



# The Good, The Bad, And The Buzzy: The Impacts Of Pesticides On Pollinators And How To Protect Them

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# Who cares about pollinators?

- Required for 13 crops
  - Increase yield in an additional 78 crops
- (Klein et al, 2007)



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# More Than Just Honey Bees



# More Than Just Honey Bees



# More Than Just Honey Bees



# More Than Just Honey Bees



# More Than Just Honey Bees



# More Than Just Honey Bees



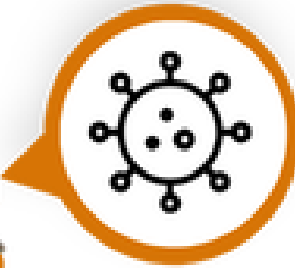
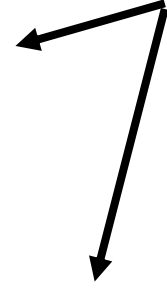


# The 4 P's

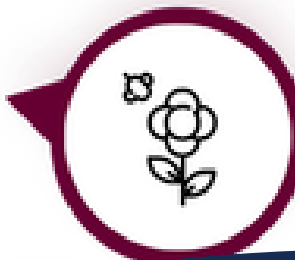


**PESTS**  
Varroa Mites

Sandhill Crane  
Festival



**PATHOGENS**  
Virus, Fungus, etc.



**POOR  
NUTRITION**  
Where are the flowers?



**PESTICIDES**  
Necessary Exposure

# Why are bees so susceptible?



(Claudianos et al. 2006)

Bee kills in the news

The largest native bee kill to date.



<https://xerces.org/wilsonville-bee-kill>

Treated seed was not restricted by the same disposal rules as pesticides



Photo: USDA-NRCS/Lance Cheung

# Nebraska ethanol plant



Photo: Judy Wu-Smart

# Excessive dust from corn planting poisoned over 11,500 German hives

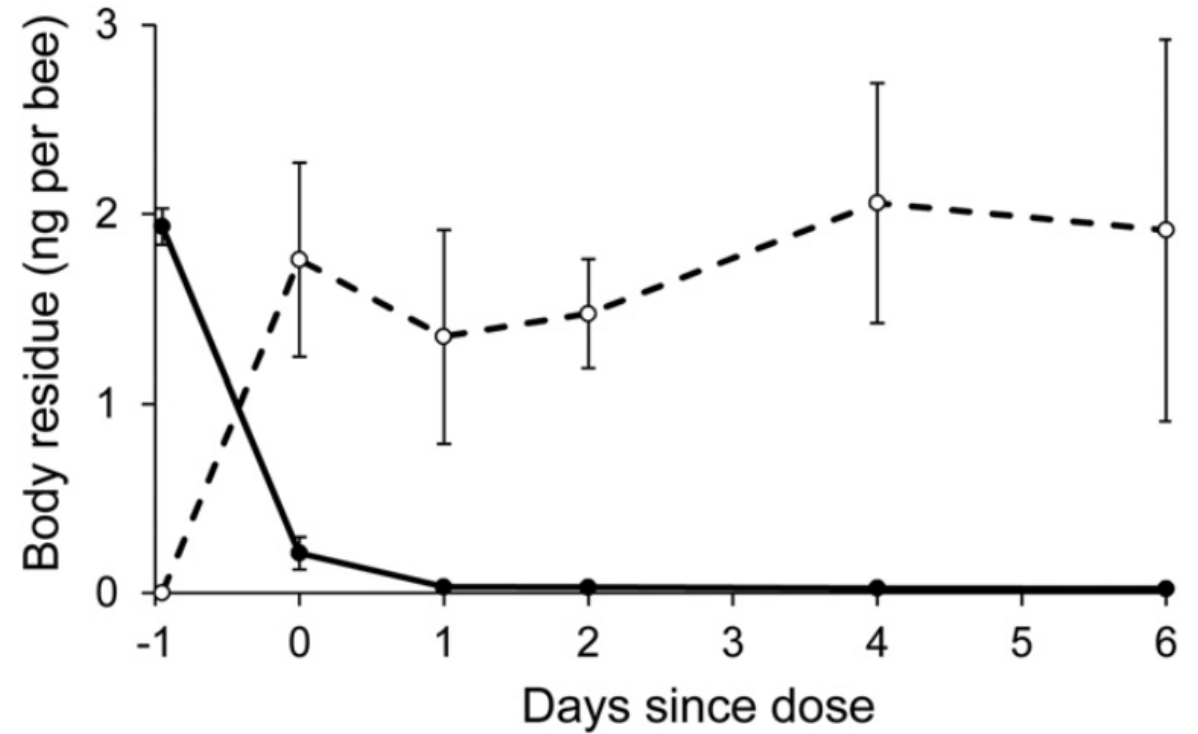
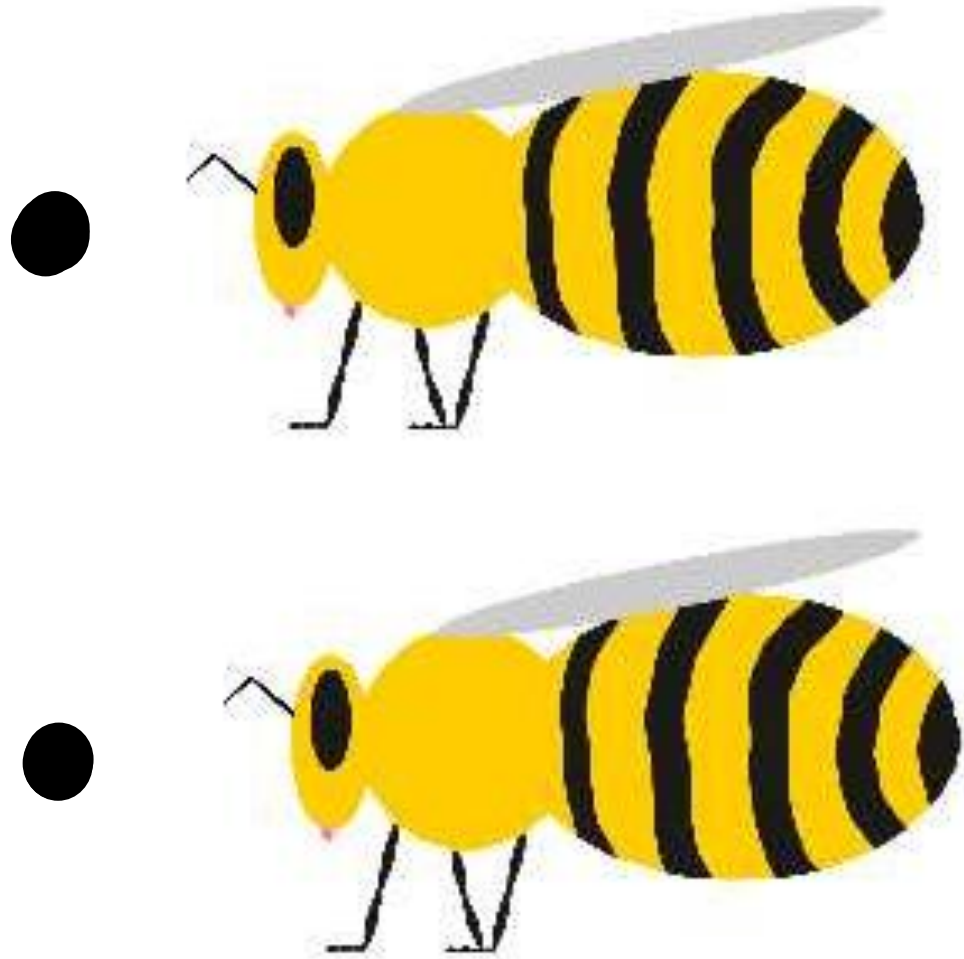


(Nikolakis et al., 2009; Pistorius et al., 2009)

