

# Red Sunflower Seed Weevils and Reduced Pyrethroid Susceptibility



Photo by P. Beauzay, NDSU

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# Red Sunflower Seed Weevils (RSSW)

- Annual pest of SD and ND sunflower
- Severe infestations can result in 50-80% of achenes being infested
  - Larvae feed on developing seed
- Primarily managed using foliar insecticides



# The problem?

- Field outbreaks 10-100x over threshold
- SD Field Failures reported: 2017, 2018, 2019, 2020, 2021



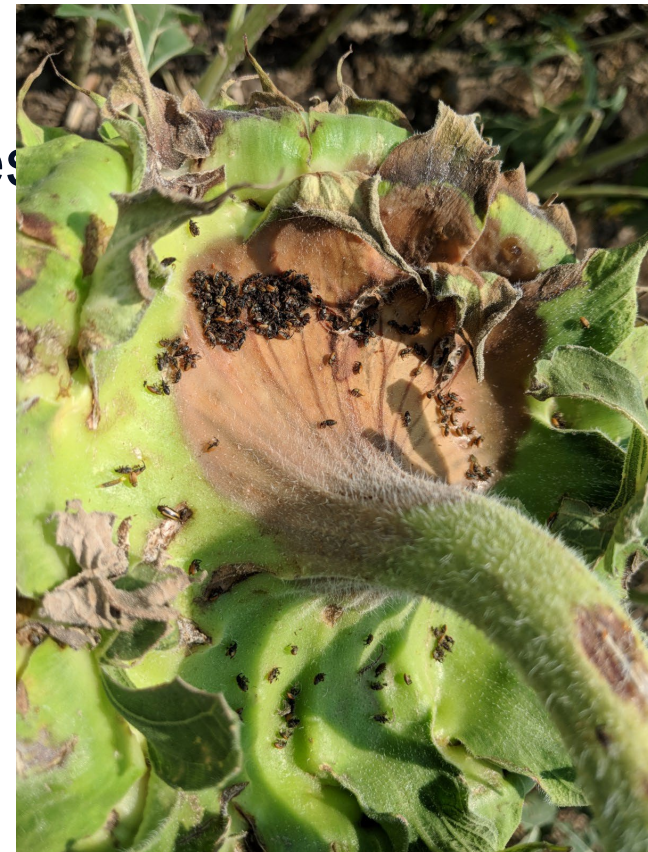
# Source of the problem?

- 47 insecticides labeled for management
  - 29 with pyrethroid a.i. and premixes
  - 5 with at least one pyrethroid a.i. (premixes)
  - 13 with organophosphate a.i. and premixes



# Source of the problem?

- 47 insecticides labeled for management
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  - ~~5 with at least one pyrethroid a.i. (premixes)~~
  - ~~13 with organophosphate a.i. and premixes~~
- Objective: to determine susceptibility of RSSWs to pyrethroid insecticides (4A)



# Experimental Design

- 7 treatments:
  - Acetone (control)
  - High and low rates of lambda-cyhalothrin, esfenvalerate, zeta-cypermethrin
- RSSW adults collected at the onset of flowering
  - 24 locations in SD
  - 10 locations in ND
- 20 adults placed in vials 24 hr after collection
- Evaluated 24 and 48 hr after placed into vials



Photo by A. Hargens, SDSU

# Rates of insecticides used for vials

- **Normal (High):**

- Lambda-cyhalothrin (Warrior II): 1.92 fl oz/acre
- Esfenvalerate (Asana): 9.6 fl oz/acre
- Zeta-cypermethrin (Mustang Maxx): 4 fl oz/acre

- **Low:**

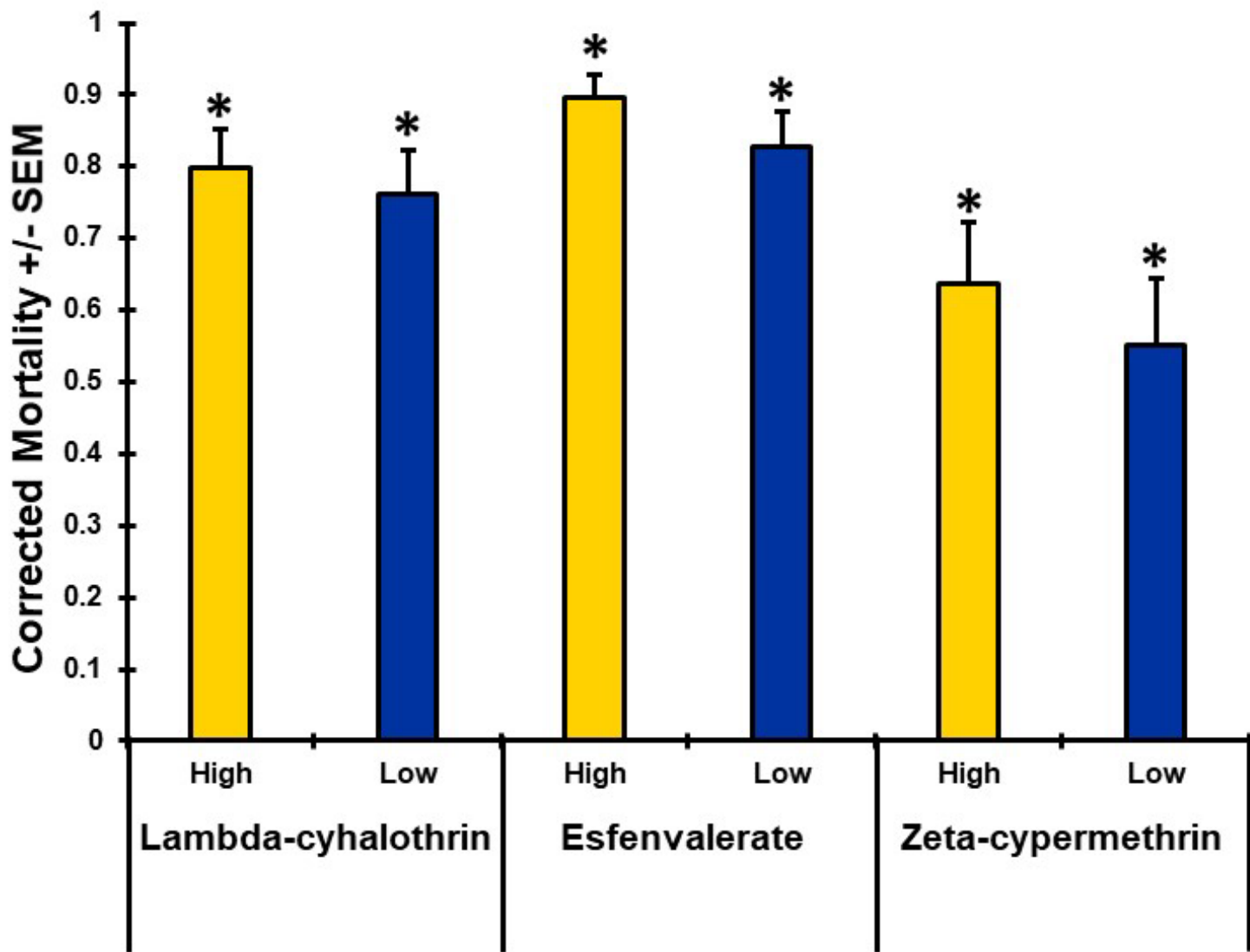
- Lambda-cyhalothrin (Warrior II): 0.96 fl oz/acre
- Esfenvalerate (Asana): 5.8 fl oz/acre
- Zeta-cypermethrin (Mustang Maxx): 2.6 fl oz/acre



