Posters presented at the International Plant Propagator's Society, Western Regional Meeting, September 19-22, 2012

HOW TO SUCCESSFULLY USE AQUEOUS (WATER BASED) IBA ROOTING SOLUTIONS.

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Since the discovery of natural plant rooting hormones (Thimann and Went 1934), for propagation it has been intuitive to apply these substances to the basal end of cuttings to produce new roots. Basal methods used are the Quick Dip and Basal Long Soak Methods, using rooting solutions, and the Dry Dip Method, using rooting hormone powders.

Currently many growers use foliar applied aqueous IBA rooting solutions to propagate annual, perennial and woody plants. Dr. Fred Davies' physiology research proved efficacy of the application (Davies 1978, 1980, 1982). Since IBA is a natural rooting hormone (Epstein 1984, 1993), having such ability is understandable. When aqueous IBA solutions are applied to the leaves of cuttings, the IBA enters the plant's vascular system through open stomata. IBA then translocates, by polar transport, to the basal end; there, plants store it for self-regulated root formation.

Kees Eigenraam developed commercial foliar methods (1985), first used by Dutch chrysanthemum growers. Kees and I standardized the techniques, the foliar Spray Drip Down ™ and Total Immerse Methods ™. In the early 1990's we introduced the methods to US growers, first for annual and perennial plants. Research by Bailey Nurseries expanded uses to woody plants (Drahn 2007). Required for foliar methods, aqueous IBA rooting solutions are made using Rhizopon® AA Water Soluble Tablets and Hortus IBA Water Soluble Salts®.

METHODS AND TIPS

The following is a brief review the basal and foliar methods along with 'tips'. Some of the studies and tips are in the Combined Proceedings of the IPPS (Kroin 1992, 2008, 2009, 2010, 2011) and Hortus Plant Propagation from Cuttings (Kroin 2011A).

BASAL METHODS

- Basal Quick Dip Method:
  Hydrate cuttings. Using rooting solutions, dip the basal end of the cuttings about 3/4 inch into the solution for a few seconds. Stick in media. Take care of cuttings.
- Basal Long Soak Method:
  Hydrate cuttings. Batch treat. Using rooting solutions, soak the basal end of the cuttings, about an inch, into the solution for a several hours (sometimes12-48 hrs). Stick in media. Take care of cuttings.
- Basal Dry Dip Method:
  Hydrate cuttings. Using dry dip rooting hormone powders, dip the basal end of the cuttings about 3/4 in. into the dry powder. Stick in media. Take care of cuttings.

FOLIAR METHODS

- Spray Drip Down Method ™:
  Stick cuttings into media. Hydrate cuttings. Batch treat. Using aqueous IBA rooting solutions, spray onto the leaves until visually the droplets fall. Turn on misters after about 3/4 hr or until the solution dries on the leaves. Take care of cuttings.
- Total Immerse Method ™:
  Hydrate cuttings. Batch treat. Using aqueous IBA rooting solutions, total immerse the cuttings a few seconds, drain. Stick cuttings into media. Take care of cuttings.

TIPS

Following are tips on how to use aqueous IBA rooting solutions.
The studies listed used solutions made with Hortus IBA Water Soluble Salts®. Alternatively it is possible to use Rhizopon AA Water Soluble Tablets (Distributor: Phytotronics. Sales@phytotronics.com, phytotronics.com. 314-330-0717; Rhizopon worldwide: Rhizopon bv, rhizopon.com).

FOLIAR AQUEOUS IBA ROOTING SOLUTION TREATMENT

- Timing for the Spray Drip Down Method:
  Using aqueous IBA rooting solutions, spray the leaves of the cuttings soon after sticking. It is best to treat cuttings on the same day as sticking. Waiting to spray several days after sticking gives reduced root formation. (Kroin 2010, Davies 1978, 1980, 1982)

  If after sticking the cuttings are under stress from high daytime air temperatures in the propagation area, keep the cuttings hydrated. Some growers spray early the following morning after sticking, when air temperatures are in the range from 65-90°F.

- Aqueous vs. alcohol-based IBA solutions:
  Studies found using the Spray Drip Down Method it was found that alcohol in the IBA rooting solution caused cutting fatality (Kroin 2011). This is likely due to alcohol solutions dehydrating cells. Alcohol-based solutions if used by Quick Dip can cause what growers call 'alcohol burns' with subsequent cutting failure.

  For foliar methods only use aqueous IBA rooting solutions.

- Spray Drip Down Method treatment in warm vs. cold temperature:
  Studies compared the Spray Drip Down Method using aqueous IBA rooting solutions with solution and cutting temperatures at 45°F and 78°F. For cuttings treated and maintained at 45°F for 2 hrs, then brought to 78°F, had fatality. For cuttings treated and maintained at 78°F had improved root formation as compared with 78°F control cuttings (Kroin 2011).

  It is best to do foliar methods when the cutting and solution temperatures are nominally in the range from 65-90°F.

