

Plant Propagation Laboratory Introduction and Exercise

Module 1

An introduction to propagation substrates

1. Characteristics of an ideal propagation substrate

Propagation substrates include both naturally occurring and soilless substances and are extremely variable for such characteristics as water holding capacity, pH, buffering capacity and drainage. The characteristics of an ideal substrate are listed in the following table. Some of the more widely utilized substrate components and their characteristics are also listed in a table that follows.

2. Characteristics of commonly used propagation Substrate¹

- a. The substrate must be sufficiently firm to hold the cuttings or seeds in place during rooting or germination. Its volume must be fairly constant when either wet or dry; excessive shrinkage after drying is undesirable.
- b. It should be highly decomposed to prevent nitrogen immobilization, and excessive shrinkage during production.
- c. It must be easy to wet and it must retain enough moisture so that watering does not have to be too frequent.
- d. It must be sufficiently porous so that excess water drains away, permitting adequate penetration of oxygen to the roots.
- e. It must be free from weeds and weed seeds, insects, nematodes and various pathogens (bacteria, fungi, viruses, etc.).
- f. It must not have a high salinity level.
- g. It should be capable of being pasteurized with steam or chemicals without harmful effects (without influencing the physical, chemical and biological properties of the substrate such that the changes would be harmful to the plants being propagated).
- h. It should have a high cation exchange capacity (CEC) for retention of nutrients that may be applied preincorporated and/or in a supplementary soluble and/or slow-release fertilizer form.
- i. It should be of consistent quality from batch to batch, and reproducible.
- j. It should be readily available and of acceptable cost.

¹ Adapted from Plant Propagation principles and practices. Sixth Edition, 1997. Hartman, Kester, Davies, and Geneve, editors. page 68.

Plant Propagation Laboratory Introduction and Exercise

Module 1

3. Sterilization procedures for propagation substrates

a. Steam pasteurization is the principal sanitizing procedure employed by many greenhouses. Such systems need a steam generator, an intake mechanism, a covered area or container into which the steam is forced, a pressure gauge, and an escape outlet. Many greenhouses use a large fixed autoclave type sterilizer, two smaller fixed generated steam cabinets, wagons or carts through which steam is forced under pressure, and portable pipes and hoses for sterilizing greenhouse benches.

b. Chemical sterilization is a widespread practice using sodium hypochlorite (bleach) for plastic or metal containers and greenhouse benches which do not contain plants or propagation substrate. In addition, copper sulfate solution is utilized for sterilizing tools such as spades or trowels prior to their being used to move or mix the steam-pasteurized growing substrate.

4. Determining the Effects of Propagation Substrate on Rooting of Coleus.

The composition of propagation media has a dramatic effect on water and oxygen availability. Optimum rooting responses of various plant species may require media of differing water holding capacity or oxygen availability so it may be advisable to initiate a small experiment to determine the appropriate media to compliment your water delivery system. The following is an example of an experiment that can be utilized to compare various media as a propagation substrate.

Methodology: Place the media (substrates) in the flats provided. Prepare 5 to 20 cuttings of ***Solanostemon scutellaroides (coleus)*** for each substrate. Cuttings should be a uniform 3 inches in length, the bottom inch of the cutting should be stripped of leaves, and the cutting treated with Hormodin #1 (rooting hormone) prior to sticking. Place the flats under mist in the propagation house and water lightly to insure good substrate/cutting contact.

Record rooting data next week. The class should evaluate 5 to 10 cuttings from each substrate. You should do this with all students present. All students are responsible for obtaining the rooting information for all substrates. Record your data on the data sheet provided and summarize. In your discussion be sure to discuss the relative degree of water holding capacity of the various media and how that may have influenced the overall root quality or timing of rooting.

A few notes on data calculations.

1. Rooting percentage is based on the total number of cuttings stuck so you will divide the number of cuttings with roots by the number of cuttings stuck.
3. Root number per cutting is based only on rooted cuttings. You would determine an average number of roots per rooted cutting.
3. Root length (length per root or root length per cutting) should only be based on rooted cuttings. You would determine an average length per root per rooted cutting for each treatment.

