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Why Aren't Your Palms Green?

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Mineral Nutrition

Why is it that south Florida palms often look so bad? Is it because they haven't been fertilized, or is it because they have been? Unfortunately, the answer could be either of these.

Proper fertilization is one of the most important factors in maintaining good palm health and appearance, especially on Florida's nutrient-poor soils. The palm fertilization rate recommendations used today were developed nearly twenty years ago, long before the importance to palms of elements such as potassium or magnesium was understood. The palm fertilizers of that time typically utilized nitrogen sources such as sludge or other organic materials. Although this sludge often caused problems with manganese tie-up, this and other organic fertilizers were relatively safe in terms of salt content. Improvements in palm fertilizer formulations over the years by fertilizer manufacturers have resulted in higher analysis fertilizers being marketed.

Early palm special fertilizers had N:P:K ratios of about 3:1:2. Once the importance of K to palm nutrition became known, this ratio was increased to 3:1:3. We now recommend a 2N-1P-3K-1Mg ratio. Despite this increased percentage of K in the blend and the high application rates used, K deficiency often persisted, even in regularly fertilized palms. The problem, we now know, was not so much the amount of K applied, but its efficiency.

One of the main problems with these fertilizers was that they contained controlled release N, but soluble forms of K. In a very short time, this soluble K was leached through the soil and beyond the reach of the palm roots. Meanwhile, the controlled release N stimulated plant growth and actually diluted the K already in the palm. This resulted in the fertilized palms looking worse than those that had never been fertilized. This problem can be overcome by using controlled release potassium sulfate as a K source in the fertilizer blend. Unfortunately, the percentage of controlled release K in commercially-available palm special fertilizers has never been high enough to totally overcome this dilution effect or the inability of Florida's soils to retain nutrients.

The newer generation palm special fertilizers also had never been tested at their recommended rates under landscape conditions until recently. After two years of testing one typical palm special fertilizer on over 50 species of palms at the University of Florida FLREC, we concluded that **it is impossible to grow a palm free from nutrient deficiency symptoms (usually K or Mg) or soluble salt injury on a sandy south Florida soil when using this product at its recommended rate**. This is because these fertilizers typically have 30% to 50% or less of their N and K in a controlled release form, the remainder being water soluble. This means that over half of the 5 to 8 lbs of fertilizer applied per tree is quickly solubilized. If moderate to heavy rainfall or irrigation occurs, this majority of the applied fertilizer is quickly (within one week) leached through the soil and beyond the root zone of the palms. This fertilizer is wasted from the plant's perspective, but does contribute to the pollution of our ground water. On the other hand, with minimal irrigation or rainfall, this solubilized fertilizer will remain in the root zone at concentrations high enough to cause soluble salt injury to many species of palms, other ornamentals, and adjacent turfgrass. Meanwhile, the minority controlled release portion of these fertilizers releases its nutrients much more slowly and is not affected by heavy leaching. Thus it should be no surprise that our palms do not look good if we burn their roots initially, but then starve them for the next couple of months before fertilizer is reapplied and this cycle is repeated

What this all means is that the soluble portion (most of the 5 to 8 lbs per tree you applied) is doing very little good. Under moderate to heavy leaching conditions it is quickly lost to the groundwater and is not available to the palm roots. Under minimal leaching, it releases toxic concentrations of salts that can injure the roots of many plants. Thus with water-soluble fertilizers, it is usually either too much or not enough nutrients for the palm. In either case the result is unattractive, deficient or tip-burned foliage.

So, if the large water-soluble portion of your palm special fertilizer is doing little good and may be doing considerable harm to your plants, why are you applying it? Numerous studies have shown that 100% controlled release fertilizers are much more efficient than water-soluble fertilizers. That is, a greater percentage of the applied nutrients are taken up by the palm where they are needed, and less ends up in the groundwater where it is not. We have always urged fertilizer manufacturers to produce palm fertilizers that were 100% controlled release, as opposed to the 30 to 50% or less controlled release content of most, if not all, palm special fertilizers. Their reply is invariably "the cost of such a product would be too high to be competitive". Here, as in most things in life, you get what you pay for. What good is a cheap fertilizer if your palms don't look good? It's a waste of money, and may even injure your plants or the environment.

