

California Tomato Research Institute – Final Report 2004

Project Title: Transplant Density in the Control of Curly Top Virus

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Objectives:

- 1) Evaluate transplant density in relation to incidence of curly top virus.
- 2) Evaluate the effect of plant density on yield performance of two varieties. The idea is to compare a smaller “vine” variety to a larger “vine” variety.

Summary:

When curly top virus occurs on the west side of the San Joaquin Valley the amount of damage to tomatoes appears to be more extensive in transplant fields compared to direct seeded fields. Growers have been switching to transplants for a number of reasons and in the process the total number of plants per acre has been reduced. Fewer plants per area may create conditions favorable for the beet leafhopper, *Circulifer tenellus*, the vector of the virus, since it is believed that dense stands of tomatoes discourages visitation by leafhoppers.

A field trial was initiated to investigate in-row spacing (15 vs. 30 inches), number of plants per transplant plug (1, 2, or 3), on a medium vine size variety (Halley 3155) and a large vine size variety (AB2) in efforts to minimize effect of curly top virus. Disease incidence in this trial was too low to affect the results. Yield results indicate that these two varieties responded similarly to increasing plant density. In general a 15-inch spacing with 2 or 3 plants per plug yielded significantly more than 1 plant per plug regardless of variety. A 30-inch plant spacing with only 1 plant per plug yielded the least.

Procedures:

A transplant density experiment was established on May 21, 2004 in a commercial field of processing tomatoes grown in the Five Points - Huron area in the San Joaquin Valley. Though early incidence of curly top virus appeared low throughout the Westside of the SJV, the trial was initiated to determine yield differences of plantings of various densities.

Two varieties Halley 3155 (medium vine size) and AB2 (large vine size) were seeded at 1, 2, and 3 seeds per transplant plug and grown in a commercial greenhouse until they were hand transplanted in the field at a 15” and 30” spacing. Individual plot size was one 60-inch bed wide x 100’ row length. The field was grown under sprinkler and furrow irrigation and was machine harvested on October 7, 2004. Fruit samples from the mechanical harvester were hand-sorted for defects. The incidence of curly top virus was too low in the field to have an effect on yield. Results are a reflection of plant density and variety differences.

Results:

In general yields were low for Fresno County, perhaps reflecting the late planting and fruit set problems associated with heat. Yields ranged from 30.7 to 17.4 tons per acre. Variety, in-row spacing, and the number of plants per transplant plug each had an effect on yield (Table 1 and Figure 1).

Variety: Over all density treatments Halley 3155 (a medium size vine) averaged 2.3 more tons per acre than AB2 (a large size vine). This proved statistically significant, although the tonnage difference between varieties at the density treatments was small. At a 15" plant spacing across all plug densities Halley averaged 28.3 and AB2 averaged 26.6 tons per acre. At a 30" plant spacing across all plug densities Halley averaged 24.7 and AB2 averaged 21.7 tons/acre.

	Tons/Acre		
	Halley	AB2	Average
15" spacing	28.3	26.6	27.4 a
30" spacing	24.7	21.7	23.2 b
Average	26.5	24.2	25.3
LSD .05			1.8

Halley also yielded higher than AB2 at the different plug densities and across the in-row plant spacing as illustrated below.

	Tons/Acre		
	Halley	AB2	Average
1 plant/plug	22.5	20.9	21.7 b
2 plants/plug	28.6	25.2	26.9 a
3 plants/plug	28.3	26.4	27.4 a
Avg. (LSD = 1.8)	26.5 a	24.2 b	25.3
LSD .05			2.2

In-row spacing: The closer in-row spacing of 15 inches brought higher yields than a 30-inch in row spacing across plug density and within and between varieties.

Number of plants per transplant plug: When both in-row spacings were averaged, 2 and 3 plants per plug brought higher yields than one plant per plug, however there was no yield advantage with three plants over two plants per plug. This held true in Halley and AB2.

