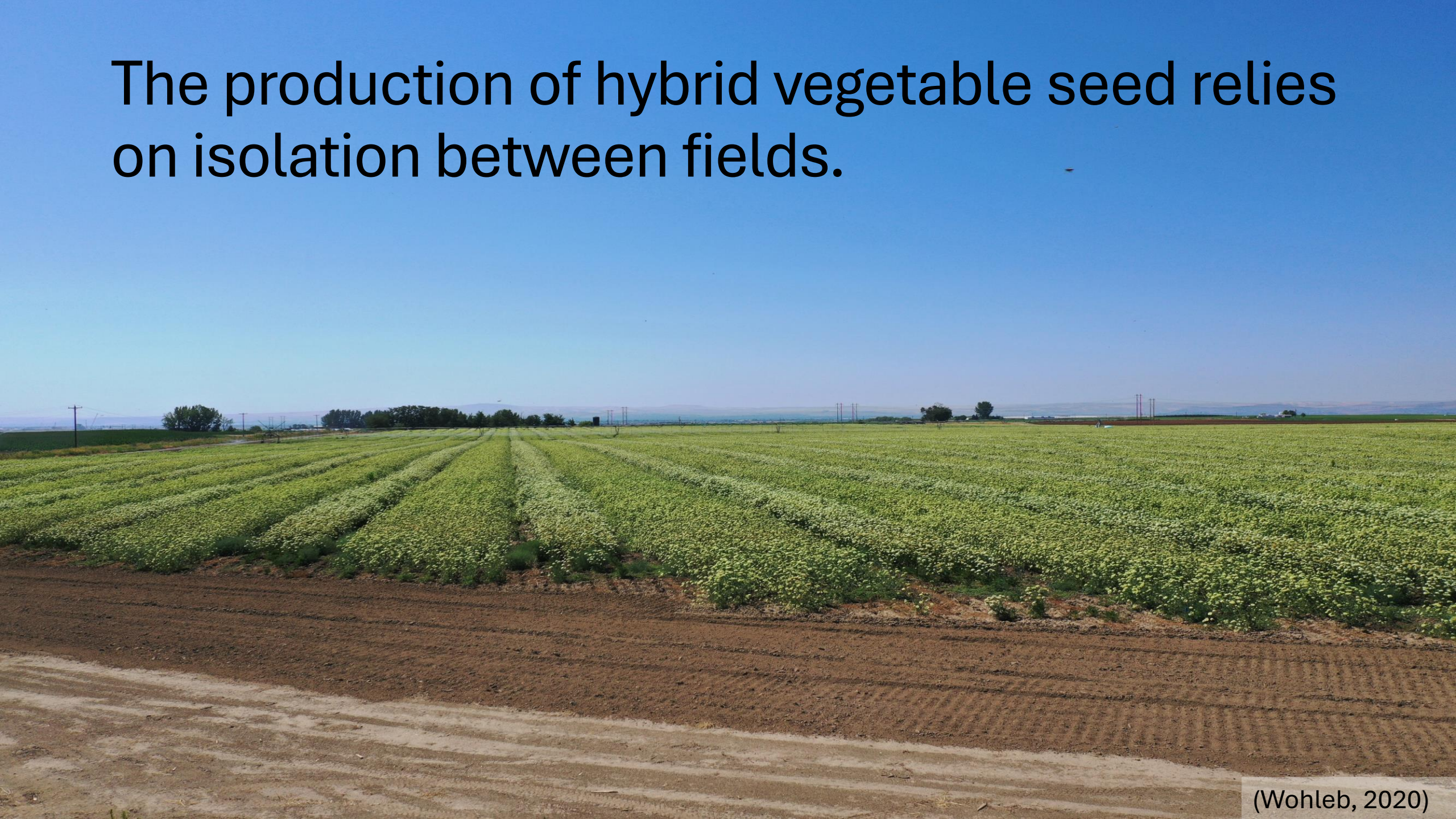
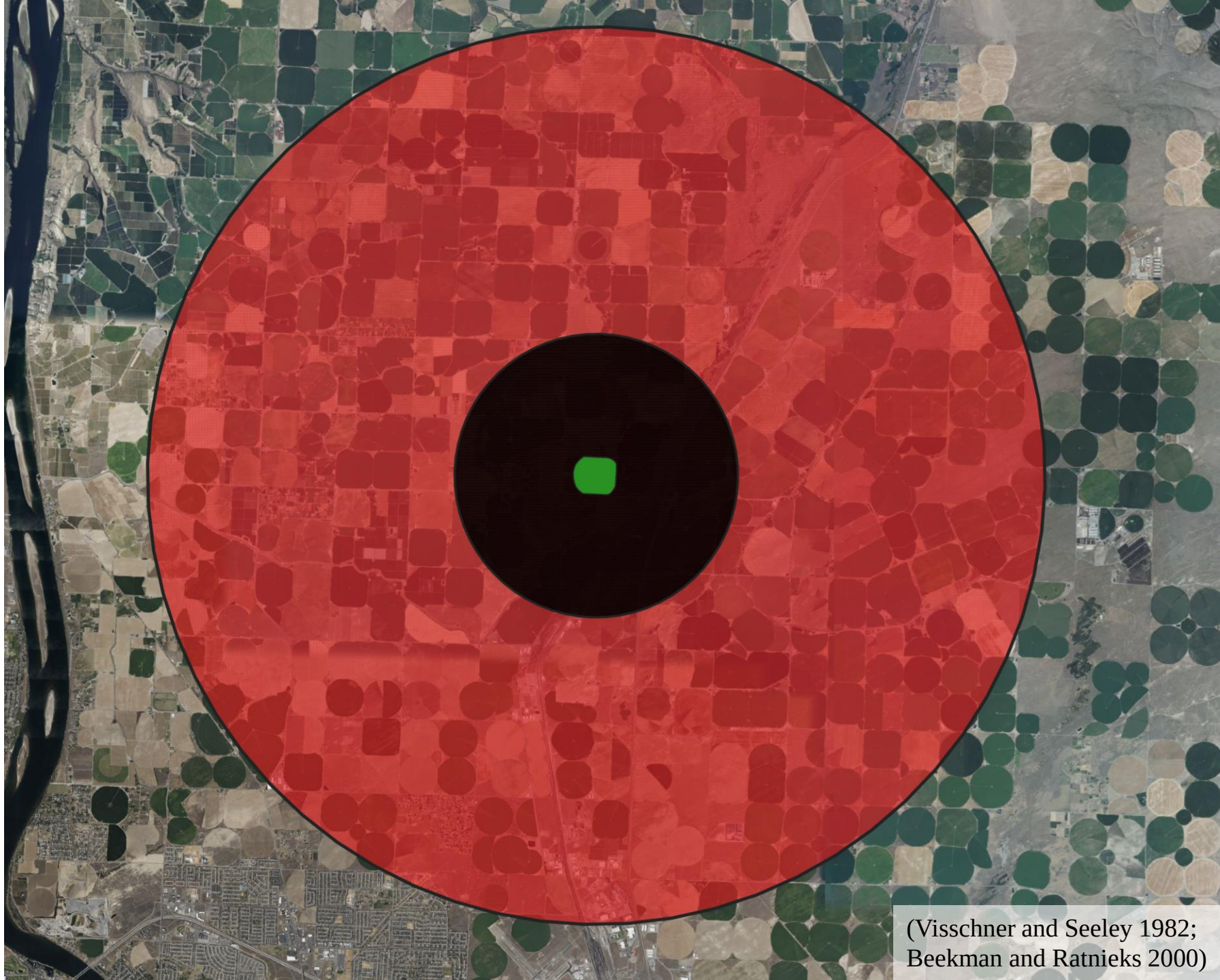
Improving Pollination Quality in Vegetable Seed

