Effect of transplant cell size and Hydretain on yield and quality of two processing tomato cultivars - 1999

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South-East New Brunswick has been producing tomatoes commercially since 1995. This region is considered to be situated at the northern limit for tomato production. Successful tomato production in this area depends on a number of factors such as carefully chosen sites that have more frost-free days, fertile and well-drained soils, early cultivars, good hardy transplants and appropriate management techniques. The primary objective of this trial is to determine the effect of transplant cell size on yield and maturity. The second objective was to evaluate the effect of Hydretain, a plant aid to water retention and water uptake.

This experiment had three factors: transplant cell size, with and without Hydretain and cultivars. The transplant cell sizes used in the experiment were the Blackmore 200 Square Flat cells (11.0 cc), the Blackmore 128 Deep cells (22.7 cc) and the Plastomer ST200 cells (32.8 cc). Hydretain treatments consisted of drenching the seeding trays in a solution of Hydretain (19.5 ml/L) containing a 10-52-10 soluble starter fertilizer solution of 300 ppm. The no Hydretain treatments were only drenched with the soluble starter fertilizer solution. The two cultivars used in this trial were CC329 from Nabisco and TS45 from Tomato Solutions. The experimental design was a completely randomized block design with a 3 x 2 x 2 factorial with four replications. An experimental plot consisted of 5.5 m long double rows with a spacing of 35 cm between double rows and 1.8 metres between rows.

The tomatoes were seeded in the greenhouse on March 29 in the Blackmore 128 Deep cells and in Plastomer 200 seeding trays. The Blackmore 200 cells were seeded on April 6. The larger cells were seeded earlier in order to get larger and older transplants, thence getting the maximum advantage of them. The growing medium used for all treatments was Fafard Growing Mix #2. In 1999, we tried to produce shorter and more robust transplants. We did this by maintaining temperatures as cool as possible after germination and fertilizing twice a week with soluble fertilizers rich in nitrogen and potassium and low in phosphorus. In the greenhouse, we tried to maintain daytime temperatures of 13-16°C and nighttime temperatures of 10-13°C.; however, during warm and sunny days our control systems could not maintain these cool conditions. On May 21 the transplants were put in an unheated coldframe in order to harden them before planting. On transplanting day, the seeding trays were drenched in a solution of Hydretain (19.5 ml/L) containing a 10-52-10 soluble starter fertilizer solution of 300 ppm. The trays were put in the solution until they were completely soaked. The no Hydretain treatments were only drenched with the soluble starter fertilizer solution. They were transplanted in the field on May 27.

All plots were fertilized with N, P_2O_5, K_2O at a rate of 70-50-160 kg/ha before transplantation. Magnesium was also applied with the fertilizer. Plants received 500 ppm 10-52-10 soluble fertilizer on May 31. Weeds were controlled by an application of Sencor 75DF herbicide at a rate of 0.32 kg/ha followed by mechanical cultivation and hand weeding. No insecticide sprays were needed to control Colorado Potato Beetles this year however one spray of Dylox 420L at a rate of 2.75 L/ha was applied to control cutworms. Regular fungicides were used to control diseases in the field. Three sprays of Bravo 500F at a rate of 2.4 L/ha were applied from July 22 to August 11 . The entire field was sprayed with Ethrel when all the cultivars had 10 % of their fruits either red or breakers. The purpose of this growth regulator is to hasten the ripening of the fruits. The Ethrel treatment was applied at a rate of 3.75 L/ha on August 20.

Tomato plots received supplementary irrigation on June 11, 16, 21 and 26 and on July 6 and 23. About one inch of water was applied using an overhead reel system.

Harvesting was done from August 31 to September 9. Each plot had 30 plants, of which the 22 middle plants were harvested.

Yield data from this trial are presented in Table 1. There was a significantly higher marketable yield and a higher percentage of marketable fruit with the cultivar CC329 compared to TS45.

The Hydretain treatment had a significantly higher percentage of marketable fruit with 91.3% compared to 81.3%. The interaction cultivar*hyd was also significant. The cultivar TS45 had a much greater response to Hydretain than CC329 in the yield and percentage of marketable fruit.

The larger cell sizes had a significantly less percent marketable fruit than the 200 B cell, however there were no significant differences in yield.

Plant size data taken on June 29 are presented in Table 2. Five plants from each plot were measured. CC329 plants were significantly taller and wider than TS45. Hydretain had no effect on plant size. Cell size was quite important. Larger cell sizes had bigger transplants.

