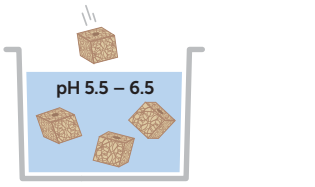
Propagation of cuttings

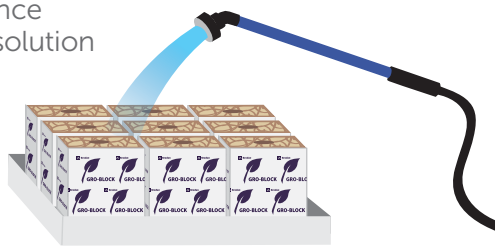
Clonal propagation is an integral part of the growing process. Propagating uniform, healthy, and vigorous cuttings lays the foundation for consistent and quality harvests. By measuring and adjusting environmental parameters and root zone conditions, growers can ensure quality starter plants year-round. Cultivators can employ precision growing techniques in rockwool to maximize yield and quality while simultaneously reducing their inputs, waste product, and overall environmental footprint.

Mother care

The quality, strength, and establishment time of new cuttings is highly dependent upon the health of the source plant material. Cultivation of hardy and vigorous mother plants plays an integral role in the successful establishment of clones. Proper plant nutrition, tailored irrigation strategy, and effective IPM are among the most important components of developing a strong mother stock. The nutrient solution applied to mother plants should be maintained around 1.5 EC or higher and applied in frequent daily irrigations that achieve drainage of 20% -30% of the total water volume applied daily. Mother plants should be pruned and trained in a balanced manner to maintain an open canopy structure that will produce healthy new shoots without overstressing the plant.

Saturating the Starter Plugs and Cubes

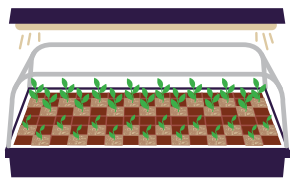




Correct saturation of the growing media sets the stage for proper root development. Because rockwool is an inert and sterile medium lacking essential nutrients, growers must provide fertilizer to sustain the cuttings as their roots develop. Cuttings will need a near-immediate source of nutrient in order to maintain existing tissue and structure and continue growing. Steady nutrient supply becomes especially important once rooting has initiated. Starter plugs and cubes should be saturated in a nutrient solution of roughly 1.5 EC and 5.5 pH. This solution should be applied using a course spray to wet the media multiple times until fully saturated. Alternatively, the plugs and cubes can be submerged in the solution for about 30 seconds. After initial saturation allow excess nutrient solution to drain away. Measure the weight of a few starter plugs or trays to ensure that they are uniform and fully saturated. Now you are ready to take cuttings.

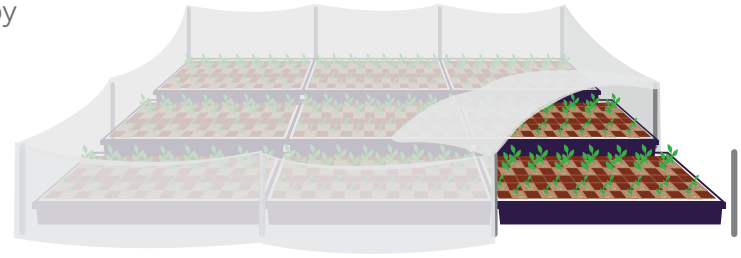
Tips taking cuttings

- Select areas of new growth that are no more than 14 days old, preferably from the top of the plant.
- Select shoots equal in length and diameter to ensure a uniform canopy.
- When applying a rooting solution, avoid excess powder or gel on the stem as this has the potential to slow down root development.
- Maintain a humid environment once clones are cut to avoid water loss through leaves. Cuttings lack the necessary root structure to initially uptake water, therefore diffusion of moisture from the leaves to the ambient environment must be limited.
    - A moist and warm climate can be easily maintained in a humidity dome until cuttings are ready to be placed in the starter growing media.
        - Stems should be placed around 1/2in (1cm) into the starter plug. This allows for root initiation in the plug from the top.
        - Measure and note weights of cubes and trays to help determine when to apply irrigation.



Cutting Care

Once cuttings have been placed in starter cubes or plugs they need to enter an environment that encourages root development. Humidity, temperature, light intensity and air movement will all play a role in how the cuttings develop, so it is important to monitor and adjust the climate daily. While small propagation domes are a popular choice, they can create a challenging environment for growing quality cuttings at large scale. High humidity (90%+) and overly wet conditions in the canopy slow root initiation and increase disease, pest, and pathogen pressure. For large scale cutting production, it is recommended to use large humidity tents to cover batches of cuttings. These humidity tents allow for better air movement and the larger volume of air creates a more stable climate.



In addition to environmental conditions, irrigation plays a significant role in root development. Overly wet conditions in the root-zone can slow root initiation and facilitate the establishment of pathogens. The best way to determine when to irrigate is to measure the weight of the cubes or trays at initial cutting placement and at regular intervals throughout the propagation process. By measuring the individual or aggregate weight of the plugs, you can calculate the decrease in water content in the root-zone and apply irrigations accordingly. This is especially important when growing multiple genetic varieties as they will consume water at different rates. Once the cubes or trays reach approximately 50% of their initial wet weight at saturation apply an irrigation using an ebb/flow system or by manually dipping the trays in a nutrient solution of 1.5EC/ 5.5pH about 1/2 to 3/4 inch (1 to 2cm) up the side of the starter plug or cubes. It is important to drain away excess solution because overly wet conditions at this stage will slow growth and increase the likelihood of disease, mold, algae, and pests.

Propagation table for indoors: 18-22hrs light per day

Days	1-4	4-7	7-10	10-14
Humidity (%)	80-90	75+	65+	60+
Temperature (°F)	75-80	75-80	75-80	75-80
Fertilizer (EC)	1.5EC	1.5EC	1.5EC	2.0EC

In conclusion, applying precision growing techniques can maximize the speed of development and improve the final quality of cuttings. Healthy mother plants that receive proper nutrition and daily irrigations are the key to healthy cuttings. Monitoring and adjusting climate conditions will improve root initiation and prevent the development of plant diseases. Using a balanced nutrient solution from the very beginning will ensure the cuttings have the fuel to develop without deficiencies. Measuring the weight of the starter cubes or plugs through the cutting stage will help determine the optimum time to irrigate.

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