Photo by A. Hargens, SDSU

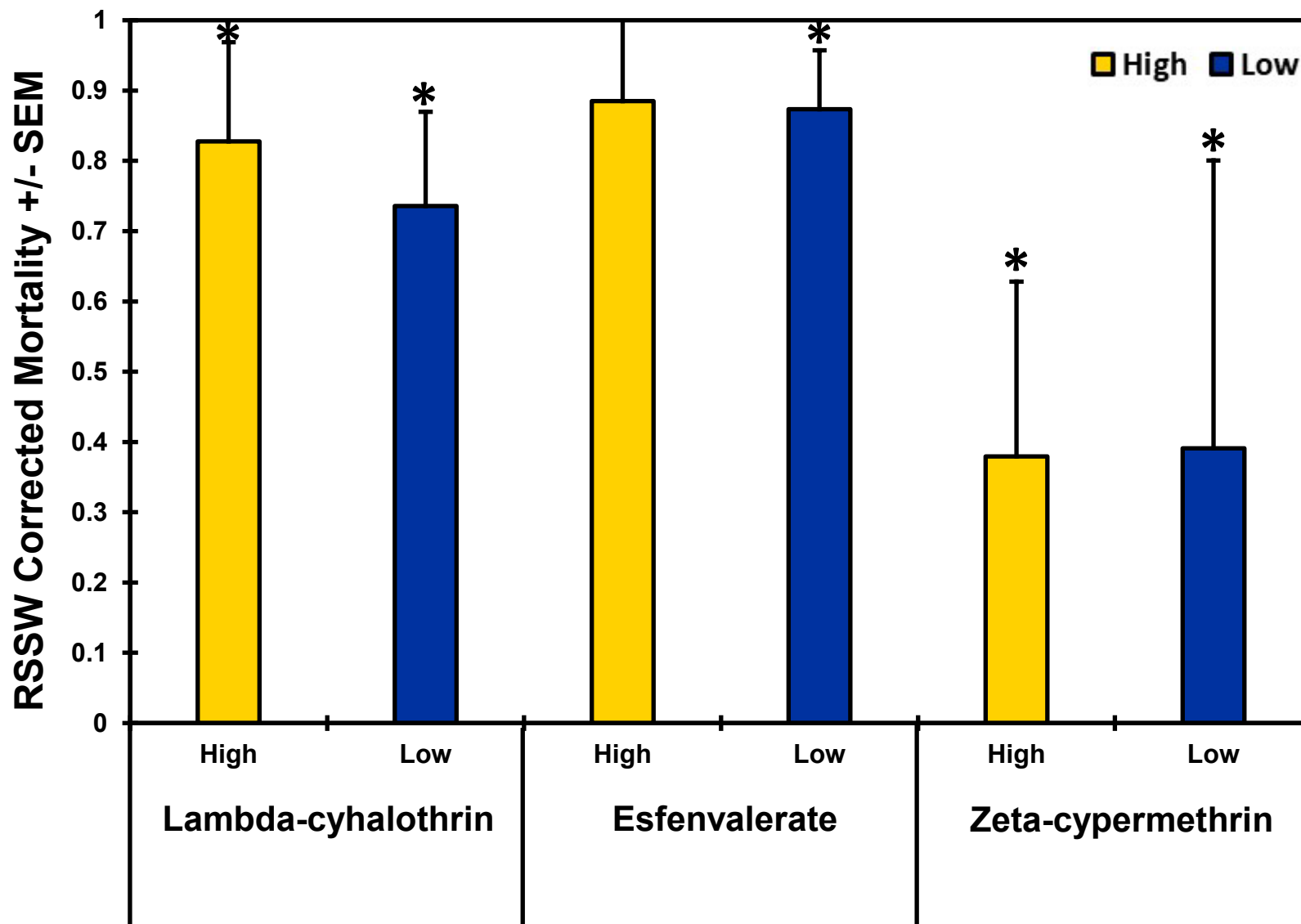


# Combined 2021 SD Locations