Lethal and sublethal effects

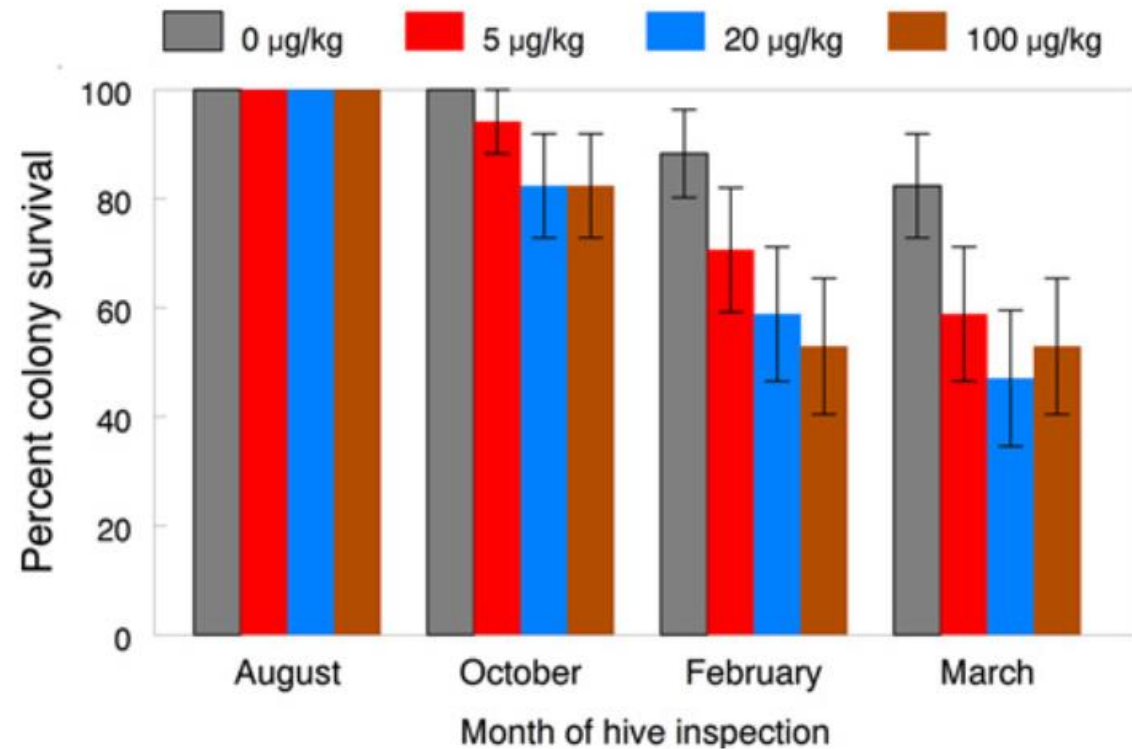


Fipronil metabolites effectively bioaccumulates in honey bees.



(Holder et al. 2018)

# Chronic exposure to imidacloprid can decrease winter survival



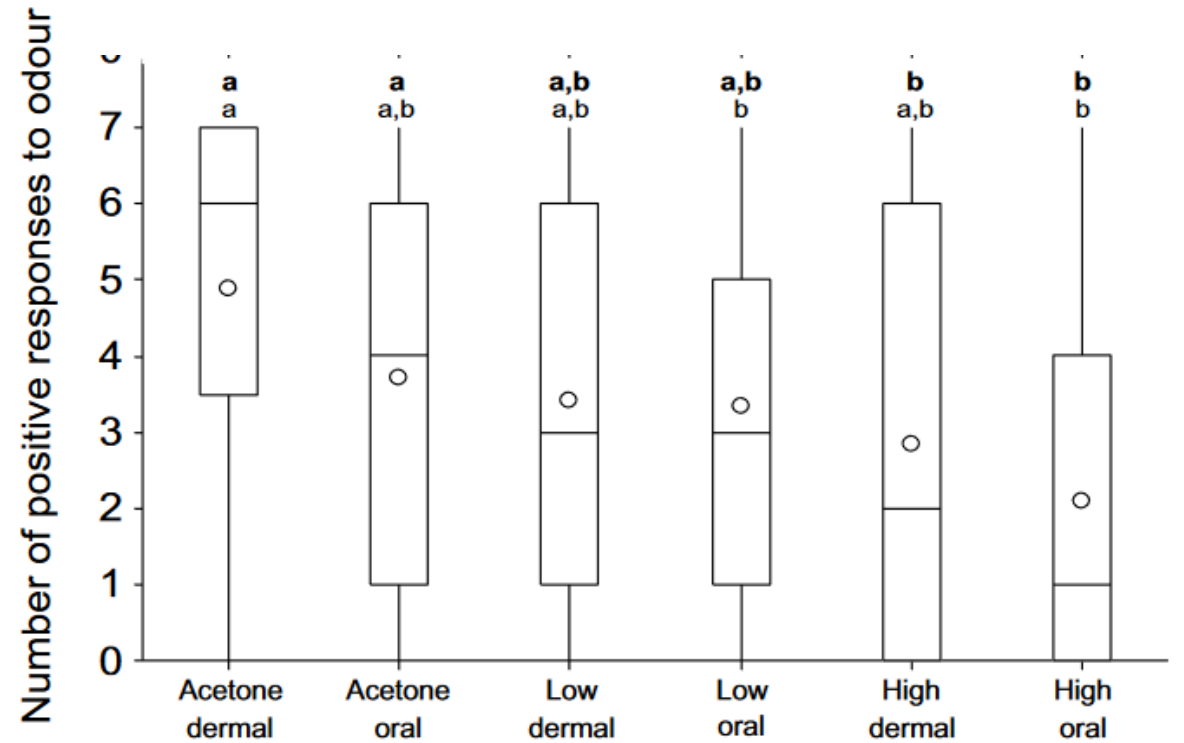
Learning and memory is vital to honey bee survival.



# Tau-fluvalinate negatively impacts learning and memory in honey bees.



(Matsumoto et al. 2012)

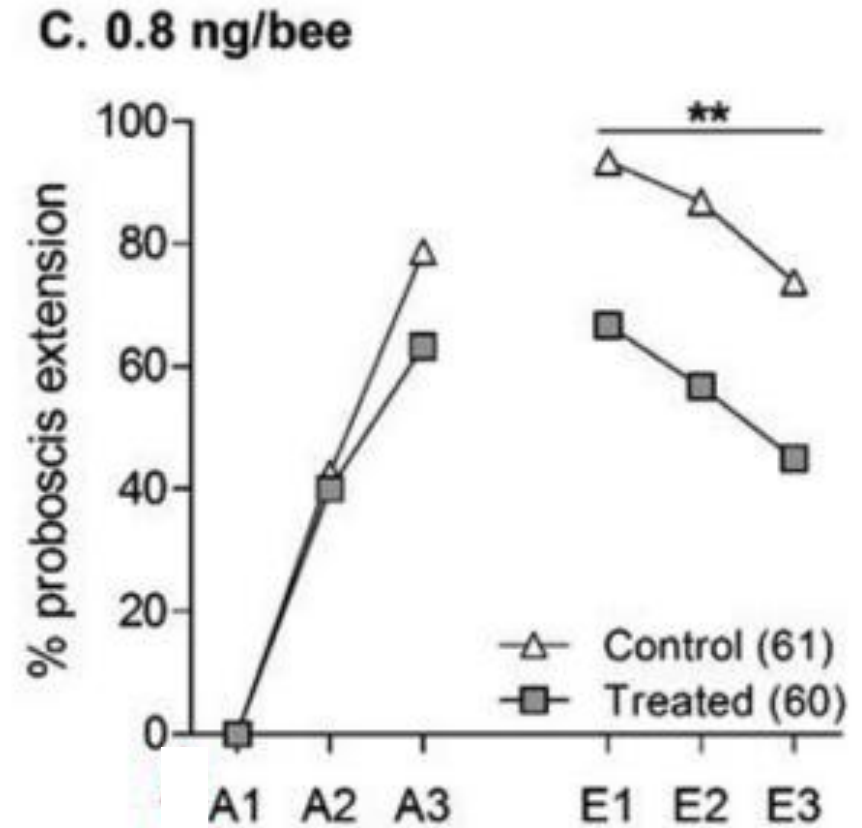


(Frost et al. 2013)

