

TECH TRAINING: ROOTING HORMONES

Typically applied as a dip or spray, rooting hormones like indole-3-butyric acid (IBA) and 1-naphthaleneacetic acid (NAA) can be used to improve rooting success and uniformity of vegetative cuttings, especially in slow or difficult to root species. Understanding the rooting process, as well as best practices for rooting hormone application and moisture management during propagation are essential for producing successful liners.

Tip 1: Optimize operations

- Liquid IBA formulations (Hortus K-IBA salts, Advocate):
 - Quick and efficient applications.
 - Finding optimal rates may require trial and error.
- Powder and liquid dips:
 - No special equipment, work well for smaller batches.
 - Can slow down the sticking process.

Tip 2: Application considerations

- Powder applications prior to sticking:
 - Dip stem ends in powder.
 - Available as 0.1-0.5% IBA with 0.3% being most common.
 - Avoid washing off powder (after sticking) by overirrigating.
- Liquid applications 24-48 hours after sticking:
 - Typical dip rates range from 500 to 1500 ppm.
 - Typical spray rates range from 50 to 400 ppm.
 - Up to 800-1500 ppm for perennials or woodies.
 - The most important location for the rooting hormone is where roots are produced—the base of the cutting.
 - Normal spray volumes are 2 qts/100sq ft.
 - Sprech volumes of 4-8 qts/100sq ft deliver rooting hormone to the base of the cutting.
- *Exceeding recommended rates or application frequency can cause aerial rooting or excessive callus formation.*

Tip 3: Roots grow in air, fish grow in water

- Roots require oxygen to grow even though they transport water.
 - Saturated media will limit the efficacy of rooting hormones and delay rooting.
 - Use [water by weight](#) or the [one-to-five irrigation scale](#) to optimize irrigation timing.
- Drying cycles are essential for root development.



Fig 1. Rooting hormone may be applied at time of stick.



Fig 2. Root initiation at the base of a cutting.

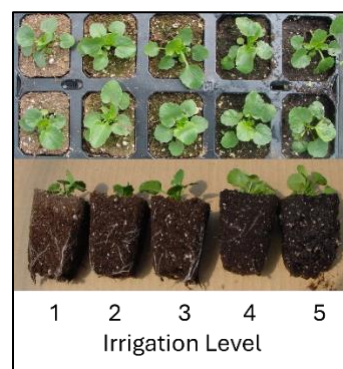


Fig 3. Demonstration of different substrate moisture levels.

DEEPER DIVE: THE WHY

How roots form: After a cutting is stuck, auxins play an important role in stimulating root development. Auxin is a naturally occurring plant hormone that is produced in the meristem (shoot tip) and is transported downward. When auxin accumulates at the base of the cutting, it stimulates root initiation (adventitious roots). This is why rooting hormones, which are synthetically derived from auxins like indole-3-butyric acid (IBA) and 1-naphthaleneacetic acid (NAA), can be applied to improve rooting success and uniformity. Roots move water which is why it makes sense that roots develop from xylem (water transporting vessels) not the callus.

Types of rooting hormones: Rooting hormones are available as powders or liquids and are typically applied as a dip, soak or spray. While the potassium salt formulations of these rooting hormones are water soluble, other formulations must first be dissolved in solvents like alcohol, which can cause phytotoxicity. The application methods are specified on each product label and depend on the product formulation. The key to effective use of rooting hormones is to apply the active ingredient *in a way that contacts the base of the cutting*, where root formation is desired. Dips into powder or liquid rooting hormones have long been used in vegetative propagation and while they are effective, they also are labor-intensive and pose risk of spreading disease. Thus, rooting hormone solutions used for dipping should be changed between crops.

Rates and volume: The typical rates used for propagation depend largely on the product formulation, application method and crops being grown. Foliar applications to annuals generally range from 50 to 400 ppm but may be as high as 800 ppm for herbaceous perennials. Higher rates pose the risk of leaf and stem distortion and chlorosis (yellowing). Application volume is an important consideration. While typical spray volumes (2 qts/100 sq ft) can be effective, higher volume sprays (4-8 qts/100 sq ft) can help deposit rooting hormone near the base of the cutting, providing higher efficacy. However, sprays provide more total active ingredient than dips per unit of area, so application rates should be lower when application volume is increased.

Timing: When using powder or liquid products as a dip, the application is made at the time of sticking. For foliar applications, sprays should be applied within 24-48 hours of sticking. Making foliar applications the day after sticking gives cuttings time to rehydrate, providing lower stress conditions to spray. Turn off the mist for one to two hours after application to allow the rooting hormone to be absorbed by the cutting. If rooting is slow, a second foliar application can be made one to two weeks after sticking.

While rooting hormone is generally beneficial for any plant species, some species yield greater benefit from their application than others, as can be seen in [Table 1 from this e-GRO Alert](#). Remember, *always read and follow the label to ensure products are compatible with your intended application*.

For more information, check out these additional resources:

GrowerTalks: [Sticking Head Start](#)

GrowerTalks: [Using a Rooting Hormone?](#)

GPN Magazine: [Keys to Rooting Success](#)

University of Florida: [Auxin](#)

e-GRO: [Improving Rooting Uniformity with Rooting Hormones](#)