



## Virginia Cut Holly Production: Holly Pollination and Honey Bees

Bonnie L. Appleton, Ann D. Spivey, and Susan C. French\*

Most hollies, whether deciduous or evergreen, require a male plant as a pollinator to insure fruit set. Though some hollies will set fruit in the absence of a male, the resulting berries will have sterile seeds.

English holly (*Ilex aquifolium*), American holly (*I. opaca*) and winterberry (*I. verticillata*) are holly species having male and female flowers borne on separate plants (dioecious). Female plants produce flowers without viable pollen, therefore, they are dependent upon male plants for pollination.

Pollen transfer from a male to a female plant is known as cross-pollination. If a holly plant fails to produce berries, it is either a male, or an unfertilized female plant. To insure good berry production, male and female plants generally should be of the same species.

### Reproductive Structures of Hollies

Holly flowers have four, or rarely five, small white petals. The male flower has four prominent stamens, each composed of a filament (stalk) that supports an anther. The anthers release sticky yellow pollen. The ovary in male flowers is very small and not functional.



Holly flowers: male on left, female on right.

The female flower has a prominent pistil made up of a stigma, style, and a large green ovary. Female flowers may have underdeveloped stamens, but they will not produce viable pollen.

Holly flowers are cross-pollinated by insects such as bees and flies. Pollination takes place when pollen is transferred from the male anther to the female stigma.

### Holly Orcharding

Select male hollies which have desirable foliage for wreath making, and which produce large amounts of pollen at the time when the female hollies are in bloom. Generally, one male plant for every 20 female plants is sufficient to supply the necessary pollen in normal seasons.

When planting your holly orchard, locate your male plants equally among the female plants. Bees must be able to visit male and female flowers during the same excursion for cross pollination to occur. If bee activity is restricted by weather conditions during bloom, it may be necessary to double the number of pollinators (male plants).

### Using Honey Bees

The use of honey bees for pollination may be commercially feasible. Because holly is insect pollinated, hives of bees in or near the orchard will insure better fruit set.

Honey bees are unusually industrious insects. In a single day, one bee makes a dozen or more trips from the hive, visiting several thousand flowers. These numerous trips, coupled with the bee's hairy body, enables honey bees to accumulate and distribute an abundance of pollen. On each trip bees usually visit only one plant species, collecting one kind of nectar and distributing one kind of pollen.

\*Extension Specialist, Graduate Student, and Extension Technician, respectively; Hampton Roads Agricultural Research and Extension Center



*Colonies of bees for holly pollination.*

Honey bees pollinate flowers more thoroughly within 100 yards of their colonies. Distribute honey bee colonies in groups throughout the orchard you want pollinated.

Beekeepers maintain honey bee colonies in most agricultural areas. They are usually equipped to move colonies easily and quickly to any location.

In orchards of less than 40 acres, place colonies along the borders of the orchard. In larger orchards, put colonies 528 feet apart in all directions. The exact number of colonies needed per acre may vary depending on the number of natural pollinators in the area, and on other crops competing for the attention of pollinating insects.

## Scheduling Colony Delivery

Schedule delivery of honey bee colonies to coincide with the flowering cycle of your plants. Flowering cycles vary by species. Have the colonies already located in the field before flowers begin to open.

When bees are moved to new locations, they undergo a period of orientation as they get used to their new surroundings. Throughout this orientation time, bees are most effective pollinating flowers nearest the hive. Once fully oriented, their foraging extends further.

## Pesticide Danger to Bees

Pesticides in agricultural areas are the most serious threat to beekeeping. Many crops must be protected with

pesticides from insect and disease damage, but must also be pollinated by bees.

Before applying any pesticides to or near your hollies, read the labels to be sure that the pesticides won't be harmful to the bees. Whenever possible apply pesticides when bees are least active - from sunset until dawn.

## Renting Honey Bee Colonies

Honey bee colonies can be rented from custom pollination services or from local beekeepers. Have a contract written up that states the names of the beekeeper and the orchardist, and the time for which the pollination service is contracted.

The contract should also include:

- **Siting and number of colonies.** Inform the beekeeper in advance of the type of site(s) where bees are needed. Sites should be accessible by truck or other motorized vehicles commonly used in handling and servicing bee colonies. Have the beekeeper confirm the number of hives involved.
- **Plan of distribution.** Determine bee colony placement within your holly orchard.
- **Beekeeper certification.** Require the beekeeper to certify that his bees are disease free. The queen should be actively producing broods.
- **Time of delivery and removal.** State the date by which the bees must be placed in your holly orchard.
- **Beekeeper's right of entry.** Allow the beekeeper access to your holly orchard as often as necessary to service the colonies.
- **Degree of protection for bees from pesticides.** Since a major consideration in avoiding bee poisoning is beekeeper-grower cooperation, explain your pest-control practices to the beekeeper.
- **Payment of the rental fees.** Agree to pay a stated rental fee per colony. Also consider penalties for poor quality or service by the beekeeper, and a breach-of-promise by the grower relative to bee protection from loss by fire, theft, vandalism or poisoning. Specify any extenuating circumstances.