Transplant Nutrient Conditioning Improves Cauliflower Early Yield

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INTRODUCTION

Vegetable stand establishment of direct-seeded crops continues to be a problem. High temperatures plus high soil and water salt levels often result in erratic germination and emergence and non-uniform stands. For some crops, using transplants can assure establishment of the required population at the desired spacing, improve uniformity, increase yields and allow more efficient use of expensive hybrid seed. In addition, earlier crops may be produced and harvest-date may be more accurately predicted.

Cauliflower ranks second in production in the Yuma area and transplanted cauliflower acreage is increasing steadily in the Yuma area. Stand establishment of transplanted cauliflower depends on seedling survival of transplant shock and resumption of growth; transplant nutrient conditioning (TNC) may assure both and also enhance earliness and yield.

PROCEDURES

Cauliflower (Brassica oleracea var botrytis) cv Snow Crown was seeded in peat lite mix (1:1,v:v) in model 100A Todd planter flats. In the first experiment, TNC regimes were a factorial combination of N (ammonium nitrate) at 50, 150 or 450 mg liter^{-1}; P (triple superphosphate) at 11, 33 or 98 mg liter^{-1}; and K (potassium chloride) at 50 or 150 mg liter^{-1}. During the second week after emergence all plants received 3 applications of 150 mg N liter^{-1} 20-20-20. In the 3rd and 4th weeks there were six TNC applications (3 x per week) of 5 ml to each plant. On August 26, 1987, transplants were manually set in the field 30 days after seeding; they were spaced 1 foot apart in the center of standard 40" vegetable beds and given approximately 275 ml of a 9-45-15 starter fertilizer. Heads were harvested as they matured. In the second experiment "Olympus" was conditioned similarly with 50, 150 or 450 mg liter^{-1}, respectively. On October 29, transplants were manually set as for Snow Crown; there was one harvest.

RESULTS

"Snow Crown" transplant fresh weight, leaf area, percent dead leaves and stem diameter increased linearly in response to the main effects of increasing N (Table 1). Fresh weight, leaf area and stem diameter also increased linearly in response to P. There was a slight decrease in days after transplanting (DAT) to harvest in response to main effects of N and P TNC regimes, but N and P interacted inversely on head weight.

In the second experiment, "Olympus" stem diameters increased linearly in response to glasshouse TNC regimes but showed no response to field N levels (Table 2). The percent of heads cut at first harvest showed a linear increase in response to increasing field N from 100 lb/A to 400 lb/A. In addition, the percent heads harvested also increased linearly in response to increasing glasshouse TNC from 50 to 450 mg liter^{-1} within the lower three field-N levels. There were similar head diameter and weight responses to glasshouse TNC regimes, but only at the 100 and 200 lb/A field-N levels.

The unusually warm fall resulted in devernalization of the early cauliflower in the first experiment. Consequently, the strong transplant responses early to TNC were lost over the very long growing season, as reflected in harvest DAT. TNC was beneficial for winter cauliflower production with increased head weight and percentage of heads cut on first harvest.

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

Nutrient	Conc. (mg/l)	Fresh wt. (g)	Leaf area (cm^2)	Dead leaves (%)	Stem d. (mm) 2 DAT	30	Harvest DAT	Head wt. (g)
N	50	0.62	12	11.8	2.1	6.9	121	694
	150	1.22	26	19.6	2.6	7.2	120	693
	450	2.44	48	31.5	3.2	7.9	118	720
P	11	1.05	24	19.5	2.4	7.1	120	723
	22	1.37	28	22.3	2.6	7.3	119	697
	98	1.53	34	21.1	2.8	7.5	119	688
K	50	1.27	28	21.0	2.6	7.3	121	693
	150	1.36	29	21.0	2.6	7.3	118	712

Table 2. Influence of transplant nutrient conditioning and field N on 'Olympus' cauliflower stem diameter, maturity and yield. (Seeded 10/1/87, transplanted 10/29/87, harvested 2/9/88).

Field (lb./A) N	G.H.[z] (mg/l) (NH_4NO_3)	Stem d. 19 DAT[y] (mm)	(mm) 63	First Harvest (%)	Yield head d. (cm)	Yield head wt. (g)
100	50	3.4	9.6	64.7	14.6	448
	150	3.8	9.7	71.3	14.6	568
	450	4.0	10.0	86.0	15.6	563
200	50	3.4	9.9	75.2	15.1	530
	150	4.0	10.0	81.1	15.9	580
	450	3.7	10.1	85.7	16.3	637
300	50	3.5	9.2	79.2	15.6	560
	150	3.7	9.7	83.8	15.8	559
	450	3.9	10.9	93.8	15.7	587
400	50	3.2	9.9	92.5	15.5	554
	150	3.7	10.0	97.4	16.0	631
	450	4.1	10.6	94.8	16.7	632

[z]G.H., Glasshouse, 6 applications of approximately 5 ml each.

[y]DAT, Day After Transplanting