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The Art and Science of Watering Greenhouse Crops

As the greenhouse fills up with plants, it's important to take time to review watering principles with your seasoned and new employees. Consider using a numerical substrate moisture level scale to define how you want your team to irrigate crops.

You can teach employees how to stick cuttings, fill containers, transplant, and pinch and space crops. Unfortunately, watering is more of an art than a science as many variables can influence the decision of when and how much to water. Most often new employees receive limited training and are just told, "go water the crop." Some employees will eventually learn how to properly water from trial and error. While others may become bored, text their friends and under- or over-irrigate. Imagine the results! Inconsistent moisture content among containers (Figure 1 A and B) creates a nightmare for everyone on your team. Non-uniform growth and development becomes the norm

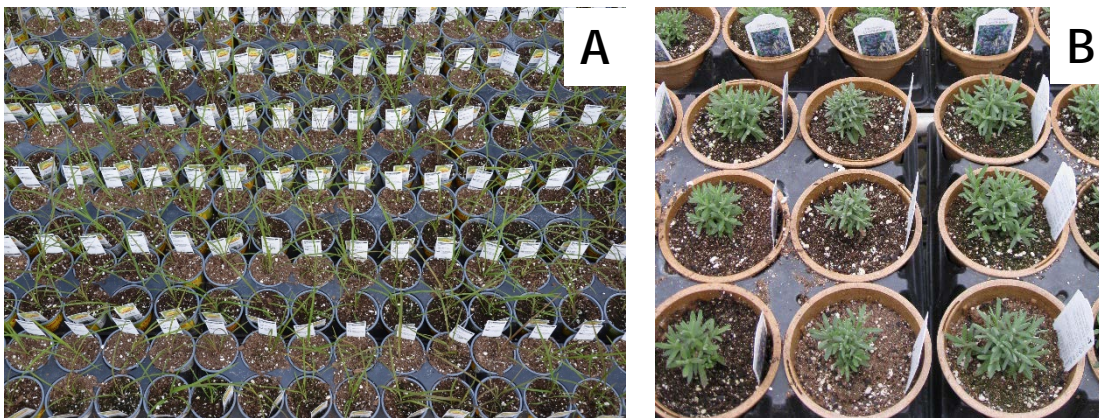


Figure 1A and B. Poor watering practices can lead to inconsistent substrate moisture levels among containers of the same crop. The result is non-uniform crop growth and development and crop losses.

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of over- or under-watered crops as can be seen in Figure 1 B. To prevent crop shrinkage (Figure 2) from over-watering, growers rely on fungicides and plant growth regulators to control root diseases and excessive stretch, respectively.

Over the past few years, the e-GRO team has produced e-GRO University lectures and videos to train growers how to properly water a variety of crops:

- [Overview of Irrigation and Methods](#)
- [Watering Practices & Techniques](#)
- [Watering Science and Art](#)
- [Watering Plugs and Bedding Plants](#)
- [Watering Potted Crops](#)

Substrate Moisture Levels 1 to 5

Level 5: A substrate that is fully saturated, black, shiny and has free water present at the surface is at a moisture level 5 (wet). Containers should only be at level 5 after leaching the substrate or after a pesticide or fertilizer drench. Water will freely drip from liner or plug trays at a level 5 (Figures 3 and 4). They are also heavy and have a visible bend in the middle when picked up (Figure 5).

Level 4: A substrate that has no free water at the surface (NOT shiny) and is dark brown is at a moisture level 4 (medium wet). When the substrate is softly pressed or squeezed water drips easily. During callusing of cuttings and germination of some genera, growers will maintain a level 4. Liner and plug trays are heavy and have a visible bend in the middle when picked up (Figures 5 and 6).

Level 3: A Substrate that is brown to light brown in color is at a substrate moisture level 3 (medium). When the substrate is



Figure 2. Non-uniform growth of potted gerbera due to over-watering. The moisture level of the plant on the left is medium dry or a level 2 and the one of the right is wet or a level 5 .



Figure 3. Black and fully saturated substrate with visible water (level 5) during the rooting of alternanthera cuttings.



Figure 4. Inconsistent germination and growth of petunia due to excessive substrate moisture (level 5).

