Field Control of a Ficus elastica Leaf Spot by Proper Potassium:Magnesium Nutrition

Robert B. Marlatt and Paul G. Orth

Plant Pathologist and Assistant Soils Chemist, respectively, University of Florida, Agricultural Research and Education Center, Homestead 33030.

Florida Journal Series Paper No. 4761 of the Institute of Food and Agricultural Sciences.

The technical assistance of Eva Pryor is gratefully acknowledged.

ABSTRACT

A severe leaf spotting of the ornamental India rubber plant, *Ficus elastica* 'Decora', occurs in southern Florida on oolitic limestone soil. It was associated with soil containing low concentrations of K. Applications of fertilizer containing high amounts of K and Mg gave good control of the disease during a 3-year period. Fertilization with "high K + no Mg" and "no K + high Mg" gave significantly more disease.

Phytopathology 63:1084-1085.

Additional key words: tropical, ornamental.

In 1970 Marlatt & Orth (5) reported the occurrence in southern Florida of a severe leaf spot of the ornamental India rubber plant, *Ficus elastica* Roxb. 'Decora'. No bacteria or fungi were isolated from the spots. A greenhouse experiment involving hydroponically grown potted rubber plants, revealed that the disease was greatly diminished by a nutrient solution containing a high concentration of K. Von Hentig & Pawlowski (3) recommended a high-K fertilizer for *F. elastica* Decora, although they did not mention any deficiency symptoms. The plants are propagated commercially by making air-layers (2) on stock plants in groves.

This paper describes a successful application of results of the hydroponic experiment to a typical rubber plant grove. The grove was 6 years old and was growing on oolitic limestone soil (1).

MATERIALS AND METHODS.– Three treatments consisted of fertilizer applications which provided no K and high Mg ("no K + high Mg"), high K and no Mg ("high K + no Mg"), and high K and high Mg ("high K + high Mg") (Table 1). Sufficient N and P were applied to all treatments to promote vigorous growth. Treatments were randomized in three blocks, four plants per treatment. Treatments were applied for 6 years but only data from the last 3 years were used to insure a consistent mineral content in the plots.

A trench was dug around each treatment to prevent absorption by roots from adjoining treatments. Weeds in the grove were mowed periodically. No fungicides were applied and chewing insects were controlled by an annual application of a chlorinated hydrocarbon.

Air-layers were made and observed for disease severity because they were more likely to show symptoms than were normal branches. Disease was estimated by assigning a rating to varying symptom expression. A lack of disease was given a rating of 1 and the most severe disease (5) was rated 11. An average of ten leaves per air-layer were inspected for disease and the average disease of all of an air-layer's leaves was recorded.

RESULTS.–The "no K + high Mg" treatment consistently had the most severe disease. "High K + no Mg" resulted in moderate disease severity, whereas "high K + high Mg" treatment consistently showed the least disease. The disease control of the "high K + high Mg" treatments was statistically significant at the 1 and 5% levels (Table 1).

DISCUSSION.–In the previously mentioned hydroponic experiment (5), high K resulted in the least disease and high Mg promoted the most severe symptoms. K:Mg ratios were not studied at that time. The results of the present experiment indicate that the K:Mg ratio was relevant to disease severity and that 2K : 1Mg gave good control. This may explain the superior disease control by the "high K + high

TABLE 1. Relationship of fertilizer regimes to leaf spotting of *Ficus elastica* 'Decora'

		Fertilizer[a]						Number of annual applications	Disease[b]	
		Kg/ha N		Kg/ha K		Kg/ha Mg				
Year	Treatment	Each application	Annual total	Each application	Annual total	Each application	Annual total		Average of disease ratings[c]	Average % of leaves diseased[c]
1970-71	No K, high Mg	56.04	336.24	0	0	28.02	168.12	6	4.1 b[d]	57 b
	High K, no Mg	56.04	336.24	56.04	336.24	0	0	6	3.1 b	39 b
	High K, high Mg	56.04	336.24	56.04	336.24	28.02	168.12	6	1.3 a	13 a
1972	No K, high Mg	56.04	492.28	0	0	28.02	196.14	7	5.2 b	34 b
	High K, no Mg	56.04	492.28	56.04	492.28	0	0	7	4.8 b	27 b
	High K, high Mg	56.04	492.28	56.04	492.28	28.02	196.14	7	2.0 a	0 a

[a] 756.52 Kg/ha P had been applied over the 3-yr period before 1970.
[b] 1 = no spots; 11 = leaves covered with spots.
[c] The 1970 and 1971 disease averages were significantly different at the 1% level, 1972 at the 5% level.
[d] Figures followed by the same letter were not significantly different (Duncan's multiple range test).

Mg" treatment as compared with "high K + no Mg" treatment.

The physiology of this disease is not yet understood. Possible explanations include remedying a K deficiency, which may have weakened leaf tissue sufficiently to permit necrosis to occur (6). Heat and/or bright sunlight enhanced disease. Perhaps leaf stomata were not sufficiently open to cool the underlying tissues since potassium was found necessary for stomatal opening and Mg prevents opening (4).

LITERATURE CITED

1. COLBURN, B., & S. GOLDWEBER. 1961. Preparation of oolitic limestone soil for agricultural use. Proc. Fla. State Hort. Soc. 74:343-345.
2. HARTMANN, H. T., & D. E. KESTER. 1968. Plant propagation principles and practices. 2nd ed., Prentice-Hall, Inc., Englewood Cliffs, New Jersey. 702 p.
3. HENTIG, W. U., VON, & H. E. PAWLOWSKI. 1962. Mehrnahrstoffdunger fur Zierpflanzen. Bericht über vierjahrige Dungungversuche. Gartenwelt 62:184-187.
4. HUMBLE, G. D., R. A. FISCHER, & T. C. HSIAO. 1970. Potassium role in stomatal functioning. Calif. Agric. 24(4):10.
5. MARLATT, R. B., & P. G. ORTH. 1970. Relationship of potassium to a leaf spot of Ficus elastica 'Decora'. Phytopathology 60:255-257.
6. TRESHOW, M. 1970. Environment and plant response. McGraw-Hill Book Co., New York. 422 p.