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GARDEN FACTS
University of Wisconsin-Extension
Fruit crop pollination

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Teryl Roper

Glossary

Anther: The male portion of a flower where pollen grains are produced and released.

Diploid: Having two copies of each chromosomes; the normal condition.

Fertilization: Joining of the male gamete (sperm nucleus) with the female gamete (egg) in the ovary.

Germ tube: Produced as pollen grains germinate. Carries the male gametes (sperm nuclei) into the plant ovary.

Ovary: The female portion of a flower. Seeds are typically produced here.

Pollen: The male sex cell in plants.

Pollination: Transfer of pollen from anthers to the stigma.

Sperm nucleus: The male gamete in plants. The sperm nucleus has one copy of all chromosomes. Two sperm nuclei are produced in each pollen grain.

Triploid: Having three copies of each chromosome. Not a normal condition.

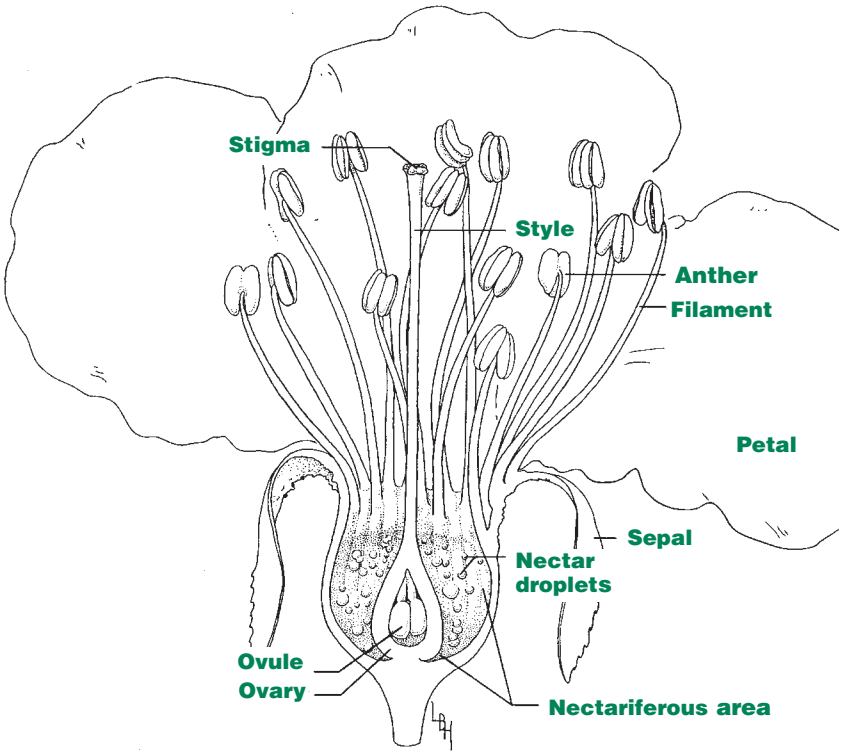
Tube nucleus: Directs the growth of a germ tube from the stigma into the ovary.

Zygote: A developing embryo produced from the joining of male and female sex cells in the ovary.

ALL THE TEMPERATE FRUIT CROPS grown in Wisconsin must flower to produce fruit (see table 1 for a list of these fruits). However, in most species, flowering alone is not sufficient. Pollination of the flower followed by fertilization of the ovary is also required.

Pollination is defined as the transfer of pollen from an anther (the male part of a flower) to a stigma (the female part of a flower). Self-pollination occurs when the anther and stigma are from the same flower, from different flowers on the same plant, or from flowers on different plants of the same cultivar. Cross-pollination takes place when the anther and stigma come from flowers of different cultivars of the same species.

Figure 1. Cross-section of a flower.



Pollen transfer is accomplished mostly by insects, predominantly honeybees. Insects are attracted to the large showy flowers and nectar that is produced in the flowers. Other insects such as flies, bumble bees and wasps also help pollinate flowers. Wind may also play a role, especially in nut crops.

After the flower is pollinated, the pollen grain germinates on the stigma and a germ tube grows down through the flower's style to the ovary (fig. 2). One of the two sperm nuclei in the germ tube will unite with the egg in the ovary to create a zygote that will eventually produce a seed.

