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Saving Seed for Next Year

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How to tell whether a plant is outcrossed, inbred, or hybrid

First, look for the words “hybrid” or “F1” on seed packets. Any plant that has separate male and female flowers is most likely outbred. Plants with closed flowers, such as peas and beans, are usually inbred. Sometimes it will not be obvious whether the plant is inbred or outbred. The following plants are either mostly outcross or inbred:

<table>
<thead>
<tr>
<th>Outcrossed</th>
<th>Inbred (self-pollinated)</th>
</tr>
</thead>
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<tr>
<td>Beans</td>
<td>Clarkia</td>
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<tr>
<td>Peas, sweet peas</td>
<td>Anthracnose; bean common mosaic virus; bacterial blight; halo blight; rhizoctonia rot</td>
</tr>
<tr>
<td>Cabbage</td>
<td>Lettuce</td>
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<tr>
<td>Radish</td>
<td>Eggplant</td>
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<tr>
<td>Carrots</td>
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<tr>
<td>Squash</td>
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<td>Corn</td>
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<td>Turnips</td>
<td>Double-flowered asters</td>
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<td>Cucumbers</td>
<td>Melons</td>
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<td>Pumpkins</td>
<td>Most annual flowers</td>
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Diseases that can be spread through seed from infected plants

- Beans, peas, sweet peas: Anthracnose; bean common mosaic virus; bacterial blight; halo blight; rhizoctonia rot
- Cabbage, radish, turnips: Black rot
- All cucurbits (cucumber, muskmelon, watermelon, squash, pumpkin, gourd): Angular leaf spot (especially cucumber); gummy stem blight; scab; squash mosaic virus
- Muskmelon, cucumber, watermelon: Anthracnose
- Solanaceous (eggplant, tomato, petunia, pepper): Alternaria (early blight); rhizoctonia rot; tobacco mosaic virus; tomato ringspot virus; verticillium wilt
- California poppy, nasturtiums: Anthracnose
- Zinnia: Bliight

If you know that your plants have any of these diseases, do not save the seed. However, most people will have no idea whether their plants are infected with particular fungi, bacteria, or viruses. A good rule of thumb is to simply save seed only from plants that have healthy, normal-looking leaves and fruit. As extra insurance, prior to planting, seed from cabbage, eggplant, pepper, and tomato can be carefully immersed in hot water (122 degrees F) for 25 minutes to decrease disease. Both the temperature and timing must be exact to decrease the disease without affecting germination.

References


International Seed Saving Institute P.O. Box 4619, Ketchum, ID 83340 (208)-788-3463 http://www.seedsavers.org

Saving Seeds, the gardener’s guide to growing and storing vegetable and flower seeds, by Marc Rogers (1990). Storer Publishing

Seed Saver’s Exchange - 3076 North Winn Road, Decorah, IA 52101 (319)-382-5872 http://www.seedsavers.org


Vegetable Seed-savers handbook. Available from Seeds of Texas Seed Exchange, PO. Box 9822, College Station, TX 77842, jacknowe@compuserve.com

For an introduction to genetics: http://www2.mc.tucop.edu/anthropology/origins/genetics/introgene.html

Seed from almost any kind of plant can be saved and grown; however, seed from annuals (plants that flower in the same year that they were planted) are usually the easiest, and least likely to need specialized treatments. Common annuals include vegetables such as peas, beans, tomatoes, peppers, squash, melons, and broccoli, and flowers such as marigolds, zinnias, snapdragons, and petunias.

What plants can I save seed from?

Although we grow flowers because we enjoy their appearance, their true function in nature is to form seeds. Two flower parts are essential for seed formation – an egg-containing ovule (found inside the pistil), and pollen (fig. 1). When pollen fertilizes an egg, the seed begins to form. The egg and the pollen each contribute a complete single set of genes (chromosomes), so that the resulting seed (and plant) has two sets of genes. These two sets may be exactly the same or may be very different from each other, and the exact characteristics of the resulting plant will depend on how the two sets of genes interact with each other.

Each egg and pollen grain contain only one of the two sets of genes from the parent plant, and the exact genes in each egg or pollen grain are determined more or less randomly. Thus, different pollen grains (or eggs) from the same plant may contain different genes, and the resulting progeny of different seeds from the same plant may differ if the two sets of genes in the parent were not identical.
Inbred, outcrossed, and hybrid plants

**Inbred plants**

In inbred plants, the eggs are fertilized with pollen from the same plant. Another term for this is self-pollination. The progeny will each have two identical (or nearly so) sets of genes, exact copies of their parents, and will thus appear very similar to each other. Most peas and beans are inbred. Since seed from a self-pollinated plant will produce plants very like the plant it was produced on, these kinds of plants are ideal for seed saving.