# Clothianidin also negatively impacts honey bee learning and memory.

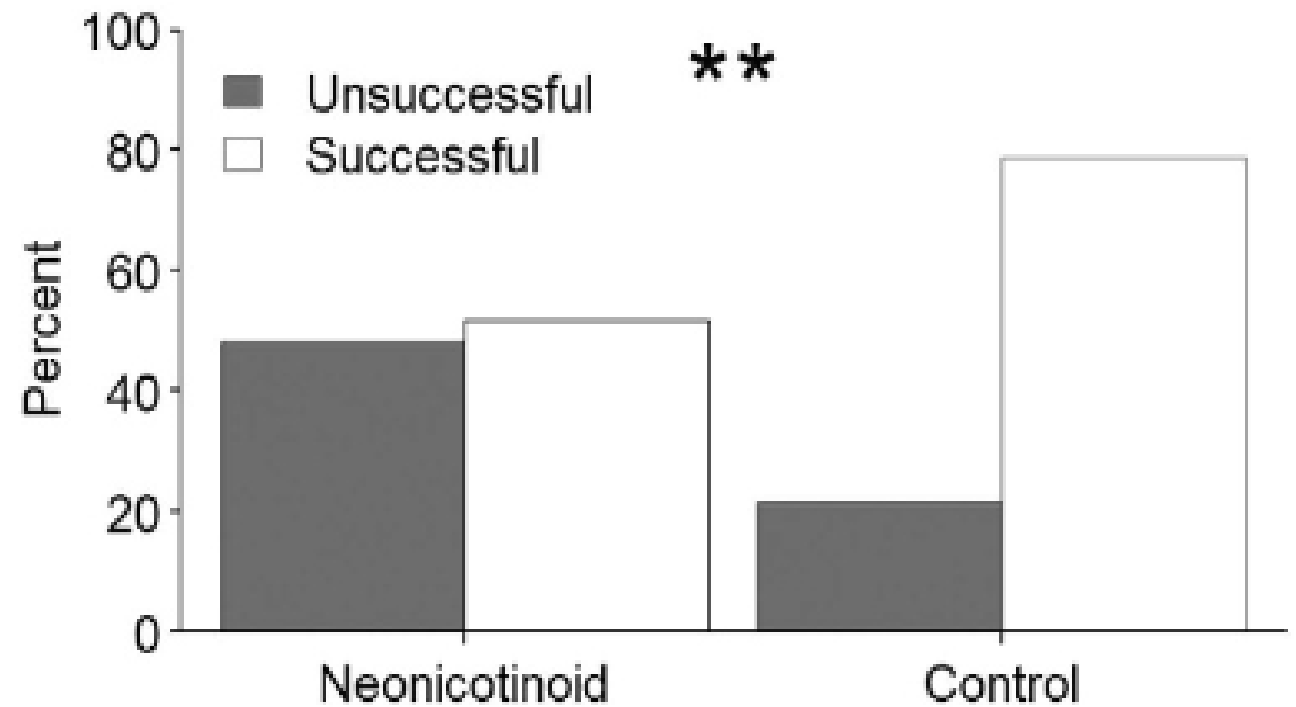


(Matsumoto et al. 2012)

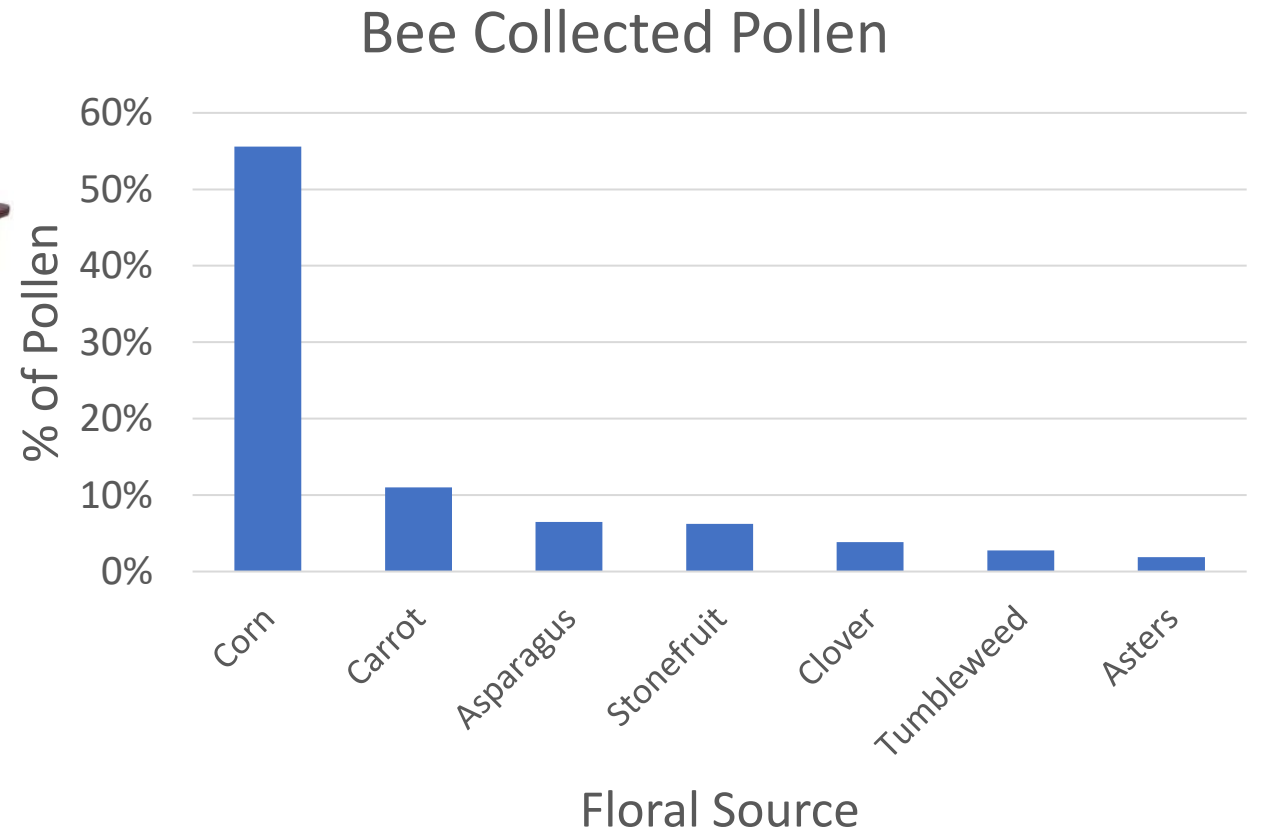


(Tison et al, 2019)

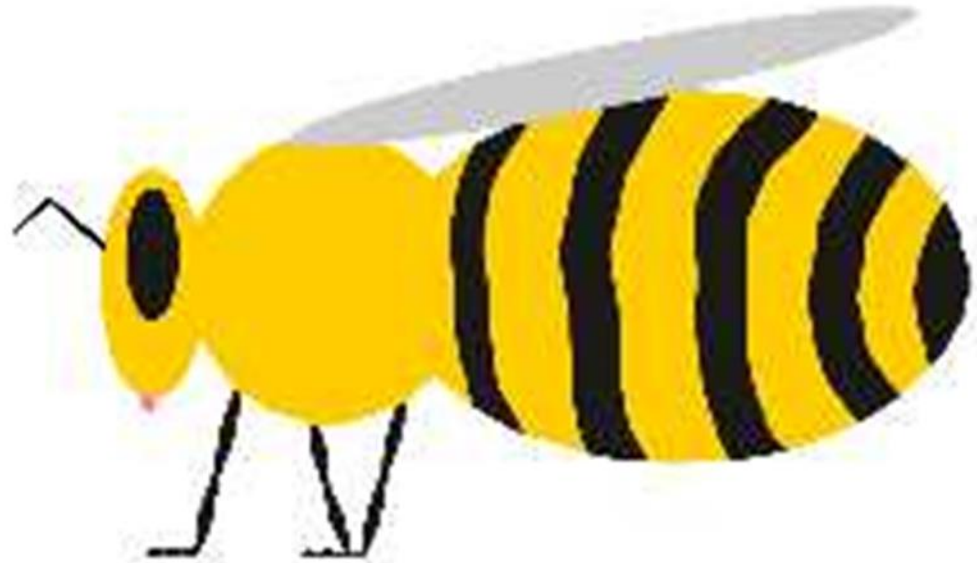
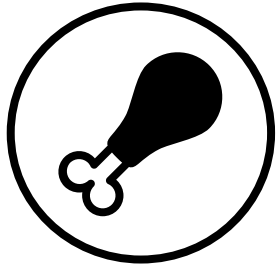
# Exposure to thiamethoxam and clothianidin can negatively impact queen success



Bees will also visit wind pollinated crops when resources are low.



Bees mistook microencapsulated parathion for pollen, storing it in their hives.