In order to evaluate crop maturity, a count of the number of red and breaker fruit was taken from a representative plant from each plot. The counts were taken on August 16 and 26. The results are also summarized in Table 2. TS45 had significantly more mature fruit on August 16 than CC329. The larger cell sizes had more mature fruit at the first sampling date than the smaller cell size. Hydretain had no measurable effect on maturity.

Table 1. Effect of various treatments on yield of processing tomatoes.
Tableau 1. Effets de divers traitements sur le rendement des tomates de transformation

Treatment Traitement	T/ha				% Marketable % Vendable
	Red / Rouge	Breakers / orange	Green / vert	Marketable / vendable	
Cultivar					
CC329	27.4	61.2	1.3	88.6	89.6
TS45	26.5	33.3	1.9	59.8	83.5
	n.s	sig.	sig.	sig.	sig.
Hydretain					
Hydretain	29.2	47.7	2.2	76.9	91.3
No Hydretain	24.7	46.8	1.0	71.5	81.8
	n.s.	n.s.	n.s.	n.s.	sig.
Cell / Cellule					
128 B	26.5	43.9	1.4	70.4	83.4
200 B	28.0	48.8	2.5	76.9	90.5
200 P	26.3	49.0	0.9	75.3	85.8
	n.s.	n.s.	n.s.	n.s.	sig.
Cultivar * Hydretain					
CC329 H	32.6	55.5	1.0	88.1	88.8
CC329 No H	22.1	66.9	1.7	89.0	90.5
TS45 H	25.7	40.0	3.5	65.7	93.8
TS45 No H	27.4	26.6	0.3	53.9	73.2
	n.s.	sig.	sig.	sig.	sig.
Cultivar * Cell					
CC329 128 B	31.0	56.6	1.1	87.6	87.6
CC329 200 B	28.5	62.6	2.3	91.1	94.6

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Table 1. Effect of various treatments on yield of processing tomatoes.
Tableau 1. Effets de divers traitements sur le rendement des tomates de transformation

Treatment Traitement	T/ha				% Marketable % Vendable
	Red / Rouge	Breakers / oranges	Green / vert	Marketable / vendable	
CC329 200 P	22.5	64.4	0.6	86.9	86.7
TS45 128 B	21.9	31.2	1.7	53.2	79.2
TS45 200 B	27.6	35.1	2.8	62.6	86.4
TS45 200 P	30.0	33.6	1.2	63.6	84.9
	n.s.	n.s.	n.s.	n.s.	sig.
Hyd * Cell					
H 128 B	34.7	42.3	2.4	76.9	90.0
H 200 B	29.4	48.8	2.7	78.2	93.8
H 200 P	23.4	52.1	1.6	75.5	89.6
No H 128 B	18.3	45.6	0.4	63.9	76.3
No H 200 B	26.7	48.9	2.3	75.5	87.3
No H 200 P	29.2	45.8	0.3	75.1	81.9
	n.s.	n.s.	n.s.	n.s.	sig.

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Table 2. Effect of various treatments on plant size and maturity of processing tomatoes.
Tableau 2. Effets des divers traitements sur les tailles des plantes et sur la maturité des tomates de transformation.

Treatment Traitement	Plant height on June 29 / Hauteur des plants le 29 juin	Plant spread on June 29 Longeur des plants le 29 juin	% of red + breaker on Aug. 16 % de fruits rouges et oranges le 16 août	% of red + breaker on Aug. 26 % de fruits rouges et oranges le 26 août
CC329 200 B	33.6	49.2	14.8	49.0
CC329 200 P	36.8	53.6	16.5	47.3
TS45 128 B	30.1	42.9	21.2	55.4
TS45 200 B	28.4	40.4	16.0	50.0
TS45 200 P	34.2	48.2	23.9	54.7
	n.s.	n.s.	n.s.	n.s.
Hyd * Cell				
H 128 B	32.5	47.6	20.0	54.5
H 200 B	30.2	45.7	13.8	44.1
H 200 P	34.2	51.0	21.8	48.7
No Hyd. 128 B	31.3	47.4	18.5	52.6
No Hyd. 200 B	31.8	44.0	17.1	54.8
No Hyd. 200 P	36.9	50.9	18.6	53.2
	n.s.	n.s.	n.s.	n.s.