PRECISION PLANTING FOR CANNERY TOMATOES

TRIALS WERE CONDUCTED at two sites to compare three types of precision planting techniques. One trial was at the Giffen Ranch and the other at the Vista Del Llano (VDL) Farms in Fresno County. Seeds were planted to grow as clumps, as single plants, and in the established pattern of plants thinned to clumps and singles. The Stanhay, a compact belt-type planter; a vacuum planter developed by the University of California; and a scatter-type planter (Planet Jr.) were used.

Tomato seed used for all treatments was from the same seed lot with a 90% guaranteed germination rate. Three different types of seed preparations were used: raw seed, minimum-coated seed (1 lb seed to 4 lbs of coating), and full-coated seed (1 lb seed to 19 lbs coating). All treatments were replicated four times. Plot size was a single 5-ft bed, 340 ft long, with two rows 12 inches apart on each bed. The tomato variety was VF 145–21–4.

Bed mulching

The Giffen Ranch beds were mulched with a 4-inch-wide band of coke over the seed row, and furrow-irrigated. Those at the VDL ranch were treated with a 4-inch band of asphalt mulch and sprinkler-irrigated. Both trials were first irrigated the last week of February.

After complete plant emergence, a 10-ft-long paper tape was randomly placed in each treatment giving a total of 160 ft of row marked as to the exact number and location of the plants. These tapes were taken to the lab and the information on plant population, skips, spacing, etc. was taken from them. No actual plant counts were made at, or after, thinning. Four treatments (in table 1, with asterisks) were hand thinned with a hoe. Yields were taken at the Giffen ranch by a mechanical tomato harvester. The ripe fruit from each plot was weighed separately on a public scale for yields. Six days prior to harvest, a sample from each plot was harvested to determine maturity. No yield data was obtained at the VDL ranch because of pilfering ("finger blight") of the fruit prior to harvest.

Coated treatments

Both minimum- and full-coated treatments planted in 10-inch clumps and the 12-inch minimum-coated treatments gave significantly better yields than any of the single plant treatments. These data indicate that higher yields generally can be expected from multiple plants than from single plants. There was no significant difference between clump spacing thinned to from 10 inches up to 15 inches; but again, the 10-inch spacing was generally better than the wider spacings. There was no significant difference in yield between four seeds placed in a tight clump, or four seeds placed 1 inch apart in a clump (table 1). There was also no significant difference between treatments in percentage of maturity.

Clumping

The placement of four seeds in a clump practically eliminated skips with an average of one complete skip per 20 ft of row, or 3%. Even where approximately six seeds were dropped, skips remained about the same. Where seeds were dropped singly, 3 inches apart, the incidence of skips was much higher (38%) but the percentage of skips over 15 inches was below 5%. Where single seeds were dropped 5 inches apart, the incidence of skips over 15 inches increased to 14%. Observations of treatments at harvest time show few noticeable skips in foliage (table 2). The actual spacing between drops fluctuated several inches from the average. Approximately 60% of the seeds emerged in all treatments. It would appear from the data that there was little consistent difference in percentage of emergence between clumped or single seeds.

Clumps where four seeds were dropped averaged a little over two plants per drop. Approximately 15% of the clumps were singles, 29% doubles, 28% triples and

Minimum-coated seed planted at four seeds per drop and four plants showing (clumps).

Full-coated seed planted at four seeds per drop, 1 inch apart, four plants (clumps).

Raw seed planted at six to nine seeds per drop, six plants showing (clumped).

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A saving in both seeding and thinning costs can be obtained from precision planting of tomatoes to be harvested for canning. To make precision planting effective, other cultural practices also must be more precise — including a sufficient amount of surface moisture (to minimize crusting) and an absence of weeds.

TABLE 1. RESULTS FROM PRECISION PLANTING TRIAL

Seed treatment	Seeds/drop	Test No.	Skips per 10 ft of row	Data before thinning: Av. spacing before thinning	Data before thinning: Total plants per 160 ft	Plants per ft	Data after thinning: Approx. spacing after thinning	Data after thinning: Yield tons/acre	Percent ripe fruit
Minimum coat	4/clump	1	.6	10.1	517	3.2	10" C	31.9	81
		2	1.3	9.6	496	3.2			
Full coat	4–1" apart	1	.1	10.6	506	3.2	10" C	31.1	81
		2	.5	9.8	537	3.4			
Minimum coat*	4/clump	1	.8	12.5	535	3.4	13" C	31.1	72
		2	.9	13.0	396	2.5			
Untreated	1½ lb/A	1			947	5.9	10" C*	30.2	73
		2			959	6.0			
Minimum coat	4/clump	1	.3	14.9	322	2.1	15" C	30.0	79
		2	.8	14.2	302	1.9			
Untreated	6–9/clump	1	.6	13.4	659	4.1	13" C	29.3	74
		2	.5	12.8	607	3.8			
Full coat	4–1" apart	1	.2	13.5	414	2.6	13" C	29.2	72
		2	.1	12.7	395	2.5			
Full coat	1 single	1	11.3	3.1	388	2.4	9" S*	27.1	73
		2	14.3	2.9	486	3.0			
Untreated*	.8 lb/A	1			483	3.0	12" S*	26.6	70
Untreated*	1 single	1	10.9	4.6	330	2.1	5" S	24.8	70
		2	22.4	4.8	193	1.2			
Untreated*	1 single	1	23.3	2.9	390	2.4	6–12" S*	23.3	74
		2	24.6	3.0	293	1.8			
							LSD 5%	3.1	NS

