



National Bee Unit

Using artificial swarms for *Varroa* control

October 2024

Artificial swarms can be used to control swarming or increase colony numbers. However, with a few adaptations they can also be used to control *Varroa* mite numbers in a colony. This fact sheet provides step by step instructions on how to perform artificial swarms for *Varroa* control.

The principles behind the artificial swarm

The artificial swarm can be used to control swarming or increase colony numbers as a normal part of colony management. This modified method creates a broodless period that can be manipulated to control *Varroa* mite numbers.

Varroa are parasites of honey bee brood. They are attracted to the brood cells and reproduce inside the cell once it is capped. A brood break reduces the number of mites in a colony by interrupting their reproductive cycle. However, it will not kill all the mites in the colony because they can survive for weeks on the adult bees and re-infest brood cells when the queen recommences laying. The mites favour the young nurse bees and become attached and hidden beneath their sterna and terga (body segments) to mature and feed on the fat body of the bee¹. 'Bait' combs of brood can be added to a broodless colony to attract these mites that need to enter brood cells to reproduce. The bait combs are destroyed when capped, ridding the colony of extra mites, enhancing the effects of the broodless period.

This artificial swarm method separates the queen and the flying bees that have a relatively low *Varroa* load from the brood and young bees with a high *Varroa* load. The aim is to make up two colonies: one with the old queen (that continues to lay) and the flying bees and another with sealed brood, nurse bees and no queen; this colony will then raise emergency queen cells. The colony with the queen donates brood frames to the second colony, which has a higher *Varroa* load, and they act as bait combs and along with the vast majority of the *Varroa* mites, are destroyed after capping.

¹ Ramsey, S. D., Ochoa, R., Baughan, G., Gulbranson, C., Mowery, J. D., Cohen, A., ... and vanEngelsdorp, D. (2019) *Varroa destructor* feeds primarily on honey bee fat body tissue and not hemolymph. Proceedings of the National Academy of Sciences. 116(5). DOI: doi.org/10.1073/pnas.1818371116

How to perform an artificial swarm

Before getting started, you will need the following materials:

- A new hive, containing drawn brood comb (preferably) or foundation; or a combination of both
- A queen excluder, crown board, and roof
- If there is no honey flow, you will also need a feeder and 4.5 litres of strong sugar syrup. This is made using 1 kg of white granulated sugar dissolved per 630 ml of water (or 2 lb sugar to 1 pint of water)

