

# Transplant Nutrient Conditioning Hastens Broccoli Maturity

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## INTRODUCTION

Broccoli ranks third behind lettuce and cauliflower in acreage in the Yuma area. As with cauliflower, the number of acres that are transplanted is increasing steadily. Stand establishment, uniformity, earliness and yield could be enhanced through the use of transplant nutrient conditioning (TNC).

## PROCEDURES

Broccoli (*Brassica oleracea* var *italica*) cv Emperor was seeded in peat lite (1:1,v:v) mix in model 100A Todd planter flats. In the first experiment, TNC consisted of a factorial combination of N from ammonium nitrate at 50, 150, or 450 mg liter<sup>-1</sup>; P from triple superphosphate at 11, 33, or 98 mg liter<sup>-1</sup>; and K from potassium chloride at 50 or 150 mg liter<sup>-1</sup>. Six fertilizer applications (3 x per week) of 5 ml to each plant began in the 3rd and 4th weeks after emergence. Thirty-four days after seeding, transplants were set one-foot apart in the row and approximately 275 ml per plant of a 9-45-15 starter fertilizer was applied. In the second experiment for a later planting, TNC consisted of a factorial combination of 100, 200, or 400 mg N liter<sup>-1</sup> and 22, 44 or 87 mg P liter<sup>-1</sup> at a constant 50 mg liter<sup>-1</sup> K.

## RESULTS

Broccoli transplant leaf area, fresh weight, percent dead leaves and stem diameter increased in response to the main effect of N (Table 1). Early seedling responses to P and K diminished with increasing N and maturity. Days after transplanting (DAT) to harvest decreased linearly with increasing N; high N resulted in harvest days earlier than low N. At low K levels, DAT decreased with increasing P, but P effects were less at high K (data not shown). Head weight increased in response to increasing N with a smaller response to increasing P.

In the second experiment, broccoli seedling fresh weight increased with each increment of N and in response to increases in P within each N regime (Table 2). Stem diameter was greater with 400 mg N liter<sup>-1</sup> than with 100 mg N liter<sup>-1</sup>, but there was no response to P. Mature plant height and head diameter and weight increased linearly (pooled across P levels), and P effects were evident only in the lower N treatment. High N resulted in a 31% increase in head weight over the low N treatment.

Transplants grown with the high TNC regimes were more succulent and exhibited a greater degree of transplant shock, as evidenced by increased leaf necrosis. This would suggest the use of lower nutrient levels, especially N for transplant production. However, the high TNC regimes also recovered from transplant shock more rapidly and produced a greater and earlier yield than the low TNC regimes.

**Table 1.** Main effects of N, P and K nutrient conditioning on 'Emperor' broccoli seedling leaf area, fresh weight, percent dead leaves, stem diameter, number of days after transplanting (DAT) to harvest and head weight.

Nutrient	Conc. (mg/l)	Leaf area (cm <sup>2</sup> )	Fresh wt. (g)	Dead Leaves (%)	Stem diam. (mm)		Harvest (DAT)	Head wt. (g)
					1 DAT <sup>z</sup>	14		
N	50	18.9	4.8	7.1	1.9	3.0	87.8	192
	150	33.9	9.3	10.1	2.2	3.7	82.6	206
	450	63.6	18.2	24.6	2.8	4.6	75.8	226
P	11	35.7	1.6	10.7	2.3	3.6	84.3	205
	22	38.5	1.8	15.0	2.3	3.7	82.1	210
	98	42.3	2.0	16.0	2.4	3.9	80.7	209
K	50	38.2	1.8	11.5	2.2	3.7	81.2	208
	150	39.4	1.8	16.4	2.4	3.7	83.0	208

<sup>z</sup>DAT, Day After Transplanting, in the field.

**Table 2.** Transplant nutrition effects on 'Emperor' broccoli seedling fresh weight and stem diameter and mature plant height, head diameter and weight. (Seeded 10/21/87, transplanted 11/24/87, harvested 2/17/88).

N (mg/l)	P (mg/l) (g)	Fresh weight (g)	Stem diam. (mm)		Plant ht. (cm)	Head d. (cm)	Head wt. (g)
			0 DAT <sup>z</sup>	28			
100	22	0.95	1.9	2.9	25.6	9.8	140
	44	0.98	2.0	3.1	27.4	10.5	154
	88	1.01	2.0	3.0	28.0	11.0	160
200	22	1.39	2.3	3.4	29.3	11.8	179
	44	1.41	2.2	3.1	27.3	11.7	178
	88	1.63	2.3	3.4	29.4	12.0	179
400	22	1.62	2.3	3.4	29.2	12.3	196
	44	1.84	2.5	3.5	29.7	13.0	205
	88	2.06	2.3	3.5	30.0	12.9	194

<sup>z</sup>DAT, Days After Transplanting