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NOTES ON CULTURE

Boron Deficiency and Toxicity in *Chrysalidocarpus lutescens*

Chrysalidocarpus lutescens H. Wendl., commonly referred to as the areca palm by nurserymen, is an extremely popular tropical foliage plant that is grown in Central and South Florida for shipment to other parts of the United States and the world. Palms in general, including arecas, are plagued by a variety of leaf spots. Numerous spotted arecas, submitted by nurseries, have been examined and cultured in the laboratory for fungus pathogens. Although many of the cultures yielded pathogenic fungi, a large number yielded no fungi or bacteria. For this reason it was concluded that some spotting may be caused by horticultural malpractice, such as faulty nutrition. Therefore, a hydroponic experiment was devised (1, 2) to determine whether or not such symptoms resulted from nutritional disorders. The experiment was continued over a two-year period and all plants given no boron or excessive amounts expressed appropriate symptoms. The effects of insufficient or inordinate amounts of boron have not been previously described for areca palms.

The earliest symptoms of boron *deficiency* include a gradual slowing of apical growth. A very unusual discoloration of leaflets was also seen, consisting of transverse, narrow bands of yellow partially crossing the pinnae (Fig. 1). These streaks often are clustered, one above the other, and they may eventually coalesce and become tan as tissue dies. If the plants are growing slowly, the terminal leaf and bud die. By the time the stunted inflorescence has developed, its tip is killed and aborted fruits are shed.

1. Transverse, narrow, chlorotic streaks are symptomatic of boron deficiency in *Chrysalidocarpus lutescens*.

Boron *toxicity* symptoms begin as leaves become mottled with chlorotic areas. The most mature leaves are affected first and die prematurely. Severe leaflet tip-burn advances toward the midvein (Fig. 2). Unfortunately for purposes of diagnosis, this leaf tip die-back

2. Tip-burn is a symptom of boron toxicity in *Chrysalidocarpus lutescens*.

is indistinguishable from symptoms of insufficient water, salty soil, etc.

It is well known that the availability of boron to plants diminishes as a soil mixture becomes less acid. A pH of approximately 5 to 7 is most conducive to furnishing plants with this element in a mixture containing very little organic matter. In an organic medium, such as peat moss, boron is most available between pH 5 to 6, diminishing as pH increases. Boron toxicity most likely results from excessive application in order to remedy deficiency or irrigating with water containing excessive amounts.

Literature Cited

Hoagland, D. R., and D. I. Arnon. 1950. The water-culture method for growing plants without soil. Calif. Agr. Expt. Sta. Circ. 347, (Rev. ed.), 32 p.

Marlatt, Robert B., and Paul G. Orth. 1970. Relationship of potassium to a leaf spot of *Ficus elastica* 'Decora.' Phytopathology 60: 255–257.

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PALM LITERATURE

Langlois, Arthur C. Supplement to Palms of the World. 252 pp. The University Presses of Florida, Gainesville, FL. 1976. $25.00.

James C. McCurrach's *Palms of the World* was published in 1960; it set out to provide a guide, illustrated with photographs, to as many recognized palm genera as possible. Though the work has many errors, it immediately became popular with palm enthusiasts as a very convenient source of information, particularly about habit, concerning many, often little-known palms. McCurrach was unable to find illustrations of some of the rarer or more obscure palm genera at the time his book went to press, and encouraged by the popularity of his book, set out to collect material for a supplementary volume to illustrate the remaining genera. Arthur C. Langlois began to help McCurrach and on the latter's death in 1966, took over the task of bringing the *Supplement* to publication. Seven years after the late Mr. Langlois' preface to the *Supplement* was written (1969), the volume finally reached booksellers.

This book is certainly one that nearly all members of The Palm Society will wish to obtain if they have not already done so. It is relatively inexpensive (compared with the current prices of books), it forms a companion to McCurrach's book, and it is full of illustrations. Dent Smith has written a foreword, there is a long list of acknowledgments, and an index to the genera described is provided.

If *Palms of the World* and its *Supplement* are contrasted, the most obvious difference is in the standard of printing. Although McCurrach's book is replete with errors, the photographs are generally well printed and clear; unfortunately the *Supplement* is full of poor printing. In some instances, the original photographs were obviously of poor quality—as the only available photographs of often very rare palms, they were probably still worth printing; others, however, have been spoilt by overprinting and this is a great shame as many are of great beauty. Fortunately the standard of accuracy of determination of species is probably better than in McCurrach's work.

Although the preface to the *Supplement* is dated 1969, additions have apparently been made to the text at dates up to 1972. Had the volume appeared in 1969 its value might have been greater. Palm botany has made con-