



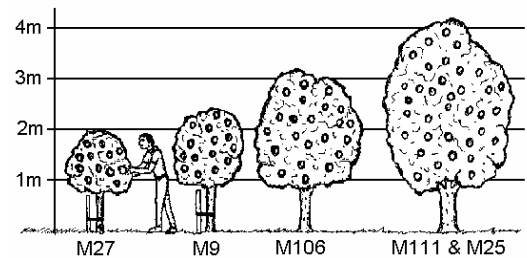
Re-Thinking Apple Rootstocks in Hot Climates

Why M111 is Currently the Best Rootstock for All Uses

Kevin Hauser, Kuffel Creek Apple Nursery, March, 2011

You would have thought by now that I would be leery about the conventional wisdom when growing apples in a hot climate. Yes, I've learned to ignore chilling hours and ripening charts. I have learned to ignore an apple's origin when trying it out here and not be surprised when a "northern" apple does well in our heat. I graft whenever I want to, not just in the spring, and I ignore ripening charts.

Yet over the last 5 years I've parroted rootstock size and vigor charts without taking time to look at my orchard to see what's really happening. I'm sure you've seen the charts like the one on the right; they start out with tiny M27 at 6' tall, Bud 9 at 6' tall, M7 at 15 feet tall, M111 at 18 feet tall, finally gigantic seedling at 20, 25, even 30 feet tall. If you want to espalier a tree or grow it as a tall spindle, then Bud 9 is for you. But if you plant an M111 or seedling, boy you'd better be prepared to haul a ladder around to prune, spray, and pick from it. And of course you've been told that M111 or seedling rootstocks can take 5-10 years to begin fruiting.



M7 and M111 Trees as Tall Spindle

But as I look around the orchard, cold hard reality slaps me in the face. I planted 9 tall spindle trees on M7 rootstock, and only one in 9 ever reached the top wire at 8 feet; most are around 6 feet tall. All 21 of the M7 trees planted as free-standing center leader trees have stopped growing at about 6 or 7 feet, easily reachable from the ground. The M111 trees planted as a tall spindle also maxed out at about 7 feet. The

three seedling rootstock trees trained as espalier are easily kept at 7 feet.

However, only half of the Bud 9 trees trained as Belgian fence espaliers ever reached the top wire at 6 feet. Only 3 of my 6 M27 trees ever got above 3 feet. The small trees have fruited no earlier than the M7 or M111 trees, as they could not support fruit earlier in their lives. On the other hand it is not uncommon to get a decent crop off the M111 trees the second year. Anna and Dorsett Golden will fruit heavily the second year, even on seedling rootstock, regardless of the size of the tree.



Espalier on seedling rootstock



5-year old Red Boskoop on M27

So what gives? First of all it has been apparent that hot and tropical climates have dwarfing effects on apple trees. Apples in the tropics are always planted on the most vigorous rootstocks and spaced at 2 meters by 3 meters. It may be because the lack of chill allows the tree to be lazy and lack vigor, or the heat itself may be hard on them. The apple variety itself has a lot to do with it, as super-low-chill varieties Anna and Dorsett Golden can indeed get large on seedling rootstocks if allowed to do so.



Large Dorsett Golden on vigorous rootstock



Borer Damage on a Bud. 9 tree that never recovered

and heal over the damage or remain productive with the restricted trunk, while more dwarfing trees are not. The same goes for physical damage when your neighbor's Jacaranda tree drops a big limb that whacks your poor apple tree; the higher-vigor trees are able to grow a new limb quickly, while the lower-vigor tree will be deformed for years. Higher-vigor trees also have a thicker trunk girth, which makes it less

The other thing is that there are two types of apple trees here; ones that have had sunburn and Pacific Flathead Borer attacks, that those that will in the future. It is almost a given that each tree will lose a quarter of the bark on the trunk on the south side of the tree, even with preventative measures such as painting the trunk white. This is also true of any horizontal branch exposed to the sun. Higher-vigor trees are able to withstand this



Vigorous tree recovering from borer damage

likely the borers will be able to girdle it completely, killing the tree. Borer damage is the leading cause of death for young trees, and it doesn't matter how dwarfing or precocious an apple tree is- if it's dead.

