

Depletion of macro-nutrients from rhizosphere soil solution by juvenile corn, cottonwood, and switchgrass plants

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Table 1 Mean values of biomass, shoot/root ratio, root length, number of root tips, and root surface area for individual corn, cottonwood and switchgrass plants

Plant parameter	Corn	Cottonwood	Switchgrass
<i>Total biomass</i>			
Shoot (g)	0.12 (0.03) b ^a	0.55 (0.02) c	0.0064 (0.0019) a
Root (g)	0.23 (0.02) b	0.25 (0.04) b	0.0031 (0.0006) a
Shoot/root ratio (g/g)	0.53 (0.15) a	2.28 (0.35) b	2.14 (0.72) b
Root length (mm)	3869 (709) c	3011 (328) b	305 (78) a
Number of root tips	1385 (433) c	963 (140) b	136 (26) a
Root surface area (mm ²)	1873 (386) c	1704 (245) b	77 (10) a

Values shown are for plants harvested after 10 days of growth in a silt loam soil in a mini-rhizotron in a controlled environment chamber. Values in parentheses are standard errors of the means

^a Different letters within a row denote significant differences among plant species ($p < 0.05$) based on One-way ANOVA followed by Duncan's Test

Table 2 Effect of plant species on the concentrations of P, K, Ca, and Mg in soil solution after 10 days of plant growth in a silt loam soil in a mini-rhizotron in a controlled environment chamber

Nutrient	Corn (average values in mg L ⁻¹)		Cottonwood (average values in mg L ⁻¹)		Switchgrass (average values in mg L ⁻¹)	
	<1 mm	>8 mm	<1 mm	>8 mm	<1 mm	>8 mm
P	0.85 a ^a	1.12 b	0.89 a	1.05 b	1.02 a	1.09 a
K	4.70 a	5.09 b	4.85 a	5.15 b	5.09 a	5.11 a
Ca	23.8 a	25.2 a	28.3 a	25.8a	25.5 a	25.5 a
Mg	15.0 a	13.8 a	13.6 a	14.8 a	15.8 a	16.4 a

Number of samples per mean varies from 4 to 6 depending on the number of roots in each distance class on the 10th day of sampling

^a Different letters denote a significant difference between values within a species-nutrient combination ($p < 0.05$) based on One-way ANOVA followed by Duncan's Test

Table 3 Nutrient concentration in shoot and root tissue of corn, cottonwood, and switchgrass observed after 10 days of plant growth in a silt loam soil in a mini-rhizotron in a controlled environment chamber ($N = 3$)

Plant component	Species	Nutrient concentration (mg g ⁻¹)			
		P	K	Ca	Mg
Shoot	Corn	3.44 (0.11) c ^a	1.90 ^b (0.11) c	7.83 (0.36) b	4.39 (0.19) c
	Cottonwood	0.71 (0.14) a	0.82 (0.11) a	13.17 (1.25) c	1.67 (0.19) a
	Switchgrass	2.07 (0.25) b	1.39 (0.09) b	5.65 (0.55) a	4.00 (0.17) b
Root	Corn	0.98 (0.07) a	2.99 (0.14) b	5.97 (0.34) c	4.62 (0.49) a
	Cottonwood	0.98 (0.06) a	1.12 (0.13) a	4.98 (0.56) b	5.70 (0.55) b
	Switchgrass	1.07 (0.21) a	0.97 (0.23) a	3.13 (0.23) a	5.83 (0.24) b

Numbers in parentheses are standard errors of the mean

^a Different letters within a column and plant component denote significant differences among plant species ($p < 0.05$) based on One-way ANOVA followed by Duncan's Test

^b Subsequent evaluation of the corn, cottonwood, and switchgrass K concentration values suggests that they may be an order of magnitude lower than normally expected. Available data do not allow us to resolve this concern