

Helpful Suggestions for Commercial Propagation of Woody Plant Stem Cuttings¹

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Introduction

Ask a producer how to root a woody landscape plant and most likely the answer will focus on the root-inducing substances or materials used to promote rooting. This is because numerous evaluations and tremendous efforts have been devoted to finding the right combination of substances that induce roots rapidly. However, after achieving the goal of finding the ideal substance(s), formulation(s), the right amount, and the best application methods for rapid rooting with large numbers of vigorous roots, there is the tendency to become complacent with many of the other details for propagating cuttings. These other details are just as important as finding the ideal root-inducing substance. So as a reminder, provided below are details that are very important for successful propagation. Some of the details might be altered based on experience with particular species or cultivars and the environment (structure, moisture, etc.) in which cuttings are rooted.



Figure 1. Uppermost recently mature stem cutting is removed by cut just above subtending leaves. The position of the cut results in a cutting that is approximately the desired length.

Credit: Tom Yeager, UF/IFAS

Sanitation—Start with pathogen-free plants, substrate, tools, and surfaces and do not become complacent during the process of gathering, preparing, and sticking cuttings. Personnel should wear disposable gloves that are changed several times a day. However, washing gloved-hands is also helpful if the same gloves are used for an extended time. In addition, tools and work-space surfaces should be sanitized frequently throughout each day. A publication on disease management is listed as a reference.

Quality of cuttings—Cuttings of woody plants are often categorized as hardwood, semi-hardwood, or softwood to denote the maturation of the shoot where stems are cut. The quality of cuttings used for propagation is paramount. Thus, it is important that stock plants, from which cuttings are removed, are grown with optimal conditions (e.g., light, water, and nutrients). Use blemish-free cuttings taken from non-stressed plants that exhibit uniform growth. Most softwood cuttings are taken from shoots near the top of plants, and the most recently formed leaves should be fully expanded.

An ample amount of stems must be available for cutting. If not, the tendency is to cut a specific number of stems even though some cuttings are not consistent quality. Having an ample amount of stems available for cutting, enables personnel to select or seek specific cuttings that will exhibit consistent root formation.

Time of year/day to take cuttings—The best time of year to cut stems, for optimal rooting, will depend on the plant's response to environmental factors such as temperature. The environmental factors result in various physiological responses by the plant and consequently varied rooting responses. Thus, it is important to understand the plant's physiological response to environmental factors so proper timing for propagation is achieved, particularly for plants that are difficult to root. For example, *Magnolia grandiflora* can be propagated in the spring from new shoots that are almost mature, while some junipers are propagated in the fall using semi-hardwood cuttings. Specific information about when to propagate plants can be obtained from books about plant propagation.

Shoots and leaves of well-watered plants should have their maximum water content in early morning. At this time, plant tissues are not stressed and thus are ideal for cutting. Once cut, the flow of water up the stem from the roots is disrupted, and cuttings need to be protected to minimize water loss. Cuttings should be placed in shade and kept moist during preparation. The goal is to get cuttings into the substrate and rooting environment as soon as possible after separation from original plants.

Stem size diameter and length of cutting—Consistent rooting between cuttings can be impacted by the characteristics of the cuttings, so uniformity is very important. Take cuttings from uppermost mature growth or shoot tips for most plants. Select stems to cut that are of similar diameters with leaf nodes of similar distances on the stems. Stems that are cut must be mature enough to remain upright once the basal end is placed in the substrate. Cuttings for many plants are a single stem, approximately three inches long with the leaves removed for approximately one inch from where the stem is placed in the rooting substrate. Cuttings that are branched may be used, but the uniformity of cuttings can impact the uniformity, form, or growth of the mature plants. In some cases, cuttings with specific specifications or sizes are desired because of the markets for the salable plants.

Location of cuts/terminal bud removal—Cut directly above subtending leaf or leaves a few nodes down the stem so that the uppermost portion of the stem can be removed if it is not mature enough to remain turgid and upright when tip is vertical. If the uppermost portion of the stem is mature enough to remain vertical, it can be convenient to size the length of the cutting by making the basal or bottom cut just above subtending leaves a few nodes down the stem. Remember that approximately one inch of clear stem is placed in the substrate, so remove the basal leaves if necessary. When nodes are approximately three inches apart, the stem between each node along with the uppermost leaves may be used for the cutting (Figure 1). Remove flower bud(s) so that energy reserves in the cutting are used for root formation and not flowering. Thus, a leaf or leaves and stem node remain at the top of each cutting. Cuttings that are the same length with similar stem diameters and the same number of leaves help ensure uniform rooting and subsequent shoot growth. For some cuttings, it may be beneficial to wound the basal area.

Environmental conditions—Propagation of cuttings from most woody plants requires shade during summer and

cold protection during winter. Cold protection is usually provided by structures or greenhouses covered with cold and wind barrier material during the winter. Often, these same structures are covered with shade materials during summer. Shade is used to minimize stress to unrooted cuttings, particularly at the beginning of propagation. As cuttings develop roots, shade amount is reduced or eliminated depending on plant need. It is important to gradually reduce shade amount to prevent sun damage of leaves.

The frequency of mist and the duration of misting follow a similar pattern to shade—more is used initially. The initial intervals of misting (time between stop and start of mist cycle) should be short enough to maintain a film of moisture on the surface of leaves and keep the substrate moist. The mist duration (length of time mist is operational) is during the time that cuttings receive direct sunlight. However, for the first couple of days after cuttings are placed in the substrate, mist duration is extended from early morning till dusk. The extra water in the evening is not likely to evaporate rapidly and might ensure the stem base establishes contact with substrate moisture. After rooting, mist frequency is gradually reduced so that the length of intervals is increased, while mist duration is gradually reduced so that cuttings are acclimated to an irrigation cycle similar to the container plant production environmental conditions.

Summary

Successful rooting of woody plant cuttings could be described as the application of science and practical horticultural principles. Many scientific evaluations have determined the optimal root-inducing substances, formulations, and amounts for treating cuttings, but relentless application of sound horticultural principles is where many become complacent. The details mentioned above are based on several years of observations and personal experiences. However, there is no recipe that guarantees success each year, but careful attention to these suggestions can enhance the chances of success.

Reference

Harmon, P. F. and S. D. Bledsoe. 2004. *Professional Disease Management Guide for Ornamental Plants*. PP202. Gainesville: University of Florida Institute of Food and Agricultural Sciences.
<https://ask.ifas.ufl.edu/publication/PP123>
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