Peat Based Substrates Moisture Level

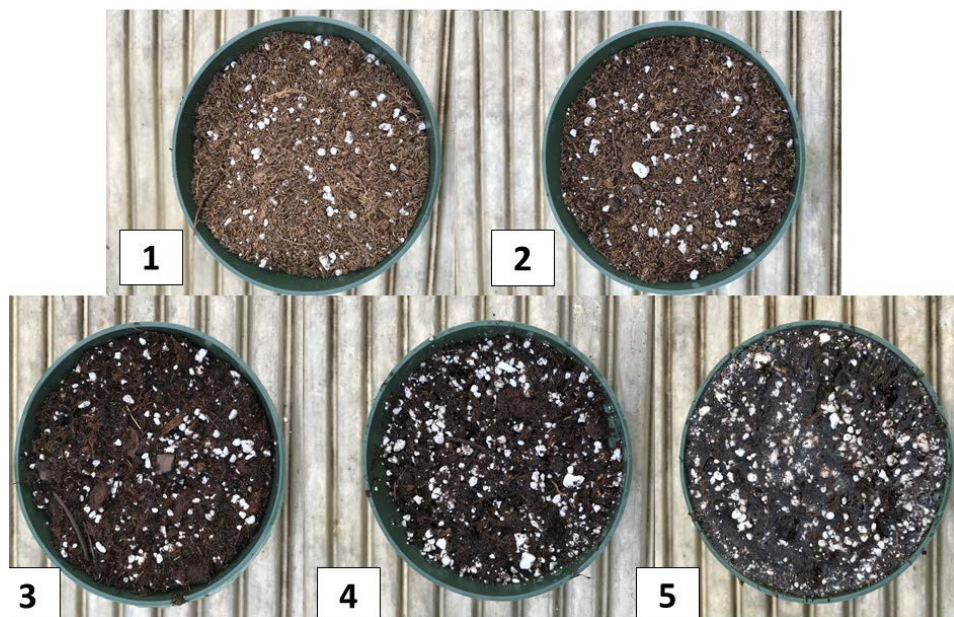


Figure 5. Moisture Level Definitions:

- 1 (dry): Substrate shrinks from wall, is hydrophobic, and is tan to white.
- 2 (medium dry): Substrate is light brown to tan. When squeezed, no drip.
- 3 (medium) : Substrate is brown. When given a hard squeeze, water drips.
- 4 (medium wet): Substrate is dark brown and has no visible water. When softly squeezed, water runs.
- 5 (wet): Black and fully saturated substrate with visible water.

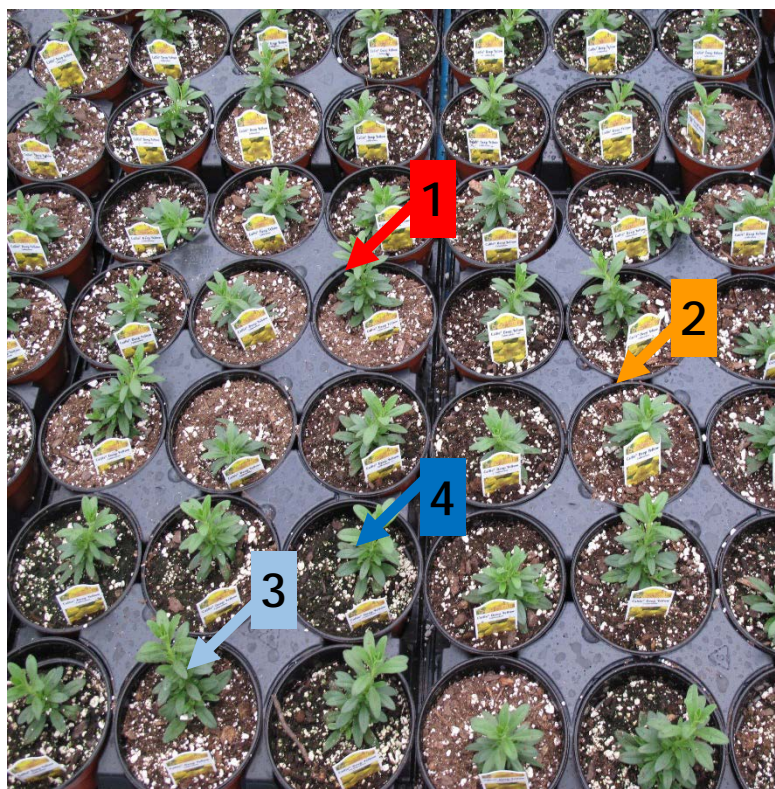


Figure 6. Containers with various substrate moisture levels.

given a strong squeeze a few drops of water come out the bottom of the container. Liner and plug trays are moderately heavy and tray bends slightly in the middle when picked up (Figures 5 and 6).

Level 2: A substrate that is light brown to tan in color, will crumble apart when touched and no water can be extracted when squeezed is at a substrate moisture level 2 (medium dry). There is however, some water available to support plant growth. Liner and plug tray weight is light and trays do not bend when picked up (Figures 5 and 6).

Level 1: A substrate that is tan to light tan in color and feels loose and flaky is at a substrate moisture level of 1 (dry). Substrates at level 1 pull away from sides of container, become hydrophobic and rewetting is difficult. Liner and plug trays are extremely light and do not bend when picked up (Figures 5 and 6).



Figure 7. Posters in a commercial greenhouse indicate the five universal substrate moisture levels.

For the vast majority of greenhouse ornamental crops grown in peat-based substrates, a substrate moisture level of 3 (medium) should be maintained during finishing.

Small to large growers across the country are incorporating the substrate moisture level concept and have posters throughout their facilities to remind their team how to properly irrigate their crops during various stages of production (Figure 7).



e-GRO Alert

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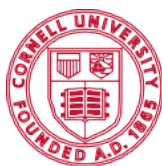
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