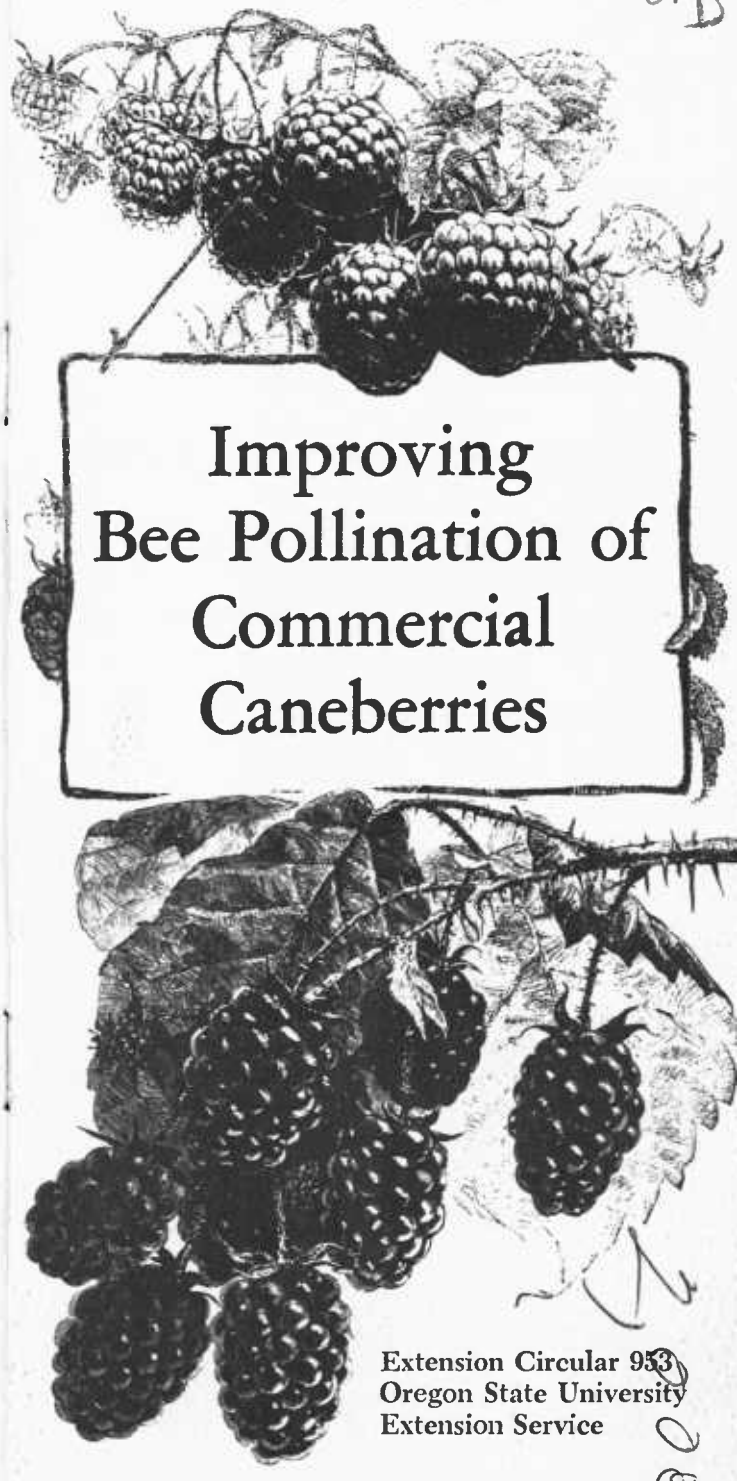


Improving Bee Pollination of Commercial Caneberries

Extension Circular 953
Oregon State University
Extension Service

Pollination and fruit set are important parts of commercial fruit production. If your crop is not fully pollinated, production will be low—even though you do everything else right. For maximum production, you can't leave pollination to chance. Introducing honey bee colonies into caneberry fields during the early bloom period should be part of your total crop management.

