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# Rootstocks for Fruit Trees

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During the past 25 years, rootstocks for fruit trees have become of increasing importance. The main reasons for this are that the rootstocks play a large role in controlling tree size allowing the grower to plant more trees per acre; and secondly, tree productivity, longevity, and adaptability to soils and climate depend on the rootstocks used.

Fruit tree rootstocks must be capable of surviving many years under local growing conditions. Ideal rootstocks should be easy to propagate, have a strong root system, be relatively sucker-free and resistant to major insects and diseases.

## APPLE ROOTSTOCKS

Apple rootstocks are listed in Table 1 according to degree of dwarfing, from most dwarfing to vigorous.

### Malling 27

'M.27' is a new, very dwarfing rootstock, not sufficiently evaluated for adaptation to varying soil types, climatic conditions, commercial scion varieties and to cultural systems.

### Malling 9

'M.9' responds well with most varieties budded on it, but must be planted on a well drained, deep, loam soil which retains

uniform moisture. Being very dwarfing, 'M.9' has brittle roots and wood, and trees on 'M.9' require support in the form of a single post next to the central leader, or a trellis to which branches can be trained.

### Malling 26

'M.26' is more vigorous than 'M.9' and has a stronger root system, so that, when well propagated, trees can be free standing. 'Delicious' strains perform very well on 'M.26', and are not as prone to develop apple measles as on 'M.9'. Some fruit growing areas have had "crown rot" and fire blight problems with 'M.26'. 'M.26' appears to perform well in Michigan.

### Malling 7

'M.7' is one of the most desirable apple rootstocks from the standpoint of production, dwarfing, longevity, ease of propagation, temperature tolerance, compatibility and disease resistance. Most apple varieties are compatible with 'M.7', and if spaced according to scion/rootstock vigor, acreage production can be high, and management cost low. The rootstock tends to sucker particularly with 'Paulared' and 'Northern Spy'. Some trees of vigorous varieties may lean, especially on clay soil types.

Trees on 'M.9', 'M.26', and 'M.7' should be budded 12" high in the nursery, and planted in the orchard with graft union 2" above ground line, to facilitate better anchorage.

### Malling 2

'M.2', a semi-dwarfing rootstock, has been declining in popularity because less vigorous rootstocks and smaller tree size have become more popular. It is difficult to propagate.

### Malling Merton 106

This semi-vigorous rootstock has become popular because of good anchorage, rapid development, some dwarfing, and ease of propagation. It is productive when planted on light, well drained, sandy loam soil. 'MM 106' makes a vigorous tree with such varieties as 'McIntosh', 'Paulared', and 'Mutsu', and is more dwarfing with the 'Red Delicious' strains. To avoid potential collar rot problems, do not plant 'MM 106' on poorly drained clay loam soils.

### Malling Merton 111

It is well anchored, resistant to woolly aphids, and tolerates droughty soil conditions. 'MM 111' is recommended for spur-type 'Declicious', and as a root system for interstem trees. Like 'MM 106', 'MM 111' is semi-vigorous with most varieties, and not adapted to close spacing or high density plantings. 'MM 111' does not mature as rapid as 'MM 106'.

'MM 109' and 'MM 104' rootstocks have been discontinued because of poor anchorage and crown rot problems respectively.

### Seedlings

Apple seedlings may have a place as root systems for interstem trees, but some tree variability may occur in such orchards.

**TABLE 1. Selected apple rootstocks available for commercial fruit growing; their relative dwarfing, and adaptability to soil conditions.**

Apple Rootstocks	Dwarfing	Soil Adaptations	
	Percent of Seedling <sup>2</sup>	Sandy Loam	Clay Loam
M.27 <sup>1</sup>	20	Yes	Maybe
M.9	30-50	No	Yes
M.26	45-60	Yes	No
M.7	55-75	Yes	Yes
M.2	70-80	Yes	Yes
MM 106	75-90	Yes	No
MM111	80-90	Yes	Yes
Seedlings	100	Yes	Yes

<sup>1</sup>Not available for commercial production in 1975.

<sup>2</sup>Degree of dwarfing will vary with variety and soil type.

## ROOTSTOCK/INTERSTEM

When an interstem for dwarfing apple varieties is used, select a well anchored rootstock clone such as 'MM 111' ('MM 106' on well drained soil). The 'M.9' interstem should be at least 6 in. long, and positioned on the trunk at least 12 in. from top of roots on rootstock, to provide a "shank" for deeper planting. For best performance, plant the tree with the lower graft union 2 in. above ground.



## SUGGESTIONS ON APPLE TREE SPACING

Tree spacing and the number of trees to plant per acre depends on variety, rootstock, soil type, tree training, and methods of harvesting (Table 2). The final decision on tree spacing must take into account long range goals, type of orchard management and capital investment.