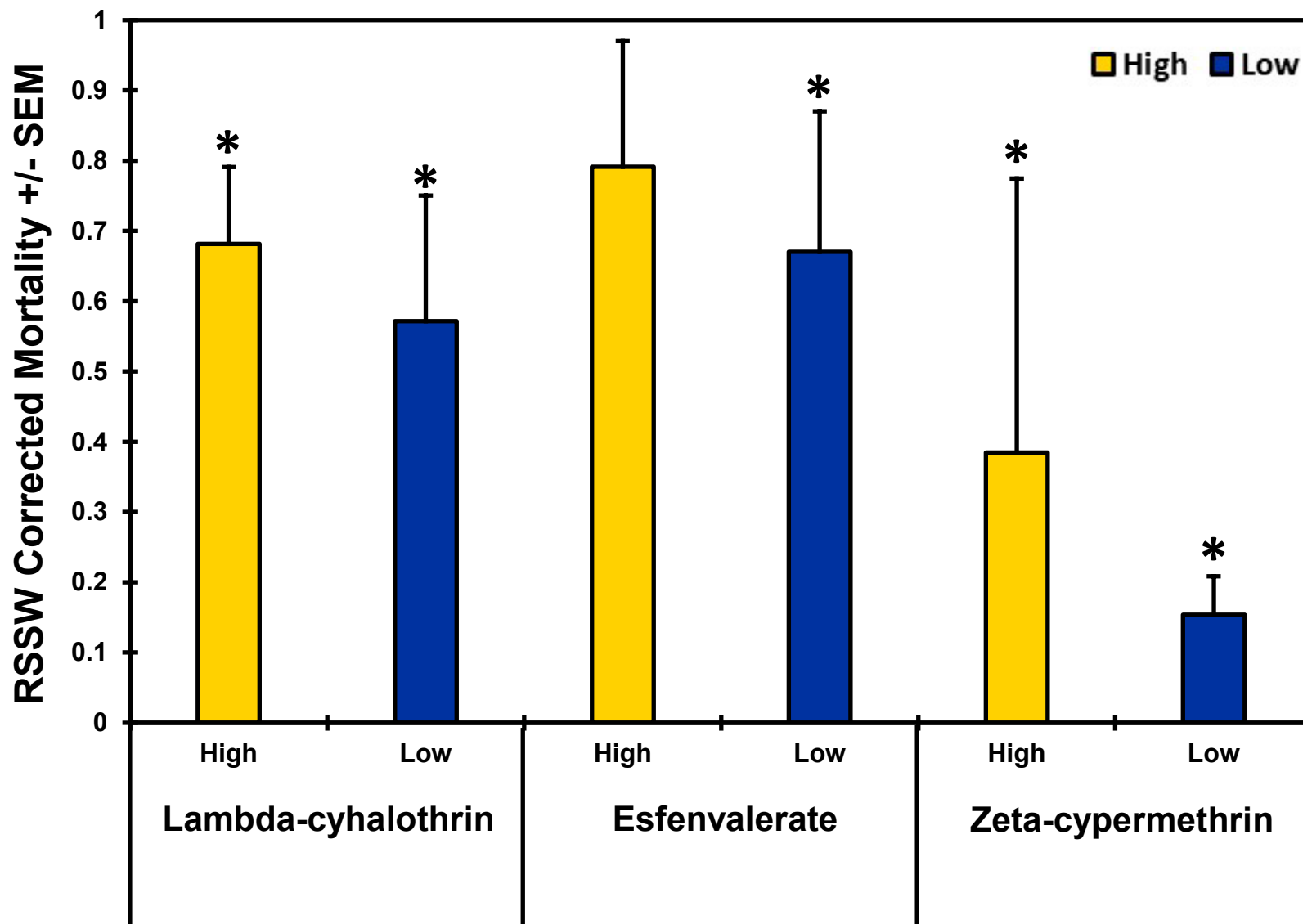




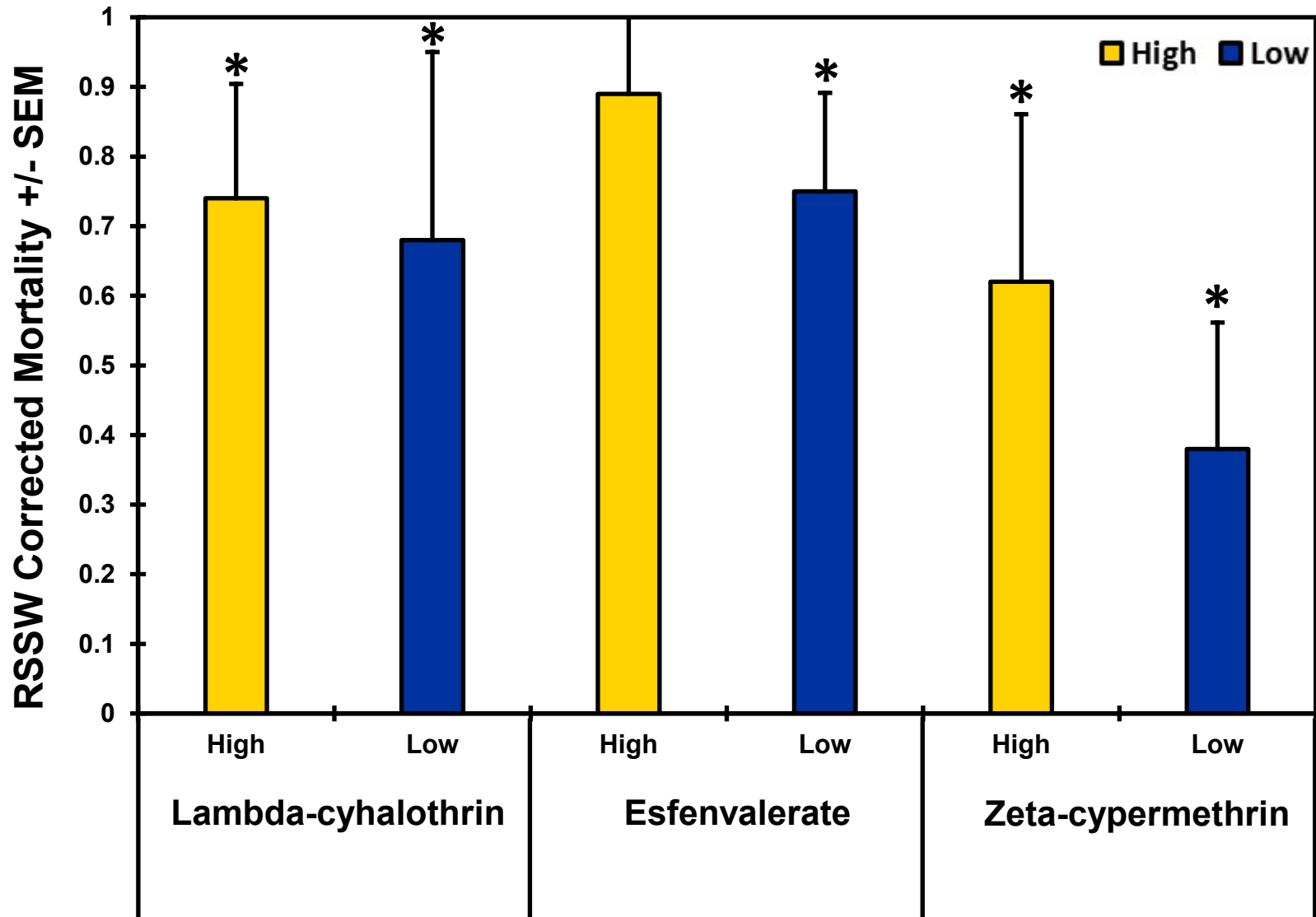
# Location east of Harrold on