

The Difference Between Seedling, Grafted and Cutting Grown Fruit Trees



Fruit trees naturally reproduce themselves from seeds, but most fruit trees that you buy are not produced that way for very good reasons. There are many ways to propagate fruit trees, and each method has its advantages and disadvantages. Whether you propagate fruit trees yourself or buy them from a garden nursery, all fruit are produced by the following methods – they may be grafted, grown from rooted cuttings, produced by air layering (also referred to as aerial layering or marcotting) or they may be seedlings grown from seed.

Why not just grow from seed?

The difference between growing plants from seed and propagating plants from cuttings off a parent plant is **genetic variation**.

The seeds of many fruit produce trees that are different from the parent, because seeds themselves are produced by **sexual reproduction** – they receive genes from a male and female to form. As they are a cross from two sets of genes, many fruit trees are not “true to seed”, that is, their seeds will produce a different variety of tree from the parent. For the botany purists, yes, there are some exceptions, but this is generally

the case.

Propagation methods that use material from the parent trees such as cuttings are a form of vegetative, or **asexual reproduction**, as genes only come from one parent to produce **identical genetic clones**.

Let's have a look at a real life example to better understand this concept. Imagine we want to produce more apple trees, say Granny Smith apples from an existing tree. Apples are not 'true to seed', so the seeds from any particular variety apple will not grow to be the same variety as the apple tree they came from. In our case the Granny Smith apple seeds will produce a wide variety of different and unknown apple tree types.

So what you may say? Well, consider that not all the varieties of apple produced would taste good, some may not be palatable or edible at all! If you're wanting to produce Granny Smith apples, you'll have the problem that none of the apple tree seedlings will be Granny Smith apples, but something else instead. You won't know how productive the tree will be, what shape or size the tree will grow to, what part of the season the tree will fruit, how big the fruit will be, or how the fruit will look or taste. There is the rare chance that the fruit will be as good or better than the parent tree, but the odds are stacked against you!

Why do plants mix and match their genetic material and constantly change? Basically to create genetic diversity and variation, as a mechanism to adapt to different conditions and enhance their chances of survival and reproduction. If every seed produces a tree with different attributes, there's a much higher probability that one or more trees will survive to grow into a mature trees and continue to produce the next generation in the event of a detrimental environment change.

So, if many fruit trees are not "true to seed" and intentionally produce genetic diversity in their seedlings as a survival strategy, what can we do if we want to preserve the qualities of the parent plant to maintain the size, quality and flavour of the fruit as well as many other desirable characteristics? The solution is simple. We can use propagation methods which produce genetic clones of the parent tree, which we'll now discuss.