It is often better to allow a little extra room, rather than to be crowded, especially when using bulk bins and average size tractors. When a considerable amount of "heading-back" of trees has to be done to keep them small, yields are sacrificed due to an imbalance in growth and fruiting (Table 3). High tree densities require more detailed tree training, especially in the early years of the orchard.

Planning, mapping, and planting the new density orchard is only the first phase of a good fruit operation. Year-to-year tree management is also essential.

## PEAR ROOTSTOCKS

Pear varieties are generally grafted on Bartlett seedling rootstocks, because resulting trees are uniform, productive, and resistant to root diseases and seed is available. Dwarfing rootstocks, such as the quince, are not hardy or dependable.

## CHERRY ROOTSTOCKS

Mahaleb seedling rootstocks are extensively used for tart cherry varieties like 'Montmorency'. These are dependable and slightly dwarfing. Uniform Mahaleb seedlings are propagated from seed collected from virus indexed 'mother trees.'

Mazzard seedlings, or the clone Mazzard F 12/1, are rootstocks recommended for sweet cherry varieties and for tart cherries under imperfect drainage. These are vigorous, and adaptable to most soils where cherries are grown. Mahaleb seedlings used for sweet cherries are slightly dwarfing, and best adapted to sandy soils, but are not as dependable as Mazzard, since incompatibility with the scion variety may occur.

## PEACH ROOTSTOCKS

Peach seedlings are used as rootstocks for peach varieties. Peach seedlings from 'Halford' and 'love11', California processing varieties, are used most extensively because they are available. 'Siberian C', in limited testing, appears promising as a hardy and slightly dwarfing peach seedling rootstock. Rutgers' Red

**TABLE 2. Apple variety/rootstock combinations in relation to tree density and trees/acre. On sandy soils, reduce the spacing by one foot, and increase by one foot in each direction on heavy soils.**

Variety/Rootstock (Examples only)	Tree Density and Trees/Acre (parenthesis)		
	Low	Medium	High
McIntosh/MM 106	12 x 24 (129)		
McIntosh/MM 111	12 x 22	(165)	
McIntosh/M.7		10 x 20 (218)	
McIntosh/M.26		10 x 18 (242)	
McIntosh/M.9			8 x 16 (339)
Spur McIntosh/M.9		10 x 16 (272)	
Delicious/MM 106	14 x 22 (141)		
Delicious/MM 111	14 x 22 (141)		
Delicious/M.7		10 x 18 (242)	
Delicious/M.26		10 x 18 (242)	
Delicious/M.9			8 x 16 (339)
Spur Delicious/M.9			6 x 14 (518)
Jonathan/MM 106		12 x 16 (226)	
Jonathan/MM 111	14 x 16 (194)		
Jonathan/M.7		10 x 16 (272)	6 x 16 (453)
Jonathan/M.26			8 x 16 (339)
Jonathan/M.9			6 x 16 (454)
Idared/MM 106		10 x 18 (242)	
Idared/MM 111	12 x 20 (181)		
Idared/M.7		10 x 16 (272)	6 x 16 (339)
Idared/M.26			6 x 16 (453)
Idared/M.9			6 x 16 (453)
Golden Del./MM 106	10 x 20 (218)		
Golden Del./MM 111	12 x 20 (181)		
Golden Del./M.7		10 x 18 (242)	8 x 18 (302)
Golden Del./M.26		10 x 18 (242)	3 x 16 (339)
Golden Del./M.9			6 x 14 (518)
Spur G.D./M.9			6 x 12 (605)

\*Spur type varieties, being slightly dwarfing, can be spaced 2 feet closer in each direction when on M.7, MM 106, and MM 111.

**TABLE 3. Guidelines for tree spacing, as influenced by the rootstock, tree training system and tree numbers.**

Rootstocks Small to Large	Tree Training System <sup>1</sup>	Tree Spacing (in feet) <sup>2</sup>	Number Trees per Acre
M.9	St. or Trel.	6 x 14	518
M.26	St. or Trel.	8 x 16	339
M.7	St. or Free	8 x 18	302
MM 106	Free Standing	12 x 20	181
MM 111	Free Standing	12 x 22	165

<sup>1</sup>St. or Trel. = Staked or Trellised tree training system. Free standing training system.

<sup>2</sup>Vigorous varieties will need 2 feet more each direction.

Leaf seedlings also are satisfactory for all but a few incompatible combinations.

susceptibility to peach tree borer and canker.

## PLUM ROOTSTOCKS

Myrobalan plum seedlings are used as rootstocks for commercially grown plum varieties such as 'Stanley'. Peach seedling rootstocks, which are sometimes used, produce vigorous growth of plum trees the first few years on light sandy soils. However, they are not suggested because of poor graft union combination and

## APRICOT ROOTSTOCKS

Apricot seedling rootstocks are used for apricot varieties and are preferred to peach seedlings because of graft incompatibility of apricot with peach. Apricot seedling suggested for apricot varieties are Manchurian and 'Goldcot'.