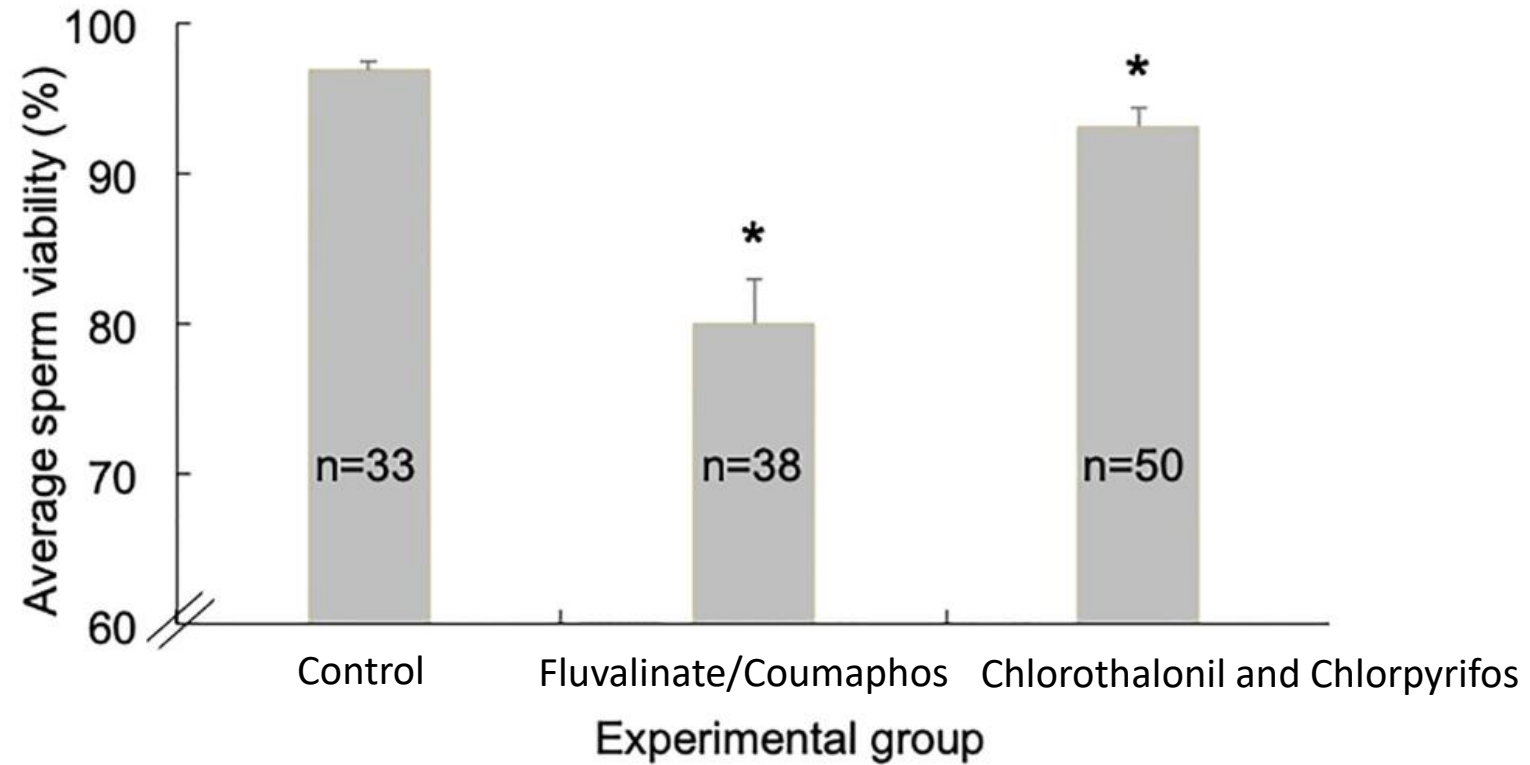




# Beeswax 101

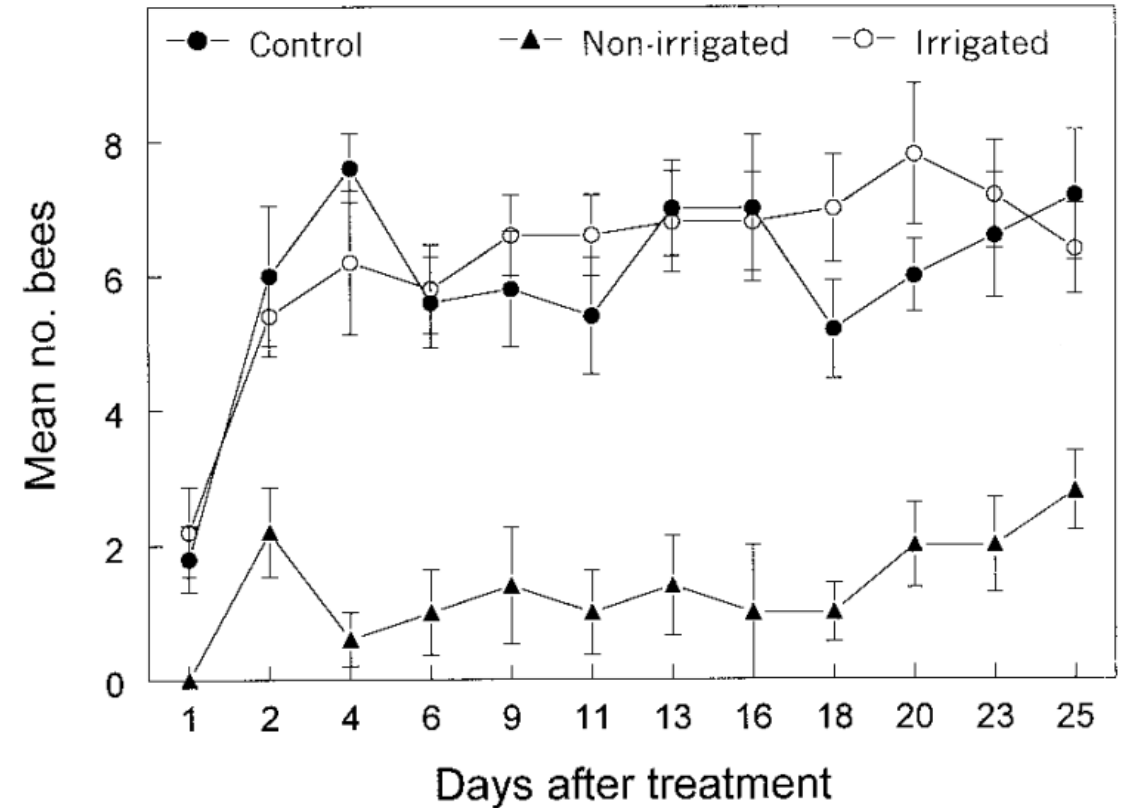
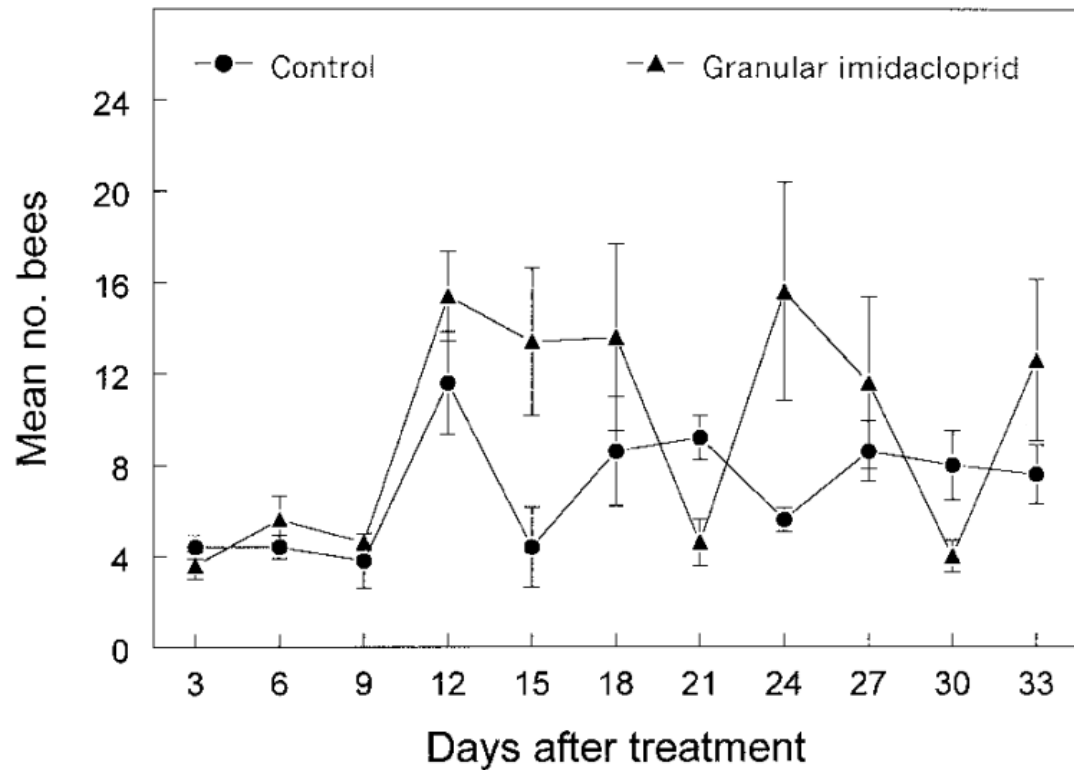