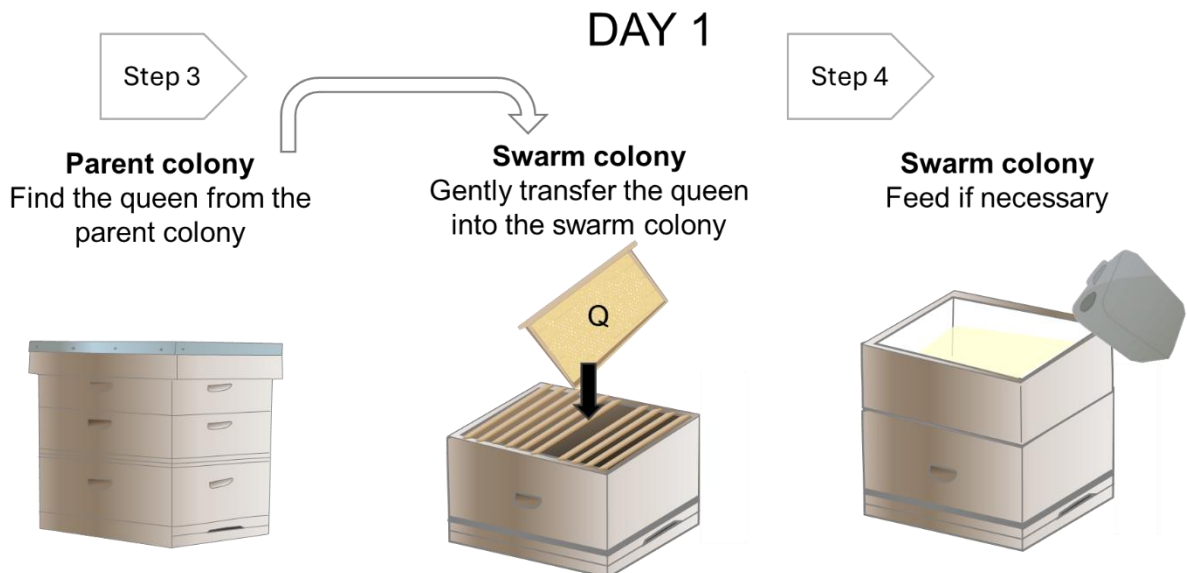
DAY ONE

1. On day one move the colony you have selected for artificial swarm a few metres away from its original location. This colony is the '*parent colony*'.



2. Place the new hive at the site of the original parent colony. To prevent the queen and flying bees from absconding, a queen excluder can be placed between the floor and the brood box. This is especially important if using foundation rather than drawn comb.

3. Find the queen in the parent colony and transfer her to this new empty hive — this is the '*swarm colony*'. Do not transfer any brood into the swarm colony. Foragers will return to this swarm colony because they know this site, creating the artificial swarm. This swarm colony should not contain any queen cells. If there are any swarm cells in the parent colony, leave one good quality queen cell.



4. Unless there is an adequate nectar flow, the swarm colony will need to be fed 4.5 litres of strong sugar syrup. If using foundation, and not drawn-out frames, the feed will stimulate the bees to draw out good, even combs. Do not give the swarm colony any supers at this point so the bees are forced to concentrate on drawing new combs in the brood box. Bees will only draw out new comb if they need it; you are creating a situation to achieve this. Bees are more likely to make wax in complete darkness² so it helps to ensure that the removeable *Varroa* floor insert is in place (if you are using a hive with an open mesh floor) for a couple of weeks.

² Morse, R.A. (1964) The effect of light on comb construction by honeybees. Journal of Apicultural Research. DOI: doi.org/10.1080/00218839.1965.11100098

DAY NINE

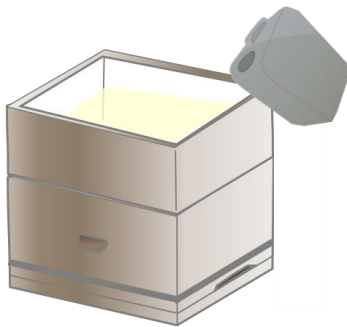
- On day 9, remove *all but one* queen cell from the parent colony (leaving two cells runs the risk of a swarm leaving the colony when the first of the two queen cells hatch). If there are many queen cells, spare ones can be cut out and used in nuclei or mini-plus mating hives to raise queens for re-queening/increases later in the season.