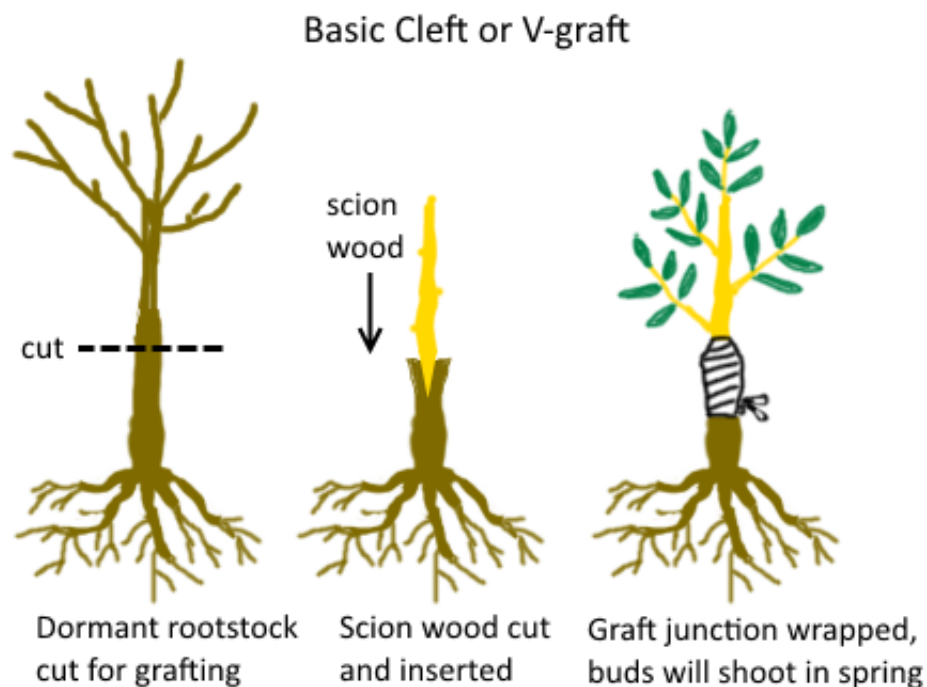
Grafted trees

The reason why many fruit trees are grafted is because they *do not* grow true to seed. Only by grafting the scion wood (a cutting of a branch) **from the original tree** onto another rootstock (the base another tree with roots) can you ensure that you get the same fruit each time.

If we consider Granny Smith apples for example, the scion wood of all grafted trees of

this variety, all around the world, everywhere, can be traced back to a single tree in one part of the world! Quite amazing when you think about it. in the case of the Granny Smith apple variety. it all originated from a single seedling that came up by chance from a pile of discarded crab apples in Australia in 1868 and was discovered by Maria Ann Smith, who propagated the cultivar. In each part of the world where a Granny Smith apple is grown, scion wood which is a clone of the parent tree will be grafted onto a various different rootstocks to cope with the local growing conditions.

There are a large number of different grafting techniques that are used in different circumstances and on different trees, the diagram below illustrates how basic cleft grafting (also known as V-grafting) works.



Since the scion wood is a basically cutting that has the same genetic maturity as the parent plant, a grafted tree fruits much sooner. So, if a plant takes six years to produce fruit when it's grown from seed, a grafted tree may only take two to three years to produce fruit. This saves a lot of waiting around and avoids having unproductive trees taking space in a garden for many years.

For example, an avocado grown from seed may take 6 to 10 years or more to fruit, while a grafted tree will produce fruit in 3 to 4 years.

Grafting provides the benefit of attaching different roots to trees to enable them to grow in soils where it normally can't grow. If you were to plant a tree where it shouldn't be planted naturally, it will have a shorter life. If you graft a tree using an appropriate rootstock, it will be better able to handle adverse conditions. Specific rootstock can be used to cope better with different soil types and soil conditions, such as heavy or clay soils, or resist particular diseases. The general rule with rootstock is that like is grafted onto like, apples onto apple rootstock, pears onto pear rootstock, and so on.

The technique of grafting can be used to control the size of the tree. Grafting is used to produce everything from fully dwarfed trees to full size trees and everything in between. Semi-dwarf and dwarf trees are produced by grafting onto a less vigorous or weaker rootstock. In the worst cases, such as with the fully dwarfing apple rootstocks, such as the M9 rootstock, the root system is so weak that it can't hold the apple tree up and it has to be staked up for life. These rootstocks luckily aren't what's used when you buy a dwarf apple tree from a retail garden nursery, so there's no need to be concerned.

Citrus is always grafted to specific rootstock such as flying dragon to create dwarf citrus trees or trifoliata to grow full size trees that will be suitable for specific soils. Trifoliata rootstock does well in heavier clay loams to loamy soils in the cooler climates and is resistant to citrus nematode and some species of the phytophthora (a soil-borne water mould that causes root rot).

It's important to realize that grafted trees don't live as long as seed grown trees, but both of these have naturally formed roots, which provide some advantages over cutting grown trees.

Cutting grown trees

Some fruit trees grow great from rooted cuttings and will fruit as soon as they have enough roots to support fruit production. Mediterranean fruit trees such as figs, pomegranates and mulberries, as well as climbers such as grapes and kiwifruit can all be grown from [hardwood cuttings](#) to produce genetic clones, no need for seedling grown trees or grafting. When you buy these trees. they are most often grown from cuttings.