# Chronic exposure through wax decreases sperm viability.



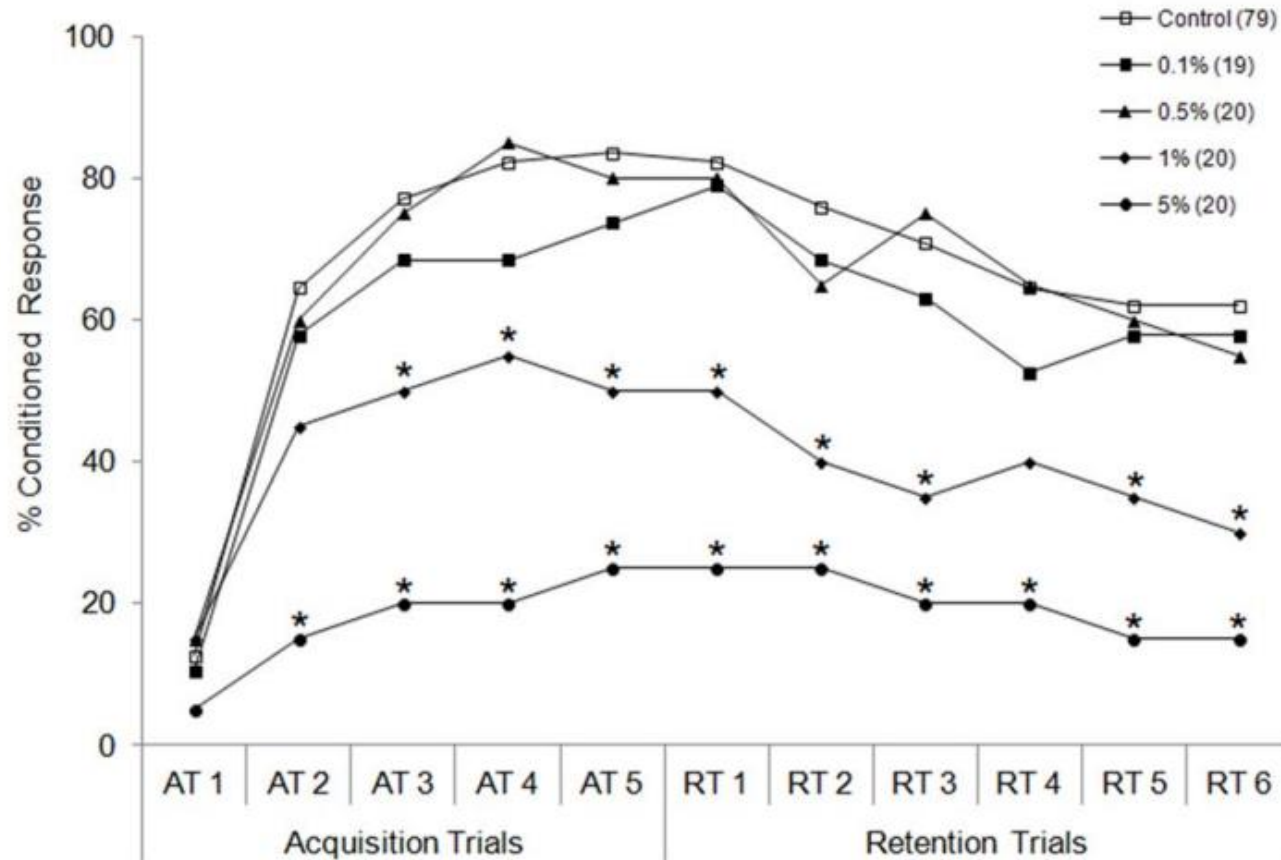
(Bischoff et al., 2023; Fisher II & Rangel, 2018)

# Granular application and post treatment irrigation decrease hazard to bumble bees



(Gels et al., 2002)

# Organosilicone surfactants negatively impact honey bee learning.

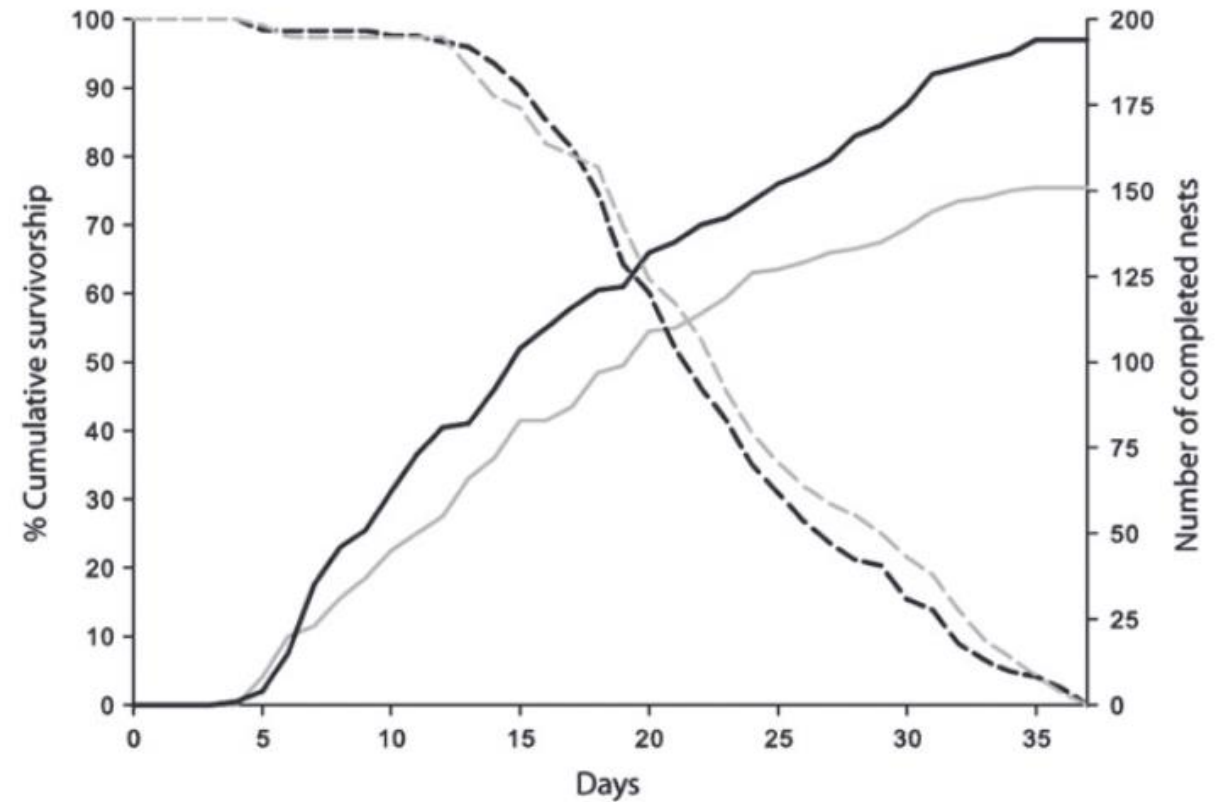


(Ciarlo et al., 2012)

# Red mason bees exposed to neonicotinoids have less reproductive success

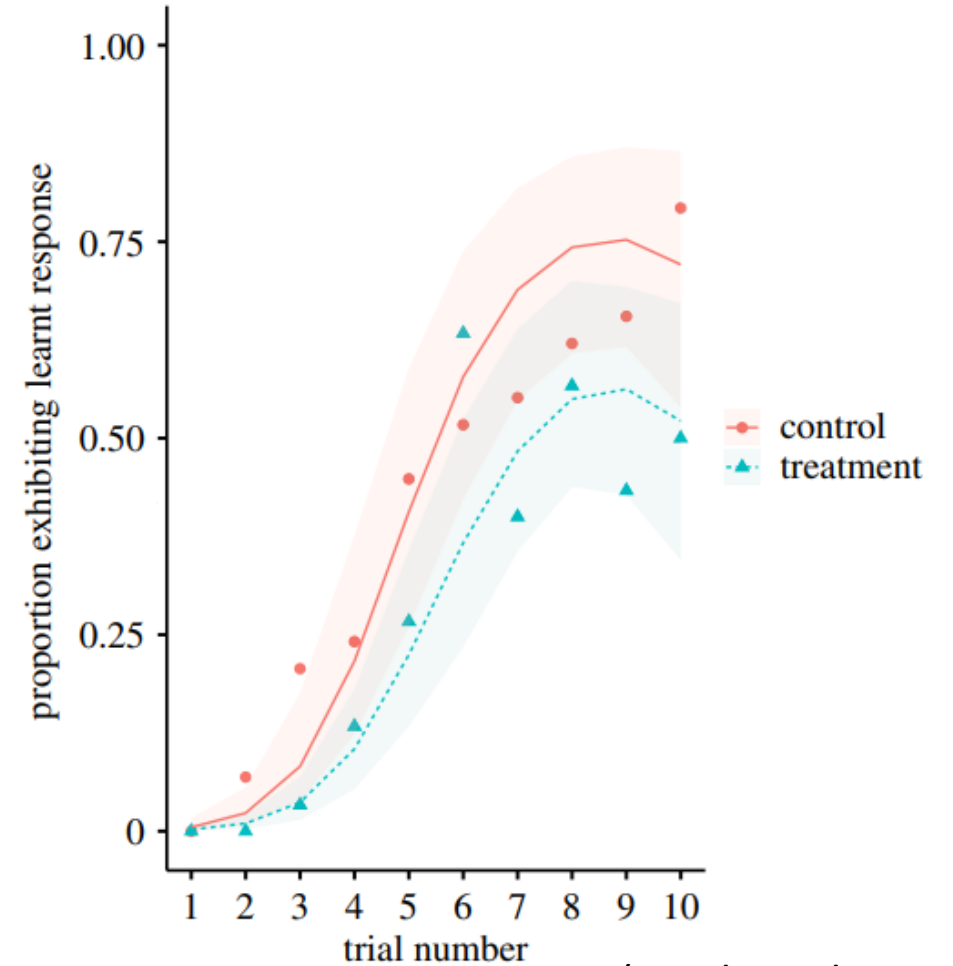
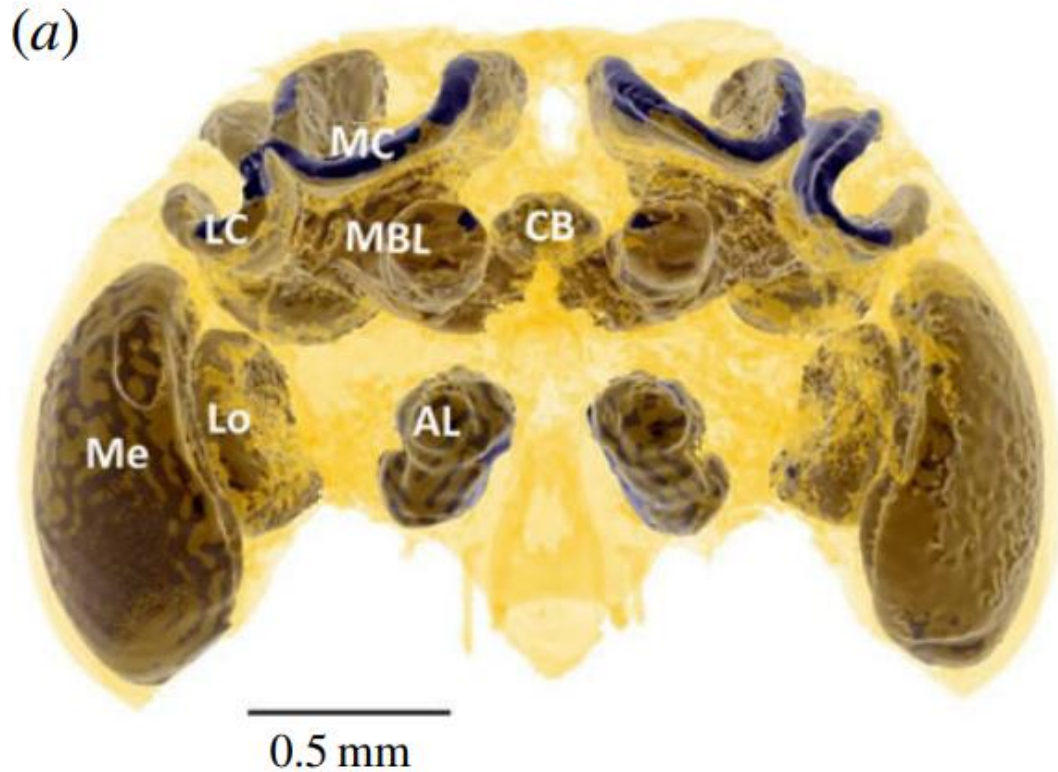