DAY 9

Step 5

Parent colony

Remove all but one queen cell from the colony

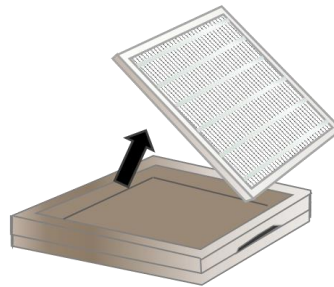


Feed if necessary

Step 6

Swarm colony

Check that there is drawn comb and brood present. If so, remove queen excluder



Remove queen excluder from entrance

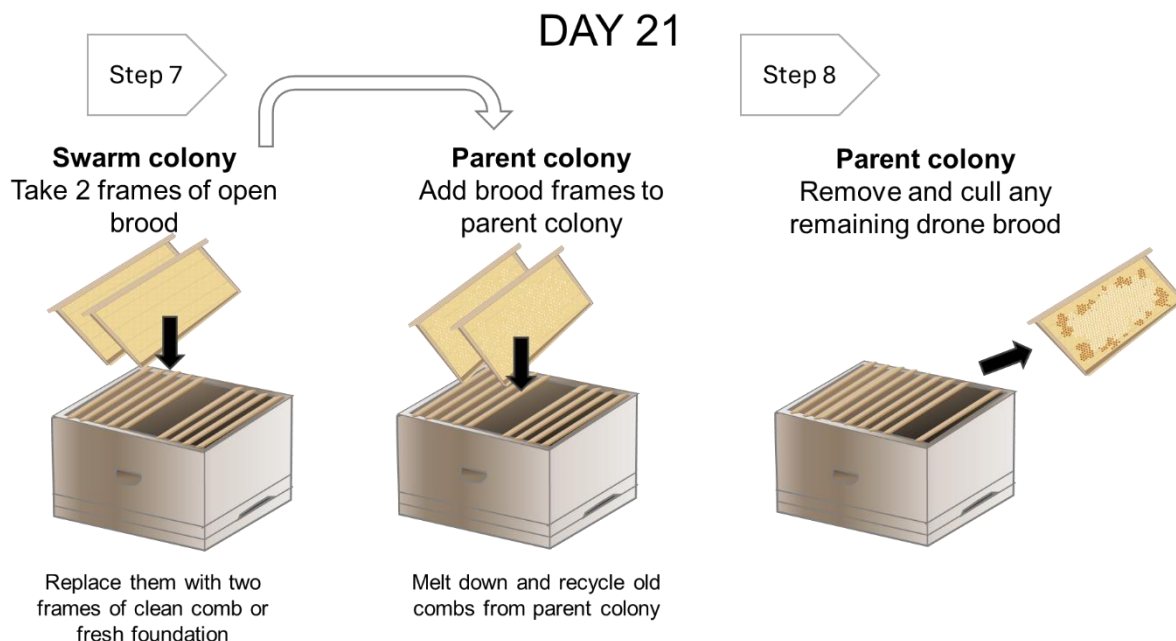


Reassemble the hive

- Examine the swarm colony and check that there is drawn comb and brood present. If there is, the queen excluder (if used) can be removed from underneath the brood box. If brood is not yet present, check again on a later day and remove the queen excluder when brood can be seen.

DAY TWENTY-ONE

- On day 21 all the brood from the parent colony will have hatched and the colony will have a virgin queen. Transfer two bait combs of unsealed brood from the swarm colony into the parent colony. Replace the frames in the swarm colony with clean comb or fresh foundation. The two old combs that have been removed from the parent colony can be melted down and recycled. Feed if required.



- Examine the parent colony to make sure all worker brood has hatched. Any remaining drone brood should be culled using a *Varroa* uncapping fork because it is likely to contain many *Varroa* mites that should not be released back into the colony. To do this, use an uncapping fork and slide it under the drone brood cappings. Use a gentle twisting motion to prise out the drone pupae and transfer them into a lidded container for destruction later by freezing or burning.



Figure 1: Remove any drone brood with an uncapping fork and dispose of it.

DAY THIRTY ONWARDS

9. On day 30, take out the capped bait combs from the parent colony and destroy them by freezing or burning. Do not allow the brood to emerge, otherwise the mites trapped inside will re-infest the colony.

The new queen raised by this colony should be mated; check that she is laying eggs. If she is not, check back in a few more days to look for eggs. Once it is confirmed she is laying eggs, check back in nine or ten days and if she has a good brood pattern, keep her.

