*2023 Winter Observational Study Proposal*

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Goal:

* Refine the Winter VPD table to help beekeepers interpret temp and relative humidity measurements.
* Continue to refine our understanding of winter colony thermodynamics using colony configurations that have been studied since 2021.

Output of the study (All available on nh-honeybee-health.com)

* Livestream Broodminder graphs and study description throughout the winter.
* Produce an updated/refined VPD table, with a detailed analysis of the data and a summary presentation that can be presented at bee club meetings.

Methods:

* Number of Colonies: *n=*3 colonies of approximately the same health and strength (i.e., number of bees).
* Location: Gilmanton NH
* Orientation:
  + 2 colonies facing south
  + 1 colony facing north
* Configuration:
  + 4 mediums
  + 1 ½” feeding shim below inner cover
  + Closed bottom board
  + Top & bottom entrances
    - Bottom entrance: ½ oval (1/2”x3/8”)
    - Top entrance : ½” x 3/8” with a wind diverter
  + Wrapped with a tall colony quilt under a bee cozy (R11.7).
  + 3” polystyrene on top of inner cover (R15)
  + Hive stand wrapped in reflectix.
  + Reflectix “shingled” over the wrap to prevent snow/rain from getting between wrap and woodenware.
  + NO slatted racks will be used.
* Other:
  + Winter feeding: sugar bricks will only be added if the bees have moved up to the top box.
  + Will (at a minimum) document the content of the box4 frames as late in October as the weather permits.
  + Will take infrared pictures of the colonies on a cold night before winterizing the colonies.
* Colony names:
  + Sask2 (used in 2021 wrap study and 2022 ventilation study, 2020 Saskatraz queen?).
  + Sask3 (used in 2021 wrap study and 2022 ventilation study, 2022 Northern queen).
  + Stalker (used in 2022 ventilation study, 2021 Northern queen).

Note: Northern queens were raised by the colonies. The two older queens have a good laying pattern still but may have been superseded at some point that went undetected.

Configuration for each colony:

* Box2 : T/RH sensors on N, S, E and W sides – same locations as Winter study (12 sensors)
* Box3 :
  + T/RH sensor W side
  + Temp only sensor E side
* Box4 :
  + All colonies T/RH sensors on N, S, E and W sides – same locations as Winter 22 study (12 sensors)