HWY 14



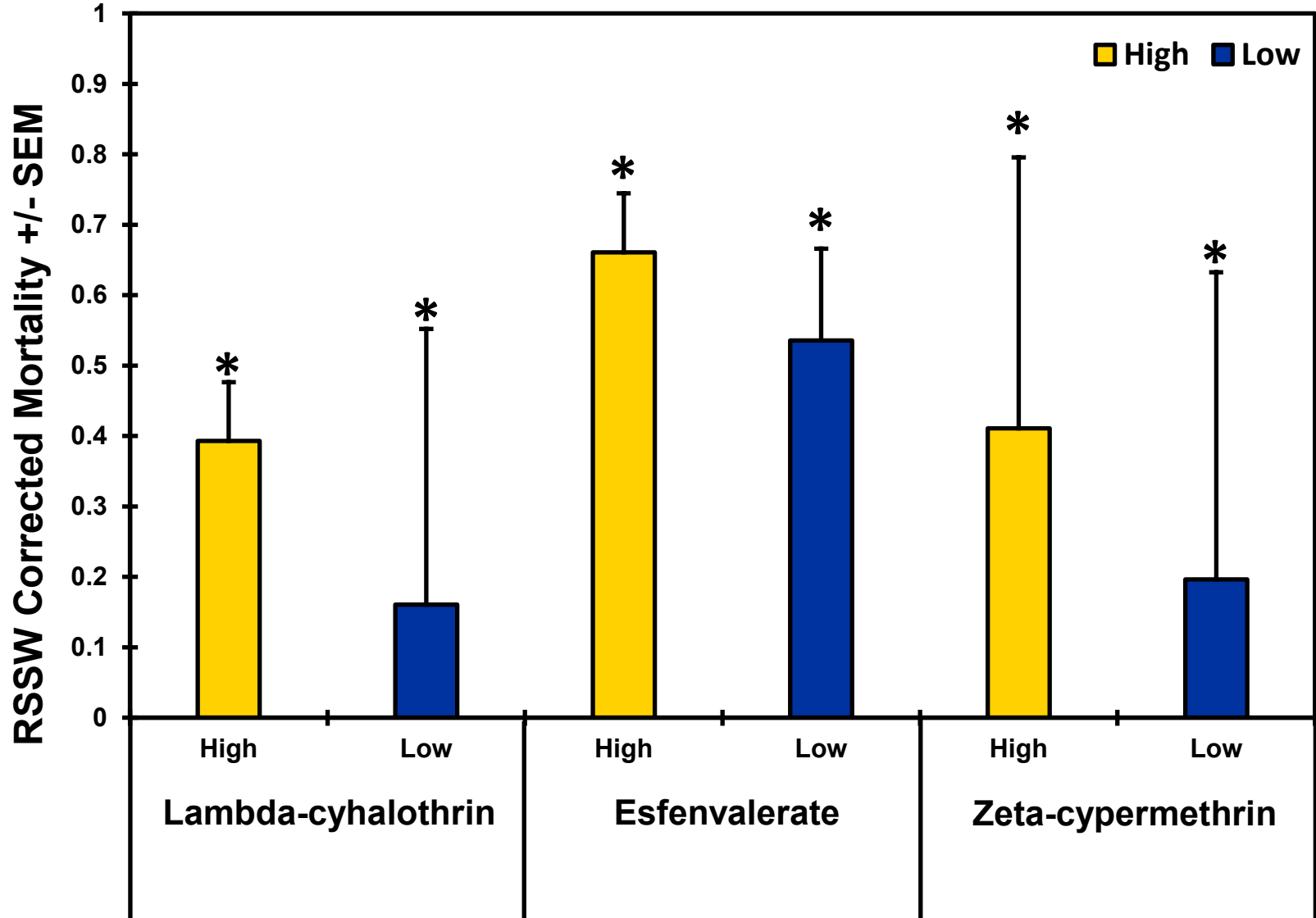
# Location south of Blunt on 310<sup>th</sup> Street