- For hard-to-root cuttings and un-seasonal rooting, comparison of the Basal Long Soak Method with the Total Immerse Method:
  The Basal Long Soak Method successfully roots cuttings of many kinds (Thimann 1950). Rooting studies were performed on Buxus sinensis cuttings in May. It is not the usual time to propagate these cuttings. Cuttings treated by Basal Long Soak Method had more roots then those treated by the Total Immerse Method. Basal Long Soak treated cuttings had more fine roots than any other cuttings. Total Immerse cuttings had more roots than un-treated control cuttings (Kroin 2011).

  Since the Basal Long Soak Method allows slow absorption in the plant's vascular system, it may be an effective method when other ways are not successful.

- Wetting agents are not needed in foliar applied aqueous IBA rooting solutions:
  Spray Drip Down Method studies found wetting agents added to the aqueous IBA rooting solution had no noticeable difference in rooting compared with solutions at the same IBA concentration that had no added wetting agent (Kroin 2011).

- Foliar rates are low:
  When doing foliar method trials, use low rates of aqueous IBA rooting solutions.

Typical trial rates for foliar methods:
- Annual plants: 50-250 ppm IBA.
- Perennials and woody plants: 250, 500, 1000, 1500 ppm IBA, where 1000 ppm is often the selected rate.
- Rates above 1500 ppm are rarely needed.

- Treatment area:
  Using the Spray Drip Down Method, one gallon can treat an area of 175-225 square foot of plants (for growth stimulation) or cuttings (for propagation).

MISTERS

- When using the Spray Drip Down Method, after sticking, keep the cuttings well hydrated. Turn off misters. Spray Treat. After a treatment wait about 45 min. or until the spray solution dries then restore misting

AQUEOUS IBA ROOTING SOLUTIONS

- Aqueous IBA rooting solutions can and are used by many applications where IBA and K-IBA are specified, usually without regard to prior use of alcohol based solutions.

- Conversion from technical IBA to Hortus IBA Water Soluble Salts or Rhizopon AA Water Soluble Tablets:

  Many articles relating to plant propagation and growing specify use of IBA or K-IBA rooting solutions. In most cases, aqueous IBA can be used. To make aqueous IBA rooting solutions, growers use Hortus IBA Water Soluble Salts or Rhizopon AA Water Soluble Tablets. They are US EPA registered for use. In rooting solution, they are as-if made with K-IBA. Note: Under the federal law FIFRA, the US EPA prohibits use of un-registered end-use technical grade IBA and K-IBA for plant growing.

  When converting rates from 'technical' IBA or K-IBA, my advice to growers is to trial Hortus IBA Water Soluble Salts or the Tablets about 10% lower rate than technical. Reasons may be ‘technical’ products may not be labeled as true assay, or, the Salts and Tablets have enhanced activity due to formulation.

- Make stock solutions:
  Making concentrated Hortus IBA Water Soluble Salts aqueous IBA stock solutions avoids the need to measure the salt powder often. Solutions can be made to over 100,000 ppm IBA. Make a solution in multiples of the number of grams per unit volume, mark the side of the container into that number of multiples. When making a working solution, decant the stock solution to the appropriate mark and pour it into the working tank. Then, add water to the working to bring to the required volume.

- Quality of water and temperature to make solutions:
  Use clean water to make aqueous IBA rooting solutions with Hortus IBA Water Soluble Salts or Rhizopon AA Water Soluble Tablets. Hard water may cause some precipitation. Demineralized water is best. Do not use pond water; it likely contains biological components that will breakdown the IBA.

  Hortus IBA Water Soluble Salts or Rhizopon AA Water Soluble Tablets easily dissolve in water at 65-95°F. They dissolve most easily at the higher range of temperatures.

- Dispose of solutions dipped with plant material:
  The foliar Total Immerse, basal Quick Dip and Basal Long Soak Methods require plants to be dipped into the working solution. Avoid pathogen cross contamination by disposing of the solution between lots.

SECONDARY AQUEOUS IBA ROOTING SOLUTION APPLICATIONS

- The Spray Drip Down Method is useful for secondary applications to cuttings that are already stuck and had been untreated or treated by any method, either basal of foliar. Uses are to level crops, induce new root formation and improve root mass. Spray the aqueous IBA rooting solution on the cuttings at the same rate as the original useful rate or lower.

  Typical trial rates for secondary applications:
  - Annual plants: 50-200 ppm IBA.
  - Perennials and woody plants: 250-500 ppm IBA

TREATING TISSUE CULTURE PLANTLETS

- Tissue culture plantlets do not have stomata, therefore, foliar application is not appropriate. Before planting, Total Immerse the plantlets in the aqueous IBA rooting solution for a few seconds.

  Typical trial rates for tissue culture transplants: 50-200 ppm IBA.

CONCLUSIONS

Several basal and foliar methods can be used to propagate plants from cuttings. Based upon trials, growers can find one or more methods that are suitable for their needs based upon the plant variety and species, seasonal variations, production needs, and total cost. When rooting solutions are selected, aqueous IBA rooting solutions are useful by all methods.

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