Finally I observed that once the tree starts fruiting, it puts on very little growth each year. This has been used in colder climates to keep even seedling-rootstock trees manageable, and their objective is to get the tree to production size as soon as possible, then get it to fruit as soon as possible, resulting in huge crop loads. This works for us also, and in doing so a vigorous tree will fruit the same time or even sooner than a more dwarfing tree that you end up waiting for years for it to get big enough to support a load of fruit. Once the tree starts to fruit it develops fruiting spurs instead of new shoots, and you may get only three to six inches of new growth a year (making it tough to find new scionwood for propagation). This is great productivity-wise as spurs mean fruit, but if the tree does this before reaching the size you want it, there's not much you can do.



Fruiting spurs as the tree enters into apple production, with little new growth



Woolly Aphid root gall on young apple roots

infestations on the roots, where it is safely out of reach of sprays or pesticides, and causes nodular galls on the roots that render them inefficient which can stunt or even kill the tree. M111 is resistant to woolly aphid, while seedling rootstocks definitely are not.

Thus I'm now advocating using M111 rootstock for all uses, whether as a Belgian fence espalier to a free-standing specimen

So if all these things are true, is the most vigorous seedling rootstock even better than M111 for use in hot climates? The answer is no, because of an almost universal pest called woolly aphid. You may have seen it as a cotton-like tufts on recent pruning wounds on your tree trunk; this is an excretion the aphid puts out (and burns really good with a light pass of a butane torch for easy pest control). But where it does the most damage is underground



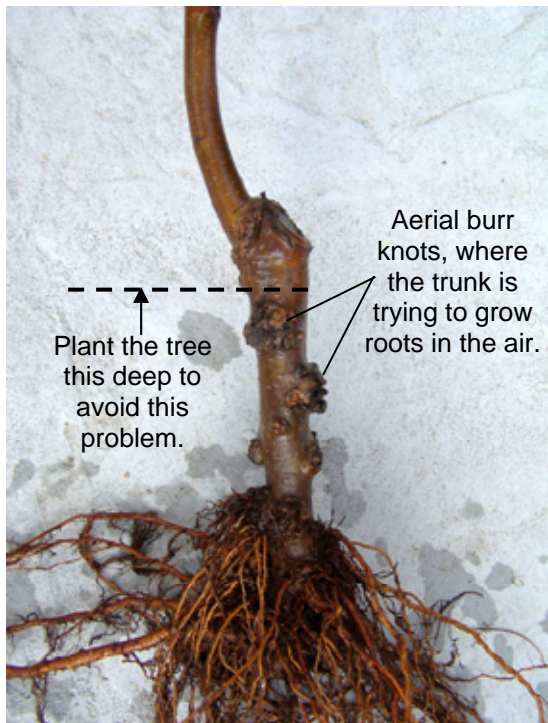
M111 likes to grow roots

tree; it can easily be trained to attain almost any size. Minimal summer pruning the first two or three years will do this and even with this pruning you're going to get some fruit off of it starting the second year. I'm afraid I'm a late-comer to advocating M111 for all uses in hot climates; my friend Tom Spellman of Dave Wilson nursery has advocated this for years (they grow over 2 million trees per year, but ah, what to they know?) M111 also has a lot of qualities home growers can appreciate; it is drought-tolerant, adaptive to sandy or heavy clay soils, very well-anchored and able to stand up to heavy winds, and is easily propagated in mound layers. If your irrigation clock fails during a heat wave the deep roots can sustain the tree until you fix the problem, unlike some of the more dwarfing rootstocks where an irrigation failure means certain death.

So what about for an espalier? A common assumption is that an espalier tree is a small tree that needs a dwarfing rootstock. But if you look at them, most espaliers are larger trees; if you have a trunk and want to grow a 5' branch on each side, that's a 10' wide tree if you had grown it conventionally, much larger than dwarf or semi-dwarf rootstock trees will get here. There will be more problems if the tree runs out before attaining your desired shape compared to having to keep pruning it for a few years until it grows fruit spurs and doesn't put on much new growth. An added bonus for espaliers is that a robust rootstock can hold a big load of fruit in high winds without ugly supplemental trellis wires or other structure as you would need with a more dwarfing rootstock.



An espalier can have a 10' spread



About the only drawback for M111, if you could call it that, is its tendency to want to grow roots on every inch of the trunk, thus any buds exposed above ground will start to grow aerial burr knots, bristling with ugly root stubs that hide pests. The remedy for this is to plant it with the graft union very low, even at ground level so that most of the rootstock is buried and can root into the ground until its heart's content. Do not worry about the scion rooting in and losing the dwarfing effect of the rootstock, as this either doesn't happen or doesn't affect the tree much. And say goodbye to the wussy, unadaptive dwarfing rootstocks that we've been told for years are the best for our location by people that have never grown them here.