# Location north of Dakota Lakes on Canning Rd

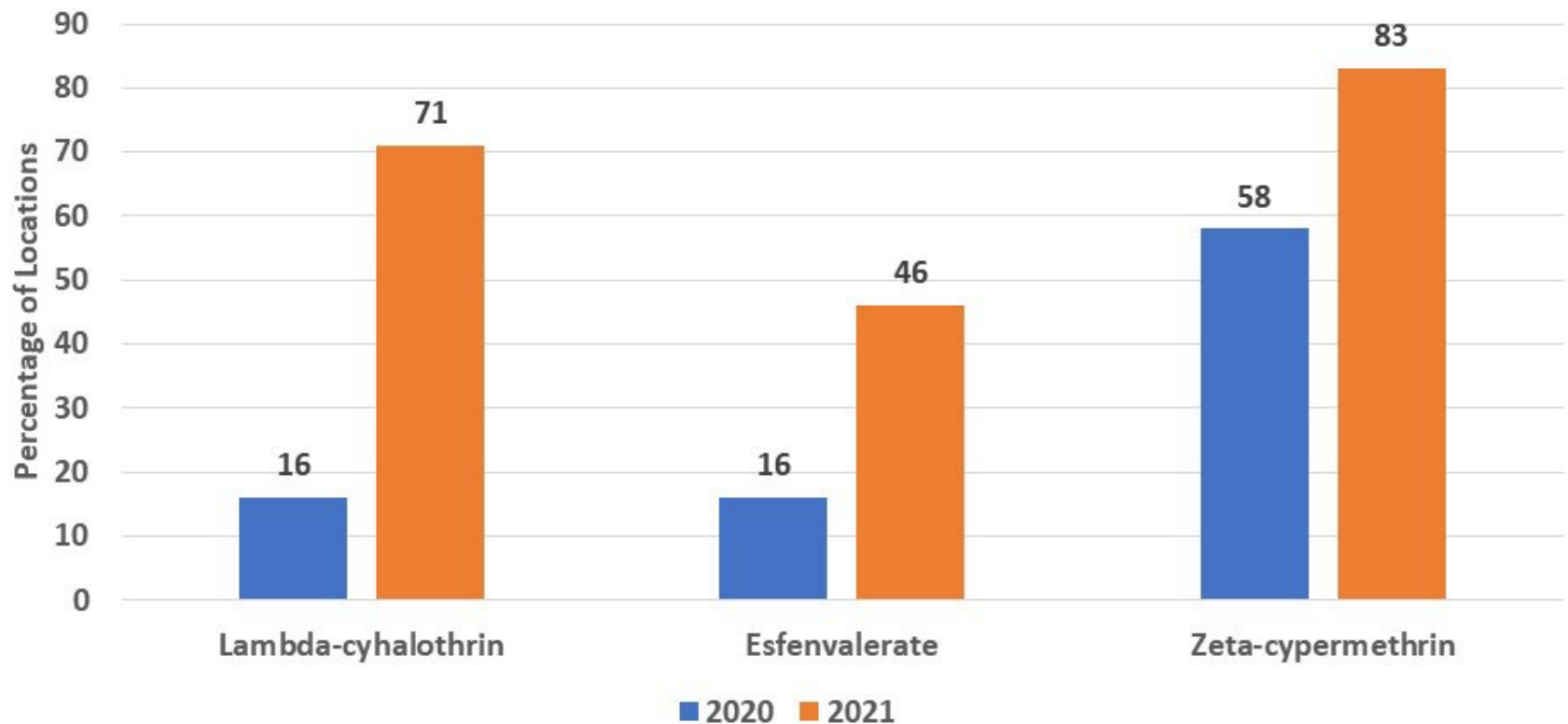


# Location ~2 miles north of HWY 212 HWY near 83



# 2020 vs 2021 Conclusions

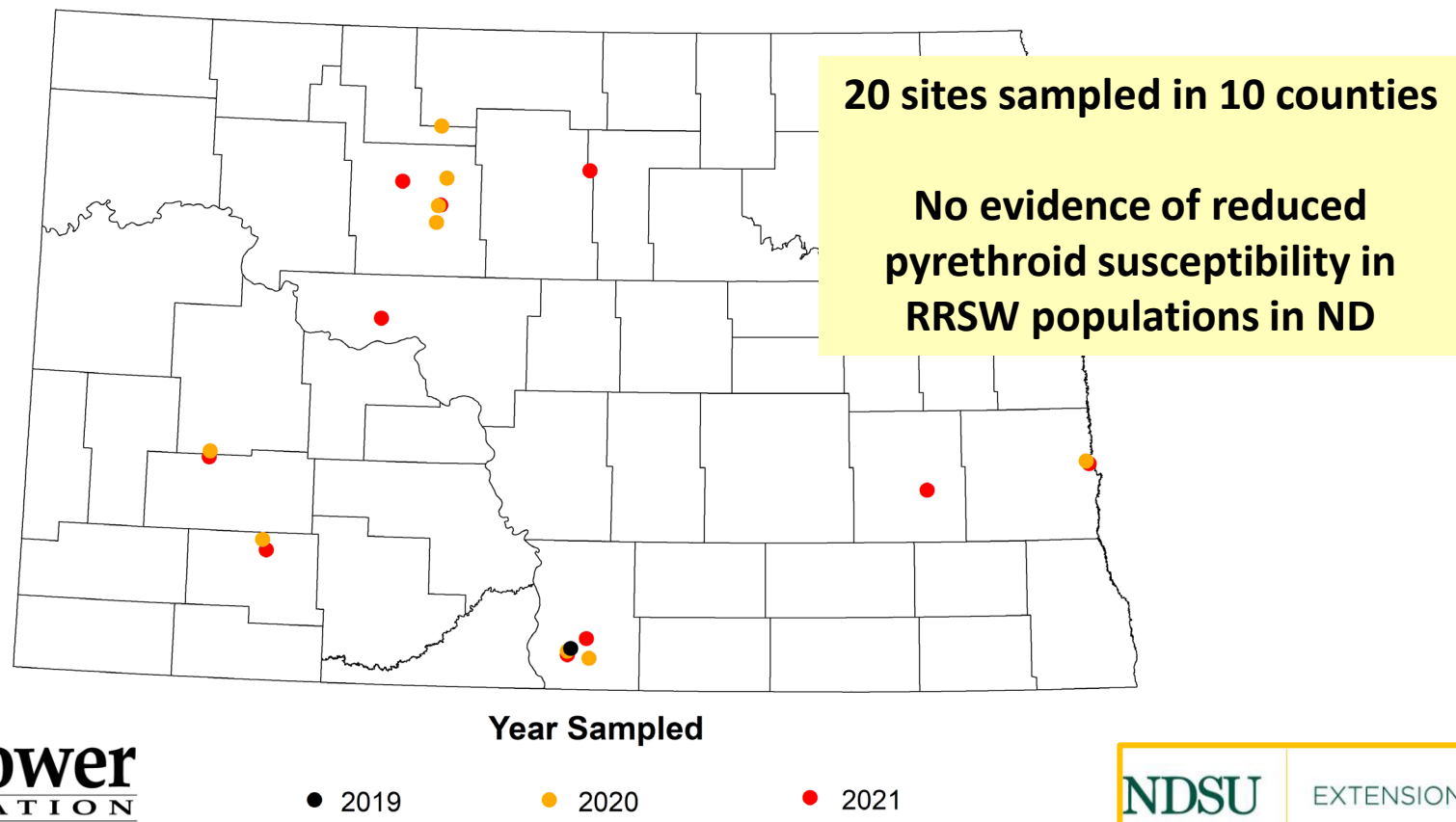
Percentage of Locations with Reduced Susceptibility of Red Sunflower Seed Weevils to Pyrethroid Treatments in SD, 2020-2021