The production of hybrid vegetable seed relies on isolation between fields.

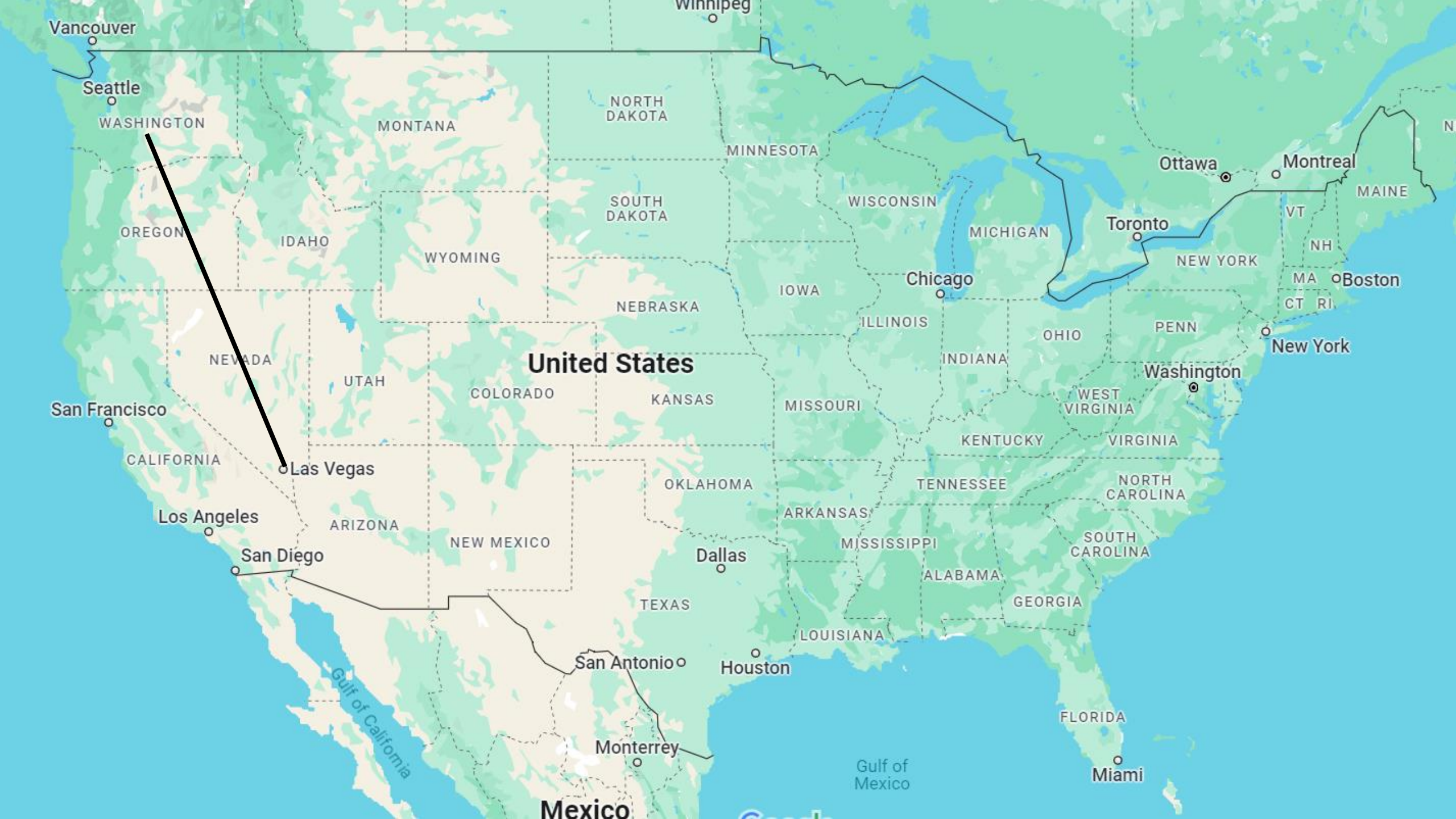


(Wohleb, 2020)

The foraging distance of honey bees depends on forage availability and quality.



(Visschner and Seeley 1982; Beekman and Ratnieks 2000)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WEST VIRGINIA
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TEXAS
GEORGIA
LOUISIANA
San Antonio
Houston
Gulf of California
FLORIDA
Monterrey
Gulf of Mexico
Miami
Mexico

The 4 P’s

PESTS
Varroa Mites

PATHOGENS
Virus, Fungus, etc.

POOR NUTRITION
Where are the flowers?

