UF UNIVERSITY of FLORIDA
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Volusia County Extension

Volusia County
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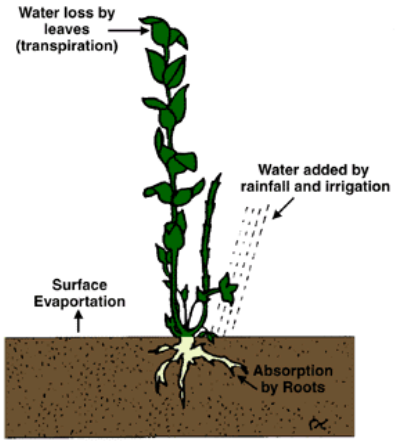
Commercial Horticulture:
The Significance of Water in Leatherleaf Fern Production

In terms of a horticultural prospective, do we really know what function water serves? When we think about water, besides being wet, the first thing that comes to mind is simply the plant needs it. This thought is especially true when we see the plant drooping on a hot and sunny day. Some plants require more water than others to survive.

In leatherleaf fern production, there are many reasons water is essential for plant survival. Mature leatherleaf fronds are composed of approximately 75 percent water by weight. With this high margin, water is vital for the plants survival. As with all plants, water serves as:

1. A solvent in which reactions take place, but chemical and physiological as well.
2. A raw material critical for the synthesis of organic compounds.
   A medium in which nutrients can transport throughout the plant (see Figure 1). [1]

Figure 1



The plant/soil/water cycle.

3. And a source for turgur pressure, due to the transpiration process, which is the determining factor for cell expansion (i.e. plant growth) and thus prevents cell collapse (i.e. plant wilting). In addition, the transpiration process aids in cooling the plant.

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Water reservoir

As a vital element of survival, the leatherleaf fern relies on the soil as a continuous reservoir for the plants survival. Moisture in the soil is typically replenished by either rain or irrigated water. In ferneries, you can't always depend on Mother Nature to supply the constant supply of water, so irrigation is logical. In some cases, high water tables supply water to the plant through capillary action. Monitoring the soil moisture is necessary, especially in the summer months on sandy soils of Florida. Immediately after irrigation or after a rain, the majority of the water in sandy soil drains rapidly downward due to the force of gravity. At the time in which the initial drain is completed, the remaining moisture terms the soil at ***field capacity***. This can be illustrated by collecting a soil sample in your hand, and if the soil is moist, but not dripping with any water, this would be ***field capacity***. At this point, the large soil pores that once held water shortly after the irrigation, called ***macropores,*** are now filled with air. On the other hand, smaller pores are called ***capillary*** or ***micropore.*** These pores still retain available moisture for the plant for days. Hence, the moisture that is contained in the micropores is called ***available water***.

Water relationship with leatherleaf fern production

The production of leatherleaf fern in Volusia County is predominately grown in well-drained sandy soils. Because of this fact, the moisture and nutrient holding capacity of the soils is extremely low. Fertilizer and other chemicals are easily leached out of the soil, and the soil dries rapidly. So to supply the needed nutrients at a constant level, the aid of irrigation is once again necessary. Not only water, but nutrients as well as pesticides can be delivered to the crop through injection of chemicals into the irrigation system. In the production of leatherleaf fern, an annual precipitation or irrigation requirement of a minimum of 50 inches per year is needed for adequate moisture. Without available moisture, commercial growers can expect fern growth and production to be severely decreased. You should never rely on an irrigation system to supplying 100 percent of the needed water. Monitoring is essential! With time, constraints

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such as algae buildup in the pipes and contaminants in the water from a faulty filter system may clog the emitters and deprive the ferns of water. Another constraint is an accidental break of a water emitter or line by laborer. This event would not only flood the area of breakage, but deprive other areas due to a loss in water pressure.

Fertilizer and pH relationship in leatherleaf fern production

Many people don't understand the importance of understanding soil pH and how it affects plant growth. From a nutritional stand point, pH monitoring is a vital component that determines the nutrient availability to a plant. In leatherleaf fern production, if the pH is too high minor elements such as manganese, zinc, iron, and copper will be tied up, and therefore, not available. For instance, yellowing foliage is an indication of magnesium, iron, and manganese deficiencies. A similar indicator of light green to yellow foliage is what Nitrogen deficiency also exhibits, but in addition, Nitrogen deficiency also will result in slow growth. Phosphorous deficiency will again exhibit not only yellowing fronds, but the plant will be stunted. To prevent this from happening, leatherleaf ferns perform best with a soil pH range of 5.5 – 6.0 and soil test should be done annually, and monitored to make the appropriate adjustment and maximize the effectiveness of the nutrient program. Adjustment of the pH can be done with the application of elementary sulfur. Make sure that immediately after the application of sulfur; the foliage of the plant should be washed to remove any residue on the leaves. The recommendation for best results is that sulfur should be worked into the soil. When the soil pH value is at 5.5 or less, special issues become apparent. Aluminum manganese and other minor elements dissolve readily in the soil solution creating a toxic environment for the plant roots and damage occurs. At this pH level, other nutrients, such as calcium, phosphorous, and magnesium are less available also.

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pH has an effect on macronutrient efficiency such as Nitrogen, Phosphorous, and Potash. As seen in (Chart 1), with all three macronutrients, there is a significant decrease in efficiency as the soil pH decreases.

Chart 1

Soil Acidity (pH)	Nitrogen (N) efficiency	Phosphorous (P) efficiency	Potash (K) efficiency
4.5	30%	23%	33%
5.0	53%	34%	52%
5.5	77%	48%	77%
6.0	89%	51%	100%

The best remedy to these potentially costly situations is to have your soil tested. The procedure is to bring a soil sample to the Extension office and request a soil test.

If the soil is extremely acidic, below 5.5, dolomitic limestone may be used and watered in to raise the pH. If the soil is above 6.0, the use of sulfur may be used. The altering of the soil pH is a timely event. It will not happen overnight. The duration may be five to eight months due to chemical changes within the soil.

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[1] Stein, Larry et.al. and Welsh, Doug, Extension Horticulturist, Texas AgriLife Extension Service, Texas A&M System, Efficient Use of Water in the Garden and Landscape, http://aggie-horticulture.tamu.edu/earthkind/drought/water/