# Results - ND

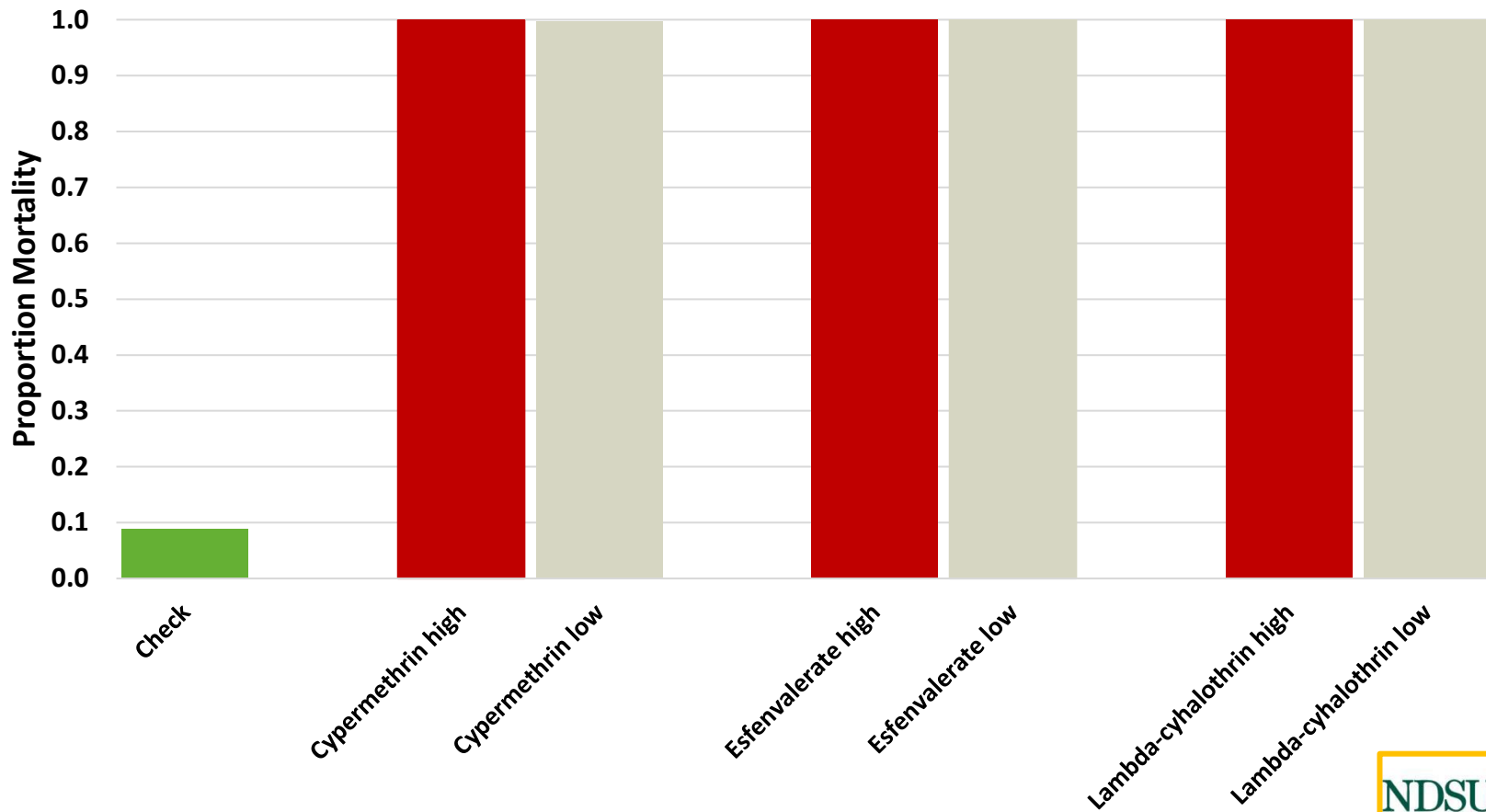


## Sampling Sites for Red Sunflower Seed Weevils in ND Pyrethroid Resistance Bioassay



# Results - ND

RSSW Mortality at 48 hours Across  
All ND Locations, 2021



# 2020 vs 2021 Conclusions

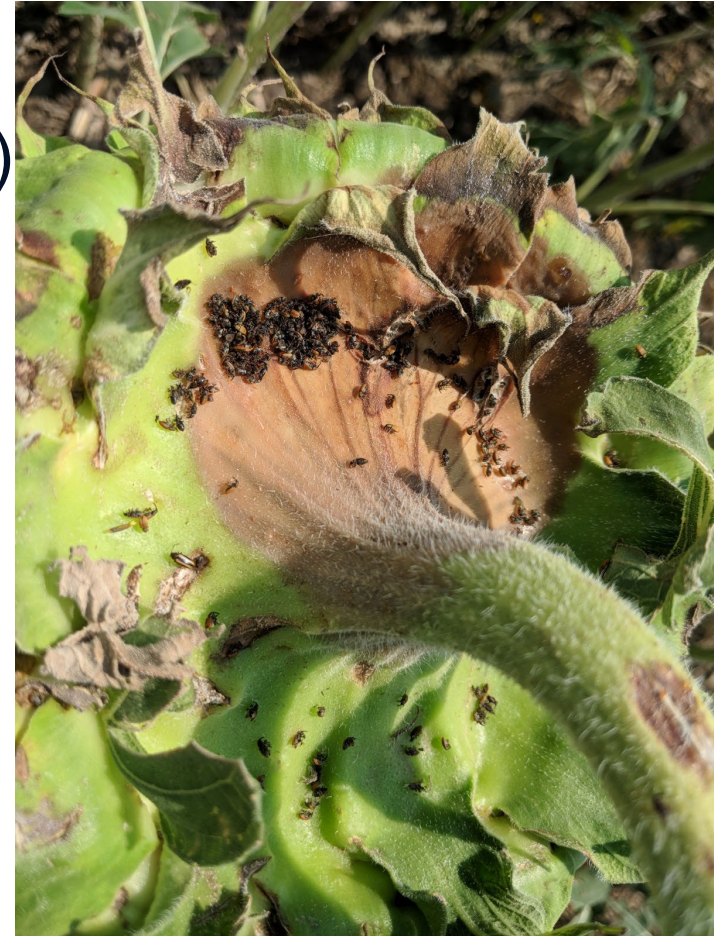
- Reduced RSSW susceptibility to tested pyrethroids at some locations in SD
  - 2022 Plans - Continue to evaluate additional locations in SD 2022