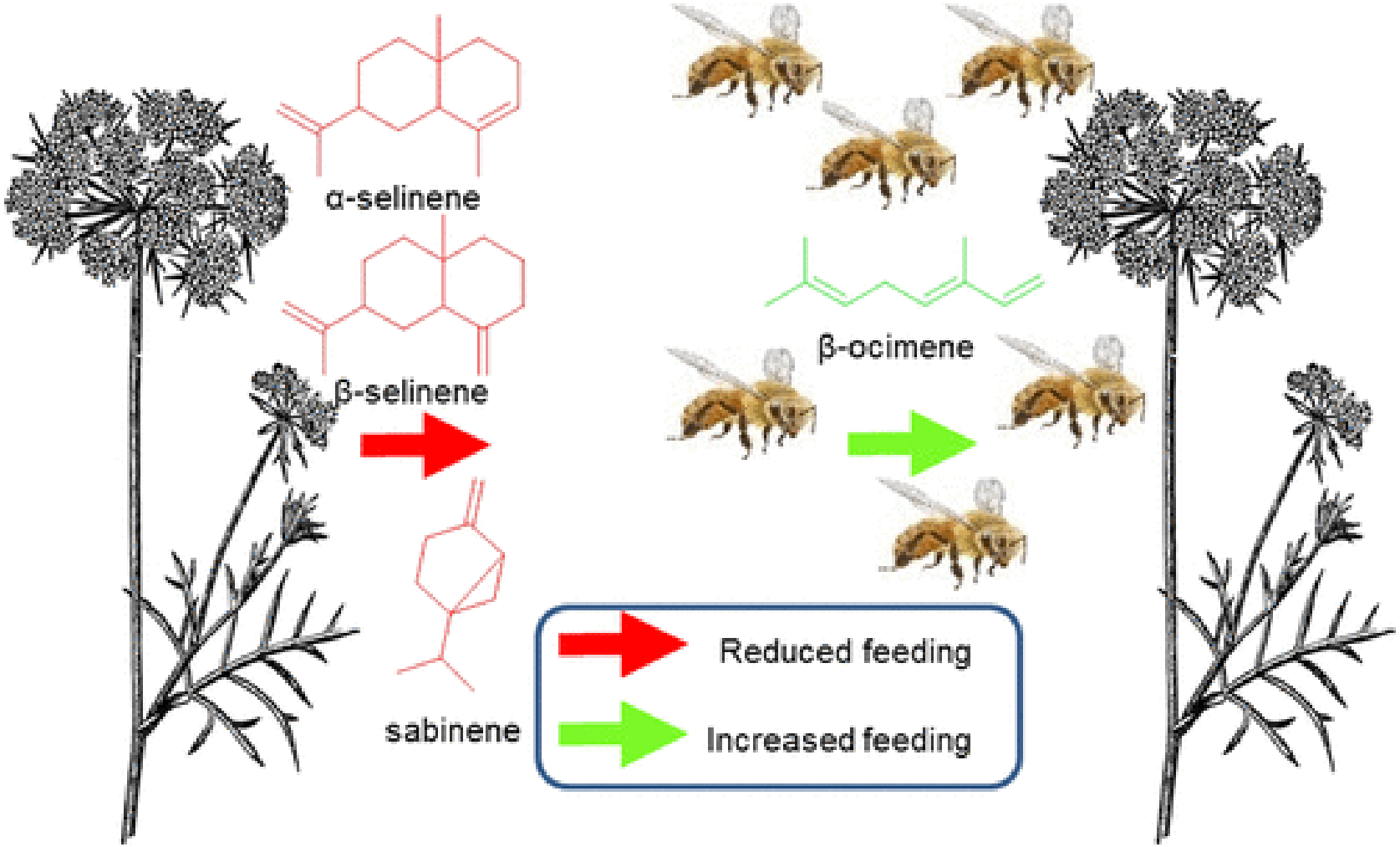
PESTICIDES
Neccesary Exposure

Graphic courtesy of Project Apis m.

The poor conditions of a hybrid seed field forces bees to search for alternative forage.

Gaffney et al. 2011; Hendriksma and Shafir 2016; Zarchin et al. 2017

Some carrot varieties produce honey bee repellant compounds in their flowers.



(Quarrell et al., 2023)

Kiwi growers in New Zealand also struggled to keeps bees on their crop.

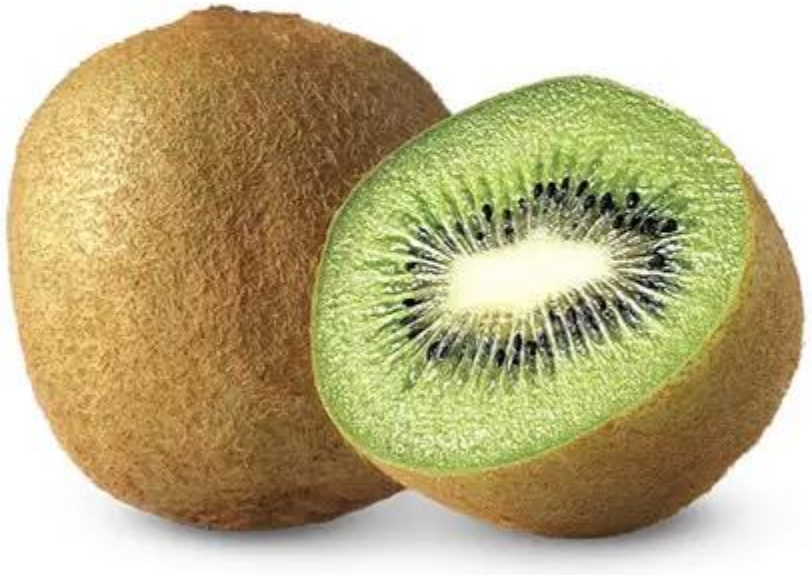


Photo courtesy of Aldi

Feeding sugar syrup increase the collection of kiwi pollen.