When you mention a 100% coated fertilizer, most people think of resin-coated products such as Osmocote or Nutricote (Florikan). These products do make excellent palm fertilizers for Florida soils, but are very expensive for landscape use. Alternatively, effective fertilizers containing sulfur-coated urea and sulfur-coated potassium sulfate, in addition to the P, Mg and micronutrients currently used in palm special fertilizers, can easily be blended by any fertilizer company. Sulfur-coated fertilizers have a useful life of about 3 months under south Florida conditions. The sulfur coating also renders these fertilizers acidic in pH, a useful feature on our alkaline soils. Most of the fertilizer companies producing palm fertilizers for Florida have already formulated products that meet these criteria.

All this still leaves one important palm fertilization problem unanswered. Like K, Mg is readily leached through our sandy soils and Mg deficiencies are common throughout the state of Florida on a wide range of plants, including palms. Controlled release Mg is the obvious solution to this problem, but due to the physical properties of soluble Mg salts, coating them had usually been unsuccessful. In acid soils, MgO and dolomite work very well as slow release Mg sources, but these never release significant amounts of Mg in the neutral to alkaline soils found in much of south Florida. Several fertilizer manufacturers have been working on this problem during the past few years and new products are being produced. We are testing all of these products as they become available and at least some of them appear to be effective controlled release Mg sources. One such product is a prilled kieserite that releases Mg over a 6-week period, but could also be lightly coated due to its spherical shape for even slower release.

The methods traditionally used to fertilize palms have also contributed to this problem. Fertilizers have usually been applied at high rates (5-8 lbs./tree) 3 to 4 times per year. This large amount of fertilizer is concentrated in broad bands around the trunk of a tree and extends out several feet. This pattern results in excessive amounts of fertilizer contacting the roots near the trunk of the palm. Roots directly under the fertilizer band may be injured by high fertilizer salts, as will turf or ornamental groundcovers growing in this region. On the other hand, the majority of the palm's root system lies outside of this relatively narrow band, but receives no fertilizer.

Palms, like other ornamental plants in a landscape, are all growing in the same soil with their root systems intermingled. Therefore they are all subject to the same nutrient deficiency symptoms associated with that soil. It is no secret that palm special fertilizers work well on other plants as well as palms. These plants, however, are often less salt tolerant than palms and cannot tolerate the concentration of fertilizers typically applied to palms. A much more logical approach to this problem is to fertilize the entire landscape, rather than individual trees. By broadcasting (use a rotary spreader) 100% coated fertilizers at a rate of 1.5 lbs. of fertilizer (not N) per 100 sq. ft. of landscape area (or at least tree canopy area) 4 times per year, you will be applying about the same amount of fertilizer per palm as before. However, you will be providing fertilizer to all of the palm's roots, not just the small fraction near the trunk. Groundcovers and other ornamentals in the landscape will also benefit from this approach. Most of all, these 100% coated fertilizers will even out the peaks of toxicity and valleys of starvation that occur with current mostly water-soluble fertilizers.

Can the current palm special fertilizers be used more effectively? Certainly. By applying them more frequently at lower rates and by broadcasting rather than banding them, their effectiveness will be enhanced. These fertilizers should be broadcast at a rate of 3/4 to 1 lb. /100 sq. ft. of landscape area every month. This will dramatically improve plant quality, but will also cost more in terms of additional fertilizer applied (about twice as much) and the labor to apply it (about 3 times as much).

In conclusion, our current palm fertilization recommendations just aren't working as well as they could and can cause injury under certain conditions. Palms and other landscape ornamentals can be much more effectively and efficiently fertilized by broadcasting a 2N-1P-3K-1Mg plus micronutrients fertilizer over the entire ornamental landscape area at a rate of 1.5 lbs/100 sq. ft. every 3 months. These fertilizers should have 100% of their N, K, and Mg in controlled release form to maximize their effectiveness to the plants and minimize their impact on the environment.

Bedding Plant Growth in a Subirrigation System

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Floriculture & Mineral Nutrition

Surface and groundwater contamination from fertilizer run-off from greenhouse benches is a growing concern for the greenhouse industry. The use of subirrigation or ebb and flow irrigation is a potential solution to this problem. However, a factor limiting the use of subirrigation in bedding plant production is a lack of cultural and management information.

