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Some Fundamental Differences Separating Rooted Cuttings and Seedlings©

H. William (Bill) Barnes
Barnes Horticultural Services LLC, 2319 Evergreen Ave., Warrington, Pennsylvania 18976 U.S.A.
Email: Bhs16@verizon.net

Over the course of my 35 years in commercial horticulture I have noticed that we are far from understanding many of the things that appear obvious or intuitive. To further complicate that is our inability to comprehend what we do not know. This means that there are trends, characteristics, and facets of our jobs that present themselves regularly but we do not know why nor in some cases have even the faintest of idea as to what the fundamental explanations might be. One such case is the observable differences between rooted cuttings and seedlings. It is logical to assume cuttings of *Juniperus* might be different than that of *Cornus*, but they do have similarities. It is also logical to suggest that seedlings of *Pinus strobus* do not behave as seedlings of *Quercus robur*. But again there are similarities that can be subscribed to readily. However, a quandary exits when rooted cuttings of *C. florida* do not behave the same as seedlings of *C. florida*. From a production point of view, rooted cuttings of *C. florida* have more in common with rooted cuttings of *Juniperus* than to seedlings of *C. florida*. After years of study with a range of species it seems clear that a rooted cutting is not physiologically the same as a seedling of the very same species. The purpose here is to delineate some of these differences.

DISCUSSION

As can be seen in the accompanying chart there are a number of differences between rooted cutting and seedling. Much of these differences can be traced to both chemical and morphological differences that can be readily distinguished.

Morphologically seedling roots are derived from cambium tissues along side the xylem in a plant and are under the direct influence of naturally occurring auxins such as indole-3-acetic acid, indole-3-butyric acid, and 4-chloroindole butyric acid. In addition to this, seedling root systems are under the direct influence of gibberellins and cytokinins from the onset of a radicle during seed germination. Such a chemical cocktail is finely tuned to give the normal appearing and growing root system. Altering these chemicals can and does induce changes in the resultant root system.

The very nature of rooted cuttings is that the root systems they possess is not derived from xylem/cambium tissue but originates from undifferentiated parenchyma cells. Undifferentiated parenchyma cells under the influence of auxin and other chemicals related to the wounding response give rise to adventitious roots. These roots do not have the same physiological make up as seedling-derived roots. As with the weeping blue spruce (mentioned in the remarks of the chart), such changes are bordering into the realm of an epigenetic change.

For the sake of clarity an epigenetic change is a change in form or function that is evident but not a genetic change. The transition of *Hedera helix* from juvenile to adult is an epigenetic change as is the transition of the foliage of *Thuja occidentalis* 'Rheingold' from needled form to the more familiar flattened spray form of normal appearing *T. occidentalis*. In some cases such as the formation of adventitious roots the changes occur as a result to exposure to naturally occurring auxins and