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Effect of Potassium Level on Severity of Drechslera Leaf Spot of *Calathea picturata* 'Vandenheckei'[1]

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Abstract

Severity of Drechslera leaf spot (*Drechslera setariae*) of *Calathea picturata* 'Vandenheckei' was affected by potassium fertilization rate with ½, 1 or 2 times the recommended rate (1400 g/m^3) causing a reduction in number of lesions caused by *Drechslera setariae* compared to plants receiving no potassium. In addition, plant quality, height and number of leaves were unaffected by potassium rate during the test period. Leachate electrical conductivity was unaffected by these potassium rates and was approximately 1000 µmhos/cm two months after fertilization.

Index words: Foliage plant, *Drechslera setariae*, *Helminthosporium*, *Bipolaris setariae*

Significance to the Nursery Industry

Periods of no to low potassium (2 to 3 months) can result in increased severity of Drechslera leaf spot (*Drechslera setariae*) even when plant foliage does not display symptoms of potassium deficiency. Longer periods (6 months) of potassium deficiency can lead to marginal necrosis in calatheas. Adequate potassium fertilization (1400 g/m^3) should therefore be maintained with this crop to minimize leaf damage by this pathogen. Current recommended level of potassium affords the maximum nutritional control of Drechslera leaf spot and should allow development of a high quality crop free of potassium deficiency.

Introduction

Calatheas are popular indoor foliage plants because of their leaf textures, shapes and colors and tolerance of low light and humidities found indoors. Of the diseases reported on these plants, only Drechslera leaf spot (4) has been a continuing and serious problem over the past 10 years. Fungicides used for control of Drechslera leaf spot of calatheas are not always acceptable due to unsightly residues. Alternative control techniques are needed to improve salability. Nutritional control of Drechslera leaf spot on Calathea cultivars was not successful when rate of complete fertilizer was varied (2). Calatheas are highly susceptible to potassium deficiency (1) and may be more susceptible to foliar diseases under conditions of potassium stress. The work reported here was initiated to determine the effect of potassium rate on severity of Drechslera leaf spot of *Calathea picturata* 'Vandenheckei' [chosen due to its high susceptibility to the pathogen (3)].

Materials and Methods

Plant production. Tissue-cultured plants of *Calathea picturata* 'Vandenheckei' were obtained from a commercial producer and established in a potting medium consisting of Canadian peat, perlite and builders' sand (4:2:1 by vol.). This medium was amended with 4.5 kg/m^3 (7.5 lb/yd^3) of dolomite, 0.9 kg/m^3 (1.5 lb/yd^3) of Micromax and 0.9 kg/m^3 (1.5 lb/yd^3) superphosphate. Ten single plant replicates were included for each potassium level tested. A controlled-release formulation of potassium (0N-0P-38K) was incorporated in the potting medium at the following rates: 0, 700, 1400, and 2800 g/m^3. Plants were grown in 10 cm (4 in) plastic containers. Nitrogen was applied at the recommended rate. Plants were irrigated by hand one to three times weekly as needed. Tests were conducted in a shadehouse (73% shade) at the Ft. Lauderdale Research and Education Center—Ft. Lauderdale, FL (Test 3) or in a glasshouse (75% shade) at the Central Florida Research and Education Center—Apopka, FL (Tests 1, 2, 4).

Leachate electrical conductivity (EC) was recorded monthly for four replicates per treatment using the pour-through method (5). Deionized water was added to the surface of the potting medium until 100 ml of the resulting leachate was collected in a beaker beneath the pot. Leachate EC was evaluated using a Hach Conductivity Meter #2511 (Hach Chemical Company, Ames, IA 50010). The following growth characteristics were recorded: number of leaves, plant height and plant quality. Plant quality was determined visually on the following scale: 1 = dead; 2 = poor, unsalable; 3 = marginal, salable; 4 = good, salable; and 5 = excellent, salable. Plants were inoculated with the conidial suspension as described following plant data collection.

Inoculum preparation and inoculation. A strain of *Drechslera setariae* shown to be pathogenic on *Calathea* spp. was grown on Difco potato-dextrose agar at 28°C (82°F) for 2 weeks (1). Conidia were removed from plates by flooding with sterilized water and gently rubbing with a sterilized rubber policeman. Suspensions were collected and adjusted to approximately 1×10^5 conidia/ml using a haemocytometer. Inocula were applied to plants within 30 min of preparation. Plants were inoculated by spraying the conidial suspension onto leaf surfaces with a pump action hand sprayer and immediately covered with polyethylene bags for 24 hr. Plants were treated under intermittent mist (5 sec/30 min from 0800 to 2000 hr daily) starting the day of inoculation and maintained under mist until final disease

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Table 1. Effect of potassium rate on number of lesions on *Calathea picturata* 'Vandenheckei' caused by *Drechslera setariae*.

Potassium rate g/m³	Mean number of lesions: Test 1 June 14 1989	Test 2 March 1 1990	Test 3 March 21 1990	Test 4 July 13 1990	Overall mean
0	86*[z]	14.2 ns	20.0 ns	11.9**	33.0
700	46	13.8	10.7	5.5	19.0
1400	55	11.2	14.6	4.9	21.4
2800	46	9.0	14.1	4.5	18.4

[z]Significant effects were denoted at the 5% level (*), the 1% level (**) or not significant (ns).

ratings. Number of lesions per plant was recorded approximately 2 to 3 wk after inoculation.

Results and Discussion

The rates of potassium tested did not affect the height, number of leaves or the quality of the calatheas even when no potassium was supplied. In contrast, potassium rate did affect the number of lesions caused by *D. setariae* (Table 1). Plants which received any level of potassium had about half the number of lesions of plants which did not receive any potassium. Although Tests 2 and 3 showed only marginally significant results ($P<0.10$), the same trend occurred as for Tests 1 and 4. When the four tests were analyzed together, the difference between the treatment without potassium and the three with potassium becomes clearer.

Although some of these plants did not receive any potassium, they did not show any reduction in growth or plant quality during the test period of about 3 months. No signs of potassium deficiency developed when plants were observed for 6 months (unreported data). Leachate soluble salts at 2 months were about 300, 500, 1200, and 975 μmhos/cm for the 0, ½, 1, and 2 × treatments, respectively. These tests indicate the importance of supplying calatheas with potassium for disease resistance and that the lowest rate (700 g/m³) provided the same effect as four times that rate. However, use of this potassium rate may, under some conditions, result in potassium deficiency since calatheas are a relatively slow growing, long-term crop.

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Pin Oak Root Injury from Soil Acidification with Sulfuric Acid[1]

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Abstract

Sulfuric acid soil treatments that have been used to reduce soil pH in the landscape can cause root damage. When 5 cm (2 in) diameter holes were filled with 33% (4 N) sulfuric acid, pH reduction of one-half unit or greater was limited to soil within 5 cm (2 in) of the treatment hole and persisted less than 2 years. Fine root density was significantly reduced and root tip injury was significantly increased within 15 cm (6 in) of the treatment hole. Cambium of woody roots greater than 3 mm (0.1 in) diameter was killed up to 25 cm (10 in) from the application hole. Destruction of the cambium would result in the death of the roots beyond the point of cambium injury and may be responsible for crown dieback which sometimes develops following acid treatments in the landscape.

Index words: *Quercus palustris*, chlorosis, root injury, soil acidification

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Significance to the Nursery Industry

Chlorosis associated with alkaline soils and iron deficiency is common in Midwest landscapes. Sulfuric acid