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Nutrient deficiency symptoms in potted avocado plants

PROGRESS REPORT

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Abstract

Hass on G 755, Duke 7 and G 6 are currently being compared in a nutrient elimination sand culture trial. To date G 755 appears generally better, and G 6 generally weaker. Deficiency symptoms for N, P, K, Ca, Mg, S, Fe and Cu have been obtained for later publication in colour. Leaf samples will be analysed to determine at which levels deficiency symptoms occur.

UITTREKSEL

Hass op G 755, Duke en G 6 word tans in 'n voedingselement eliminasie sandkultuurproef vergelyk. Tot op datum kom G 755 algemeen beter voor, en G 6 algemeen swakker. Tekortsimptome vir N, P, K, Ca, Mg, S, Fe en Cu is reeds verkry vir latere publikasie in kleur. Blaarmonsters sal ontleed word om vas te stel by welke vlakke terkortsimptome voorkom.

INTRODUCTION

Over the past few years investigations have been carried out on deficiency symptoms in potted avocado plants. An initial water culture experiment (Barnard, 1988) proved disappointing, as the plants became seriously diseased, despite permanent aeration and controlled chlorination.

Interesting tendencies occurred, however, and it was decided to follow this study up in sand culture. The purpose was primarily to obtain specific deficiency symptoms, but also to investigate differential nutrient effects of rootstock and scion.

MATERIAL AND METHODS

On the advice of Slabbert (1988, personal communication) plastic buckets were obtained, the base removed except for a narrow rim and shade cloth glued into place with Pattex glue, to provide a suitable base. These were filled with 15 kg of washed quartz playpen sand and placed on a galvanised mesh shelf with openings of 6 x 7 mm, supported on bricks in such a way as to allow another, smaller, bucket to collect the leachate from each pot.

Drainage in pots is often a problem, but measurements carried out confirmed that these pots retained considerably less water, and dried out quicker, than other pots of comparable size, but different (more conventional) base. There were 9ℓ of nutrient solution in circulation in each case, with approximately 4ℓ in the top (and) and 5ℓ in the bottom.

Plant material was obtained from the nursery at Westfalia Estate. Three rootstocks, with Hass as scion, were studied: G 755, Duke 7 and G 6.

On receipt the plant material was washed free of growth medium and planted singly in the quartz sand. Half strength Hoagland nutrient solution (Hoagland & Arnon, 1950), with the respective elimination composition, was given straight away. Because of uncertainty about the effect of N-source on avocados, some NH_4^- was included with the predominantly NO_3^-N supply. The composition of the basic strength solution is given in Table 1.

TABLE 1 Composition of control half strength nutrient solution applied

Element	mmo lc dm^{-3}	Element	mmo lc dm^{-3}
Ca^{++}	5	NO_3^-	5
Mg^+	2	$SO_4^=$	7
K^+	3	$H_2PO_4^-$	0,5
NH_4^+	2,5		
	12,5		12,5

Microelements

Fe as Fe-EDTA, Mn, Cu and Zn as the sulphates and B, Cl and Mo as the sodium salts, on the following basis:

Fe, Mn, B and Cl = 0,25 mg dm^{-3}
Zn = 0,025 mg dm^{-3}
Cu = 0,01 mg dm^{-3}
Mo = 0,005 mg dm^{-3}

The respective elimination treatments, of which there were duplicates, are given in Table 2.

TABLE 2 Elimination treatments

Treatment Number	Treatment Applied
1	Complete (control)
2	-N
3	-P
4	-K
5	-Ca
6	-Mg
7	-S
8	-Fe
9	-Mn
10	-Cu
11	-Zn
12	-Mo
13	-B
14	-Cl

The required adaptations were made in the different instances, to ensure that the remaining elements were given in as comparable amounts and ratios as possible to the complete control.

RESULTS AND DISCUSSION

The initial growth was fairly slow, as it was during the winter. Subsequently growth was satisfactory and deficiency symptoms developed systematically. These are being photographed on an ongoing basis, with a view to publication of typical deficiency symptoms at a later date.

Stunted growth and typical deficiency symptoms have been noted for all the macro-nutrients: N, P, K, Ca, Mg and S. In addition Fe and Cu deficiency symptoms have occurred. With regard to differences between rootstocks, G 6 generally appeared weaker with G 755 generally better.

Leaf analyses will be carried out on suitable leaves to determine at which levels deficiency symptoms actually occur in the different cases.

CONCLUSIONS

Rootstock differences in nutritional pair terns would obviously have important implications in practice in the possible matching of more suitable material to potentially problematic situations. This would include aspects such as differential resistance to disease as well as 'predisposition', through sub-optimal or adverse nutritional conditions to the onset of disease. In the meantime material suitable for inclusion in a publication on specific deficiency symptoms is being collected.

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