Research being conducted at the University of Florida, Fort Lauderdale Research and Education Center is comparing the fertilization, growth, and nutritional monitoring of bedding plants grown in a subirrigation system to a traditional overhead irrigation system. One of the many benefits of using subirrigation is conservation of water. For example, in an experiment growing petunia plants, we added ≈ 10 L of fertilizer solution a week to the subirrigation tanks but used ≈ 70 L a week of fertilizer solution for the overhead watering. A second advantage of using subirrigation is the elimination of fertilizer run-off. With subirrigation we have no run-off because the solution is re-used, and the soluble salt and NO_3-N concentrations change little over time in the subirrigation solution. However, we have collected 5 to 16 L of leachate run-off from overhead irrigated plants and soluble salt and NO_3-N concentrations were higher in the overhead leachate than concentrations in the subirrigation solution. Other advantages of subirrigation include labor savings, uniform watering of a crop, and dry foliage.

Disadvantages of subirrigation include the initial cost of the system, cleaning the benches, and potential salt build-up in the upper layers of the medium. However, if you remove the top layer of the medium and sample from the active root-zone, soluble salt concentrations are similar to concentrations measured in the active root-zone of overhead irrigated plants.

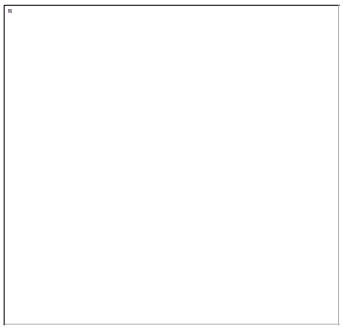
Despite the disadvantages, growth of petunia, impatiens, pentas, and salvia on our subirrigation benches were equal to or better than growth of overhead watered plants. We learned that our growing media needs to be wet before transplanting bedding plant plugs or cuttings to avoid variable growth patterns on the subirrigation benches. If the medium is wet, capillarity is easily established but if the medium is not wet, it takes ≈ a week of subirrigation watering to establish capillarity and to wet the medium appropriately.

In all of our experiments, all of the bedding plants grew better at the higher fertilizer concentrations (3 g of 14-14-14 Osmocote/pot and 150 ppm N as Peter's 20-10-15). In fact, as fertilizer concentration increased, bedding plant growth linearly increased. This is contrary to many reports that fertilization concentrations should be ≈ half of the concentration used in overhead irrigation. At this point, we do not have an explanation for this. More work needs to be conducted before recommendations can be made about the use of subirrigation for the growth of bedding plants but subirrigation systems have a lot of potential for use in Florida greenhouses.

sHORT TAKES

Release Rates of Controlled-Release and Soluble Magnesium Fertilizer. Release rates at 21° C were determined in sand columns for 12 commercially available soluble and controlled-release Mg fertilizers. Lutz Mg spikes, $K_2SO_4.MgSO_4$, $MgSO_4 \cdot H_2O$, and $MgSO_4 \cdot 7H_2O$ released their Mg within 2-3 weeks. Within the first 6 weeks, $MgO \cdot MgSO_4$ released its soluble Mg fraction, but little release occurred thereafter. Dolomite and MgO released <5% of their Mg over 2 years while MagAmp released <20% of its Mg. Florikan 1N-0P-26K-4Mg types 100 and 180 exhibited typical controlled-release fertilizer characteristics, with most of their Mg release occurring during the first 15 weeks. ***T. K. Broschat****, HortTechnology 7: 58-60. 1997.*

Alstroemeria 'Las Olas'^{PPAF} , A Semi-dwarf, Tetraploid Hybrid Selection for Hot Climates. *Alstroemeria* 'Las Olas'^{PPAF} is a semi-dwarf, cutflower-quality, hybrid selection with a flowering season lasting from April to July under south Florida conditions. Unlike most of the commercial alstroemeria, 'Las Olas' exhibits remarkable heat tolerance, and has survived south Florida's subtropical, monsoon-like summers for 3 years in the field under shade cloth, despite occasional torrential rains. 'Las Olas' can be grown for the local market by growers in hot climates with minimal infrastructure. The semi-dwarf stature of the plant also allows for production as a container plant and use as a garden herbaceous perennial in USDA Zones 8-11. 'Las Olas' has been approved for patented release by the Florida Agricultural Experiment Station and will be available for licensing later this year from Florida Foundation Seed Producers, INC. Details will be forthcoming on our web site (www.ftld.ufl.edu). ***A. W. Meerow****.*



***Alstromeria* 'Las Olas'^{PPAF}**