

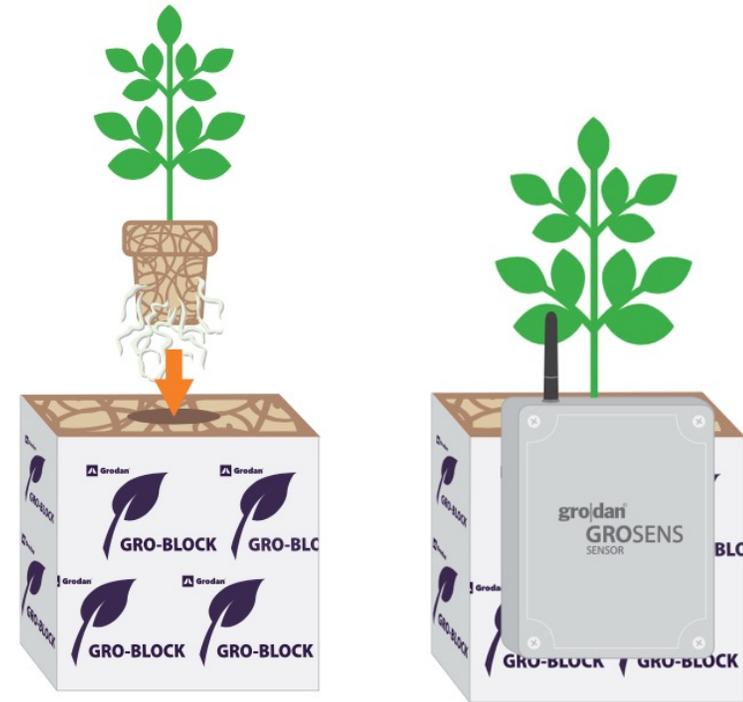
## GROWING IN GRODAN PRODUCTS

### Best Practices for Hugo Blocks

The Grodan® Hugo™ (6" x 6" x 6") Gro-block is a popular choice for growing larger plants. The Hugo block allows a grower to transplant a cutting directly into a one-touch block configuration that will carry plant growth through harvest.

Created as a slab alternative for home growers, this block has become popular amongst commercial and hobby growers alike.

Employing the best practices outlined below will allow you to maximize the performance of your Hugo blocks quickly and efficiently with minimal input.



Start with a healthy, vigorous cutting that has a well-developed root system. Weak or stressed cuttings with under-developed root systems are not ideal candidates for transplant into Hugo blocks due to the large volume of media the roots must colonize.

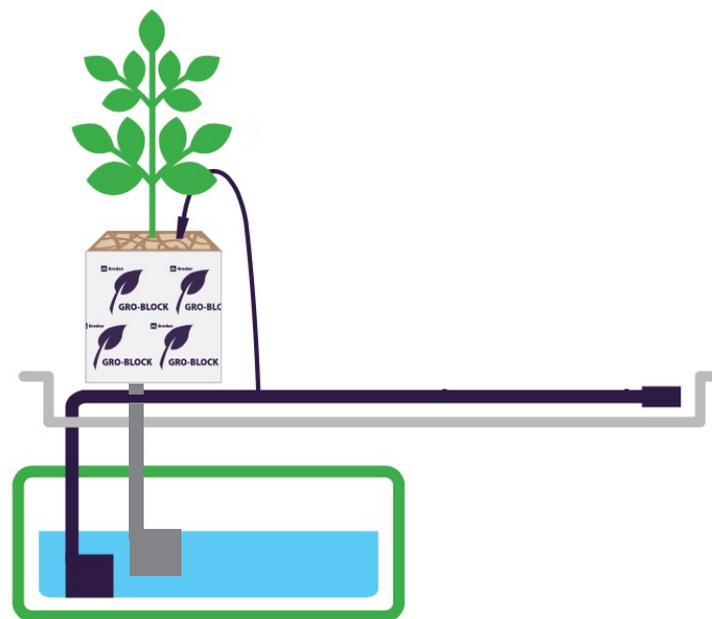
Select healthy and uniform cuttings with roots present throughout the starter plug. These cuttings should already be accustomed to daily irrigations with a well-balanced nutrient solution with a minimum EC of 1.5 mS.cm and a pH of 5.5 - 6.5. Deliver multiple small irrigation events daily until roots colonize the Hugo block.

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Because rock wool is completely inert, nutrients are needed from the onset to fuel encourage plant growth. Condition the Hugo with a similar strength nutrient solution you were applying to the cuttings prior to transplant. To perform the initial saturation submerge the blocks in the nutrient solution for a few minutes. The blocks should sink. Alternatively, you can perform an overhead saturation by making several applications with the nutrient solution via a watering wand fitted with a coarse spray head to wet the media (multiple times) until fully saturated. After initial saturation, allow the excess nutrient solution to drain away. Check the weights of the blocks to ensure they are uniformly saturated. A Hugo Gro-block should weigh a minimum of 2650 grams. If the blocks you sample do not weigh 2650 grams or more, you must continue to make overhead passes with the watering wand. Insert your rooted cutting into the Hugo block and apply an initial irrigation within the first 24 hours using the same nutrient solution used to condition the block.

After the initial transplant, measure the weight of the block to determine when to apply the next irrigation. Wait to irrigate until the block weighs 20%-30% less than its initial weight at first saturation.

