

## How Fruit Forms

By now, you certainly are harvesting the results of your garden labor. But you aren't the only one who's been working hard during the past months. The plants also have been doing their part to make fruit, sparked by the movement of pollen from the anther to the sticky stigma. Pollination, however, is only the first step in the varied and intricate process that leads to the vast array of fruits we eat.

Fertilization must occur. And to achieve that goal the pollen grain divides itself into two specialized cells. One is a tube cell, which elongates on a transmitting track leading through the stigma and style on a course to the ovary.

Inside the ovary sit the ovules, which hold the waiting eggs. The pollen grain's generative cell, located at the tip of the advancing tube, further divides and forms two sperm cells. Fertilization occurs when the tube cell delivers the sperm to the egg. The product of the egg-sperm merger is an embryo inside an ovule. The ovule develops into the seed coat protecting the embryonic plant. The other sperm cell helps form the endosperm, which fuels the embryo's growth. Open a green bean fruit and you'll see several seeds inside. Each seed represents a pollen tube's successful delivery of a sperm to an egg.

### Fruit develops to protect seeds

The plant wants to give seeds the best chance of reaching a hospitable environment for growth and renewal of the species, and fruit provides the vehicle. The great variety of strategies for dispersing seeds is reflected in the different forms fruit takes. Coconuts float their seeds near and far, berries are eaten by animals that expel the seeds elsewhere, and certain other fruits, such as beans, fling forth their progeny by bursting open.

All fruit forms in a similar manner and originates with the ovary, the tissue that

forms below the style. Together, the stigma, style, and ovary comprise the pistil. The ovary, prodded by hormones associated with the formation of the embryo, develops into the fruit wall or pericarp. Early fruit growth is dominated by rapid cell division with a minimal increase in overall fruit size. This is followed by a period characterized by a dramatic increase in fruit size and weight due to the cells' intake of water. In some species, the pericarp becomes soft, fleshy, and sweet, while in others it may be thin and dry.

Generally, the more seeds, the larger the fruit, although parthenocarpic types, such as the navel orange, develop from an ovary without pollination or fertilization. And sometimes, if fertilization has been uneven, an oddly lopsided fruit will result.

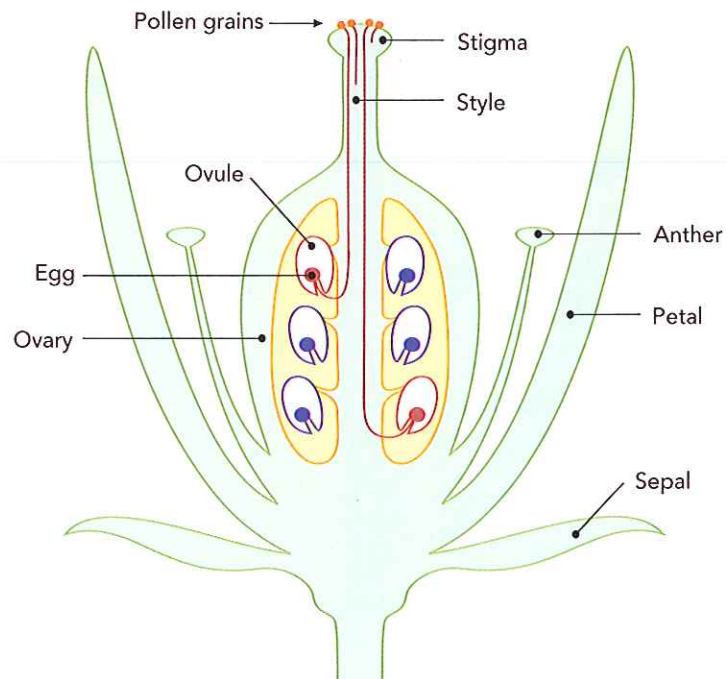
The specific categories of fruit are based on anatomy. Simple fruits, which are the most common type, include peaches and tomatoes. They come from a flower bearing a single ovary. An aggregate fruit, such as raspberries and black-

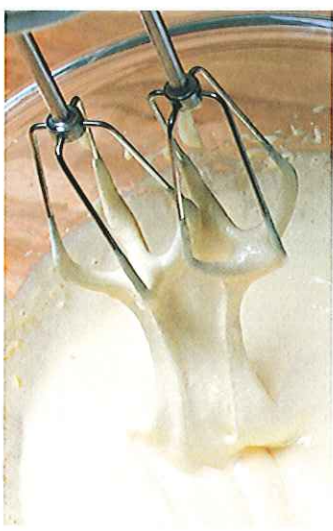
berries, comes from a single flower with multiple pistils and, hence, many ovaries. Multiple fruits, such as the pineapple, come from the fusion of many separate pericarps, stemming from many flowers, each with one ovary.