Figure 2. Germ tube.

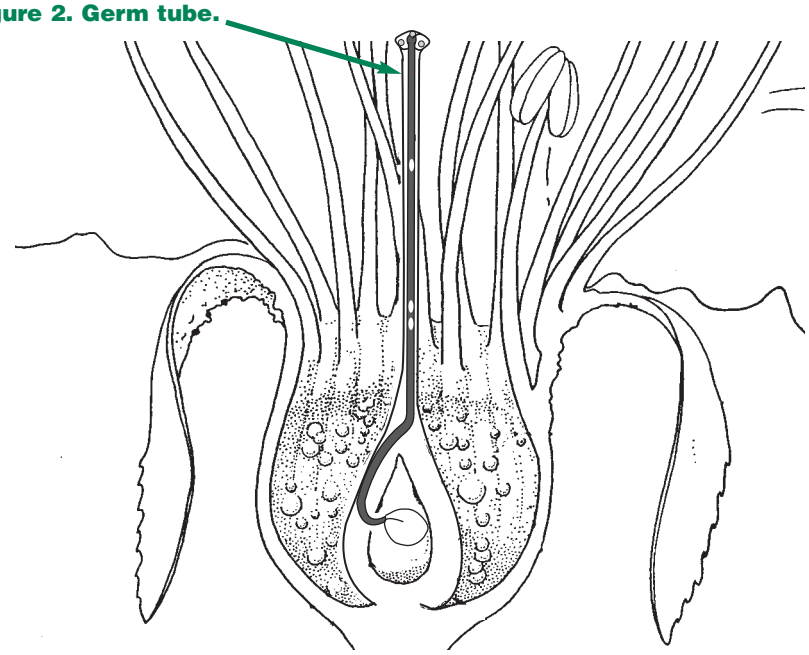


Table 1. Pollination requirements of Wisconsin fruit crops

Crop	Cross pollination		
	Required	**Not required**	**Beneficial**
Apple	X		
Pear	X		
Asian pear		X	X
Tart cherry		X	
Sweet Cherry	X[1]		
Peach		X	
Nectarine			X
Apricot			X[2]
European plum			X
Hybrid plums	X[1]		
Strawberry		X	
Raspberry			X
Blueberry	X		
Cranberry		X	
Gooseberry		X	
Currant			X
Juneberry	X		
Grape		X	
Elderberry	X		
Lingonberry		X	
Hardy kiwifruit	Male & female plants		

[1] Cross incompatibility also a problem.
[2] Not all cultivars are self-fruitful.

If the flowers on a plant are self-fertile, pollen from the same flower will grow and fertilize the ovary. If the flowers on a plant are self-sterile, pollen from that flower or flowers of the same cultivar will not be able to germinate or the pollen will not fertilize the ovary. This is called incompatibility. Incompatibility may be caused several ways.

Another pollination problem has arisen through breeding programs. This is the creation of triploid cultivars that produce sterile pollen. Triploid pollen either will not germinate on the stigma or will not fertilize the ovary. Normal (diploid) plants have two copies of each chromosome. Triploid plants have three copies of each chromosome. When chromosomes segregate for sex cell formation it is impossible to divide the genetic material correctly and sterile pollen results.

To overcome these problems, fruit growers usually need to plant more than one cultivar of a given fruit crop to provide enough compatible pollen to produce fruit. This is, however, not essential in every case. Table 1 lists common fruit crops and their need for cross-pollination. There are exceptions to these generalities, however. Some cultivars of otherwise self-fruitful plants are self-sterile. Many nursery catalogs indicate which plants need special pollinators.

You may not need to plant two cultivars of even self-unfruitful plants in your garden if a compatible cultivar of the same species is growing within about 100 feet of your garden. In many instances flowering crabapples and flowering plums can provide pollen for culinary apples and plums. The flowering periods of the two trees must overlap for this to be effective, however.

With some knowledge of the pollination requirements of fruit crops, you will be able to make correct decisions about your need for multiple cultivars for any given fruit crop.

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