

Cornwall Bee Improvement and Bee Breeders Group

(affiliated to BIBBA)

Varroa Tolerance Project

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Welcome to the group. We have a long haul to develop strains of bees that can keep varroa numbers below the level which brings virus damage and colony collapse to our bees and that can repopulate the wild. It can be done. In Austria, Wallner made it with his Carnican bees. In Germany, Franz Lips made it with *A.m.mellifera* (our native race). In Yorkshire, John Dews, with the help of Albert Knight, is close with native bees selecting for the traits of hygiene and grooming with mite damage. In the U.S., Harbo and colleagues have concentrated the Suppressed Mite Reproduction (SMR) characteristic and Marla Spivak on hygiene. Now many beekeepers are combining the best colonies, including those sourced from Russia, and the Harbo's and Spivak's bees as well as other strains and working from there. Jack Griffes is facilitating a beekeepers' co-operative project along similar lines to Wallner, Dews and Lips in the U.S. We believe that if they can do it, so can we - for Cornwall. We can do it by gathering a large number of colonies and a large number of beekeepers using our resources, together with our love and enthusiasm for our bees, to select and breed from promising stock. We can help each other to do this by linking together in small groups networking to interchange methods, results, lessons and breeding stock. Though it will be a long haul, we expect to learn a great deal together about breeding and improving our bees, assess a variety of ways to manage varroa and enjoy the process.

Vision. Our vision is of beekeepers in Cornwall working together in small support groups supported by and linking with all other groups. We hope at least 50 beekeepers with at least 500 colonies spread around Cornwall will join us. The more beekeepers working with greater vigilance, the more likely we are to find those special bees that will need less frequent treatment and at some point, those which survive with no treatment at all. We are well placed to apply for and receive grants to support the work. We invite members of all associations active in Cornwall, notably WCBKA and CBKA, plus individual members of BBKA and BFA together with non-members to join us. We welcome constructive links with the parent Associations and their Committees including support for and publicity about seminars and teach-ins on the subject of Bee Improvement and varroa tolerance.

Native bee characters. So, this group exists with the sole purpose of improving bees in Cornwall. It brings us together to identify and breed from our best colonies in a co-operative project. It is based on open mating of virgin queens with local drones. Membership is therefore limited to beekeepers who use local bees rather than Italian, Carnican, Buckfast or other non-native bees unless they are willing to replace their queens with locally selected and reared queens using locally selected and reared drones. Our experience is that the Cornish climate selects for the well-known characteristics of *Apis mellifera mellifera*. This does not absolutely preclude involving non-native stock in the initial selection phase. It does however preclude importing further new non-native or other bees into the project which have had no selective

breeding for varroa limitation. We aim to conserve our local bee, which we believe is best suited to the harsh climate (for bees) of Cornwall and the most productive bee and is the only sustainable approach to improve our bees. It is up to the breeders of Italian, Carnican and Buckfast bees to do the same for their stock. We would like to recommend the local bee, which when selected, can give surprisingly high harvests (160lb plus throughout an apiary).

Objective. The Group's Constitution gives our object as: to support beekeepers to improve the health, survivability and productivity of Cornish honeybees and to maintain the contribution to general biodiversity and that of the *Apis mellifera mellifera* gene pool by sustainable development of bees and beekeeping.

The Group will provide:

- the means to monitor and assess colonies' ability to maintain health, handle varroa, survive Cornish weather patterns, produce honey and provide pollination;
- assistance to select breeding colonies on all characters promoting health, survivability and productivity;
- support for breeding programmes and dispersal of improved stock around Cornwall.
- educational activities to foster relevant skills and
- a forum for exchange of information about progress.

Our agreement. By joining, you agree to these objects and commit to contributing to the group and learning together. You agree to monitor the natural mite fall in quantity and quality throughout the season and at least before you apply any mite treatment. You agree to use a protocol which we develop together after careful review of the data we gather and our experience of the methods we attempt.

You and we agree in respect of each colony to:

- (1) fit mesh floors with mite collecting trays (such as sliding boards) to all participating colonies (floors may be rotated between colonies if necessary)
- (2) monitor mite fall and estimate the numbers falling naturally throughout the season regularly (weekly if possible)
- (3) take at least one sample of all fallen mites, before any treatment is applied to reduce the total mite population in the colony and at any other time the mite fall increases significantly (more often if possible)
- (4) examine a suitable sample (e.g. of 100 mites) under magnification for leg and carapace damage (by agreement this task may be passed on, but participation will enhance ownership of the results and development of the protocol)
- (5) make colonies available to the group for breeding queens and drones both in the member's apiary in which the colony stands and to other members and locations for daughter queens to mate
- (6) replace queens in colonies which have highest mite counts and least mite damage with queens of superior mite tolerance
- (7) contribute to discussion of the methods used and results obtained to improve the methods, protocols and designs.