Research shows honey bees are the most important pollinators of caneberries. Wind does not pollinate these plants. Fruits that develop from flowers not visited by bees often have 50 to 75 percent fewer drupelets, or individual parts in the berry. Poorly pollinated fruit is also misshapen and often crumbly.

The flower structure of all commercial caneberries is similar, and it's this structure that prevents self-pollination from occurring. As illustrated, a caneberry flower has many styles (the female part of the flower which must receive pollen), surrounded by the pollen-producing anthers. Each style, if pollinated, produces one drupelet. The center styles, however, are too long to be pollinated just by brushing against the anthers. Honey bees or other flower-visiting bees or insects are needed to transfer the pollen to the styles.

A caneberry flower's styles mature before its anthers are ready to release pollen, and all the styles do not mature at the same time. This means that the earliest-maturing styles need bees to bring pollen from the anthers of another, more mature flower. Repeated visits by bees are then needed to pollinate the styles that develop later. Research indicates that three to five visits per flower are necessary for the development of a complete fruit.

Fortunately, bees need little encouragement to visit caneberry flowers. The flowers secrete large amounts of nectar that is high in sugar. Usually, however, there are not enough local bees to visit the millions of blooms present in large fields. Growers thus need to rent bees for pollination.

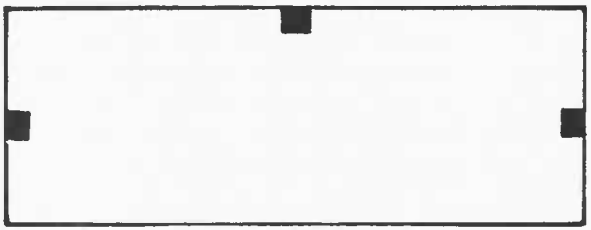
Prepared by Megan Hughes, county Extension agent, Multnomah County, Oregon, and D. M. Burgett, assistant professor of entomology, Oregon State University.

How many bees?

Good figures are lacking on how many bees are necessary for maximum pollination of caneberries. Most growers who rent bees use at least one hive per acre. More colonies will be needed if the weather is poor during bloom.

Honey bees usually pollinate flowers most thoroughly within 100 to 200 yards of their hives. Consequently, the hives should be distributed evenly in the field so the bees can fly easily to all plants. A good way to do this on fields of 40 acres or less is to place colonies in groups of four to seven hives, evenly around the edges of the field. The accompanying diagram shows ways to do this in both a 20 and a 40 acre field. For larger acreages, space the colonies approximately 500 feet apart throughout the field.