**Outcrossed plants**

Outcrossed plants require pollen from a different plant to fertilize the egg (also called cross-pollination). Some outcrossing species have the female and male parts in separate flowers (corn or squash) or even separate plants (asparagus). Others have both parts in the same flower, but the pollen will only be from another flower or plant. Apples are an example of this – that is why a separate pollinator tree is needed to obtain fruit.

The two sets of genes in progeny of outcrossed plants tend to have a lot of variation, so that the outcome of crossing is less predictable, somewhat like the variation between siblings in a human family.

Seed from outcrossed plants will not necessarily come true; do not save seed from these plants if you want to be certain that the plants will be exactly the same as their parents. However, if you have grown only one variety (and your neighbors have grown the same variety or are far enough away to avoid wind- or insect cross-pollination), you can still save the seed.

**Hybrid plants**

Hybrids result from crossing two different inbred lines. All of the first generation of plants from this cross will contain the exact same two sets of genes (one from each line) and thus will be identical to each other. This first generation is what you buy in a seed packet marked “Hybrid” or “F1.”

However, the next generation (the plants that will grow from seed produced from plants grown from “F1” seed) will contain a random mixture of genes, resulting in plants that may have a wide range of desirable and undesirable characteristics. (See below for further explanation.) Do not save seed from F1 or hybrid plants if you want to be certain that the plants grown from the seed will be the same as their parents.

When two different pure lines are crossed, the resulting progeny (known as “F1” or first generation) will inherit one set of genes from each parent. The resulting F1 offspring will be more or less identical, since they are all inheriting the exact same two sets of genes (see Fig. 2b). These progeny usually display “hybrid vigor” – the reason that hybrid plants often have larger flowers or yield more.

However, since it takes time and money to develop the pure lines, and to insure that the flowers of one line are pollinated only by the other line, hybrid seed is usually more expensive.

Because F1 plants contain genes from two different lines, their progeny (“F2” generation) will behave more like outcrossed plants, having a random assortment of the genes from either of the F1 parents – the ideal ones along with the bad ones. Some plants may look like the F1 hybrids, but others may look and grow quite differently (see Fig. 2c).

How to harvest and save seed

**Selecting plants**

✓ Determine whether your plants are hybrid, open-pollinated, or self-pollinated (see pg. 4). As discussed above, plants from self-pollinated (inbred) non-hybrid seed are most likely to look like the previous generation. If you are curious and want to see how variable plants from hybrid or open-pollinated parents can be, you can always try them also. You may even discover some good unique plants.

✓ Choose healthy plants in order to avoid seed-borne diseases.

✓ When possible, observe the potential parental plants throughout the whole season. Some plants produce seed the same season they are planted. Most root crops are biennials (the roots are the way of storing the plant’s energy over winter). These must overwinter before they produce seed, and many biennials will not survive our winters in South Dakota. To obtain seed from these crops, stores harvesting in the fall keeping them in cool (32 to 45°F) storage over winter, and replanting the following spring.

**Harvesting seed**

The trick is to harvest the seed after it has matured, but before it falls off the plant. While the list below is far from comprehensive, it gives some guidelines for common crops. You may adapt them for crops not listed, or consult one of the more complete references listed at the end.

✓ Beans, peas

Allow pods to dry on plant, but harvest before they split open. Shall prior to storage.

✓ Lettuce

Seeds don’t mature all at once, so collect seed over several time periods by gently shaking the flower head (once white tufts begin to appear) over a paper bag or other collecting device. Seeds will turn dark as they mature. An alternative method of harvest is to cut off the whole seed stalk once it becomes fluffy white, let it dry, and then shake the seed off.

✓ Tomatoes & Cucumbers

Pick ripe fruit. Squeeze pulp with seeds into a container, add water and let ferment 2-4 days at room temperature, stirring occasionally. Non-viable (dead) seeds will float. When seeds settle out, pour off pulp. Repeat if necessary to thoroughly clean the seed. When clean, spread seeds out to dry.

✓ Peppers

Harvest seed when fruit is thoroughly ripe (most varieties will turn red and begin to shrivel). Remove seed from fruit and allow to dry.

✓ Melons

Seed are ripe when fruit is ripe; simply separate out seed and rinse seed prior to drying.

✓ Most flowers

Harvest seed pods or heads when dry.

Plants that grow from seed saved from hybrid plants generally are less vigorous, more variable, and usually have smaller blossoms and yield less than their parents. Why?

Hybrid plants are the result of crossing plants from two different “pure lines” (see Fig. 2a). These pure lines are each a set of plants that have been developed by inbreeding to have consistent characteristics from one generation to the next. Both sets of genes in a pure line plant are identical, or nearly so.

Plant breeders experiment until they find the two lines of inbred parents that will result in the best progeny, for example, a cross that results in plants with the largest flowers of one parent, and the disease resistance of the other parent.