

Effect of nutrient solution pH on growth and N, P and K accumulation by citrus rootstock seedlings

As with the K and Si supply experiments, the major source of variation in shoot dry matter production under different pH treatments was rootstock (**Table 14**), and volkameriana seedlings were more vigorous than seedlings of the other three rootstock genotypes. The nutrient solution pH had no effect on dry matter production by any of the rootstock seedlings or on %N in shoot dry matter at harvest (**Table 15**).

Table 14 Effect of nutrient solution pH on shoot dry matter production by four citrus rootstock seedling genotypes growing in sand culture

Values presented are means. Means followed by the same superscripted letter within either main effect or within the are not significantly different at P=0.05

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		Rootstock				
	pH	Sweet orange	Macro-phylla	Troyer citrange	Volk-ameriana	pH main effects
		<i>g/shoot</i>				
	6.3	10.8	12.2	9.5	20.0	13.2
	7.7	14.1	10.7	11.3	14.4	12.7
Rootstock main effects		12.4 ^A	10.0 ^A	10.4 ^A	17.2 ^B	

More N was present in volkameriana shoots if the plants were growing in an acidic nutrient solution (pH of 6.3), even though volkameriana dry matter and % N were not significantly different between pH treatments, due to variability in the data. The amount of N present in the shoots of the other rootstocks was unaffected by nutrient solution pH.

Table 15 Effect of nutrient solution pH on % N and total shoot N of four citrus rootstock seedling genotypes growing in sand culture

Values presented are means. Means followed by the same superscripted letter within rootstock main effects are not significantly different at P=0.05.

		Rootstock				
	pH	Sweet orange	Macro-phylla	Troyer citrange	Volk-ameriana	pH main effects
Rootstock main effects		% N				
	6.3	2.2	2.2	2.6	2.1	2.3
	7.7	2.2	2.3	2.5	2.4	2.3
		2.2 ^A	2.3 ^A	2.5 ^B	2.2 ^A	
		mg N/shoot				
	6.3	234 ^A	284 ^A	253 ^A	472 ^B	311
	7.7	308 ^A	246 ^A	274 ^A	328 ^A	289
	Rootstock main effects	271 ^A	265 ^A	263 ^A	400 ^B	

Both in terms of percentage in shoot dry matter and the amount present per shoot, the major influence on shoot P and K was rootstock (**Table 16** and **Table 17**). Shoot % K was higher if the seedlings were grown at pH 7.7 compared to 6.3.

Table 16 Effect of nutrient solution pH on % P and total shoot P of four citrus rootstock seedling genotypes growing in sand culture

Values presented are means. Means followed by the same superscripted letter within rootstock main effects are not significantly different at P=0.05. An * indicates a significant difference between the nutrient solution pH means.

	Rootstock					
	pH	Sweet orange	Macro-phylla	Troyer citrange	Volk-ameriana	pH main effects
Rootstock main effects		% P				
	6.3	0.21	0.20	0.24	0.24	0.23
	7.7	0.21	0.17	0.25	0.22	0.22
		0.21 ^{AB}	0.19 ^A	0.25 ^C	0.23 ^{BC}	
		mg P/shoot				
	6.3	21	16	20	38	24
	7.7	27	16	22	33	25
Rootstock main effects		24	16	21	36	

Table 17 Effect of nutrient solution pH on % K and total shoot K of four citrus rootstock seedling genotypes growing in sand culture

Values presented are means. Means followed by the same superscripted letter within rootstock main effects are not significantly different at P=0.05. An * indicates a significant difference between the nutrient solution pH means.

		Rootstock				pH main effects
	pH	Sweet orange	Macro- phylla	Troyer citrange	Volk- ameriana	
% K						
	6.3	1.2	1.3	0.99	1.3	1.2
	7.7	1.5	1.5	1.2	1.3	1.4*
Rootstock main effects		1.4 ^A	1.4 ^A	1.1 ^B	1.3 ^A	
mg K/shoot						
	6.3	115	97	80	182	118
	7.7	188	132	91	194	151
Rootstock main effects		152	114	85	188	