

SEEDS



‘TRUE TO TYPE’

Most fruit seeds seldom produce a tree that is similar to the parent trees; they do not grow ‘true to type’. That is one of the many reasons why fruit trees are usually propagated by grafting.

Take, for example, an apple. The seeds inside it (usually about 6 - 10) will all contain wildly different blends of the apple’s parents’ genes. The 6 -10 trees grown from those seeds, all from the same apple, will all look slightly different and bear fruit that looks and tastes different, not only from each other, but from the two parent trees, the mother tree (the one that bore the apple) and the father tree (the apple tree that gave its pollen).

You can plant a seed from a scrumptious apple and end up with a tree that bears bad-tasting fruit. You might also end up with the best-tasting apple in the world, but there’s no way of knowing beforehand. It’s a lottery.

Plants such as apples, which give rise to varying offspring, are known as ‘heterozygotes’, from ‘hetero’, meaning ‘different’ and ‘zygote’, meaning ‘a fertilized ovum’. You could think of ‘heterozygous’ as

meaning 'having kids that are different from the parents'. Heterozygous plants need to be cross-pollinated to bear fruit. The mother tree's genes then mingle, in many different combinations, with the genes from the polliniser, creating hybrid offspring with different characteristics.

Apple rootstocks are normally propagated by layering, not by seed, because apple growers need certain valuable qualities to be passed on in their rootstocks - qualities such as disease resistance. Apple trees grown for their fruit are usually propagated by grafting.

Heterozygosity is an advantage for any plant or animal species. It gives that species a better chance of survival under uncertain and changeable conditions. With each new generation, individuals arise that are equipped to battle a wide range of adversities including drought, pestilence, flood etc.

FRUITS THAT GROW TRUE TO TYPE FROM SEED

There are, however, some fruits that grow 'true to type' from seed. Those that always turn out identical to their parents are called 'pure line' plants, and their genetic makeup is called 'homozygous' (from from 'homo', meaning 'the same'). In other words, 'homozygous' means "having kids that are the same as the parents'. The plant's characteristics remain unchanged through succeeding generations. True to type plants that occur in nature are self-fertile; that is, they produce fruit and seeds by fertilisation from their own pollen, not by using pollen from another plant.

There are, nonetheless, very many citrus fruits (and some mangoes) which almost always grow true to

type from seed; whose offspring are essentially genetic clones of the parent.

‘Most commercial [citrus] rootstock varieties produce mainly nucellar seedlings which do not inherit any of the traits of the “father” plant. This allows for the production of uniform rootstock, which yields consistent results in fruit production.

‘Rootstocks such as ‘Rough Lemon’, ‘Sour Orange’, and ‘Trifoliate orange’ can be produced true-to-type from seed. This is important for nurseries because virus is not transmitted through either nucellar or zygotic seed. Thus, nurseries can produce virus-free, clonal rootstocks from seed.’¹

‘Most common citrus such as oranges, grapefruit, lemons and most mandarins are polyembryonic and will come true to type. The good news is that polyembryony helps stabilize varieties, which allows seeds to be passed around with little chance of spreading diseases such as viruses. This unique characteristic allows amateurs to grow citrus from seed, something you can’t do with, say, apples.’²

A SPECTRUM

In between extreme heterozygosity on one hand and pure line homozygosity on the other, there exists a wide spectrum of zygosity. Some plants are more heterozygous than others. Apples and pears are extremely heterozygous, whereas stone fruits, for example, such as apricots and peaches, are only moderately so. Most peaches are self fertile, which is why the seedlings

1 *Citrus Pages*, by Jorma Koskinen

2 ‘Hardy Citrus for the South East’, by Tom McClendon.
Southeastern Palm Society (SPS Publishing).

have similar characteristics to the mother tree. They grow almost true to type.

‘Open-pollinated plant varieties are produced from a population of ‘parent’ plants with very similar genetic characteristics. Open-pollinated plants, grown in isolation to prevent cross-pollination with another variety of the same species, will produce offspring that are very similar to the original parent population, allowing seeds to be saved and grown true to type year after year, generation after generation. For example, saved seed from a heritage ‘Moon & Stars’ watermelon (*Citrullus lanatus*) should produce another ‘Moon & Stars’ watermelon plant. Heirloom seeds are open-pollinated varieties that have been maintained and handed down by seed savers for at least 60 years.’³

If cross pollination occurs, the resulting seed will be a natural hybrid and may have some characteristics of each parent or may look completely different from either. So if by some chance your ‘Moon & Stars’ cross-pollinated with a nearby ‘War Paint’ watermelon, you will get some unusual watermelons from planting those seeds.⁴

GUARANTEEING TRUENESS TO TYPE

Aside from plants that produce nucellar seedlings, the only way you can guarantee that a new fruit tree or shrub will be identical to its parent is if that plant is grafted, layered, or grown from a cutting, offshoot or sucker.

3 *Frequently Asked Questions, Seeds of Change*

4 *Gardening, on About.com*

WHY PLANT FRUIT SEEDS?

Commercial peach growers use the pits (stones) from the previous year's canning crop to grow new rootstocks. Rootstocks grown from seed tend to be more vigorous and healthy than rootstocks grown by layering. This is because viruses are not transmitted through seeds; thus most seedlings are free from disease. Over the centuries, plant cultivars that have always been propagated by methods other than seed, (cuttings, layering, grafting etc) build up a load of latent viruses in their tissue, which slows down their vigour.

'Stone fruit seedlings tend to have a deeper, more anchored root system than clonal rootstock, and have a lower probability of virus transmission from parent to progeny.'⁵

Another reason for planting fruit seeds is to create new hybrid cultivars - this is what plant breeders do.

One disadvantage of growing fruiting plants from seed is that it can take several years for the plant to become mature enough to bear fruit. Another is that their roots may not be resistant to some pests - for example, woolly aphid in apples.

If most fruits don't come true from seed, how can we use seeds to ensure the continuation of our heritage fruits?

1. We can sow seeds of fruits that are homozygous.
2. For those which are only partially homozygous, we can provide the best possible conditions for ensuring a pure line. One method is to grow open-pollinated seeds in isolation - as mentioned above - to keep similar varieties from cross-pollinating each

other. This involves simply planting similar varieties far enough apart that their pollen cannot reach each other. Distance isolation requires no equipment or special skills, but it does rely on your having a good idea of who is growing what in your immediate area, which is not always possible.

Commercial seed growers also use other methods - they sow extensive plantings of the same variety. In very large plantings. Almost all undesired cross-pollination happens around the edges of the crop. The highest grades of certified genetically-pure seed are taken from the centres of large plantings, at specified distances from the edges. gardening.about.com

3. As for heterozygous plants, we simply cannot propagate them from seed and must use other methods, as outlined in this book.

If you have some space in your back yard, try growing fruit trees or fruiting shrubs from seed. You might plant a species that grows close to type, or you might want to take a gamble and see what grows from something extremely heterozygous, like an apple, a grape or a pear.

Many nurserymen disdain such practices, and will most likely assert that the trees and fruit will not be true-to-type and will therefore be of poor quality. However every new cultivar began life as a seedling, including the commercially successful plants they themselves sell! If your experiment fails, you can always use your tree as a rootstock.