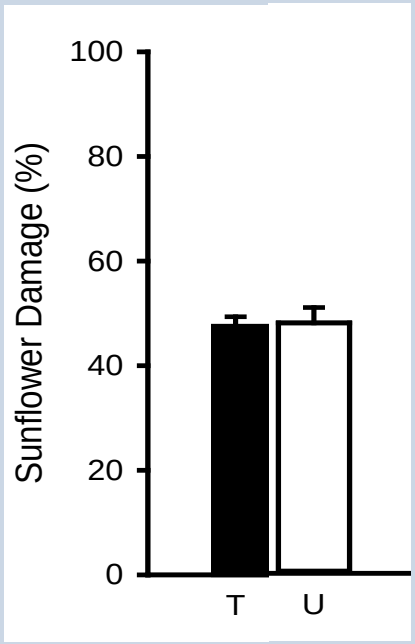


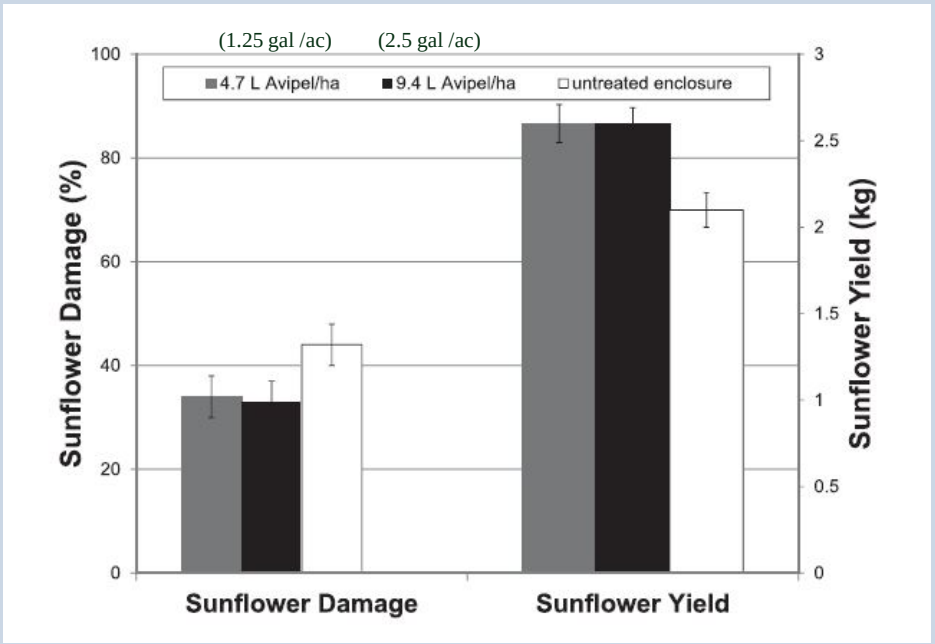
Treated and untreated plots do not have differences in bird consumption of sunflower or alternative diet, thus no difference in yield

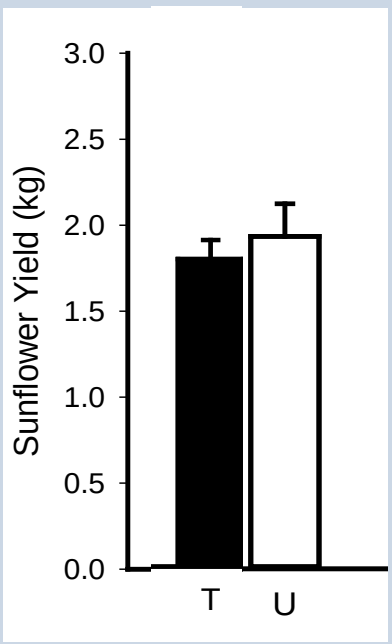












Werner et al. 2014 Crop Protection

Repellent:
Avipel = 50% AQ vs. AV-5055 = 13% AQ (with visual inert)

Application Method:
CO_2 backpack sprayer vs. high-boy drop nozzle

Residues:
Achenes = 978-952 ppm vs Florets = 12-125 ppm

Repellent needs to be optimized for specific crops and complexities in growth form and application

- Optimize the %AQ needed in a formulation designed for application on actual sunflower face.
- Evaluate an cost-effective application strategy meeting the established standards for efficacy, if possible.

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Thank You!

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