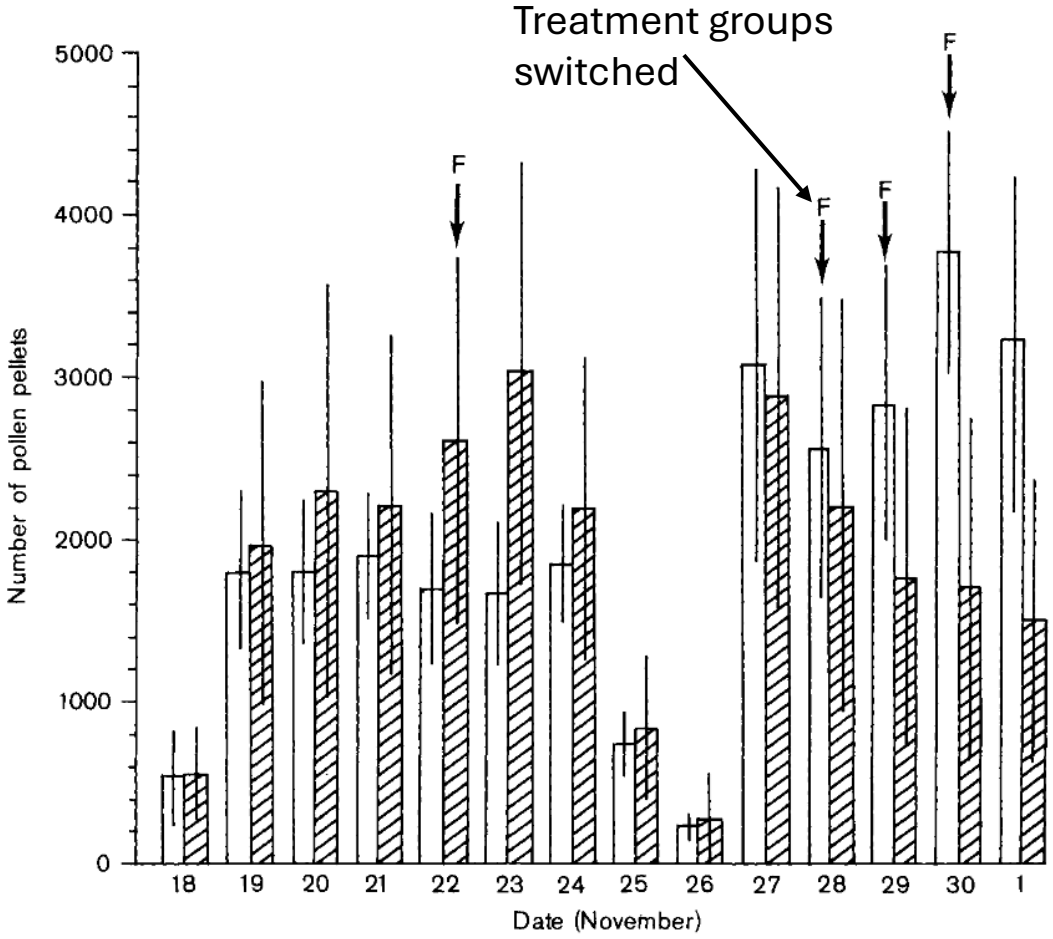


Fig. 1 Histogram of the average number of kiwifruit pollen pellets collected each day (clear bars = group A: hatched bars = group B; vertical lines = 95% confidence intervals; F = days when the group indicated was fed).

Goodwin, 1986

Feeding pollen substitute decreased the collection of other pollen other plants.

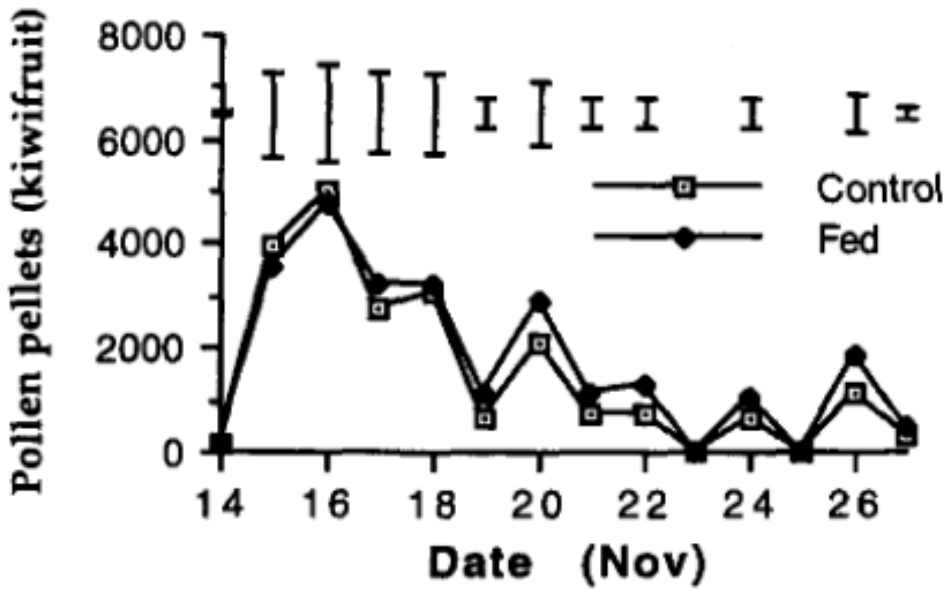


Fig. 1 Average number of kiwifruit pollen pellets trapped per day from control colonies and colonies fed pollen substitutes. The colonies were fed from 14 until 27 November. The vertical lines represent SED values.

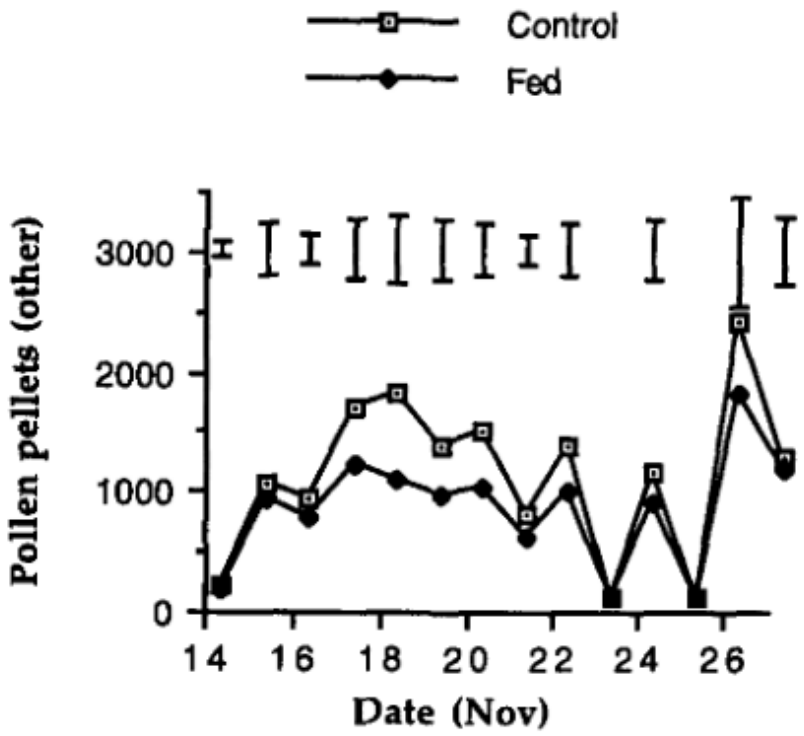


Fig. 2 Average number of pollen pellets other than kiwifruit trapped per day from control colonies and colonies fed pollen substitutes. The colonies were fed from the 14 until 27 November. The vertical lines represent SED values.

