JOINT PROCEEDINGS

TROPICAL REGION

21st Annual Meeting
of the Caribbean Food Crops Society
and
32nd Annual Meeting of the American Society for Horticultural Science — Tropical Region

technology for agricultural development

Hilton Hotel, Port of Spain, Trinidad
8 - 13 September 1985

Host Institutions

— Caribbean Agricultural Research and Development Institute

— Ministry of Agriculture, Lands and Food Production, Trinidad & Tobago

— Faculty of Agriculture, University of the West Indies

Published by the Caribbean Food Crops Society, Box 506, Isabela, Puerto Rico 00662

SOLUBLE SALTS INTERPRETATION FOR ORNAMENTAL FOLIAGE CROP PRODUCTION

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ABSTRACT

During the last few years, experiments have been conducted with potting media and fertilizer as variables. Soluble salts of the media and plant ratings were sometimes determined. Comparisons of the levels of soluble salts and plant growth indicated soluble salts readings are a poor indicator of the potting media ability to produce satisfactory foliage plants.

RESUMEN

Durante los ultimos anos, se ha conducido investigaciones con diferentes mezclas de tierra y abonos. De vez en cuando se determinó los niveles de sales solubles en las mezclas de tierra y el comportamiento de las plantas. La comparaciOn de los niveles de sales solubles y el crecimiento de las plantas indicaron que el nivél de sales solubles no es un indicador seguro de la capacidad de una mezela de tierra para producir plantas ornamentales satisfactorias.

Satisfactory plant growth requires macro and microelements, normally supplied by specific fertilizers. Addition of fertilizer increases soluble salts levels, actually soluble ions, in the medium. To determine soluble salts levels, a conductivity meter is used since dissolved salts increase electrical conductivity. Horticulturists use soluble salts levels to indicate fertility level desired for plant production. If a plant is chlorotic or necrotic, roots are usually examined and sometimes soluble salts of the soil determined. If levels are too low, additional fertilizer is suggested and if levels are too high removal of fertilizer (soluble salts) by heavy applications of water to the soil is suggested.

Four methods to determine soluble salts levels are: (1) 1:2 – soil:water, by dry weight; (2) 1:2 – soil: water, by volume; (3) saturated paste and (4) leachate. The dry weight method should not be used for potting media because of the variability of bulk density of the different mixtures used for growing plants. The volume procedure is commonly used because of its simplicity. One volume of soil is added to 2 volumes of water, mixed, and usually allowed to stand for about 15 minutes with occasional stirring. The electrode of the conductivity meter can be placed directly in the solution, or the solution can be filtered prior to measuring conductivity. The saturated paste procedure had been recommended because readings obtained by this method are said to approximate those in the root environment, but variations in water holding capacity of potting mixtures suggests this may not be much of an advantage. The procedure for saturated paste is the most complex since the soil sample is moistened until a glistening paste is obtained. Obtaining the same degree of glistening each time can lead to errors in reproduction. After glistening is obtained, vacuum is applied to extract the solution and conductivity determined. Although the leachate method is not commonly used, it is the easiest to conduct. Water is poured through the medium in the container which is in a beaker. Fifty to 100 ml of leachate is collected and conductivity determined. This method allows frequent sampling without removal of soil or distrubing the root system.

Unfortunately, many types of electrical conductivity meters are used and units of measurement differ. The usual unit is mhos, but the reading could be micromhos (mhos x 10^{-6}) millimhos (mhos x 10^{-3}) or mhos x 10^{-5}. Numerous tables have been printed with ranges for the interpretation of these readings, (Table 1).

During the last few years, experiments have been conducted at AREC-Apopka, Florida, with potting media and fertilizer as variables. Soluble salts of the media and plant ratings were sometimes determined. A summary of soluble salts of the media and con-

Table 1. Interpretation[z] of soluble salts readings (mhos x 10^{-5}) for 1:2 air dry soil (peat or light weight mix) to water by volume (A) and saturated paste (B) methods (5).

Mohs x 10^{-5}	Rating	Remarks
A 0–50 B 0–100	Low	Need fertilizer
A 51–100 B 101–132	Medium	Satisfactory
A 101–175 B 133–164	High	Desirable
A 176+ B 165+	Very High	Leach

[z] There is no guide for leachate soluble salts.

dition of the plants is contained in Table 2.