Note: All figures are averages of four replications.
C = clump S = single plants LSD = Least significant difference Test 1 = Giffen Ranch
* = thinned with a hoe NS = Not significant Test 2 = VDL Farms
(No yield data for VDL Farms because of pilfering.)

20% quadruples. Where six to nine raw seeds were dropped at planting time, an average of slightly over four plants per clump emerged. This did not significantly decrease yields, even though 10% of the clumps had eight to nine plants per clump. The raw-seeded clumps had a much wider range of emerged plants per drop than any of the coated seed treatments. The percentage of plants per clump was fairly constant in clumps of up to seven plants. There was no way to determine what effect germination or plant emergence of from 80% to 90% might have had on yields (table 2).

The data would indicate that both raw and coated seed can be clump-planted. The Stanhay planter was more precise when dropping four coated seeds than when dropping six to nine raw seeds. For clump planting, this study did not determine the degree of precision required, nor the upper limit of number of plants per clump. The belts used had been punched to deliver four raw seeds per drop with a different lot of seed. The seed used in this trial was apparently smaller and resulted in approximately ⅓ more seeds per drop.

Metering devices

It would seem from this experience that belts or metering devices for raw seed or minimum-coated seed must be tailored to each lot of seed. Matching seed to the metering device will be more critical with raw seed. Coated seed, due to its larger size, has more flexibility.

The data indicate that with modern planters and good weed control tomatoes can be planted to a stand. This would reduce costs for seed and for hand labor. Successful precision planting will necessitate more precision in cultural operations, and it is suggested that interested farmers plant a small acreage the first year to see if it fits their farming program.

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TABLE 2. TOMATO PLANT DISTRIBUTION

Seed treatment		Seed/drop	Test no.	Number plants per drop: 1	2	3	4	5	6	7	8	9	Spacing Between Clumps, Inches: 0–5"	6–10"	11–15"	16–20"	21–25"	26–30
				(% in each group)									(% of clumps in each group)					
Minimum coat	10"	4/clump	1	16	23	29	24	9	1	–	–	–	–	27	68	2	2	1
			2	16	33	24	22	5	–	–	–	–	–	75	16	9	–	–
Full coat	10"	4–1" apart	1	13	28	28	27	4	–	–	–	–	1	16	81	2	–	–
			2	16	32	25	21	4	2	–	–	–	1	70	26	3	–	–
Minimum coat	13"	4/clump	1	16	25	29	19	9	2	5	–	–	–	–	81	12	6	1
			2	12	27	29	13	16	2	–	–	–	–	–	92	–	4	4
Full coat	13"	4–1" apart	1	12	29	27	20	12	–	–	–	–	–	–	70	27	1	2
			2	21	28	34	12	5	1	–	–	–	1	9	85	3	1	1
Raw seed	13"	6–9 clump	1	10	9	12	12	18	20	9	4	5		6	59	29	–	6
			2	15	13	15	13	21	10	11	2	1	2	10	77	6	5	–
Minimum coat	15"	4/clump	1	16	31	29	19	4	1	–	–	–	–	–	32	65	3	–
			2	22	33	30	10	5	–	–	–	–	1	3	92	3	1	–
Full coat	3"	1 single	1	82	14	3	–	–	–	–	–	–	62	32	4	2	–	–
			2	76	24	–	–	–	–	–	–	–	81	11	5	3	–	–
Raw seed	3"	1 single	1	88	12	–	–	–	–	–	–	–	51	33	15	1	–	–
			2	81	19	–	–	–	–	–	–	–	51	31	11	4	2	1
Raw seed	5"	1 single	1	87	13	–	–	–	–	–	–	–	26	44	17	6	5	2
			2	85	15	–	–	–	–	–	–	–	38	36	11	9	5	1

NOTE: Figures were taken from a total of 160 ft. of a single row randomly chosen from four replications.