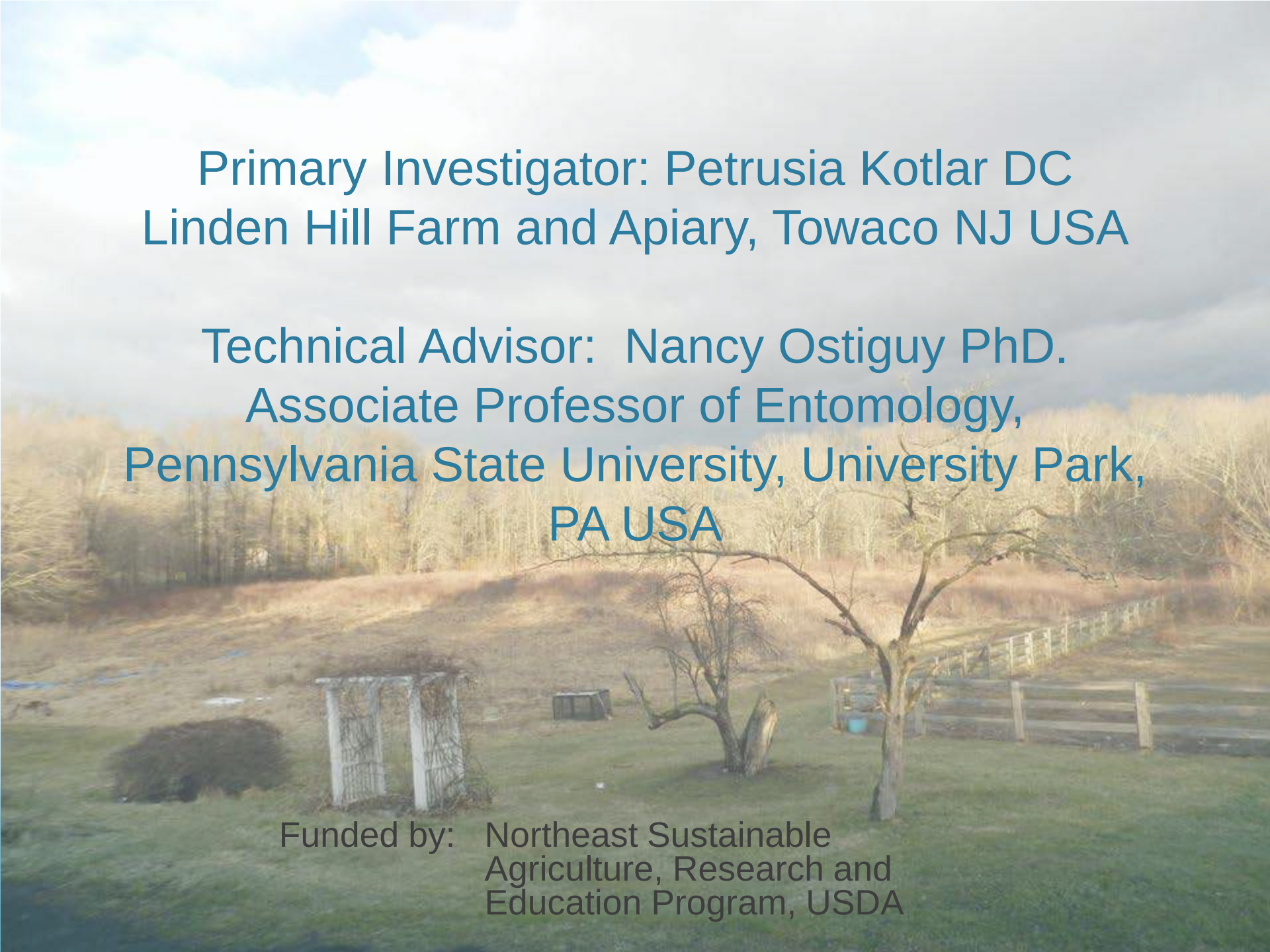
Alternative Honeybee Nutrition

Beyond Sugar Syrup



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Funded by: Northeast Sustainable Agriculture, Research and Education Program, USDA

