

Choose the Right Rootstock¹

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The key to making the best rootstock decision today is to focus on the specific site and the known performance of trees on a particular rootstock under those conditions.

Choosing a rootstock is an important decision. It should be carefully considered because the decision is a relatively permanent one and, therefore, has long-term significance. The steps in choosing a rootstock may not always be obvious, but there are several factors that have been traditionally important. One of the more important factors is your personal experience along with that of friends, neighbors, and nursery managers. The information you gather may be conflicting and sometimes confusing, but the sum total available can lead to better rootstock decisions. Some of the other steps and factors involved are described below in a generalized approach to selecting the best rootstocks for your conditions.

1. Gather the Facts About the Site and Its History

There is no substitute for having as much factual information as possible. A prominent grower once visited me to ask about rootstocks. I asked him how he made his rootstock decisions. His immediate reply was “First, I read everything I can find.” Reading is an excellent supplementary activity to all of the steps mentioned herein.

Information should be obtained regarding:

- Soil chemical and physical traits; site characteristics. Texture, depth to hardpan, organic matter content, pH, water-holding capacity, drainage, nutrient status, etc. There is no excuse for not studying your County Soil Survey (remembering that it has some limitations). Use the information in the Soil Survey, for example, to guide your bedding procedures if your grove is in the flatwoods, and to help make rootstock choices. Also, if you don't have old aerial photos of the site, see if you can obtain them from such places as the Florida Agricultural Statistics Service, your local property assessor, the Natural Resources and Conservation Service, or a private vendor. They are quite valuable in showing site variations especially those that existed before planting. The “poor” spots tend to persist in their effects in a grove.
- Topography. Changes in elevation are important to both air and water drainage. Images showing elevation changes and other features are available on the internet. Visit the Florida Geographic Data Library (FGDL) at the University of Florida (www.fgdl.org) for a wealth of free information including aerial images and the digitized County Soil Surveys. Another site is the Florida Department of Environmental Protection Land Boundary Information Systems (LABINS) at www.labins.org. This site has excellent, reasonably current aerial images.

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2. Know Your Objective

Many decisions are made within the framework of a well-defined goal. Therefore, consider:

- **Scion cultivar.** Like choosing a rootstock, the cultivar selected represents a choice not often or easily changed after planting. An example of a scion-dependent rootstock choice is the use of Cleopatra mandarin. Evidence from field research suggests that Cleo is an acceptable choice for early-season oranges because of good yield and juice quality; however, the use of Cleo for Valencia bud-lines is less certain.
- **Market.** Juice quality may be less important than yield if the fruit is for processing, and this would affect the choice of rootstock. If the fruit is for the fresh market, the influence of the rootstock on external quality may become more important.
- **Solid-set or replanting.** Sometimes for replanting, a different rootstock than the one selected for a solid planting is appropriate because of concerns about diseases like Phytophthora foot and root rots, and because of tree spacing. When the replant space is small, choosing a rootstock for its vigor rather than other characteristics becomes more important. Rootstocks of only medium vigor generally do not compete or grow well as replants in close spacings.

3. Know the Rootstocks

There are two readily available sources of information about rootstocks. Each provides a different perspective. They are:

- **Experience.** Growers usually feel comfortable planting trees on rootstocks for which they have had positive experiences. The performance boundaries of trees on a particular rootstock are established from years of commercial use. Confidence (and less risk) is derived from that practical experience; however, more risk might be encountered if the decision is made to plant outside those boundaries. For example, it is known that trees on Carrizo do not perform well in calcareous soils. So, while planting trees on Carrizo in soil of pH 7.2 might be an acceptable risk, it would not be an acceptable risk to plant those same trees in a site with plenty of calcareous material present and a soil pH of 8. The latter decision exceeds the performance boundary for Carrizo.
- **Field experiments and research data.** Rootstock research functions mainly to determine the commercial potential of new rootstocks, and to ensure that the capabilities

of currently used rootstocks are completely and clearly understood. The various field experiments established for this purpose, including those in commercial groves, represent essentially the only source of publicly available data regarding new rootstocks. As a result, they are likely to provide answers for today's important issues, such as tolerance to blight, Diaprepes, etc. It wasn't too many years ago that Swingle citrumelo rootstock was new to the Florida citrus industry. Now, Swingle is a major commercial rootstock, but one with some known dents in its armor.

4. Choose the Rootstock

The information gathering processes described above provide a sound foundation for this final step; but it is also well to recognize from the outset that all rootstock decisions are tempered by the absence of any perfect choices.

The relative importance given to individual rootstock traits affects rootstock choice. In Florida, rootstock selection is generally based on a combination of concern for productivity and tree survival. "Productivity" for juice fruit can be defined as the maximum quantity of juice or soluble solids with the minimum number of risks at the lowest cost. Therefore, priority is normally given to rootstock effects on volume of fruit, but sometimes other factors become limiting and virtually dictate rootstock choices. For example, sweet orange is not usually selected because of susceptibility to foot rot or root rot; sour orange is not chosen because of tristeza; and Carrizo is not a good choice when your irrigation water has high levels of salinity. In contrast, some rootstock characteristics are essentially non-limiting and are, therefore, less important. If trees on a cold tolerant, productive rootstock are susceptible to drought, they can be irrigated.

Actually, making rootstock selections essentially involves developing a composite assessment of a rootstock based on its individual characteristics, and then choosing the rootstock that best matches your interests and goals. No one rootstock is likely to be entirely satisfactory in any set of circumstances. It is often wise to consider using two or three rootstocks *especially if those rootstock choices are being matched to variations in the soil and site*. If two or more are selected, setting a grove so that trees are planted on alternating rootstocks is not recommended.

Rootstocks should be selected to match specific local conditions particularly when planting the highly variable soils found in flatwoods areas. Soil factors and yield are priority determinants. Rootstocks tolerances to wet and dry soil

conditions (related, e.g., to depth to clay), and calcareous conditions also must not be ignored.

Bottom line? Spend most of your time and effort understanding your site and gathering the best information available about rootstock site-specific performance. When someone inquires about rootstocks, I usually begin by asking questions related to the steps presented above, then asking why Swingle citrumelo or Carrizo citrange are not acceptable choices. If there are good reasons, then we begin to review the rootstocks described on the “rootstock wheel” which is available from the University of Florida (See *Florida Citrus Rootstock Selection Guide*, publication SP-248). Finally, there are a number of promising new rootstocks under development that can be included in any discussion of choices.

The real bottom line? Plant your own rootstock trial. It is easy to do, it is easy to manage, and it will be your best decision-making tool! Trust me!