Methyl Anthranilate (MA) to Control Sandhill Cranes Damage in Potatoes

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Overview

- Methyl Anthranilate
- Materials & Methods
- Results & Discussion
- Next Steps
- Questions
What is Methyl Anthranilate (MA)?

- A liquid bird repellent
- Generally Regarded as Safe (GRAS) compound under 21 CFR 182-60
- Labeled for many different crops
- Low toxicity and biodegradable
- Used as grape flavoring in food
- 4-hour re-entry interval
- 0-day pre-harvest interval
- Sensitive to pH, tank mixing
- Sold as “Avian Control”
Materials & Methods

- Camera survey on two UP farms
  - VanDreese Dairy & Potato Farm in Cornell, MI
  - Steinbrecher Potato Farm in Felch, MI
- MA applied 2-3 times prior to vine kill
  - Tank mixed at VanDreese, not at Steinbrecher
- Hourly visual counts of cranes 7am-9pm
  - 36 days at VanDreese
  - 54 days at Steinbrecher
- Analysis of repellent effect on crane numbers
  - No direct measurement of potato damage/loss
Materials & Methods - Steinbrecher

- Four small potato fields on the home farm
  - 9-19 acres in size, separated by strips of oats
  - Planted to Goldrush variety
  - 2 treated, 2 control
- Moderate Sandhill crane pressure
- Two MA applications, no tank mixing
  - 9/7/22 @ 32 oz/a (1 qt)
  - 9/14/22 @ 42 oz/a (1.3 qt)
- Water tested for pH, at or near 7
Materials & Methods - VanDrese

- One large potato field near the home farm
  - 34 acres in size, across the road from barley/alfalfa
  - Planted to Goldrush variety
  - All treated
- Heavy Sandhill crane pressure
- Three MA applications, tank mixed
  - 8/22/22 @ 32 oz/a (1 qt) with Roper DF fungicide
  - 8/29/22 @ 32 oz/a (1 qt) with Roper DF fungicide
  - 9/6/22 @ x oz/a (1 pt) with Roper DF, fungicide, Reglone desiccant & Activator 90
- Water and first tank mix tested for pH, at or above 7
Results - Steinbrecher

• Low crane numbers as compared to years past
• Control fields averaged:
  • 39 total cranes observed (37, 40)
  • 7.5 days with cranes (14% of total days)
  • 0.73 cranes per day

• Treated fields averaged:
  • 22 total cranes observed (15, 29)
  • 6.5 days with cranes (12% of total days)
  • 0.41 cranes per day

• Large difference in potato damage observed
Steinbrecher Average Cranes Per Day by Treatment

- MA Application
- Vine Kill
- Harvest

[Graph showing trends for MA Application, Vine Kill, and Harvest over time, with markers for specific dates and conditions.]
Steinbrecher Total Cranes by Treatment

Call:
aov(formula = totalcranes ~ trt, data = fs)

Terms:
  trt Residuals
  Sum of Squares 272.25 102.50
  Deg. of Freedom 1     2

Residual standard error: 7.15811
Estimated effects may be unbalanced

> summary(model)

          Df Sum Sq Mean Sq  F value   Pr(>F)
trt         1  272.25 272.25  3.31227 0.1488
Residuals  2    102.5  51.25

Total Cranes

Control

Treatment

MA
Results - VanDreese

- Avg. crane numbers as compared to years past
- Two cameras in the treated field averaged:
  - 628 total cranes observed (348, 908)
  - 25 days with cranes (70% of total days)
  - 17.8 cranes per day
- Repellency observed after first app, but less so following second and third apps.
- Little change in potato damage observed
VanDreese Cranes Per Day Across Two Cameras

- **MA Application**
- **Vine Kill**
- **Harvest**
VanDreese Cranes by Days After Treatment

```
call: lm(formula = cranes ~ dat, data = js)

Residuals:       Min     1Q   Median     3Q    Max

Coefficients:   estimate  Std. Error   t value   Pr(>|t|)
(Intercept)     0.120      1.488      0.0807   0.9382
dat             1.664      1.352      1.2300   0.2258

Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 20.1 on 43 degrees of freedom
1 observation deleted due to missingness
Multiple R-Squared: 0.0340, Adjusted R-Squared: 0.0115
F-statistic: 1.514 on 1 and 43 DF, p-value: 0.2253
```
VanDreese Cranes by Days After Treatment

Call: aov(formula = cranes ~ dat + rep, data = js)

Terms:
  dat    rep Residuals
Sum of Squares  4852.761  1649.427  11474.790
Deg. of Freedom  7      5      32
Residual standard error: 18.9364
Estimated effects may be unbalanced
1 observation deleted due to missingness
> summary(model)

             DF    Sum Sq  Mean Sq F value    Pr(>F)
 dat          7    4813.3 693.33   1.933 0.09386 .
 rep          5    1649.3 329.86    0.933 0.48085
 Residuals   32   11475.3 364.85

Cranes

Days After Treatment
Discussion

• Sandhill cranes eat potatoes!
  • Damage starts after small grain harvest, increases after vine kill in potatoes
  • Early maturing and small-vined potato varieties are most preferred/susceptible
  • Deer and crows were also observed eating potatoes
  • Wildlife damage tubers, but are also a food safety risk
• MA reduced the number of cranes in treated potato fields at Steinbrecher
• MA was effective for 3-4 days at VanDreese
• We can’t say if MA protected potato yield/quality
Next Steps

• Repeat experiment with good control fields
• Continue applying MA through vine kill
• Use max rate of 42 oz/a
• Measure potato damage/loss directly
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