

Saltier irrigation

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A 50 percent increase in salinity of Colorado River water has been projected for the turn of the century—if nothing is done to slow the present rate of increase. In a three-year research project, University researchers from the Department of Land, Air and Water Resources; the Department of Agronomy and Range Science; and Cooperative Extension determined the detrimental agricultural effects of such an increase.

The objective of the project was to help evaluate the potential effects of extensive upstream Bureau of Reclamation desalinization projects upon downstream irrigation districts. Yields of 12 crops irrigated with water containing 877 mg/l and 1,350 mg/l dissolved solids (representing present and projected Colorado River water concentrations) were measured over a three-year period (see table). Snap beans, onions, and carrots showed the greatest yield reductions from the higher salinity; lettuce, broccoli, and sorghum showed no yield reduction.

Yields compared

The crops were grown on five acres at the Imperial Valley Field Station from 1973 to 1976; yields from irrigation with the two salinity levels were compared. Most of the reductions from higher salinity water shown in the table agreed with predictions in the literature based on small-plot data. This study confirmed the value of the small-plot predictions used by other research workers to evaluate large-scale field procedures, such as those used in this study.

Our data on downstream yield losses that could be expected from increased

water salinity justify expenditures for Colorado River desalinization projects. The consequent higher yields and lower cost of food will benefit consumers throughout the United States, but particularly in California. Other studies conducted by the University of California at Riverside have evaluated savings to be enjoyed by homeowners and manufacturers because of slower scaling in pipes and hot-water heaters that will result from the upstream projects.

Usefulness of data

Data obtained in this study also were helpful in answering questions about the use of 1,350 mg/l-salinity wastewater for irrigation in a city disposal project at Calipatria. Since some of the crops studied produced acceptable yields at 1,350 mg/l, the developers of the Calipatria proposal were able to proceed. In addition, users of the wastewater could expect to benefit from some of the nutrients that would otherwise pollute the receiving waters.

During this time, a proposal was introduced to use waters from the Palo Verde agricultural drain to cool the proposed Sun Desert Nuclear Power Plant. Data from this study were helpful in estimating the agricultural potential of the Palo Verde drain water and in evaluating the potential benefit from reduction of salinity at Imperial Dam if the drain water were diverted.

This study developed data for a specific objective and, in the process, provided additional information to other groups for purposes not foreseen when the project was initiated.

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Reductions in Yields of Crops from a Change in Irrigation Salinity from 877 mg/l to 1,350 mg/l, 1973 to 1976		
Crop	Predicted yield reduction* percent	Measured yield reduction percent
Snap bean	25.8	34.1
Onion		
Granex 33	12.3	11.8 to 16.0
Early Premium	12.3	6.8 to 8.4
Carrot	19.2	12.9 to 14.7
Cauliflower		12.1
Sugar beet	0	0 to 9.0
Cantaloupe	6.2	9.2
Cabbage	9.4	6.4
Wheat	0	2.7 to 6.8
Alfalfa	8.1	1.7 to 7.6
Broccoli	0.8	0
Lettuce	15.0	0
Sorghum	0	0

*Prediction based on previous small-plot data.



Wheat grown with both 877 mg/l and 1,350 mg/l irrigation water salinity showed slight yield reduction in the higher salinity.