Goodwin et al., 1994

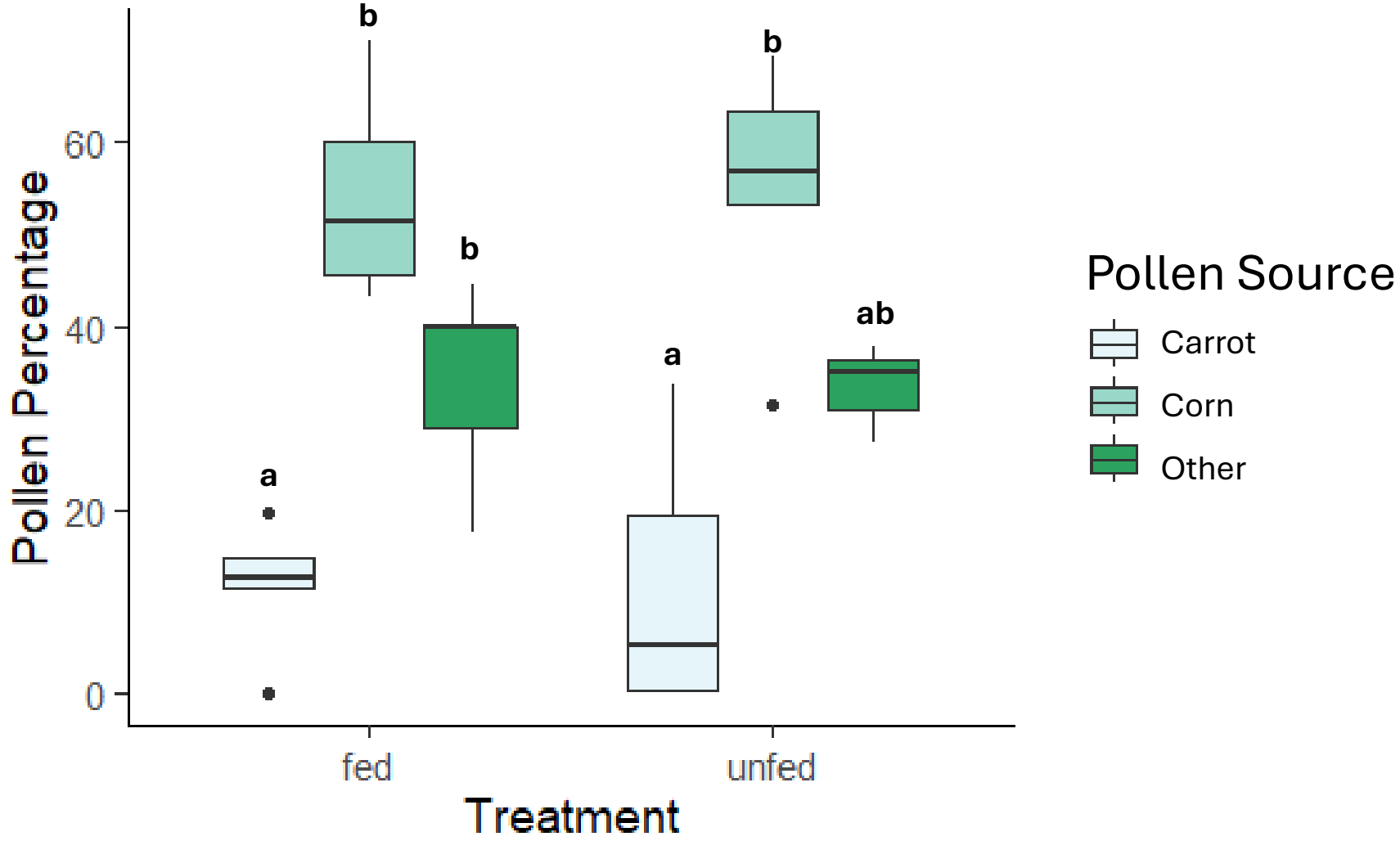
Hypothesis: Providing supplemental in-hive feeding will remove their need to forage at longer distances.

Summer 2023

Colonies were fed sugar syrup and pollen substitute each week during carrot pollination.

Pollen traps were used to collect pollen from foraging honey bees.

Feeding during carrot pollination did not significantly impact pollen diversity.




