Pennsylvania Queen Bee Improvement- Evaluation and Cooperation

The Pennsylvania Bee Keepers Association (PSBA) is launching its Pennsylvania Queen Bee Improvement Program. The goal of the program is to develop/breed honeybees that are: resistant to varroa mites and brood disease requiring little or no treatment, hardy with at least an 80% overwintering survival rate, gentle, and produce honey. Over the past several years PSBA members with help of PSU and USDA Sustainable Agriculture grants, have been evaluating different genetic stocks for their ability to survive Pennsylvania winters and other environmental stressors. Both beekeepers and queen-producers worked together on this project. Preliminary results are positive and PSBA wants to expand the field trials by seeking new participants.

The spirit of willingness to share their quality stock with others in order to move the breeding effort forward is a must. New participants should desire to improve Pennsylvania stock by evaluating either their current stock, and/or stock they receive from the program and by sharing of quality genetic stock with others. There are a variety of ways to share genetic stock either by distributing queens, virgin queens, queen cells, eggs/larvae frames for grafting or drone semen for artificial insemination.

YEAR 1-Measuring, Evaluating and Producing Queens

Queen bees of promising genetics either currently owned by or recently received by participants will be field measured. As the colonies grow, the participants will evaluate the quality of each colony using the easy field evaluation methods described below.

The colony and queen bee evaluation techniques used in this field trial are industry recognized methods and should be familiar to most proficient beekeepers. The measurements are easy to perform and easy to record.

Measurement Dates
The life cycle of honey bee colonies is inherently seasonal, related to day length, temperature, food supply, and rainfall. Therefore, the dates we have chosen for performing field measurements are tied to the two specific bench mark periods: Summer Solstice (June 15-30), and Fall Closure (September 15-31). The exact date within these ranges is based on weather, geographic location and other factors.

Measurements
New participants will measure the following five indicators for each colony.

1) Strength-The hive strength will be determined by counting and recording the number of: 1) frames of eggs/larvae/sealed brood, and 2) frames of honey/open nectar in the colony on both measurement dates specified above. The total is recorded as a whole number for each (ex. brood frames= 4, honey frames=7).

2) Honey- Excess honey will be removed, weighed and recorded in 10 pound increments (ex. 25 pounds of honey would be recorded as 2.5).

3) Overwintering- Each year a colony survives with the original queen, they will be scored one point (+1).

4) Mites-The mites will be assessed using the "sugar roll" method. The assessment is made by collecting 1/2 cup of bees placing in a quart jar and coated with powdered sugar, and the number of mites will be counted and recorded. Mites will receive a negative score per mite (ex. 5 mites would be recorded as -5).

5) Treatments - Hive treatments for varroa mites optimally would be zero. However, this is very limiting for beekeepers who would like to participate in the program. So, scoring will be negative one (-1) for each IPM/soft treatment (ex. formic acid, oxalic acid, MAQS, and drenches). Miticides using more toxic active ingredients will be scored (-2) for each treatment. We understand that high pre-winter mite populations, result in low survival rates, and because of this some valuable lines have been lost by not allowing limited mite control methods.

Data Evaluation
The data will be entered into an online database and used to calculate a Quality Score (QS). The Quality Score is the sum of:

QS = Strength + Honey + Overwintering + (mites) + (treatments)

Typical scores are usually between 1 and 10 making it easy to evaluate the quality of the genetic lines.

Selection and Distribution
Colonies with high Quality Scores will be selected and queens will be produced from them. These queens will be distributed back to program participants to preserve the genetics for field trials and the next round of evaluation/selection/production. The highest quality genetic lines will be advanced either by grafting larvae for queen rearing and/or Artificial Insemination (AI).

Over Wintering
The ability for a colony to survive a northeastern winter is important. Adequate honey will be left on the colony for winter survival. Sugar and protein supplements can be used in the colonies in preparation for winter if necessary. If the colony survives, it will be entered into Year 2 for evaluation; if it dies it will be recorded as well. The cause of death will be determined if possible and recorded.

<u>YEAR 2</u>
The colonies that survive the winter will be evaluated using the QS method, and if viable, will be field trialed for a second year. High Quality Score colonies will be selected and moved to the field trial by: 1) producing queen daughters, and/or 2) using drone semen for AI.

Open Source and Ethics
As PSBA beekeepers, we strive to produce a better Pennsylvania honeybee. We all benefit by increasing the overall strength of Pennsylvania bees. In the spirit of cooperation, no individual should attempt to hide or hoard their stock to gain advantage. Nor should anyone be expected to work for free; postage and nominal charges are allowed for program participants depending on level of participation. Breeders are encouraged to produce as many queens as possible from any quality stock they currently have available in their yards for use in the program.