

# Effect of Salinity on Yield of Two Varieties of Tomatoes

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## ABSTRACT

*Two varieties of tomatoes were grown with two water qualities and three N rates at Safford in 1987. Results indicate that adapted varieties may be suitable for commercial production in the upper Gila Valley.*

## INTRODUCTION

Growers in Arizona continue to explore possibilities of producing new crops and expanding areas where conventional crops are produced. In many parts of the country, tomatoes are used as a cash crop that supplements income and complements farmers' resources. Tomatoes have not been utilized significantly in the field in Arizona due to problems with diseases, high temperatures and poorly adapted varieties. During the 1986, season at Safford two varieties (Columbia and Pearson Improved) produced relatively well under heavy soil conditions, high temperatures, moderate salinity and sodium, and the presence of certain diseases. This study was undertaken to determine the influence of salinity on the yield of these two varieties of tomatoes grown in the field.

## MATERIALS AND METHODS

Tomato seeds were sown in flats containing sand in the greenhouse on 14 January. After sufficient growth was made, the plants were individually transplanted to plastic cups with drainage holes and a vermiculite-sand mixture on 2 February. Nutrient solutions were added to the flats and cups as needed, and the plants were near flowering when transplanted to the field on 15 April.

The experiment was carried out at the Safford Agricultural Center on Grabe clay loam soil. There were 10 plants per subplot, with plants 1.67 feet apart in the row. Superphosphate was banded into the row before transplanting at a rate of 90 lbs P<sub>2</sub>O<sub>5</sub>/acre. Row width was 3.3 feet. Two sources of water were applied by furrow irrigation: river water (EC 0.7 dS/m) and well water (2.5 dS/m). Varieties (Columbia and Pearson Improved) and Nitrogen rates (0, 75 and 150 lbs/ acre) were replicated four times in a randomized complete block design for each water treatment. All of the N was applied to the 75 lb rate, and one half was applied to the 150 lb rate on 7 May and the remaining N was applied on 7 June.

Ripe fruit were harvested weekly during the season and weighed from each subplot. Results are reported in pounds per plant (Table 1) since some plants were lost to disease. The number of plants which survived until the heavy rains were recorded and shown in Table 1. Soil, petiole and whole plant samples were collected on a regular basis but analytical results analyses have not yet been tabulated.

## RESULTS

The first harvest was on 2 July; weekly harvests were made for five weeks when heavy rains caused a severe loss of fruit. A final harvest was made on 23 August. Columbia produced the first ripe fruit; the peak yield was at the third harvest. The variety Pearson peaked at the fifth harvest date. The higher salinity water generally produced lower yields than the river water irrigation did, although there seemed to be earlier fruit production by the Pearson when grown with the saltier water. Generally the Columbia produced more than the Pearson, but this could be due to a greater fruit loss by the Pearson later during the rainy season. No attempt was made to estimate fruit losses. Nitrogen at the 75 lb rate appeared to produce the best yields for the lower salt water treatment; yields for the higher salt water were more variable. Overall yields for the lower salt water averaged about 1.25 lbs more fruit per plant than the higher salt water-treated plants did.

Commercially acceptable fresh market yields were approached with both varieties and waters. Overall Columbia produced about 33 tons per acre, and Pearson produced about 23 tons. If the plants had been pruned and staked, fruit loss would have been reduced. While the quality was generally acceptable for fresh market production, it would also have been improved by pruning and staking.

**Table 1.** Means of yields of Columbia and Pearson tomatoes in pounds per plant and number of plants per plot which survived until the rainy season, as affected by irrigation water quality and N fertilizer rate.

Variety	N Rate*	River Water		Well Water	
		Yield	No. Plants	Yield	No. Plants
Columbia	0	8.12	9.75	7.35	9.25
Columbia	75	9.61	9.50	7.55	9.50
Columbia	150	8.94	9.25	9.22	9.50
Pearson	0	6.97	9.00	6.07	7.25
Pearson	75	8.21	8.25	6.14	8.50
Pearson	150	6.71	9.00	5.77	8.25
Overall Means		Yield	No. Plants		
Columbia with River Water		8.89	9.50		
Pearson with River Water		7.60	8.75		
River Water		8.24	9.13		
Columbia with Well Water		8.04	9.41		
Pearson with Well Water		5.99	8.00		
Well Water		7.02	8.71		