If using Grodan root-zone sensors to measure volumetric water content, you should wait until WC is about 60%-65% before implementing the desired irrigation strategy. Work to apply 1 or more irrigations per day (1-3% shot sizes) for the first 1 to 2 weeks or until rooting is evident. This will steer the plant vegetatively and ensure the cutting's roots are incentivized to establish in the top few inches of the block.



$$\text{Runoff volume} \div \text{Total Daily Gift/Plant} = \% \text{ Drain Fraction}$$



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Once rooting-in is complete, growers should use their drip irrigation systems to apply watering events at roughly 3% to 6% of the total volume of the growing media. This is about 100 mL to 200 mL per irrigation event for a Hugo. If hand watering, you can apply larger volumes of 200 mL to 500 mL per irrigation event, but it is most optimal to reduce the flow rate of the wand to a low level.

Throughout the plant's life cycle, the irrigation strategy must be adjusted based on genetic variety, growth stage, environment, and root zone conditions. During early vegetative growth, growers should aim to apply smaller volumes of water (3%) at greater frequencies to encourage vigorous growth of leaves, stems, and structural tissue.

As the plant progresses towards flower and fruit production, growers should begin generative steering by applying larger volumes of water (6%) at lower frequencies. Balancing vegetative and generative growth in the Hugo blocks will allow you to maximize your plant's potential productivity and quality. For more detailed information on crop steering, refer to

Grodan's brochure, Basics of Precision Growing.

Monitoring the block water content daily will help you determine when irrigations should be applied. During the vegetative phase you should aim to achieve a 5-15% runoff fraction of your total daily water gift. During the flowering phase you should aim to achieve a 15-25% runoff fraction of your total daily water gift. It is important not to over-saturate the block after the initial transplant.

Over-saturating the root zone will lead to algae establishment, nutrient imbalance, slow plant growth, and increased pest and disease pressure. Over application of water and nutrients also harms the environment and wastes valuable resources. Conversely, it is important not to allow the block to dry back below ~25-30% volumetric water content.

Drying back too aggressively will diminish root development, slow growth, and create inconsistencies between plants in different blocks. Dry backs that push the block below 25-30% VWC will also make it harder to re-saturate the media, creating dry spots in the blocks.



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Taking regular measurements of block weights will help you determine when irrigations should be applied. Toward the third week after transplanting, you will want to achieve 10% to 20% runoff of the total daily water gift applied to each plant. It is important not to over-saturate the block after the initial transplant.

Over-saturating the root zone will lead to algae establishment, slow plant growth, and increased pest and disease pressure. Over application of water and nutrients also harms the environment and wastes valuable resources. Conversely, it is important not to allow the block to dry back below 50% of its weight at initial full saturation.

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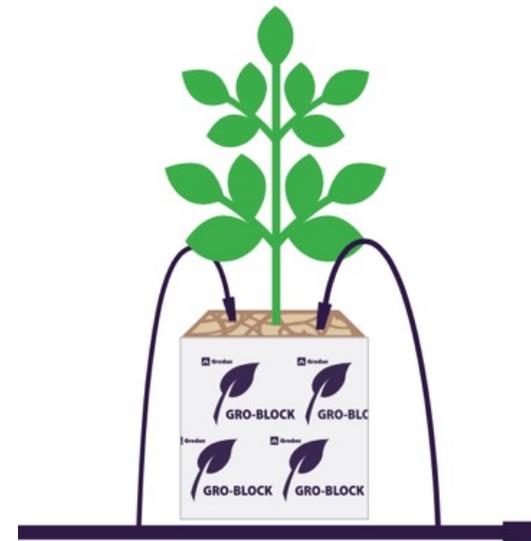
### Irrigating Large Blocks

Ideally, a pressure-compensated, low flow (0.3-0.5 gph max) drip irrigation system should be used to deliver precise amounts of nutrient solution to each plant.

For large blocks like the Grodan Hugo, 2 drip stakes per block should be used. Most drip stakes should be placed only about 1-1.5" inches into the top of the block on diagonals, about halfway between the plant stem and corner of the block. Inserting drip stakes too far into the blocks can often result in water only being delivered to the lower portion of the substrate. Always check with your drip stake manufacturer to determine what depth is ideal.

If hand watering without root-zone sensors during flower, the timing of the first irrigation is important to ensure the plant does not dry out during the middle of the day. Try to apply an irrigation roughly 2 hours after the lights come on to ensure the plants have adequate access to water when they are transpiring. If possible, apply a second irrigation around mid-day, and a third roughly 2 hours before lights-off. It is important to ensure that you achieve 10% to 25% runoff of your total daily water gift. This ensures proper re-saturation of the blocks and substantial nutrient refreshment.

The use of flood systems can be challenging when using such a tall block. This method of irrigating necessitates a deep table capable of flooding up to 1 inch from the top of the block to avoid late-stage salt build-up. If you are unable to flood the block that high, it is recommended to hand water the top of the block at least once a week with the same solution used to





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### Irrigating Large Blocks

The Grodan Hugo Block is an excellent choice for growers looking for a one-touch product that allows them to grow from the vegetative stage through harvest without having to root into another block or slab.

Using a well-rooted cutting, the proper nutrient concentration, and a controlled irrigation strategy will ensure healthy plant growth. Through daily monitoring of block water content, you can determine the optimal times to irrigate the plants.

Grodan partnered with the Wageningen University and Research as well as top growers from all over North America to determine the optimal stone wool substrate and irrigation strategies for indoor and greenhouse specialty crops. This scientific rigor results in Grodan Gro-Block Improved with our Advanced Hydrophilic Binder and Wetting Agent.

These cutting-edge blocks have the optimal fiber structure and physical properties for plant uniformity, homogeneous Water Content (WC) throughout the height of the block, and thus, better nutrient distribution throughout the entirety of the substrate. More uniform water distribution along the vertical gradient forms the basis for a well-defined root system capable of producing robust and vigorous crops. These benefits translate to higher yields, improved quality, less water and nutrient usage, and reduced crop sensitivity to diseases. The Gro-Block Improved line offers the greatest steering capabilities yet.