Mesh floors to a group design may be given free of charge, from grants obtained for that purpose. In this case the

above practices are required as a return for the free floor. Microscopes will be available to each working group.

You also agree to:

(8) review our current practices for treating colonies for varroa and discuss alternative practices with a view to agreeing a varroa treatment which allows the agreed monitoring strategy to be sustained. It is expected that members between them will cover a range of alternative practices which are effective with mites already resistant to synthetic pyrethroids and will provide data to help determine best practices.

We hope members will recognise that Integrated Pest Management will be best practice (to use a suitable treatment when mite populations are close to the threshold level) and that sustaining higher mite populations (below the threshold level) is more likely to show up the presence of grooming behaviour which produces mite damage. We recognise that participating beekeepers will wish to have maximum freedom of choice to maintain their own independence. Nevertheless, we intend to review the range of characters involved in selecting our breeding stock and include productivity as a major criterion. We also intend to share and review all practices designed to increase colony productivity.

(9) Beekeepers whose floors were provided through a grant from Penwith District Council must agree to this condition.

(10) It should be obvious that money from sales of queens from stock bred in a co-operative project should accrue to the Group and that individual members should not profit from the arrangement unless the membership agree that the member concerned has indeed put into the project sufficient work to justify this. In this case, any excess over the normal charge for improved varroa tolerance would be given to the Group to further our objects. The same applies to sales of publications from Group members about the work of the Group.

Collecting and examining Mites

Preliminary. Trays under mesh floors will be cleaned after each mite count and collection and at other times to ensure that no wax moth breeding is encouraged: weekly cleaning is recommended during the breeding season, along with weekly counts. Mesh floor trays may be removed between assessments so the hive works with an Open Mesh Floor throughout the season or part of the season. In this case a sample period of 2 days every 7 or 4 days every 14 days is recommended.

Protocol. Mites will be counted weekly if possible. A sample will be removed for later examination at least when daily mite fall rises to an agreed value. Daily mite fall is recorded against the date of counting for that hive, preferably added into the normal hive records. Mites will be examined with a magnifying glass to determine the extent of damage. (Keen beekeepers with low hive numbers and sufficient available time may count mites and take samples from hives on a daily basis to add to the collection from those hives. Prior to opening a hive, examination of the debris with a magnifying glass may show immature mites in one or more locations together with parts of pupae cut out by bees. These will indicate removal of pupa and mites together. Such mites may be damaged, even severely. On opening the hive, knowledge of where these clusters were, can assist

identifying the exact location of the cell from which the pupa and mites were taken.)

All mites will be removed either by scraping the debris into a plastic sample bag which can be provided, or removed individually into the sample bag such as with a small paint brush (0 or 00).

Plastic bags will be sealed and marked or labelled at the time of sampling with a permanent marker giving the date of sample, a unique hive reference and a beekeeper name. The number of days the mite count covers will also be noted from the hive records. All samples should deep frozen to kill any living creature (some may damage mites).

Normal hive records will be adapted to include mite count, estimates of the colony size including the amount of drone brood present, and other criteria developed by the group (see below).

Samples not separated in situ by a small brush, will be separated later by an agreed method such as methylated spirits/water. This and the following can be done in a group setting where members will encourage each other, share responsibility and reduce the work.

Samples of 100 will be mounted for examination under the microscope. Plates will be labelled with a unique sample reference.

Samples will be examined on the carapace for dents and underneath for leg damage. The % will be recorded.

Selection and breeding

Hives will be selected after careful discussion as having the best breeding potential on all agreed criteria.

Criteria will include the following: lower mite populations (as determined by mite fall or other additional means); mite damage; hygienic behaviour; cool/wet weather flying of workers, queens and drones (also early and late in day); good productivity; ease in management; good winter honey/pollen storage; economic use of stores; rapid spring build-up.

Some hives will be allocated for drone rearing - others for queen rearing. Some may be used for both.

Group help will be available to optimise success in breeding such valuable queens and drones.

A variety of methods may be used to suit members' skill and preference.

A proportion of the reared queens must be made available for distribution to other areas to reduce local inbreeding and to maximise distribution of valued characters in the population both for honey and wax production, further development and drone production (spreading the characters around Cornwall).

Enlarging the Group. All members are invited to encourage other beekeepers to join the project. It will only be with concerted effort that we can improve the bees' ability to survive without treatments. All beekeepers in Cornwall will benefit from our work since we expect to tell our drones to be vigilant and catch all virgin queens around and so pass on their attributes.

Future updates. We expect members to contribute reflections and opinions about procedures and practices throughout this project. In particular, improvements to practice, guidance on queen rearing and progress reports will be published from time to time as a PDF file for email and hard copy for posting, also for our website at <https://www.cbibbg.co.uk> (send an email to james@cbibbg.co.uk to join.). Page corrected 29/03/23.