- ND sites showed no signs of reduced susceptibility both years





# Why might susceptibility be reduced?

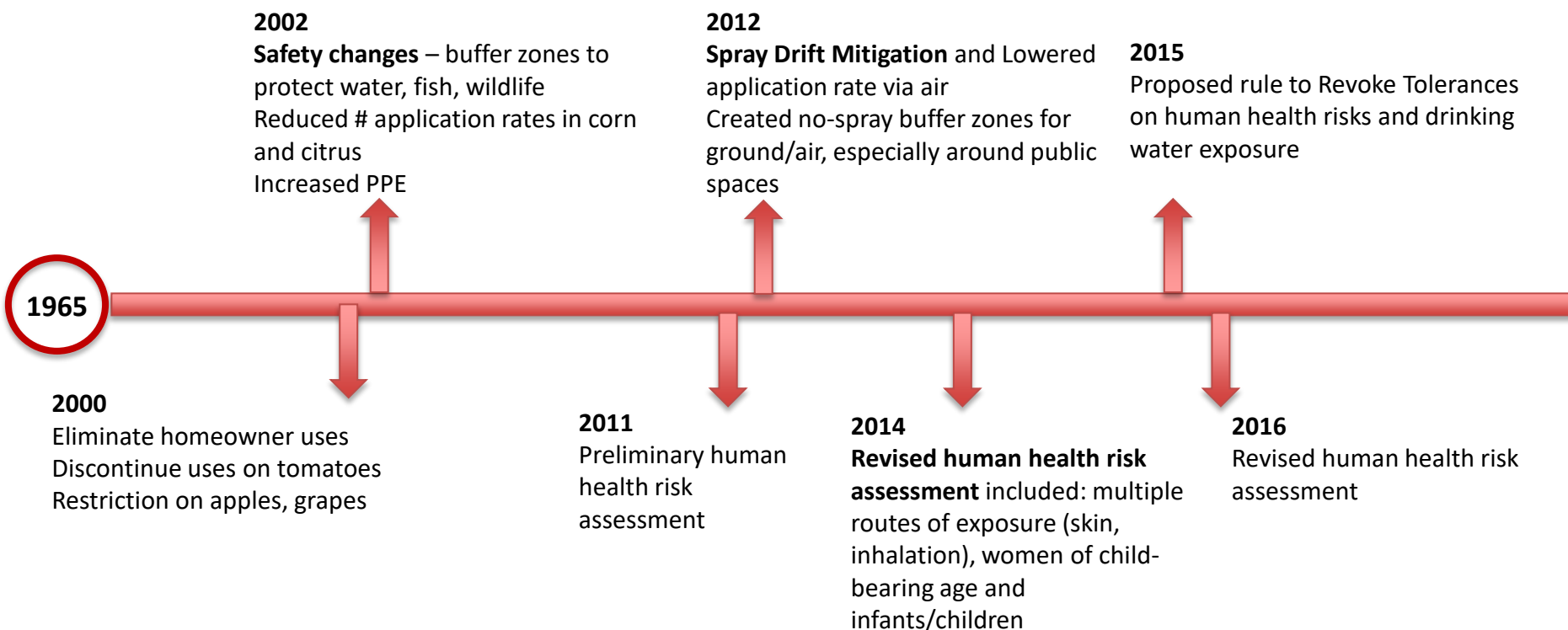
- Sprayer coverage difficulties
  - Low water volume via air application (<5 gallons per acre)
  - 2021 Drought – increase water evaporation before reaching sunflower heads
- Very large RSSW populations
  - Re-infestation of fields
- Routine treatment of RSSWs
  - Confection sunflowers
    - Require 2 applications (early flowering + 7 day later)