Summer 2024

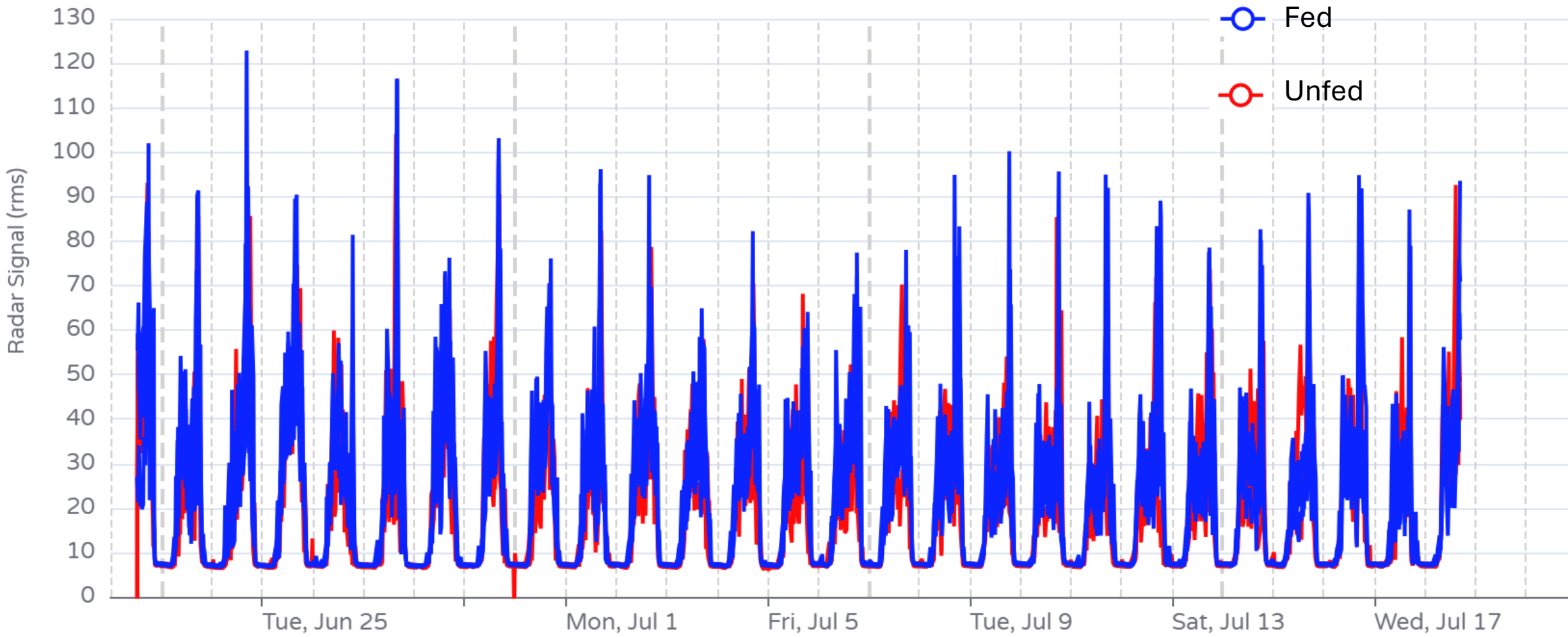
In 2024, feeding began during almond pollination.

The waggle dance is used to communicate the location and quality of a resource

Waggle Dance Game: https://askabiologist.asu.edu/bee-dance-game/how-to-play.html

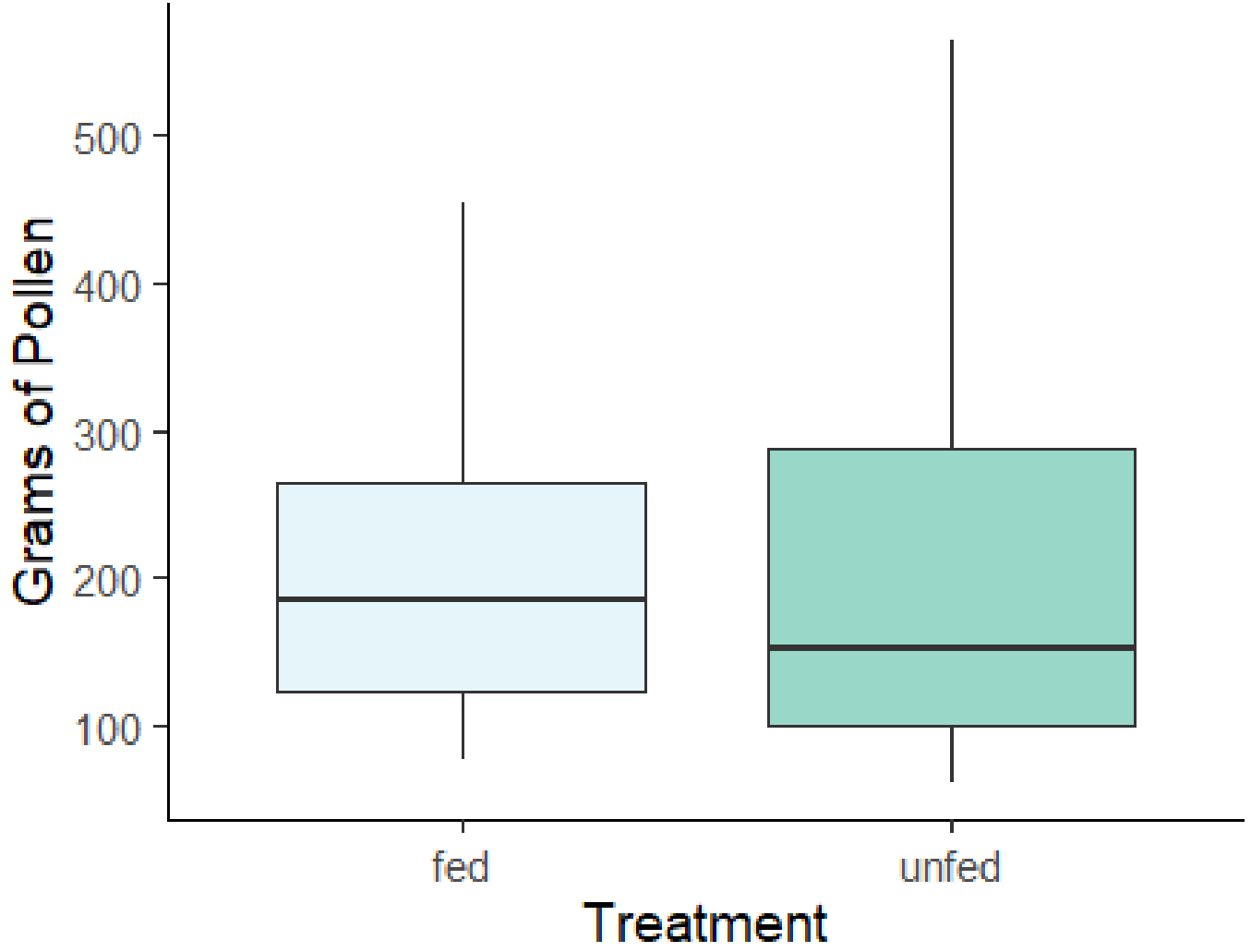
Pollen traps, activity monitors, and observation hives were used to track behavior.

Feeding had no significant impact on activity.