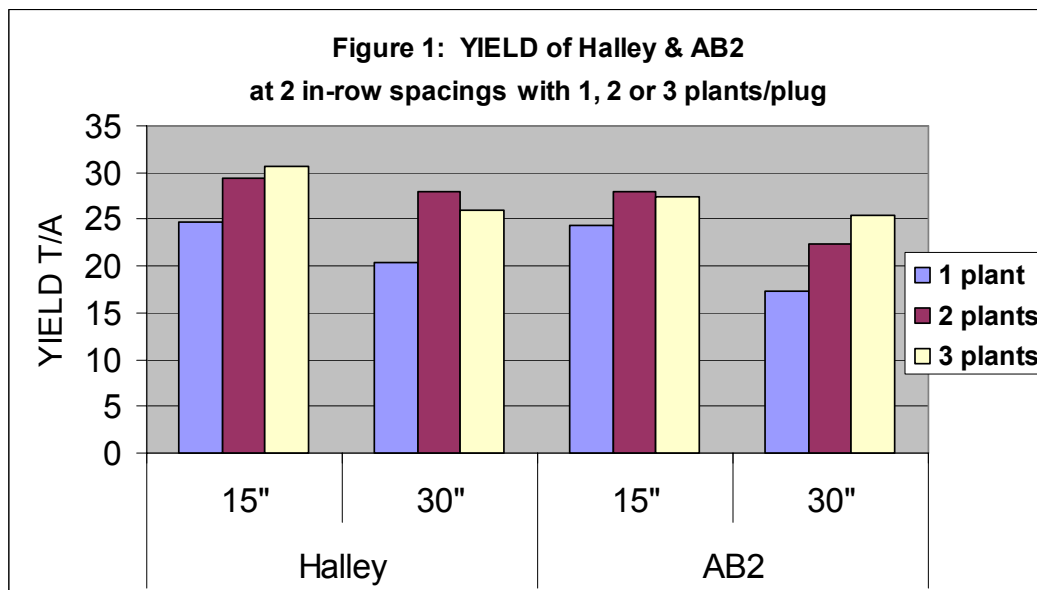
In this trial a 15-inch in-row plant spacing with either 2 or 3 plants per plug yielded the most fruit. A 30-inch plant spacing with 3 plants per plug yielded about the same as a 15 inch spacing with 2 plants per plug. A 30-inch spacing with only 1 plant per plug yielded the least regardless of variety. Although the variety with medium vine size, Halley 3155, yielded more than AB2, the variety with larger vine size, the yield differences were small and the varieties performed consistently across the density treatments.

Table 1. Effect of variety, in-row spacing, and plant number in transplant plug on yield of processing tomatoes, Fresno 2004.

Variety	In-row Spacing	Plants in Plug	Yield T/A	Percent				lbs per 50 fruit
				red	green	sunburn	rot	
Halley	15"	3	30.7 a	75 ab	5 ab	4 d	17 abc	7.6 a
Halley	15"	2	29.4 ab	75 ab	5 ab	6 bcd	13 abcd	8.5 a
AB2	15"	2	28.0 abc	82 ab	4 ab	6 bcd	8 d	8.5 a
Halley	30"	2	27.9 abc	73 ab	3 b	8 abc	15 abcd	8.0 a
AB2	15"	3	27.4 abc	76 ab	7 ab	5 cd	13 bcd	8.5 a
Halley	30"	3	26.0 bcd	69 b	4 ab	8 abc	19 ab	7.8 a
AB2	30"	3	25.4 bcd	76 ab	5 ab	9 ab	11 bcd	7.2 a
Halley	15"	1	24.8 cd	70 b	2 b	6 bcd	22 a	7.6 a
AB2	15"	1	24.4 cde	79 ab	3 b	8 abc	10 cd	7.1 a
AB2	30"	2	22.3 de	71 b	3 b	9 ab	17 abc	7.3 a
Halley	30"	1	20.3 ef	73 ab	4 ab	7 abcd	15 abcd	7.7 a
AB2	30"	1	17.4 f	71 b	4 ab	10 a	14 abcd	7.5 a
	LSD 0.05		4.3	11	3	4	9	ns
	CV %		11.9	10	51	37	42	14.7
Halley	average		26.5 a	73	4	6	17	7.9
AB2	average		24.2 b	76	4	8	12	7.7
	LSD 0.05		1.8					

^{ns} no significant difference

Results followed by same letter are not significantly different from each other.



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