

# Magic from the Manual: Proper Watering Controls Plant Quality

*By Dr. Terry Ferriss, Professor of Horticulture, UW-River Falls*

"The person who controls the hose, controls the profits" is a guiding principle in the production of horticultural crops. Water management can make or break plant quality and consequently the salability of a crop. Every plant species has an optimum level of moisture to maximize growth. However, it may be necessary to compromise on when the plants are to be watered if several species are being grown or displayed on the greenhouse bench together. Consider plant species, stage of growth, environmental conditions, medium moisture levels and plant appearance to assist you in properly "reading your crop" to determine when it is time to water.

It is helpful to remember that most plants will perform better if they are grown on the dry side. It is always quicker and easier to correct an under-watered situation than it is to rescue an overwatered plant. Let's review the basic principles of watering.

## **Under Watering:**

When water is not applied frequently or in adequate quantities, the plants will have a hardened appearance. Under watering reduces photosynthesis and overall growth. In addition, the elongation of young cells is reduced, resulting in smaller leaves and shorter stem internodes. In severe cases, wilting, marginal leaf burn, dry patches on the leaves and death may result. Growers frequently refer to plants grown under these conditions as having hard growth, i.e. slow, tight, less vigorous growth.

## **Over Watering:**

Applying water too frequently will keep the soil pores filled with water which reduces oxygen availability to the roots

resulting in a weakened root system. High water content in the growing medium may produce large leaves, but they will be soft and succulent, which makes them susceptible to high temperature and high light stress. Over watered plants can wilt due to lack of oxygen in the growing medium. They can also have excessively long internodes, chlorotic lower leaves, soft growth, and are more susceptible to nutrient deficiencies. Plants grown under these conditions are frequently referred to as having soft growth, i.e. tall, lush, rapid, elongated, growth that can wilt rapidly.

Best Management Irrigation Practices – Best Management Practices (BMP) for greenhouse irrigation includes, but is not limited to the following:

### 1. Use a Well Drained Growing Medium

Good aeration porosity will aid in maintaining a good oxygen to water balance. Greenhouse container media generally has a bulk density of 0.1 - 0.8 g/cc.

### 2. Water Thoroughly

Under general growing conditions, the root zone should be entirely wetted each time a plant is watered to promote development of deep rooting within the container. Recommendations include creating a 10% leachate with each irrigation to ensure saturation, and to minimize soluble salt accumulation. When using other alternative irrigation strategies to minimize water run-off, evaluate uniformity of moisture within the container, aeration and monitor soluble salts.

### 3. Knowing When to Water:

Never wait to irrigate until the plant wilts. All plant species differ in their

water requirements so "read your crop". Signs that a plant is approaching water stress include loss of luster of the leaf surface. Plus, a subtle change in leaf color occurs, becoming a bluer or grayer shade of green. The color of the growing medium may also be used to evaluate the irrigation status. Peat-based media and most other media, become lighter tan as the medium dries. The weight of the growing medium can also be used to gauge irrigation requirements. Lifting the pots to compare the saturated weight to the drying out weight is a useful quick assessment. Allow plants to dry down to 40% to 60% of its original water weight before re-watering. In addition, the "Finger Test" can also be used on potted crops. Insert the pointer finger into the medium and when it is dry to a depth of the middle knuckle, it is time to irrigate.

Many plug growers have implemented the "5 Levels of Watering" as a guide to assist employees in their watering practices. Employees are instructed as to what Level of dryness should be observed prior to re-watering the plants. For example, Stage 1 plugs may be kept at Level 4-5 and are then switched to Level 2-3 as they mature. These Levels could be used in water management of potted plants as well as plugs.

Level 5 = SWAMPY; free water on surface of medium; medium appears black in color

Level 4 = WET; water squeezes out easily; medium appears dark brown in color

Level 3 = MOIST; hard to squeeze water out of medium but it still feels moist; brown in color

Level 2 = FAIRLY DRY; crumbles when squeezed; medium appears light brown in color

Level 1 = DRY; medium pulls from the sides of the cell or pot; medium appears tan in color

#### 4. Select the Proper Time of Day to Irrigate

Irrigate so that the plants are turgid and remain turgid during the heat of the day, which is usually from 11:00 AM to 2:00 PM. Avoid irrigating at a time which would leave the plants really wet over night as these conditions can promote disease problems.

#### 5. Keep the Leaves as Dry as Possible

A film of water on the leaf surface creates an environment conducive to disease development, especially when going into the cooler, darker evening and night hours. Irrigation systems that minimize leaf wetting will help control diseases. Water early in the day so the leaves have time to dry before darkness to minimize disease development.

#### 6. Adjust Irrigation Relative to the Environment

Adjust the frequency of irrigation as changes in the environment occur. This includes light intensity, temperature, air movement and humidity. Many irrigation systems are integrated with computerized environmental control systems that automatically monitor environmental conditions and adjust the irrigation accordingly. Frequently however, the evaluation of environmental conditions is the responsibility of the grower. Conditions that increase the plant's use and transpiration of water will require the frequency of irrigation to increase; the reverse is also true. For example, with four to five consecutive days of cloudy weather, plants may not need to be watered at all, depending on temperature. Over watering during cloudy weather can lead to soft growth plus physiological and pathological problems. A hot and extremely windy day in an outdoor situation may dry out plants rapidly and require multiple applications of water to small containers.

Summary:

Generally for most established plants it is important to let the growing medium dry to 40% to 60% of its original weight before re-watering. This will allow oxygen to reenter the medium, as oxygen is required for root development. It takes much longer for a plant to recover from over watering than from under watering. Therefore, it is better to error on the side of growing plants slightly dry. Applying enough water with each irrigation to ensure total root zone saturation.

#### Sample Questions:

1. A grower's crop has long internodes, wilts rapidly between irrigations, is growing rapidly and the lower leaves appear somewhat chlorotic. Which irrigation practice could cause this type of growth?

- watering too much at every irrigation
- watering too frequently
- not watering frequently enough
- not applying adequate water at each irrigation

2. Plants in a retail garden center have been improperly watered. Which condition can be most easily and rapidly corrected?

- under watering
- over watering
- irregular watering
- all are equally difficult to correct

3. A grower is deciding when to re-water a crop. Which statement best reflects Best Management Practices for greenhouse irrigation?

- Monitor the plants closely and re-water just as they start to wilt regardless of the time of day.
- Re-water the plants every afternoon, late in the day so the plants will not dry out overnight.

c. Lift up a few pots to determine the weight and water when they are about 50% lighter than the saturated weight.

d. Re-water every morning to ensure plants are well watered going into the heat of the day.

4. T or F Over watering is caused by too much water being applied to a containerized plant at one time.

5. T or F Level 2 watering is frequently recommended for Stage 1 plug production.

Answers:

- B
- A
- C
- F
- F

*Terry Ferriss is a member of the MNLA Certification Committee and can be reached at [terry.l.ferriss@uwrj.edu](mailto:terry.l.ferriss@uwrj.edu).*