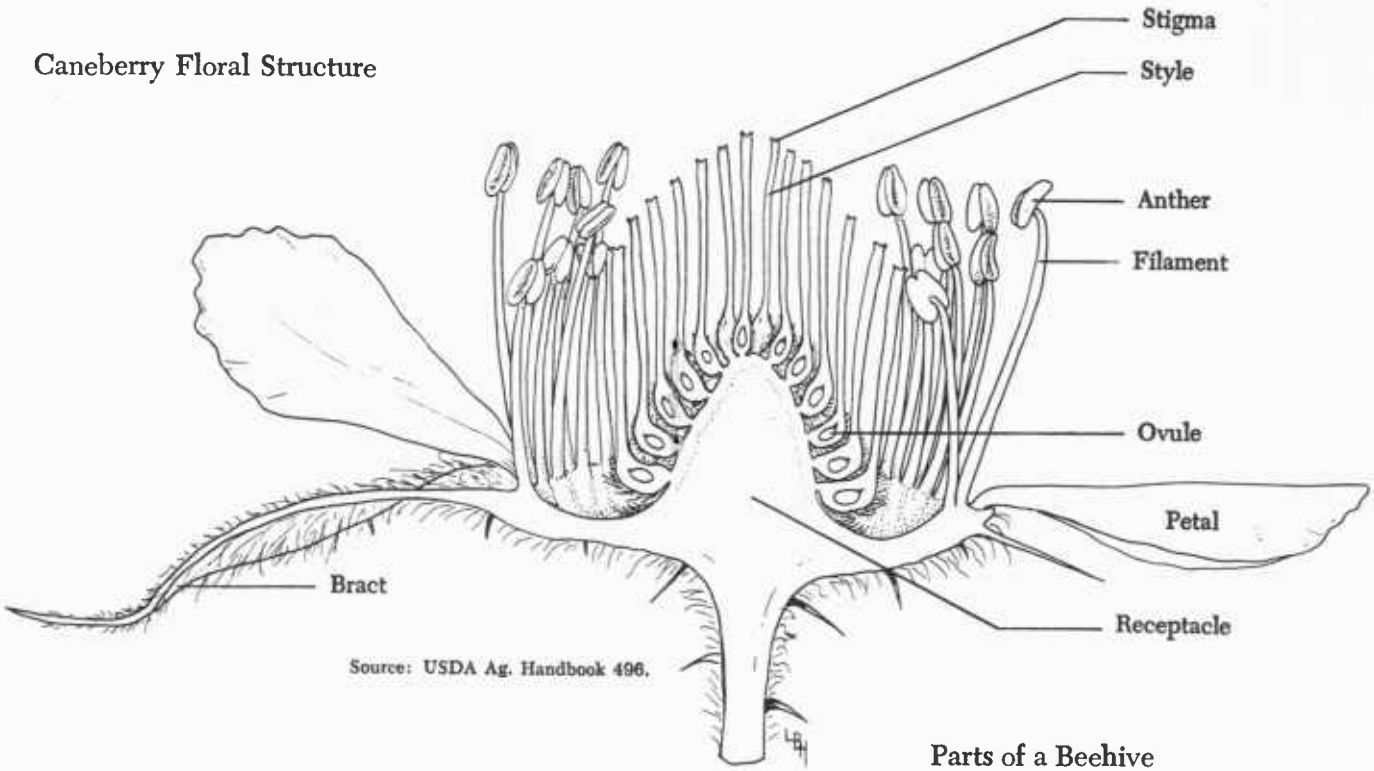
Colony Distribution for Large Fields



20 acres

40 acres

Caneberry Floral Structure



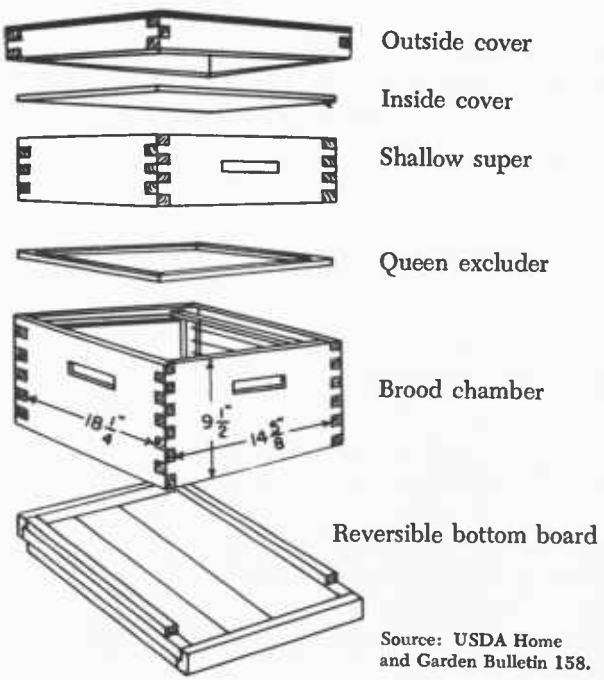
Source: USDA Ag. Handbook 496.

Strength of colonies

The rate of one hive per acre assumes strong, healthy colonies. Weaker colonies may not have enough bees to do the job, so more would be needed. Every grower who rents bees needs to check the strength of the colonies he rents.