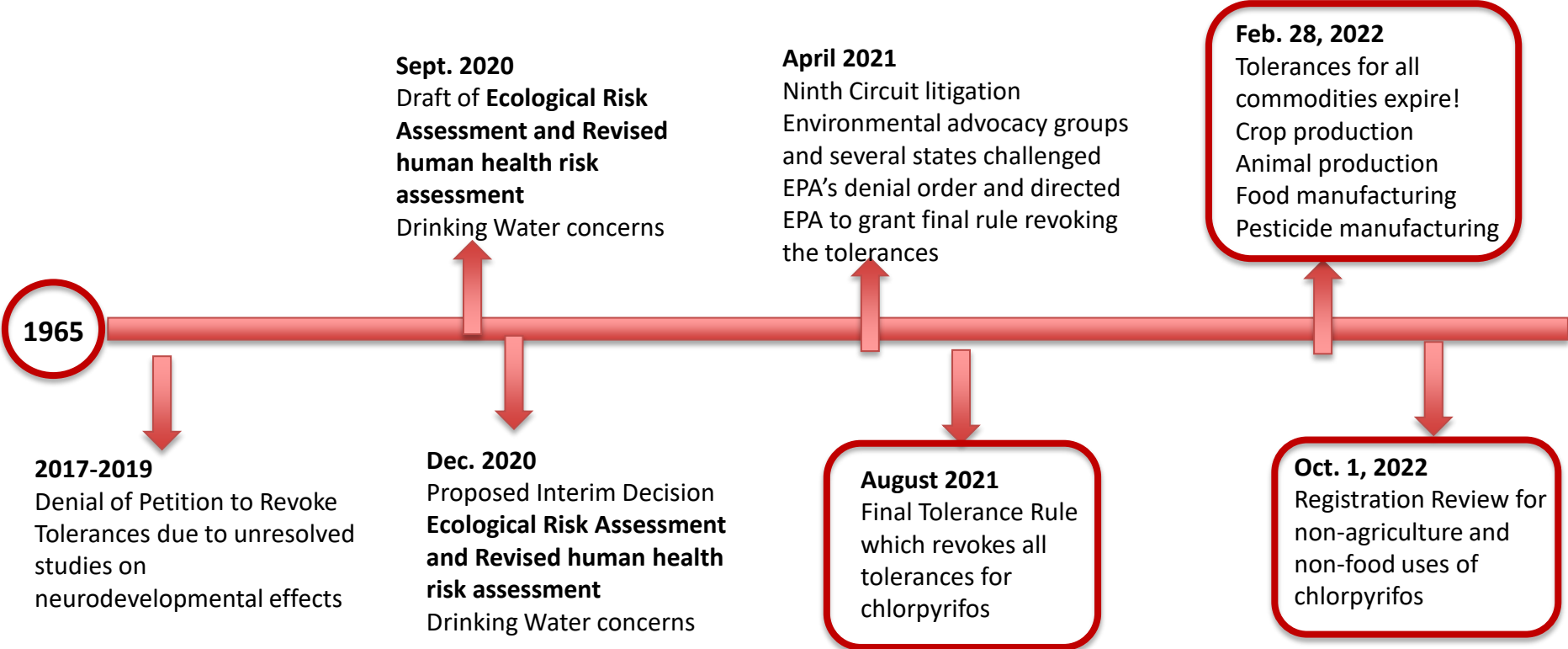
# RSSW - IPM in 2022



# Organophosphate - Chlorpyrifos



# Organophosphate - Chlorpyrifos



# RSSW management in 2022



- Testing unlabeled **'new' products** for efficacy
- Emergency registration likely necessary

# Chlorpyrifos Alternatives – Sunflower

- Foliar Applications – banded sunflower moth, cutworms, grasshoppers, lygus bug, sunflower beetle, sunflower moth, **red sunflower seed weevils**, sunflower stem weevil
- Alternatives
  - Pyrethroids – beta-cyfluthrin (Baythroid XL), cyfluthrin (Tombstone), deltamethrin (Delta Gold), esfenvalerate (Asana XL), gamma-cyhalothrin (Declare), lambda-cyhalothrin (Warrior II, generics), zeta-cypermethrin (Mustang Maxx)
    - **May not give as good of control of seed weevils in some areas**
  - Carbamates – carbaryl (Sevin XLR Plus)
  - Diamides – chlorantraniliprole (Prevathon, Vantacor), cyantraniliprole (Exirel) for lepidopteran pests, grasshoppers
    - **Not control seed weevils**

# Acknowledgements

- Funding Sources:



**South Dakota Oilseeds Council**

# Thank you!



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