Photo courtesy of <https://www.gardenia.net/guide/mason-bees>



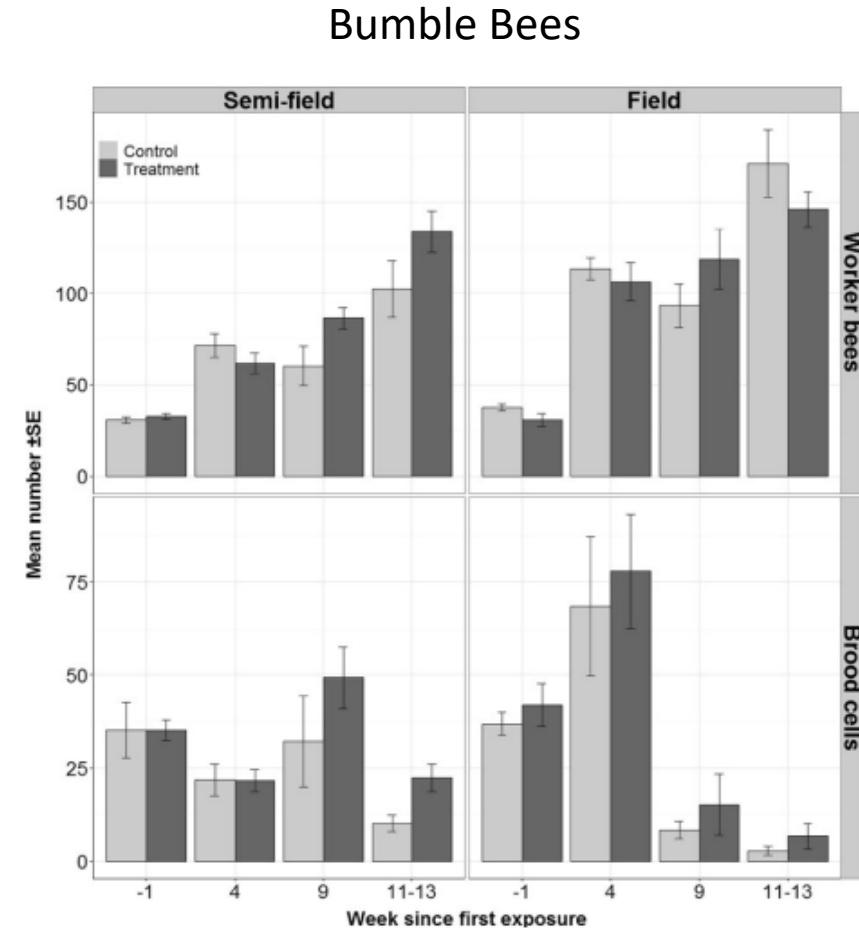
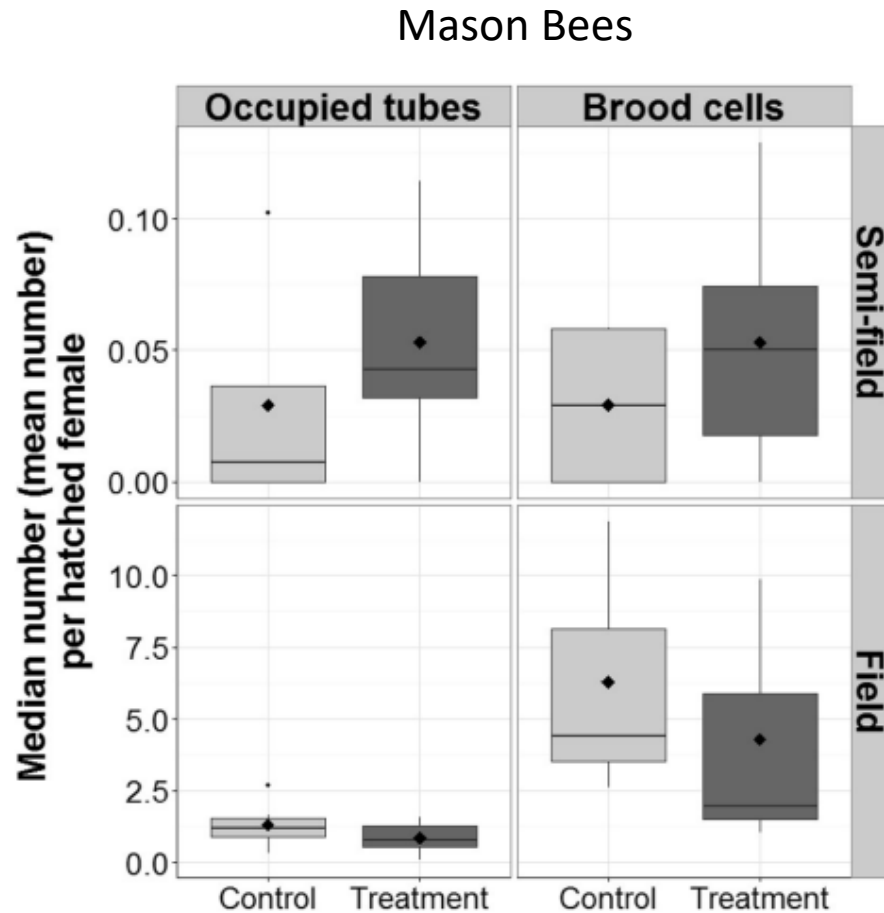
(Sandrock et al, 2014)

# Imidacloprid exposure reduces bumble bee learning and brain volume.



(Smith et al., 2020)

Winter canola grown from treated seed doesn't negatively impact bumble bees or mason bees.