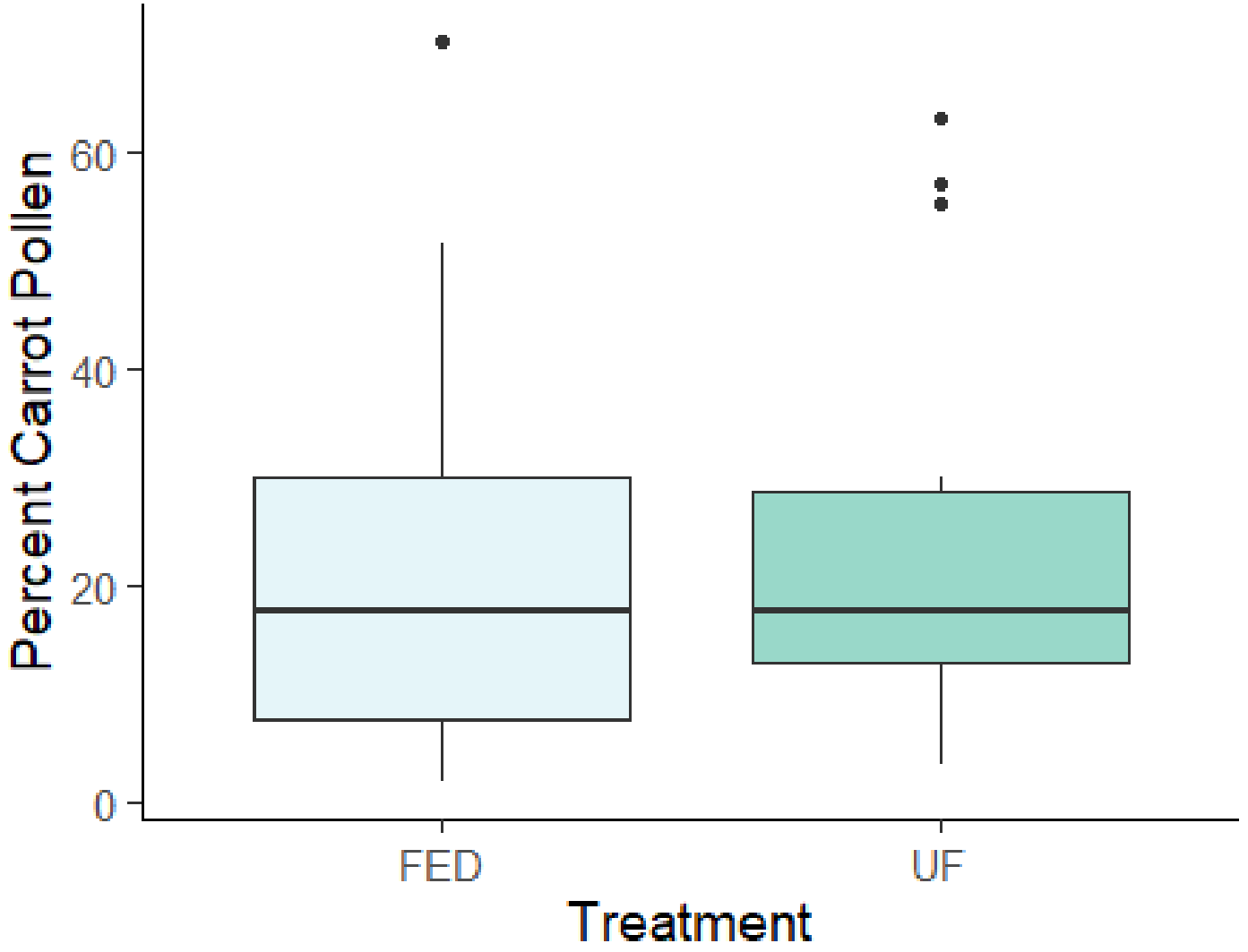


The design of our observation hives prevented us from recording waggle dances

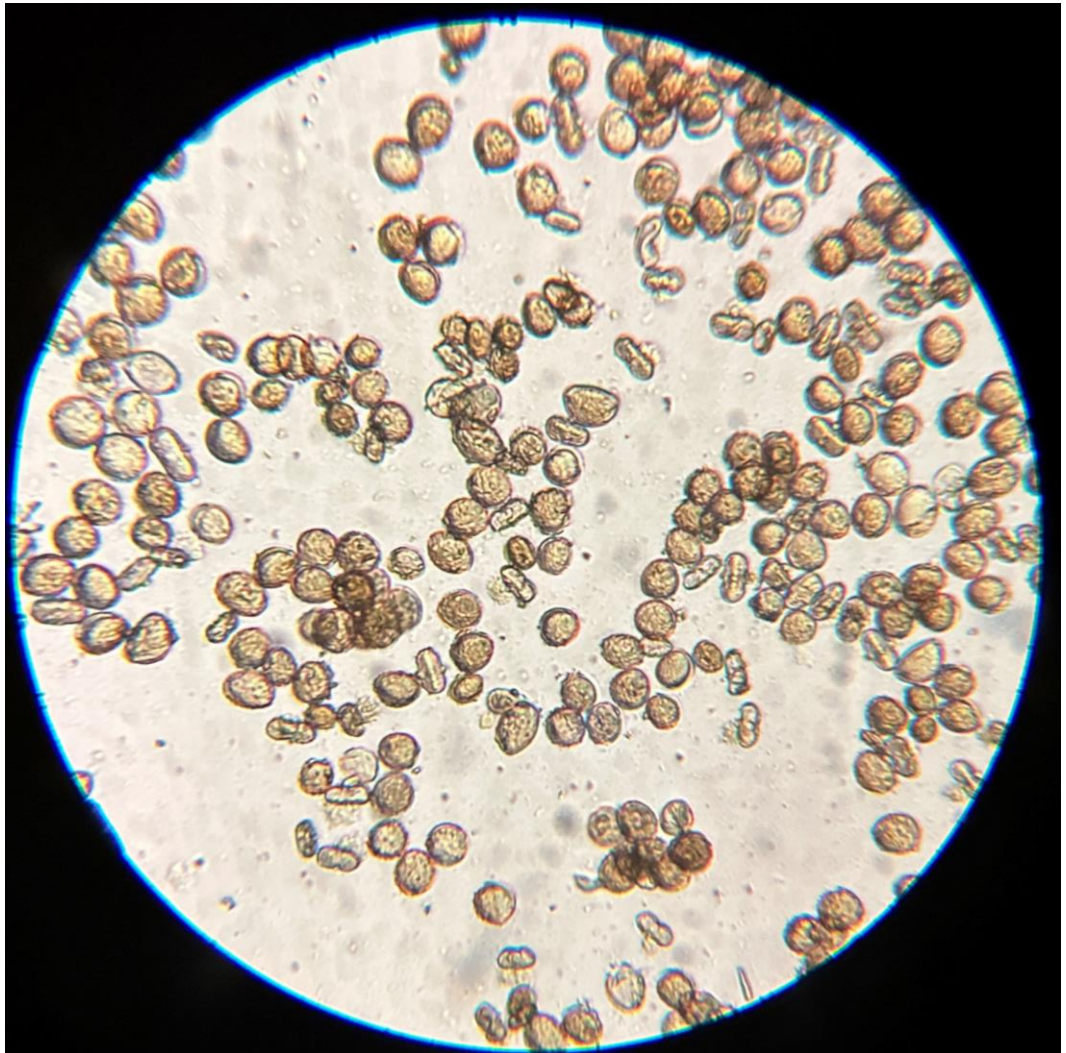
Feeding had no significant effect on the amount of pollen collected by colonies.



