UF UNIVERSITY of FLORIDA
IFAS Extension

ENH1009

Fertilization of Field-grown and Landscape Palms in Florida[1]

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Palms growing in Florida landscapes or field nurseries are subject to a number of potentially serious nutrient deficiencies. These deficiencies are described and illustrated in document ENH1018. Prevention and treatment of these deficiencies is the subject of this document. Chemical symbols used in this document are: N=nitrogen, P=phosphorus, K=potassium, Mg=magnesium, Ca=calcium, Mn=manganese, Fe=iron, B=boron, Cu=copper, Zn=zinc

Fertilizer Formulation

Nutrient deficiencies are much more easily prevented than corrected once they occur. Correction of nutrient deficiencies can take as long as 2 or 3 years for some elements. Research at the University of Florida has shown that regular use of a fertilizer having an analysis (=the three numbers on all fertilizer labels which refer to their N-P_2O_5-K_2O content) of 8N-2P_2O_5-12K_2O +4Mg with micronutrients can correct mild to moderate deficiencies and prevent their recurrence in most soil types in south and central Florida. However, not all fertilizers having an analysis of 8N-2P_2O_5-12K_2O+4Mg with micronutrients are effective, and if improperly formulated, may be worse for palm health than no fertilizer at all.

First of all, it is essential that 100% of the N, K, and Mg in such a fertilizer be in slow release form. Since Florida's soils have very low capacities to retain these elements in the root zone during periods of heavy rainfall or irrigation, the only effective way to keep these elements readily available to plants during the 2 to 3 month interval between fertilizer applications is to use slow release sources. A water-soluble source applied one day could be completely leached out of the root zone the next day by a heavy rainfall and the palm would receive no benefit from the application. Controlled-release fertilizers are not greatly affected by rainfall or irrigation intensity. Since they release more slowly than water-soluble fertilizers, they are also less likely to burn plant roots during periods of drought.

Unlike the macronutrients, N, K, and Mg that should be in slow release form, most micronutrients need to be in a water soluble form. However, granular slow release forms of boron are safer and more effective for Florida landscape soils.

Effective sources for N include sulfur-coated urea, urea-formaldehyde, resin-coated urea and resin-coated ammonium salts. Of all the slow-release K sources tested, sulfur-coated potassium sulfate was found to be the most effective and economical. Prilled kieserite (a more slowly soluble form of magnesium sulfate than Epsom salts) is an effective and low-cost slow release form of Mg. Coated Mg products tend to release too slowly to be effective. Slow release B sources such as Granubor are less affected by leaching than the water soluble B sourcesoften used in landscape fertilizer blends. The only recommended Mn, Zn, and Cu sources

1. This document is ENH1009, one of a series of the Environmental Horticulture Department, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida. Original publication date September 2005. Revised October 2011. Visit the EDIS website at http://edis.ifas.ufl.edu.

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are the sulfate forms of these elements. Since iron sulfate is rather ineffective on most Florida soils, granular chelated products such as Trachelene Fe are preferred for blending into palm maintenance fertilizers.

Another reason why 100% of the N, K, and Mg must be in controlled release form is that the release rate of a nutrient source can determine the "effective analysis" of the blend. If heavy rainfall or irrigation occurs, any water soluble nutrients will be rapidly leached out of the root zone, while controlled-release sources are still releasing nutrients into the soil. This differential leaching of soluble vs controlled-release nutrient sources can alter the effective ratios among the various elements, and often with detrimental effects on palm nutritional health. The soil N:K, N:Mg, and K:Mg ratios are very important for palm health and it is essential that all three elements have similar release rates to keep these ratios constant over time.

Fertilizer Application

How you apply a fertilizer can also determine whether the application will be effective or not. Concentrating fertilizer in holes, as spikes, or in bands around the trunks of palms is less effective than spreading the same amount of fertilizer uniformly throughout the area under the canopy. This is because nutrient movement is almost exclusively downward in direction and thus only that small proportion of the palm root system directly under concentrated fertilizer will ever be exposed to these nutrients. Concentrating fertilizers is also much more likely to burn palm roots than fertilizer spread out over a larger area. Injecting water-soluble fertilizers into the "root zone" of palms is never recommended because: 1) water-soluble fertilizers are readily lost to leaching, 2) lateral movement of injected fertilizer is minimal, and 3) injecting any nutrients deeply enough to avoid turfgrass roots will also miss the majority of the palms fine feeder roots which tend to intermingle with turf roots near the soil surface.

Although trunk injection micronutrients such as Mn have been shown to be effective, this method is not recommended for palms except in cases where soil applications have been ineffective in alleviating chronic micronutrient deficiency symptoms.Since palms lack a vascular cambium and thus, the ability to heal over wounds in the trunk, any holes created in the process of injecting palm trunks will remain as permanent scars and may provide entry sites for diseases or insect pests.

The 8N-$2P_2O_5$-$12K_2O$+4Mg with micronutrients maintenance fertilizer blend described above should release nutrients for up to three months, and thus a three-month application interval is recommended. The suggested application rate for south Florida landscapes is 1.5 lbs of the 8N-$2P_2O_5$-$12K_2O$+4Mg with micronutrients fertilizer (not N) per 100 sq. ft. of palm canopy area, bed area, or landscape area. Field nurseries typically apply twice that amount to maximize growth. Lesser amounts may be adequate for landscapes in central and north Florida, although field nurseries in those regions will probably benefit from the higher south Florida application rates.

