Salts are a permanent constituent of soil. Once the salts have accumulated in a soil, there is no chemical treatment that will remove or counteract their adverse effects on plant growth. Special management practices become necessary in order to successfully grow plants on soils with high salt content. Some recommended practices are as follows:

Provide Adequate Drainage

Digging shallow ditches or trenches to remove surface runoff water will help to reduce salt content in soil and prevent further accumulation. The runoff water will carry away dissolved salts that would otherwise be deposited on the soil surface when the soil dries out.

Grow Salt Tolerant Plants

Plants differ widely in their tolerance of high salt content in soil. The growth of some plants may be seriously reduced when grown in high salt containing soil, while more salt tolerant plants such as beets or spinach may only be slightly affected. Table 1 shows the relative salt tolerance of some commonly grown vegetables.

Salt content of soil can be measured accurately in the laboratory. Table 1 gives the salt level in soil, measured in mmhos1, at which a 50 per cent reduction in plant growth occurs. For example, tomatoes would produce half as well in a soil having a 10 mmhos test as they would in a non-saline soil (less than 1 mmho). Similarly, cucumbers would do half as well in a soil having a test of 4 mmhos as in a non-saline soil.

The first and most common symptom of salt injury is a reduced rate of plant growth. A plant growing on saline soil is smaller than normal, may have darker leaves than normal and will wilt from drought sooner than it would in a non-saline soil. As salinity increases plant growth will cease. Leaf burn, commencing at the tip, will occur with ultimate death of the plant in highly saline soil.

Maintain Adequate Soil Moisture

Salts are most damaging to plants when the soil is dry. For this reason, any means of maintaining or replenishing soil moisture content will help to avoid salt damage to plants.

Table 1. Relative salt tolerance of vegetables*

High salt tolerance	Medium salt tolerance	Low salt tolerance
12 mmhos	10 mmhos	4 mmhos
beet	tomato	radish
kale	broccoli	celery
asparagus	cabbage	bean
spinach	pepper	
	cauliflower	
	lettuce	
	corn	
	potato	
	muskmelon	
	carrot	
	onion	

	pea	
	squash	
	cucumber	
10 mmhos	**4 mmhos**	**3 mmhos**

*** Relative salt tolerance decreases down each column, e.g., tomato is more salt tolerant than cucumber.**

Halophyte Database http://www.ussl.ars.usda.gov/pls/caliche/Halophyte.query

Reuse of saline-sodic drainage water for irrigation in California: evaluation of potential forages

GRATTAN Stephen (1), GRIEVE Catherine (2), POSS James (2), ROBINSON Peter (3), SUAREZ Donald (2) and BENES Sharon (4)
(1) Department of LAWR, University of California, Davis, CA 95616, USA
(2) USDA-ARS Salinity Laboratory, 450 W. Big Springs rd., Riverside, CA 92507, USA
(3) Department of Animal Science, University of California, Davis, CA 95616, USA
(4) Department of Plant Science, Calif. State Univ.-Fresno, Fresno, CA 93740, USA

Reuse of saline drainage water is a management option on the west side of California's San Joaquin Valley (SJV) that is necessary to reduce the volume of drainage water (San Joaquin Valley Drainage Implementation Program, 2000). There are a number of salt-tolerant forages that may play an important role in reducing drainage water volumes while producing a feed source for sheep and dairy cattle. Their suitability for sequential reuse systems, however, will depend upon their production potential under saline-sodic conditions and resulting forage quality.

A controlled study using an elaborate sand-tank system was conducted at the USDA-ARS Salinity Laboratory to evaluate a number of promising forage crops including Bermuda grass, 'Salado' and 'SW9720' alfalfa, 'Duncan' and 'Polo' paspalum, 'Big' and 'Narrow leaf' trefoil, Kikuyu grass, Jose tall wheatgrass, and Alkali sacaton. Forages were irrigated frequently with synthetic drainage waters dominated by sodium sulfate with an EC of either 15 or 25 dSm -1

.

Forages were cut periodically and biomass is presented as a function of cumulative thermal time. Shoot biomass is currently being analyzed for mineral content, trace elements, and forage quality parameters.

The forage species tested performed differently in terms of absolute biomass accumulation, biomass accumulation relative to salinity level and various forage quality parameters, which also varied from cutting to cutting. At 25 dSm

-1

Kikuyu grass produced the largest amount of biomass at 5,000 growing degree-days (°C-d), followed closely by alfalfa "SW 9720', Jose tall wheat grass, bermuda grass, alfalfa 'salado' and Narrow leaf trefoil. However Kikuyu's forage quality was among the lowest. Those forages that were of good to high quality were the two alfalfa varieties, Duncan paspalum, narrow leaf trefoil, bermuda grass, Jose tall wheat grass and polo paspalum. Comparing species is complex, particularly when trying to rank cultivars by their combined forage production and quality potentials. Therefore the final ranking is based on both quantitative and qualitative factors. Overall, alfalfa cultivars performed best under these controlled conditions. Narrow leaf trefoil and bermuda grass fall into the next class followed closely by Jose tall

wheatgrass. Under field conditions, other soil, climate and biological factors will interact to affect forages differently and this may affect the rankings based on this controlled study.

Saline Agriculture: Salt-Tolerant Plants for Developing Countries (1990)