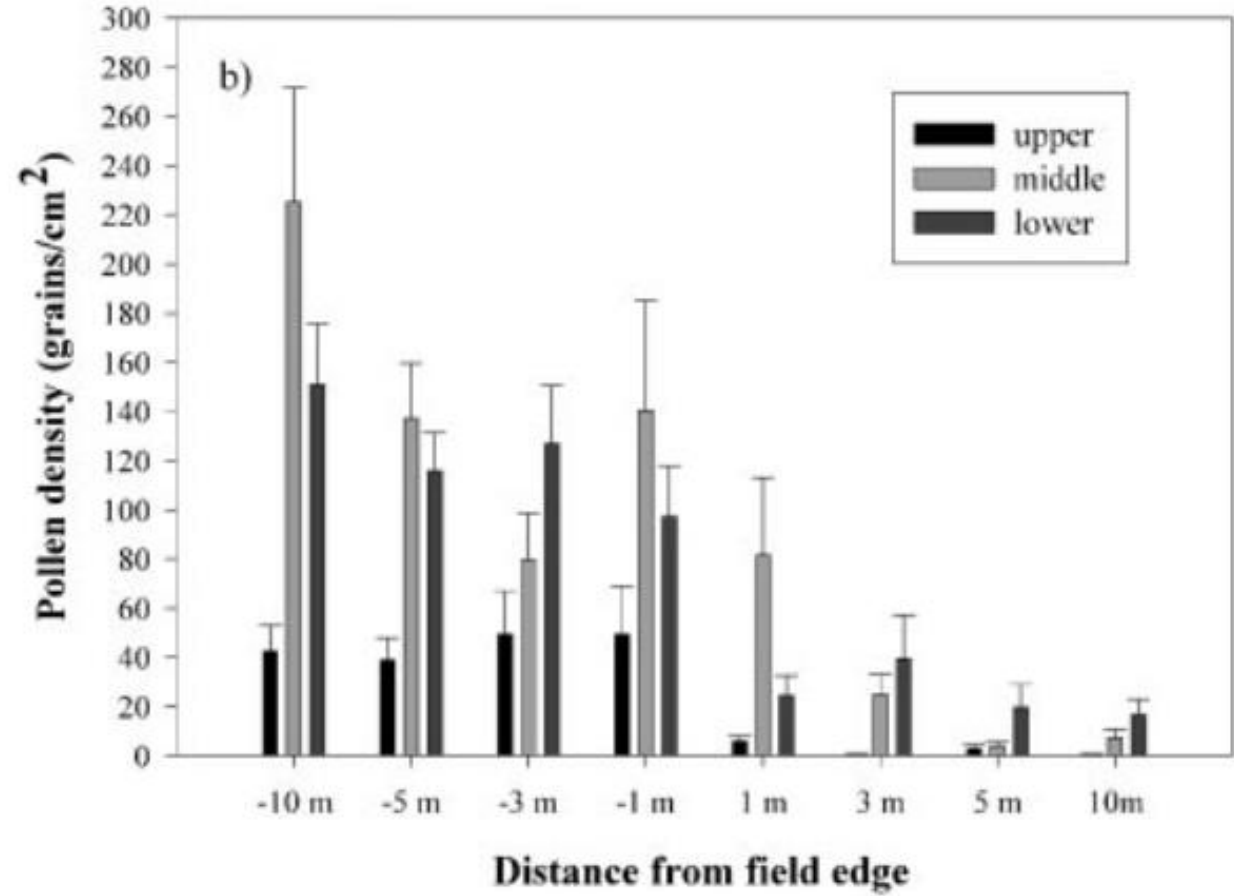
(Dietzsch et al., 2019)

# Does Bt corn kill Monarch caterpillars?





No.

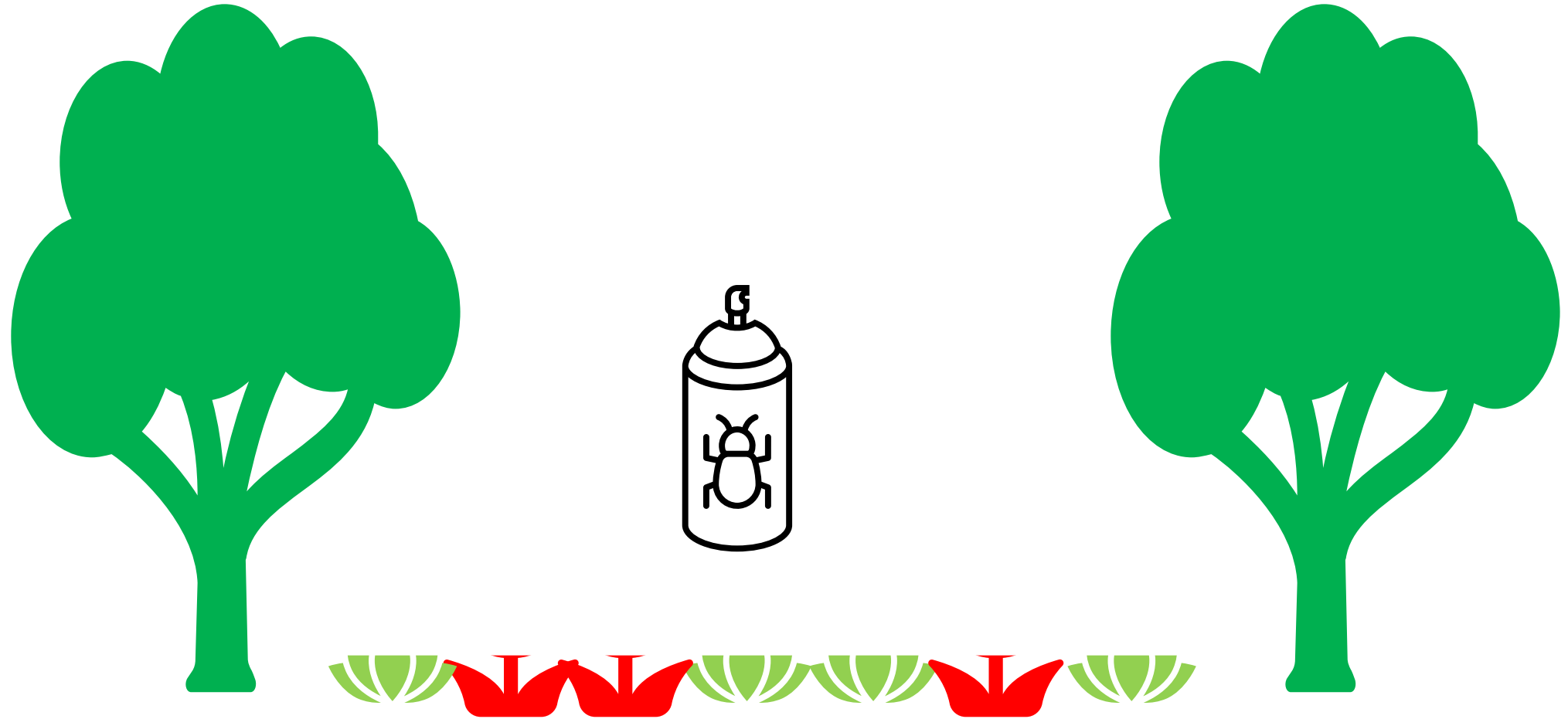


(Pleasants et al, 2001; Sears et al, 2001)

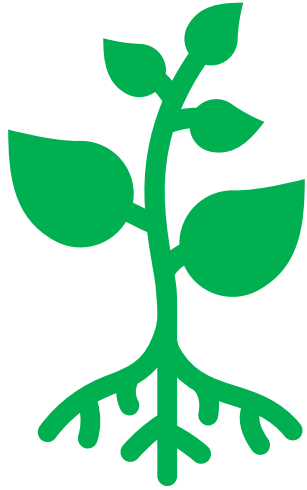
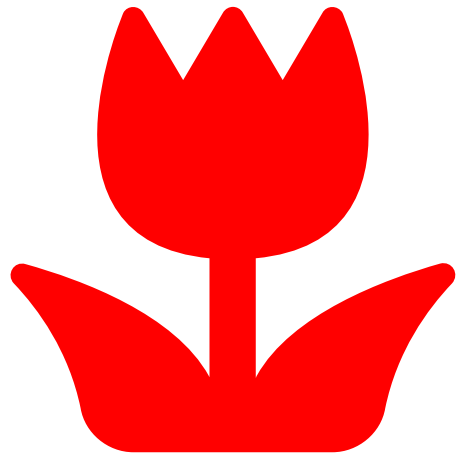
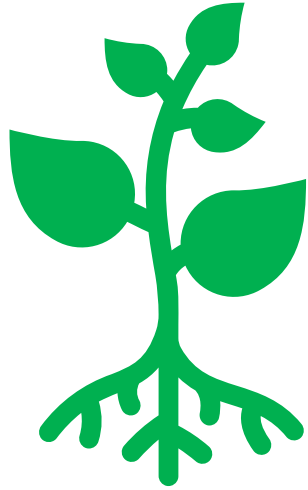
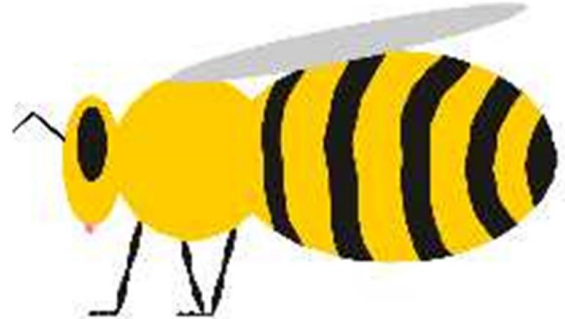
# How to protect the bees

Disclaimer: These are all just general suggestions and not applicable to all pesticides or situations, always consult the label to make sure you are following the law and staying safe!