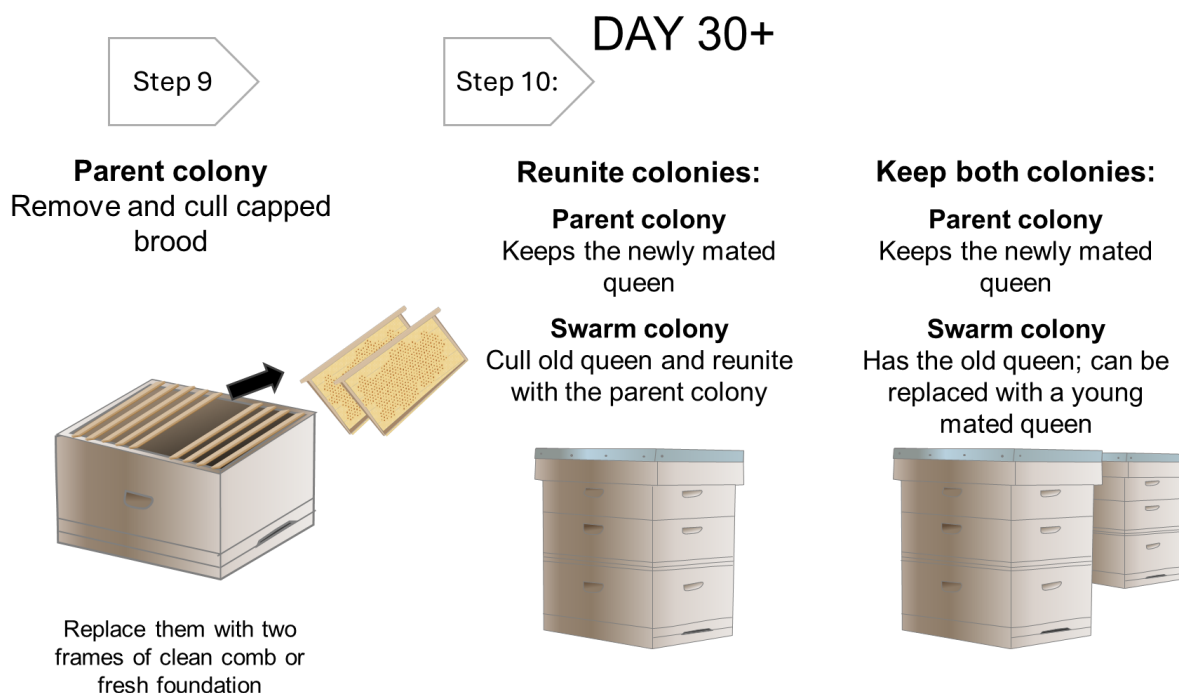
You can then reunite the colonies or keep both colonies.

10. a: **To reunite the colonies:** keep the newly mated queen from the parent colony if she has a good brood pattern. When she is laying, cull the old queen in the swarm colony and reunite it with the parent colony. If she isn't mated, or has a poor brood pattern, cull her and either keep the old queen or introduce a young, mated queen.

OR

10. b: **To keep both colonies:** keep the newly mated queen from the parent colony if she has a good brood pattern. If she isn't mated, or has a poor brood pattern, cull her and introduce a young, mated queen.

If necessary, replace the old queen in the swarm colony with a new, young queen.



When to perform artificial swarms

The best time to use this method is during early nectar flows and it should only be performed on strong colonies that have enough bees and brood to survive being split; an absolute minimum of 10 seams of bees. This method can be used before the colony has started making swarm preparations, as the parent colony will make emergency queen cells.

Combination with other methods of control

Artificial swarms create a broodless period in both colonies; the swarm colony has a relatively low *Varroa* load on the older flying bees and starts with no brood but has a laying queen, so is only broodless for only a short time. The parent colony that kept the young nurse bees with the higher *Varroa* load spends much longer without brood. Once all the brood has emerged, the colony then enters a broodless period until it is either reunited with the swarm colony, or a new queen is laying. The artificial swarm method for *Varroa* control can be enhanced if you use drone brood bait combs on day 21, because *Varroa* have a preference for drone brood over worker brood. When drone combs are added to a broodless colonies for trapping, this can result in an over 90% reduction in *Varroa* mite numbers in the colony³. In addition, during the broodless periods, oxalic acid based medication can be trickled into the colony to kill any remaining mites. For more information on how to administer oxalic acid based medication to honey bee colonies and drone culling, please read our advisory leaflet [Managing Varroa](#).

³ Calis, J.N.M., Boot, W.J. and Beetsma, J. (1999) Model evaluation of methods for *Varroa jacobsoni* mite control based on trapping honey bee brood. *Apidologie*, 30. DOI: doi.org/10.1051/apido:19990209

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