Feeding had no significant impact on the diversity of pollen collected by foragers.



Asparagus and corn pollen were the most common off target pollens.



The nearest asparagus field was 4.7 miles away.

Planting additional forage has been shown to improve pollination and pollinator health

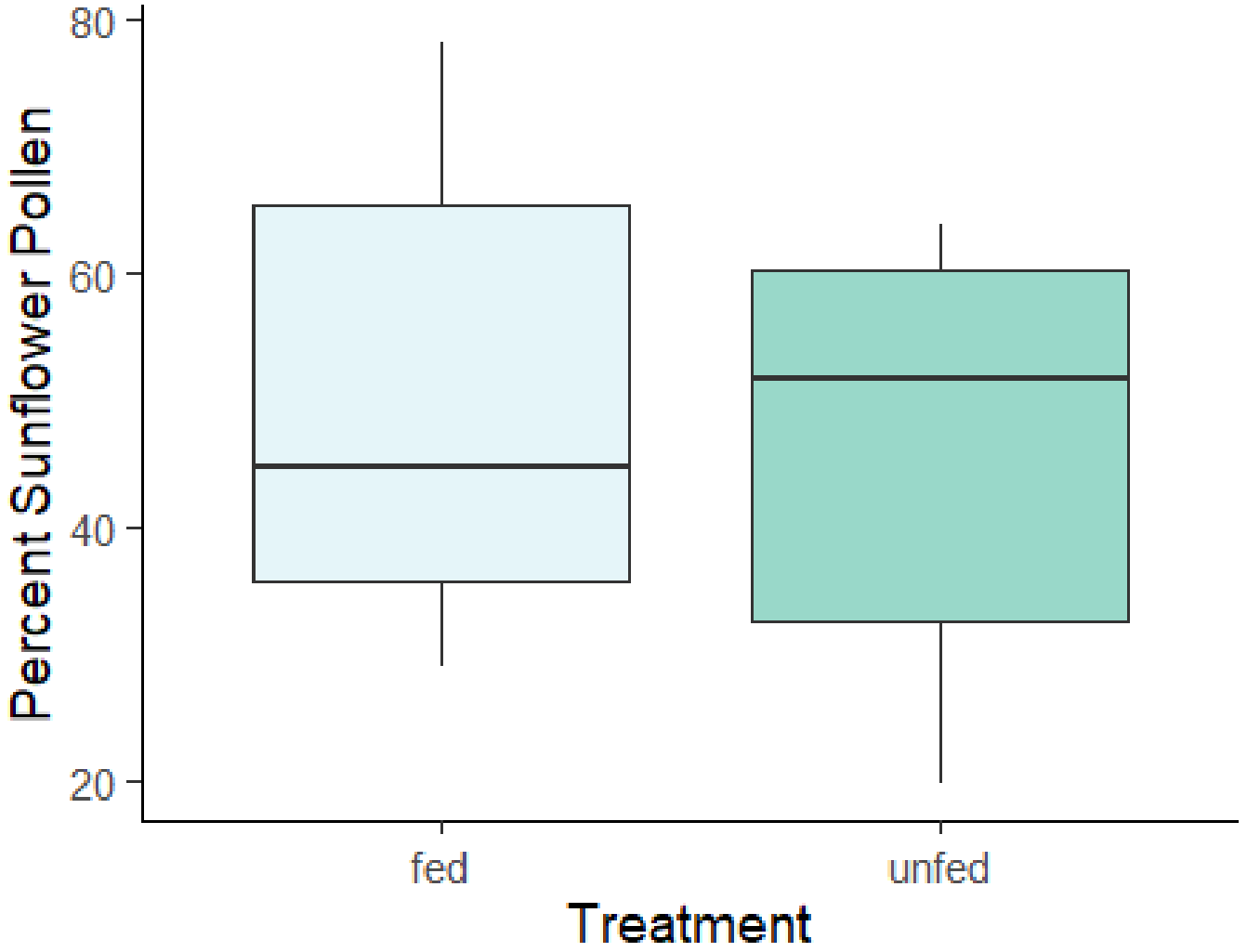
Schulte et al, 2017; Zhang et al, 2023; Pereira et al., 2015

Colonies were also placed on a hybrid sunflower seed field.

New observation hives were designed with complete visibility.

Pollen traps were used to collect pollen from foraging honey bees.

Feeding had no significant impact on the diversity of pollen collected by foragers.



Approximately half of the collected pollen came from tumbleweeds.


Summer 2025

Honey bee foraging behavior is influenced by food stores within the hive.

Colonies with large amounts of space forage at a higher rate.

Colonies with little space decrease foraging.

Hypothesis: Colonies with less open space will forage at a lower rate and remain closer to the hive.

Twohoneys bee co.

Colonies will be given large amounts of empty comb or pollen and honey.

Pollen traps, activity monitors, and observation hives were used to track behavior.

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Questions?

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