Cuttings grown plants typically have a weaker root system than seedlings or grafted trees, but to keep things in perspective, grafted dwarf trees are intentionally grafted onto weaker root systems, which is what makes them into dwarf trees.

If the type of tree has a deep taproot (and not many fruit trees do), this is something that will only be present in a seedling root (and on a grafted rootstock). Tree cuttings don't develop tap roots, as this is a structure that forms at the seedling stage.

Air layering trees

Some trees are propagated by inducing branches to form roots while they're still attached to the tree, and cutting them off **after** they have sprouted roots!



Lychee air layer on a small potted plant (Photo source: Iacopo Lorenzini (Own work) via Wikimedia Commons)

Cuttings produced by **aerial layering** (also known as **air layering** or **marcotting**) grow and behave exactly the same way as cuttings rooted in the conventional way.

With air layering, a ring of bark is stripped off the branch, but the branch is left on the tree. The exposed wood is covered with a moisture retentive medium such as moist sphagnum moss or coco-peat (coconut coir) and wrapped in plastic to keep the moisture in until roots form. Once the roots are sufficiently developed, the branch is cut, and potted up to grow on and produce a stronger root system.

Air layering is used when propagation using regular cuttings doesn't work well, and is often used on evergreen trees including many subtropical and tropical trees. This method also works on citrus which is an evergreen tree, but citrus are better propagated using bud grafting or shield grafting methods, which are different to the cleft or V graft mentioned earlier.

Seedling grown trees

As we've already mentioned there are certain advantages and disadvantages to seedling grown trees.

If a fruit tree ***is not true to seed***, the seedlings will be different from the parent, and they will often take many years longer to fruit, in some cases, well over ten years. That can be disappointing if you wait that long only to find that the fruit tastes nothing like the parent tree's fruit!

One major use for seedling trees is as grafting rootstock, as they have a strong root system which make them ideal for grafting known varieties onto.

Seedlings grown trees will live longer than grafted trees or cutting grown trees, they are more vigorous and grow slightly larger. They're also a lot stronger and more hardy, and more likely survive frosts. If a grafted tree is hit hard by frost, the graft will usually die off, but the rootstock will survive. With a seedling grown tree, if the rootstock survives a hard frost it will usually reshoot from the ground.

Apples and pears are never true to seed but tamarillos can be grown from seed.

Apricots, peaches and nectarines grow ***fairly*** true to seed, some say plums do too. They won't be exact but often quite close. A good cheap option though if you're guerrilla gardening around the suburbs in vacant public spaces!

Gardeners often ask whether they can grow citrus from seed, or avocado. The answer is both yes and no, as these require a bit of an explanation...

Can citrus trees be grown from seed?

Most citrus are true to seed because they are in fact ***polyembryonic***, the seeds contain more than one plant embryo, one only embryo is the product of fertilization (sexual reproduction) and the rest are genetic clones of the parent tree. When these seeds are grown they produce multiple shoots, the fertilised one is usually the weakest and is removed.

The following citrus are ***monoembryonic*** and ***do not grow true to seed*** – Clementine Mandarin, Meyer Lemon, Nagami Kumquat, Marumi Kumquat, Pummelo, Temple Tangor, and Trifoliate orange (*also known as Citrus trifoliata, Poncirus trifoliata, Japanese bitter-orange, or Chinese bitter orange*).

Can avocado trees be grown from seed?

Avocado seeds may be polyembryonic, but they might not be. It depends on the variety. It can get confusing identifying which is which, because the monoembryonic seedlings (which are not like the parent tree) can produce multiple shoots which can be mistaken for multiple embryos but are a completely different think.

Mangoes such as the Bowen (Kensington Pride) variety is polyembryonic and will grow true to seed, so this may be a better choice

Conclusion

Hopefully, with this understanding of the differences between seedling, grafted and cutting grown fruit trees, you won't be waiting years to find your seed-grown fruit tastes awful, you'll know what to grow from seed or cutting, and you might even feel enticed to give air layering or grafting a go!