

**Additional Comments
Regarding Cold Damage to Palms**

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Trying to grow tropical palms in sub-tropical and temperate climates means cold damage is inevitable. This year's cold weather is not atypical for Florida. For example, in the late 1970s and early 1980s, a series of hard freezes destroyed much of the citrus industry located north of Orlando, which is why that industry pushed south to Immokalee. During that same time period, severe freeze damage occurred on palms throughout the state. The only difference between then and now is that there are a lot more palms planted in communities that did not even exist in the early 1980s. So, for many people, this is their first experience with severe cold damage.

This paper is in response to your many questions about cold damage on palms and expands upon some themes outlined in the EDIS document "Treating Cold Damaged Palms" at <http://edis.ifas.ufl.edu/mg318>.

As described in the EDIS document "Cold Protection of Ornamental Plants" (<http://edis.ifas.ufl.edu/mg025>), tropical and sub-tropical plants can be damaged at temperatures above freezing, and there are two different types of freezes or frosts – radiational and advective. Furthermore, while some years experience only one cold event the entire winter season, in other years, such as the current one, you may have an extended cold season.

Patience is essential with cold-damaged palms! Avoid the temptation to immediately trim damaged leaves. In most cases, the petiole and rachis will still be green. As long as **any** green tissue remains, the leaf should not be removed. Damaged leaves may provide some protection during subsequent cold events, plus green tissue is photosynthetic tissue. Even a completely dead leaf may provide some insulating protection, especially against a radiational freeze or frost. Once the palm has produced substantial new growth (2 to 3 new leaves), damaged leaf tissue can be removed. If trunk damage is observed externally due to a freeze, it is likely that there is substantial internal damage to the vascular and structural trunk tissue. These palms should be removed as they can pose a structural hazard in the landscape.

All new leaves of a palm develop from the apical meristem (bud), so the primary tissue that needs to be protected is the apical meristem. Since leaf bases provide insulating protection to the apical meristem, this is one reason to not over trim palms at any time of the year. Furthermore, good fertilization practices, including routine applications of 8-2-12-4Mg (100% slow-release N, K and Mg), has been shown to greatly enhance cold tolerance.

Copper fungicides are recommended as an attempt (not a guarantee) to protect the apical meristem and developing leaves from secondary microorganisms that may attack damaged spear leaf tissue. *There is no research to confirm if this is effective or not.* The recommendation is based on what has been observed regarding cold damage to palms and our knowledge of

fungicides. In most situations, it is the base of the spear leaf not yet emerged from the whorl of leaf bases that is damaged first, leading to a spear rot, which may then lead to a bud rot. Thus, the goal of a copper fungicide is to prevent this spear rot from developing into a bud rot that kills the apical meristem, and thus the palm.

Copper fungicides are recommended over all other group of fungicides because they have broad activity against both bacteria and fungi. No other fungicides have this broad spectrum of activity. Note that we are not concerned about the typical bud rot pathogens (e.g., *Phytophthora*). Instead, we are concerned about non-specific, secondary pathogens. Copper fungicides are contact fungicides and not systemic fungicides. Thus, you must have complete coverage of the target tissue to be effective – in this case, the base of the spear leaf and the bud. This is more difficult to accomplish in some palm species than others, particularly those with crown shafts, because the leaf bases tightly surround the emerging spear leaf, preventing movement of a fungicide into the bud region.

If the spear leaf does rot and can be easily pulled from the bud, it should be removed immediately, followed by a copper fungicide spray or drench of the bud region, which is now exposed. It is important to use a copper fungicide and not a copper nutrient solution. Copper fungicides are insoluble and will not be absorbed by the plant tissue. This limits phytotoxicity and provides the protective barrier needed on the plant tissue.

The normal recommendation is to *apply the copper fungicides no more than twice* because of the possibility of copper phytotoxicity. If it is believed that more chemical protection of the bud is needed after the copper fungicides have been applied, a broad-spectrum contact fungicide may be beneficial. Remember, the bud rot is not due to the primary pathogens we associate with typical bud rots, but is due to secondary microorganisms. The goal is to protect the apical meristem (bud). It is not known if using a copper fungicide prior to a freeze event provides any protection against freeze damage to the bud.

You will not know if the apical meristem has survived until new growth emerges, which may be 4 to 7 months later. Hence, the need for patience! The new growth may be severely malformed or damaged, but the emergence of any living leaf tissue is a sign the palm is alive. Subsequence leaves will gradually improve in quality, but it may take as long as a year before normal leaves emerge.