



An example of a queen excluding door (light blue). Note reduce sized openings compared to a non-excluding insert (dark blue, inset). Not to scale.

PROTECTING WILD BEE CROP POLLINATION SERVICES: Commercial Bumble Bee Best Management Practices

This guide covers the use of queen excluders, how to protect colony health during pollination, and colony disposal after pollination to better inform decision making by growers using commercial bumble bee colonies. Under certain conditions, selectively-bred and commercially managed bumble bees can assist with crop pollination, but careful consideration should be taken to minimize threats to the well-being of wild pollinating insects and encourage long-term wild crop pollination services.

QUEEN EXCLUDERS. Queen excluders serve two purposes: preventing wild queen entry and resident queen escape. Observations and research¹ show that commercial bumble bee boxes deployed for spring crop pollination services trap wild queen bumble bees that are nest searching to establish new colonies. Once wild queens are inside the box, many die. Queen excluders prevent large, wild queen bees from entering and dying in the boxes. Loss of wild bumble queen populations could have negative long-term impacts on crop pollination. It is important to note that queen excluders have not effectively prevented non-local genetic spread from commercial bees to wild bees as males can pass through the excluder and mate with wild bumble bees. This may reduce genetic diversity and local adaptation, leading to diminished wild species resilience and pollination services.

WHAT IS A QUEEN EXCLUDER? There is an option to have a queen excluder door included in commercial bumble bee boxes, which reduces the size of the entry and exit openings. This reduced opening restricts the movement of larger bumble bee queens in and out of the box, while the smaller sized female bumble bee workers and males can continue to enter and exit. Typically, commercial bumble bee boxes have a door that either completely seals the box closed or provides one or two openings for bees to move in and out. Requesting and using a queen excluder door limits movement to workers and males only.

DOES IT CHANGE HOW WELL MY CROP IS POLLINATED? Female workers are the primary pollinators and can freely pass through the reduced opening. Research¹ has found that colony health is not compromised when queen excluders are installed suggesting that healthy foraging activities continue and pollination services are not likely impeded by using queen excluder doors.

DOES IT COST ME ANYTHING AND HOW DO I GET THEM? At the time of this publication, industry representatives indicated there is no additional cost for queen excluders. All hives from BioBest® will include queen excluders as of 2024 and no request is needed. If ordering from Koppert, you need to request queen excluders, which are available for single hives only and are not available for quads at the time of this publication. Always check with your sales representative to confirm details.

HOW TO PROTECT COLONY HEALTH DURING POLLINATION. There are a variety of protections against weather, pesticide spray, and pests to improve colony health. Put colonies in an area that is protected from the weather, so they are not exposed all day to full sun, and there is some rain and wind protection. A picnic table or tent made from two pallets can provide shelter. Help colonies stay dry by placing them on something like a pallet to keep them off the bare ground. If moving boxes for pesticide application or otherwise, close the door on the box the night before moving, when most foragers will be inside the box. Relocation should be at least 1.5 miles away from the original site to reduce the number of foraging bees that return to the old nest site from the new location.

Animal pests may threaten bumble bee activity. If floral resources are limited, nearby honey bees may rob food from bumble bee colonies, causing your newly purchased bumble bees to become stressed and possibly fail. Place bumble bees at least two miles away from known honey bee colonies. Installing an electric fence around your colonies can deter predators, such as bears seeking out developing bee larvae for food, and skunks who will eat emerging workers.

COLONY DISPOSAL AFTER POLLINATION. Commercial colonies provide effective pollination services for one to two months. After this time, pollination services wane as the population naturally declines. Commercial bumble bees can transmit diseases and parasites to wild bees through shared flowers and contact with the colony in the box. To reduce this risk, it is best to dispose of commercial bumble bee colonies immediately after crop pollination is achieved or when peak colony performance has declined (i.e., fewer than five bees returning after five minutes of visual observation). The most humane disposal method is to place the box containing the bees in a freezer for two days. A less humane, but effective method, is drowning the bees in the box. Boxes should not be burned as the plastics found in boxes release dioxins and other hazardous compounds. Each of these termination methods should be followed by disposing of the dead bees with the box in a sealed garbage bag.

CITATIONS

1. Miller, O., Hale, C., Richardson, L., Sossa, D., Iverson, A., McArt, S., Poveda, K., & Grab, H. (2023). Commercial *Bombus impatiens* colonies function as ecological traps for wild queens. *Journal of Applied Ecology*, 60, 592–600. <https://doi.org/10.1111/1365-2664.14353>



Designs may vary across manufacturers, however all function similarly by reducing the size of the hive entrance.



Exhausted commercial colonies are recommended to be dispatched humanely, with bee boxes sealed in a garbage bag for disposal.