Use on Entire Landscape

While the 8N-$2P_2O_5$-$12K_2O$+4Mg with micronutrients maintenance fertilizer described above was developed primarily for the nutritional requirements of palms, other types of plants, including broadleaf trees, shrubs, and herbaceous ornamentals, fruit trees, and even turfgrass growing in the same soil are subject to the same inherent nutritional deficiencies in these soils. Since palm nutritional requirements are higher than those for other types of plants, a fertilizer that is suitable for palms will be more than suitable for other types of plants. Comparative trials at the University of Florida's Ft. Lauderdale Research and Education Center have shown that St. Augustinegrass fertilized with the above palm maintenance fertilizer had quality equal to that produced by a high quality turf fertilizer.

Use of the above 8N-$2P_2O_5$-$12K_2O$+4Mg with micronutrients fertilizer is recommended for use on the entire landscape. This not only simplifies fertilization by having to use only a single product, but eliminates a serious problem encountered when high N turf fertilizers are applied to turf areas with palms growing nearby. Roots of large palms typically extend out 50 feet or more from the trunk in all directions and will take up whatever fertilizers have been applied to the turfgrass. The high N:K ratio and lack of any Mg in most turf fertilizers forces rapid growth in palms, but without sufficient K or Mg to support that growth, this growth dilutes the existing K and Mg reserves within the palm and induces or exacerbates K and/or Mg deficiencies in the palms. High N fertilizers applied to turfgrass even 30 feet away from a palm on one side only have been known to kill palms from induced K deficiency. Given the high value of most specimen palms, applying high N fertilizers to the palms or to nearby turfgrass is no bargain, no matter how much less it may cost.

Treatment of Severe Deficiencies

Finally, while the palm maintenance fertilizer described above is suitable for prevention of all nutrient deficiencies

and correction of mild to moderate deficiencies, what can be done to correct existing severe deficiencies? For severe N deficiency, this palm maintenance fertilizer will be adequate by itself and re-greening of the foliage should occur within a month or two.

When applying K fertilizers to correct a severe K deficiency, it is important to also apply about 1/3 as much Mg to prevent a high K:Mg ratio from causing a Mg deficiency problem. For severely K-deficient landscape palms, broadcast a 3:1 blend of sulfur-coated potassium sulfate and prilled kieserite uniformly to the soil under the canopy at a rate of 1.5 lbs per 100 sq ft of canopy area. This should be repeated in three months. Three and six months after that, a 1:1 mixture of the K:Mg blend and a balanced 8N-$2P_2O_5$-$12K_2O$+4Mg palm maintenance fertilizer should be substituted at the rate of 1.5 lbs of fertilizer per 100 sq ft of canopy area, bed area, or entire landscape area. After one year, use only the balanced palm maintenance fertilizer at the same rate.

Treatment of K deficient palms may require one to three years or longer, since the entire canopy of the palm may need to be replaced with new symptom-free leaves. Removal of discolored older K-deficient leaves on a regular basis has been shown to accelerate the rate of decline from this disorder and can result in premature death of the palm.

Treatment of severely Mg-deficient palms can require a year or more and is accomplished by broadcasting a controlled-release magnesium source (prilled kieserite is an excellent source) at rates of 2 to 5 pounds per tree 4 to 6 times per year to the area under the canopy. This treatment is to be considered as a supplement to regular applications of a balanced 8N-$2P_2O_5$-$12K_2O$+4Mg palm maintenance fertilizer. To reduce the potential for salt injury, Mg and maintenance fertilizer applications can be offset by six weeks.

For Mn-deficient palms, soil applications of manganese sulfate are effective, but spraying the foliage with this product may achieve more rapid, though short-term results, especially on alkaline soils. This should be considered as a supplement to soil applications, not as a replacement. Manganese sulfate solutions to be applied to the foliage can be made by mixing 3 lbs of this product in 100 gals of water.

Soil application rates are dependent on palm species, soil type, and severity of Mn deficiency. These rates will range from as low as 8 oz for a small palm or one growing on an acid sand soil to 8 lbs for a large species growing on a limestone soil. Broadcast this product over the soil under the palm canopy. Applications can be repeated every 2 to 3 months, depending on the severity of the problem and soil type, but a response may not be seen until 3 to 6 months after applications. Avoid using composted sewage sludge or manure products near palms. Excessive Mn applications normally result in an induced Fe deficiency, with its characteristic new leaf chlorosis.

For treatment of Fe deficiencies, soil applications of iron sulfate are generally less effective than some of the chelated compounds such as FeDTPA, FeEDDHA, or FeHEEDTA, since free Fe^{++} ions are rapidly oxidized under most soil conditions to the less soluble Fe^{+++} form. On alkaline soils FeEDDHA is the most effective product, followed by FeHEEDTA and FeDTPA. FeDTPA is the most effective product for foliar application, but it is important to note that all of these chelates can be phytotoxic to palms and other plants when applied at high rates. Follow application guidelines on the label for these products. Keep in mind that most Fe fertilizers can cause brown staining, so take precautions to keep them away from non-target objects.

Fertilization to correct or prevent B deficiency in palms is problematic at this time. The most common B sources used on palms are water soluble sodium borates. In high rainfall climates such as that of Florida, an application of water-soluble B can be completely leached out of the root zone with a single heavy rain shower. Slow release B fertilizers such as Granubor are an obvious solution to this problem since it releases over a 3 to 4 month period. However, appropriate application rates for this product on palms have yet to be determined. It is extremely important not to overdose palms with B fertilizers since the difference between deficiency and toxicity levels of B is rather small, and correction of a B toxicity caused by over-application of slow-release B fertilizers could be very difficult.

Current recommendations for correcting B deficiencies in palms are intentionally conservative because of the potential for toxicity. Dissolve about 4 oz of Solubor or Borax in 5 gallons of water and drench this into the soil under the palm canopy. Do not repeat this for at least 5 months, since it will take this long to see the results of the first application.

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