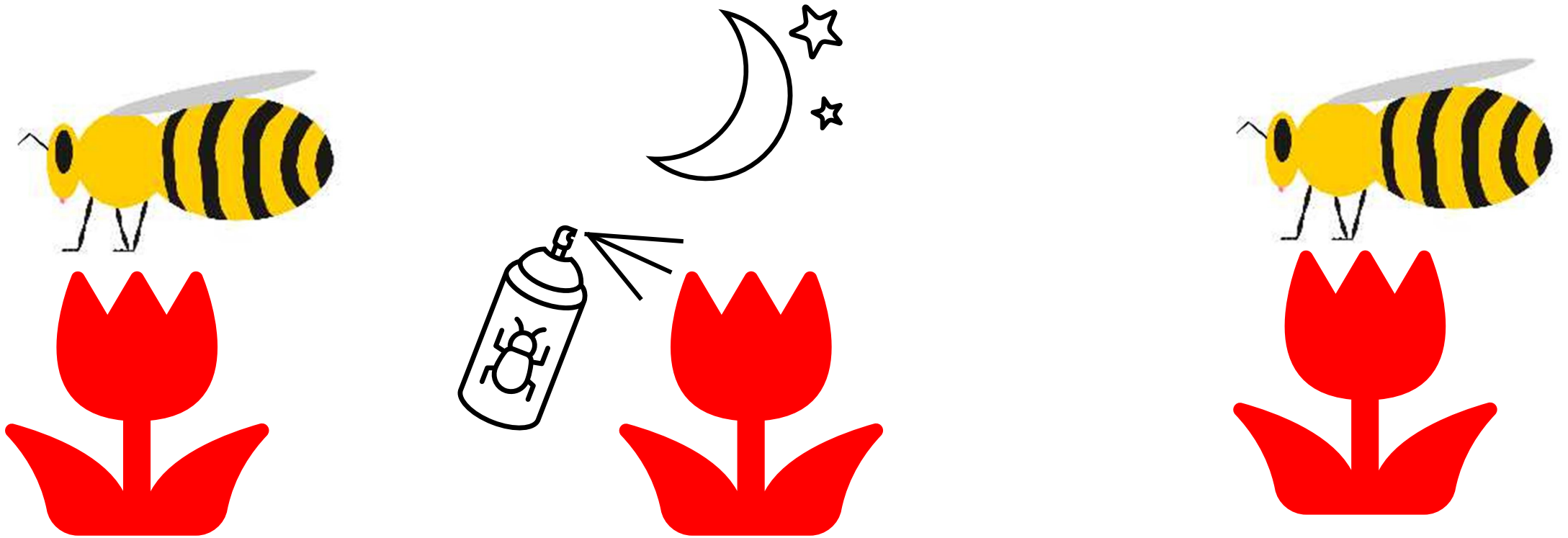
Remove flowers before applying a pesticide.



Try to apply pesticides before or after bloom.



Apply pesticides at sunset or at night when pollinators aren't active.

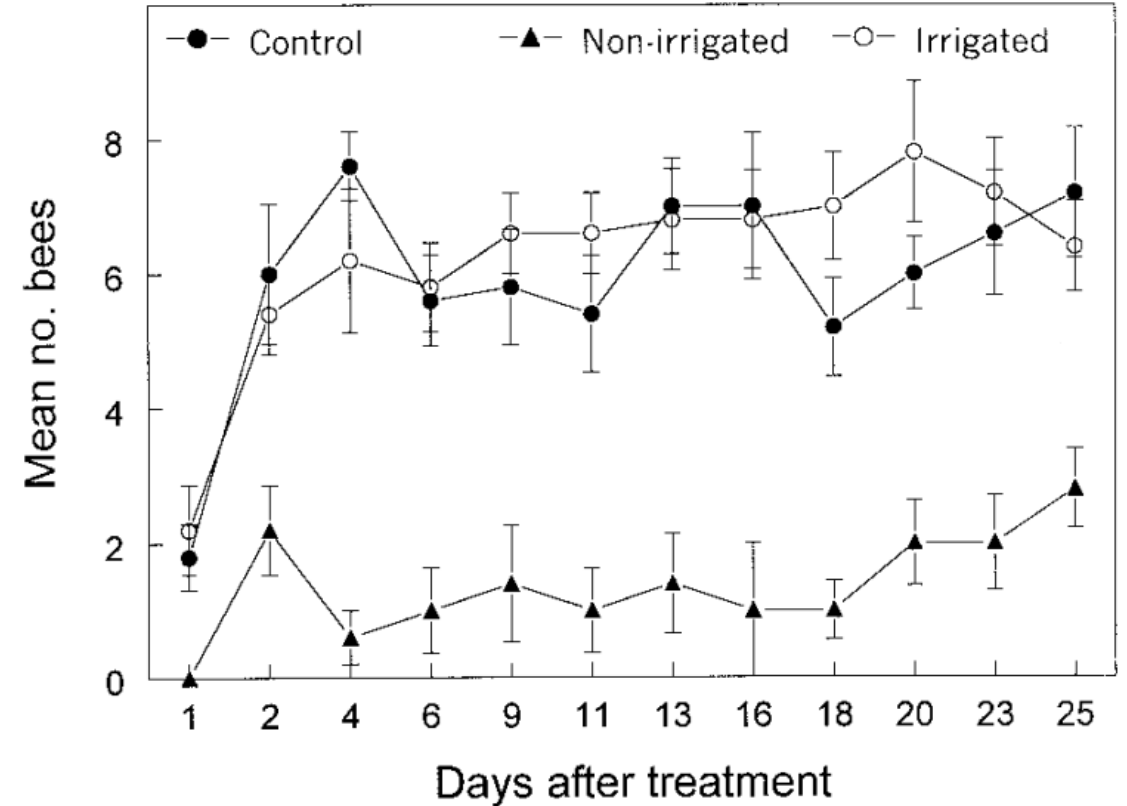
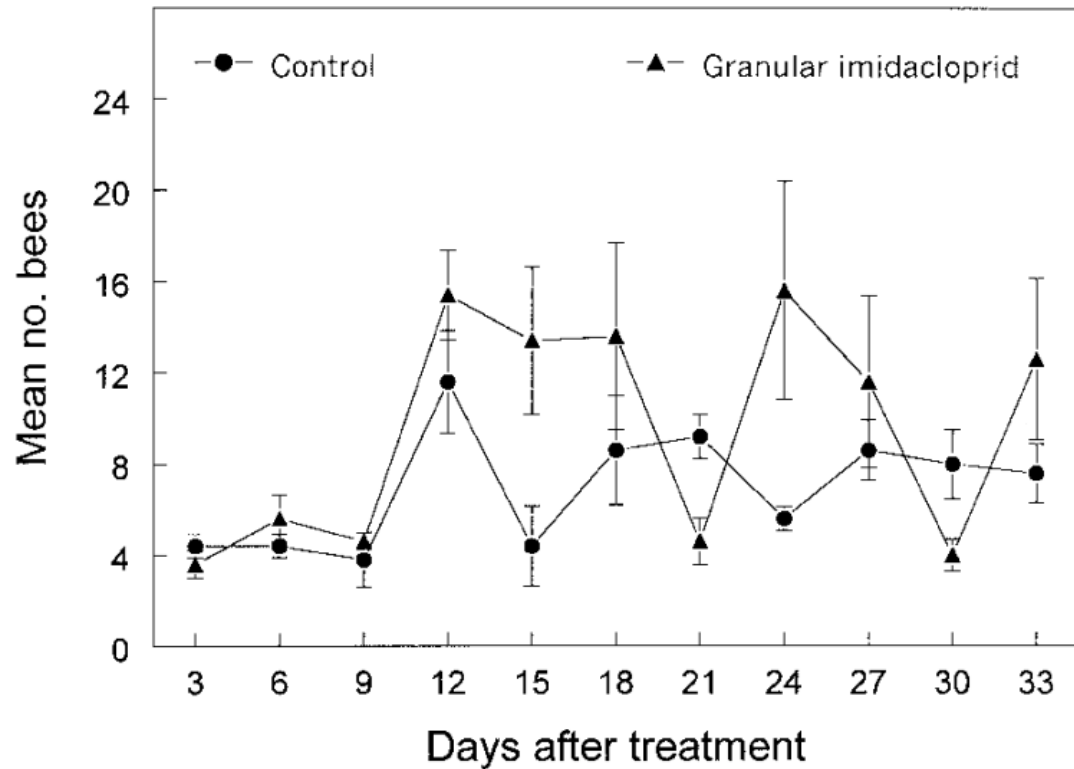


Seed quality and planting techniques can reduce dust emission from treated seed.



(Pochi et al., 2015; Nuyttens et al., 2013)

# Utilize formulations that are safer for pollinators



(Gels et al., 2002)

Finally, communicate with beekeepers.



Photo credit:  
Beeline Honey



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# Questions?

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