Honey Bee Nutrition

- Lack of adequate natural forage
  - Monoculture farming
  - Weather
- Feeding honeybees syrup & artificial pollen – economic but...
  - refined sugar cane
  - beet sugar
  - HFCS (high fructose corn syrup)
- Feeding of artificial syrup, candy and pollen widely taught to novice beekeepers (U.S.A.)
  - Widely practiced by experienced beekeepers too
  - Recommendations can be 45-136 kg/colony

METHODS

- Twelve honeybee colonies starting with 1.3 kg (3 lbs) of bees
- Upon installation of packages, 50 bees per colony analyzed to determine varroa mite, tracheal mite, and Nosema levels
- Random assignment of treatments
  - Treatment groups: No supplemental carbohydrates, sugar syrup, sugar syrup w/ Linden
  - Syrup applied: April, May (3), June, July, August, October (2)
- Varroa and general health parameters monitored from April 2012 until February 2013 (sole remaining colony continues to be monitored)
- Upon death, Nosema & tracheal mites were determined from a sample of 50 bees
- Comparison of a sample of honey (July) from each colony

Initial Hive Parameters

- Brood: 10 frame deep
  - 1 frame of drawn comb
- Super: 10 frame medium
- Foundation: beeswax coated plastic
- Screened bottoms
  - Mite board tray

Study Location

- New Jersey (east coast of USA)
  - Suburban area
- Bee house
  - No electric fencing required
  - Distinctive entrances for each colony
- South, west, & north facing entrances

TEST GROUPS

- Four colonies per treatment
- 1:1 sugar syrup April-August, 2:1 Sept & Oct.
- 2 gallon feeder pails placed directly onto frames
- TEST GROUP 1:
  - plus concentrated infusion of linden flowers and leaves (Tilia sp.)
- TEST GROUP 2
  - sugar syrup only
- TEST GROUP 3- controls.

Chemical Composition of Linden Infusion

- Linden flowers and leaves of *Tilia cordata*
- Contains **Farnesol**, a volatile oil which gives Linden flowers its characteristic smell.
- Antibacterial and natural pesticide/miticide.
  - Contains flavonoid glycocides including hesperidin and quercitin
  - Other flavonoids include astragalin, isoquercitin, kempferitin, quercitin, tiliroside, hydroxycoumarins
  - Other compounds include saponins, condensed tannins, mucilage, manganese salts.