A strong hive usually has at least two stories, but this number is not necessarily an indication of colony strength. The number of bees and brood (young bees) is more important. Have the beekeeper provide you with a veil and gloves for protection, and open the hives for you. You should be able to see most of the exposed surfaces in the hives covered with bees. Have the beekeeper remove frames of brood from the lower hive body. A strong colony will have from six to eight frames of brood and a blanket of bees covering the brood frames. If the colonies are not this strong, more will be necessary.

Parts of a Beehive



Source: USDA Home and Garden Bulletin 158.

Agreements with beekeepers

When you rent bees, protect your investment (and that of the beekeeper) by using a written pollination contract. A contract usually will insure better pollination service and reduce the risk of bee or crop loss through misunderstanding. A pollination agreement should include:

1. Date and season of pollination, and location of field(s).
2. Beekeeper's name, address, and telephone number.
3. Grower's name, address, and telephone number.
4. Number of colonies, strength of colonies, distribution in the field, rental fee, and the schedule of payment.

Grower agrees to:

1. Use no toxic pesticide on the crop or adjacent crops during the rental period, except after advance notice to the beekeeper.
2. Assume liability for hive damage from negligence in spraying or from vandalism.

Beekeeper agrees to:

1. Open and demonstrate the strength of the colonies.
2. Deliver and position the colonies as required for maximum pollination.
3. Service the colonies while they are in the fields to insure that they remain in good condition.

You may think it is unnecessary to draw up a written contract, but negligence on your part can damage hives and bee colonies, while negligence on the beekeeper's part can result in low crop yields.

Reducing bee kill from pesticides

Bees are as easily killed by insecticides as are other insects. Some beekeepers have lost so many hives from insecticides that they will no longer rent bees for pollination. Protect your crop and your beekeeper's investment by using pesticides wisely and cautiously.

Relative Toxicity to Bees of Pesticides Commonly Used in Caneberries

Highly toxic	Moderately toxic	Least toxic	Non-toxic
Diazinon	Metasystox-R	Benlate	Thuricide
Phosdrin*	Systox	Methoxychlor	*Bacillus thuringiensis*
Guthion		Captan	
Malathion			
Sevin			

* If applied during bee activity. Late-evening applications are not hazardous to bees because of the extremely low persistence of this material.

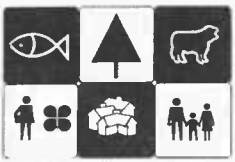
Most poisonings occur when insecticides are applied to crops during bloom. Other bee poisoning occurs from spray drift onto neighboring crops that are in bloom, and from the contamination of blooming cover crops or weeds.

Insecticides applied for control of the orange tortrix and other leafrollers are the major hazard to honey bees in caneberries. These insecticides, primarily Sevin and Guthion, are highly toxic to honey bees. Sevin is especially dangerous because forager honey bees can carry Sevin-contaminated pollen back to the hive. *Do not apply any insecticide during the bloom!* Do not use Sevin and Guthion within 7 days of bloom.

The loss of pollination from bee kill often is greater than the crop loss would have been had a spray not been applied. Careful management of caneberry sprays is necessary to prevent bee loss.

1. Check your fields for orange tortrix and leafrollers early in the year when the leaves are beginning to open. Orange tortrix and other leafrollers overwinter as larvae. They begin to feed in April on developing buds, and later on the leaves. Infested fields can be cleaned up well before bloom.

2. Notify your local beekeeper before spraying any bee-toxic material when weeds or crops are in bloom in the immediate area. This will allow the beekeeper to move the hives or take other measures to protect the bees.
3. Choose the least hazardous formulation of the material. Dusts and wettable powders (WP) are more hazardous to bees than emulsifiable concentrates (EC) of the same chemical. Ultra low volume (ULV) malathion is much more toxic to bees than WP or EC formulations.
4. Even after the major bloom period is completed, a few caneberry blossoms will be found. These are highly attractive to bees and sprays at this time can be hazardous. Remember, only a few bees need to pick up an insecticide to damage the whole colony.



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