An examination of Table 2 clearly reveals the difficulty of determining the adequacy of a potting medium or feritlizer program by soluble salts readings. Media containing plants with the worst indicators (grade or height) had 11 ratings in the low range, 3 in the medium range, 4 in high and 4 in the very high range. Media containing plants with the best indicators had an almost identical rating: 12 in the low range, 3 medium, 6 high and 1 in the very high range. When comparing the worst and best ratings of the same plant, ratings were the same 11 times, went from a high to a low rating 6 times and from a low to a high rating 5 times. Plants with a

Table 2. Comparisions of growth indicators with soluble salts of potting media.

Species	Reference	Mohs × 10		Indicator		Method	Time of	Rating Table 1	
		worst	best	worst	best		reading	worst	best
Aglaonema	4	6	5	3.5[p]	3.9	2:1, vol	Initial	Low	Low
commutatum	9	149	218	2.2[p]	4.6	Sat. paste	Initial	Med	High
Alphelandra	1	12	27	1.9[p]	3.1	2:1, vol	Final	Low	Low
squarrosa	2	27	45	3.2[p]	3.9	2:1, vol	Final	Low	Low
Brassaia	3	242	161	1.8[p]	3.9	2:1 vol	Final	V.high	High
actinophylla	6	205	51	14[c]	23	2:1, vol	Initial	V.high	Med
	9	149	156	3.4[p]	4.6	Sat. paste	Initial	High	High
	11	515	185	15[w]	24	Leachate	Final		
	11	690	300	122[w]	182	Leachate	Final		
	12	310	155	3.8[p]	4.1	Leachate	Initial		
	12	85	70	3.8[p]	4.1	Leachate	Final		
Calathea									
makoyana	9	158	155	2.0[p]	4.4	Sat. paste	Initial	High	High
Chamaedorea									
elegans	11	730	225	6	8	Leachate	Final		
Chrysalidocarpus									
lutescens	7	0	19	1.2[p]	4.1	2:1, vol	Final	Low	Low
Dieffenbachia	1	24	45	26.3[c]	28	2:1, vol	Final	Low	Low
maculata	2	47	80	26[c]	28	2:1, vol	Final	Low	Med
	3	164	142	2.2[p]	4.4	2:1, vol	Final	High	High
	10	34	208	2.1[p]	3.9	2:1, vol	Final	Low	High
	12	110	50	3.7[p]	3.9	Leachate	Initial		
	12	40	40	3.7[p]	3.9	Leachate	Final		
	12	150	165	3.6[p]	4.8	Leachate	Initial		
	12	40	60	3.6[p]	.8	Leachate	Final		
Ficus									
benjaminas	13	171	262	3.8[p]	4.5	2:1, vol	Initial	High	V.High
	13	51	53	3.8[p]	4.5	2:1, vol	Final	Med	Med
Maranta									
leuconeura									
erythroneura	9	705	200	13[w]	15[w]	Leachate	Final		
Monstera									
deliciosa	4	207	14	33[c]	38	2:1, vol	Initial	V. high	Low
Nephrolepis	1	5	29	26[c]	31	2:1, vol	Final	Low	Low
exalatata	2	66	21	30[c]	33	2:1, vol	Final	Med	Low
	4	3	3	3.7[p]	3.9	2:1, vol	Final	Low	Low
Pellionia									
pulchra	8	50	59	14[c]	17	2:1, vol	Final	Low	Med
Peperomia									
obtusifolia	8	50	59	14[c]	59	2:1, vol	Final	Low	Med
	10	234	22	2.4[p]	22	2:1, vol	Final	V. high	Low
	11	680	158	9[w]	158	Leachate	Final		
	11	621	172	116[w]	172	Leachate			
Philodendron	1	20	18	24[c]	26	2:1, vol	Final	Low	Low
scandens	2	64	49	21[c]	23	2:1,vol	Final	Med	Low
oxycardium	11	225	690	8[w]	10	Leachate	Final		
Pilea									
involucrata	8	48	59	12[c]	13	2:1, vol	Final	Low	Med

[c] Centimeters

[p] Plant grade, 1= poor, 5=excellent

[w] Weight in g

grade of 3.0 or above (considered salable) were growing in 8 soil mixes with low soluble salts, 2 with medium levels, 8 with high salts and 1 with very high soluble salts.

Summary

Results of this compilation show that soluble salts readings are a poor indicator of the potting media ability to produce satisfactory, salable foliage plants.

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