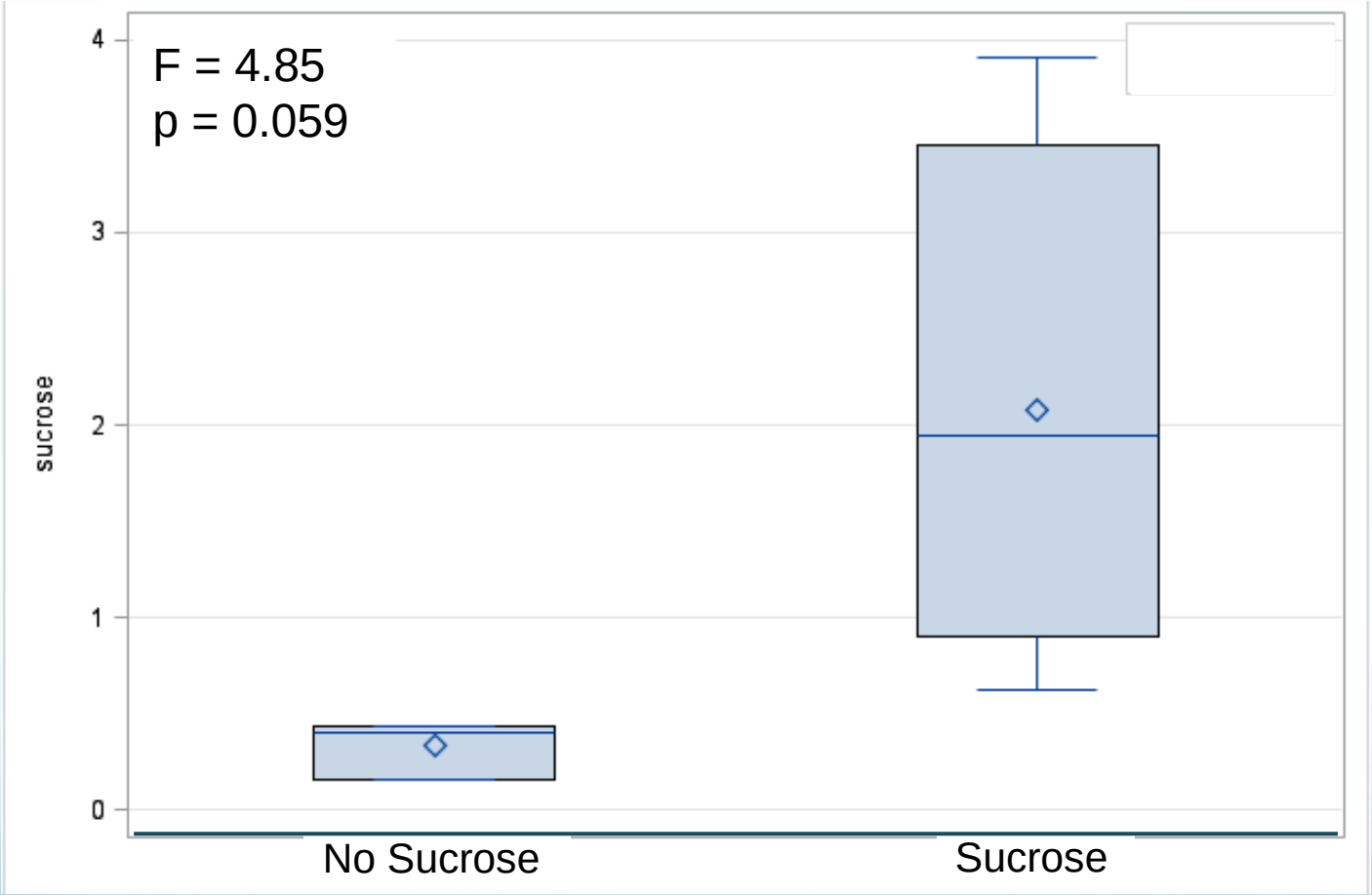
Results

- Nosema disappear over time (Colonies were not treated.)
- No tracheal mites
- Survivorship until November was not impacted significantly by treatment (p=0.71)
  - 50% of controls were dead
  - 15% of sucrose fed were dead
  - None of sucrose/Linden fed were dead
- One colony (Linden treated) survived winter

Results

- There was a non-significant trend towards fewer mites in the colonies treated with linden.
  - Control – 201.3 $\pm$ 280
  - Sugar only – 157.7 $\pm$ 121.1
  - Sugar plus linden – 99.8 $\pm$ 99.7
- There was an interaction between treatment and colony strength on the number of mites ($p=0.047$).
  - Weak colonies (those with the smallest number of bees) had fewer mites ($p=0.03$)
  - The effect of colony strength on mite numbers was not the same across treatment. More mites were observed in the weak control colonies than in the linden or sugar only treated weak colonies.

The amount of sucrose in honey is greater if bees are fed sugar syrup



Conclusions

- While linden-infused sucrose syrup may have a positive impact on colony health and survivorship, a larger sample size would have been required to determine if the impact was statistically significant.
- The quantity of sugar syrup provided to colonies was substantially less than the amount used by some American beekeepers.
- Nearly all colonies dying overwinter contained sufficient quantities of honey that starvation was not the primary cause of death.

THE END