### Turn the fruit development cycle to your advantage

Most plants produce many more flowers than they can successfully turn into fruit. So plants go through periods of abscission, when they drop fruit. The greatest loss of potential crop is during fruit set, when both flowers and small fruit drop off their perches. This period of natural thinning eliminates flowers that weren't pollinated or in which fertilization did not produce a viable offspring. Slow-growing fruit, even those with viable seeds, also drop at this time because they can't compete successfully for resources against faster-growing fruit.

A second period of fruit drop occurs near the end of the cell division stage of





Beat the yolks and the sugar until ribbons form when you lift up the beaters (far left).

Carefully fold the plum purée into the yolk and sugar mixture so the soufflé retains its lightness (left).

## Sweet Plum Soufflé

8 servings

Use sweet, yellow 'Mirabelle' or 'Greengage' plums for this delicate soufflé.

### Plum purée:

7 to 8 small plums, peeled and quartered, pits removed  
 ¼ cup brandy  
 ¼ cup granulated sugar

### Soufflé batter:

¼ cup granulated sugar, plus extra for the ramekins  
 4 egg yolks  
 1 cup plum purée (above)  
 4 egg whites  
 3 Tbs. granulated sugar

Cook the plums with the brandy and sugar in a small sauce pan over medium heat until the plums are tender, 20 to 30 minutes; stir occasionally. Remove the mixture from the heat, cover, and let the plums macerate for 30 minutes. Purée in a food processor or blender until smooth. Set aside.

Preheat the oven to 400°F. Butter and sugar eight 4-ounce soufflé ramekins.

Using a whip attachment on high speed, beat the yolks and the ¼ cup sugar until the mixture forms ribbons when dripped from the end of the whip (photo, upper left). Fold the plum purée into the yolk and sugar mixture.

In a clean bowl, whip the egg whites on high speed until frothy. Add the 3 Tbs. sugar slowly while the egg whites are being whipped. Continue whipping to a medium peak. Fold the whites gently into the yolk base. Immediately spoon the batter into the prepared ramekins. Bake the soufflés for 15 minutes. Serve immediately.

130 cal, 2.5g fat, 30mg sodium, 0g fiber

Bob Norton runs AppleCorp, a consulting firm specializing in fruit trees, in East Wenatchee, Washington. Meredith Ford is a pastry chef and instructor, as well as restaurant reviewer for The Providence Journal. 🍷



Use sweet 'Mirabelle' or 'Green Gage' plums in this cloudlike soufflé.

## SOURCES FOR PLUM TREES

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fruit growth, or early in the period of rapid increase in fruit size. Typically, fruit abscise at this time because of competition for resources between the growing fruit and another organ of the plant that initiates new growth, such as roots, shoots, or even the seed or seeds within the fruit itself.

Formed fruits drop from the plant as they progress to full maturity and death. With each drop period, less biomass is lost and fewer fruits drop. The drop periods ensure there will be adequate resources to produce viable seeds in the remaining fruit. Here the grower is typically at odds with the plant. The grower wants the plant to produce more fruit and/or fruit of larger size. Worthy of note is the fact that most plants can produce additional or larger fruit, within certain limits, when they are provided with sufficient resources and are free of diseases and pests.

The critical period for increasing fruit retention or increasing size is during the period of fruit set. Special care at this time to provide adequate sunlight, water, and proper fertilization will increase the fruit set. If larger fruit is the goal, removing fruit during this period has the greatest impact on increasing the size of the remaining fruit. If done properly, fruit thinning not only increases fruit size, but also fruit quality. In addition to removing small fruit, pluck abnormally large fruit and damaged and diseased fruit. The goal is to leave high-quality fruit distributed evenly over the plant.

Whether you are growing green beans, eggplants, apples, or avocados, the basic process from ovary to fruit is similar. However, because of the great diversity in what constitutes a fruit, learning more details about specific fruits through reading, observation, and experience will enhance your ability to increase the number, size, and quality of the fruit you harvest.

*Carol Lovatt is a professor of plant physiology at the University of California, Riverside.*

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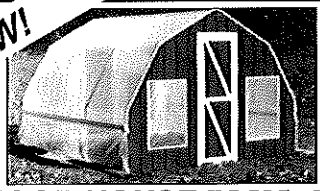


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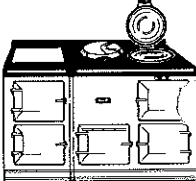
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