Irrigation Water Quality Standards and

Salinity Management

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Effect of water evaporation on concentration of salts



Type of salinity problems

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Terms used in salinity

Total salinity

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EC	EC Electrical conductivity	
		µmhos/cm
		dS/m
TDS	Total dissolved solids	mg/l
Sodi	um hazard	ppm
SAR	Sodium Adsorption ratio	
ESP	Exchangeable sodium %	

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Water Quality in selected wells in Far West Texas Location EC SAR µmhos/cm

St. Lawrence4500-58006-7Pecos E.S.2330-26808-12Coyonosa2100-38104El Paso AD8003-6.5Paso-Hudspeth9004.2-11.6

Permissible limits for the irrigation water

Classes of water	ECµmhos/cm	TDS	
Excellent	250	ppm 175	
Good	250-750	175-525	
Permissible	750-2000	525-1400	
Doubtful	2000-3000	1400-2100	
Unsuitable	3000	2100	

Sodium hazard of the water

SAR values	Sodium haza	ard Comments
1-10	Low	Sensitive crops
10-18	Medium	Amendments and leaching
18-26	High	Unsuitable-continuous
>26	Very high	Unsuitable

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Classification salt affected soils



Salinity control

Leaching

Apply more water than the crop consume to push the salts below the root zone

at least.....

at some time during the year

High Water Table



Drain - ditches, pipe



Drain pipe manufacturing





Socks for drain pipe





Extraction tubes



Lining canals



Reduce seepage

30 in deep1 ft-w bottom\$100,000 mile

Sodicity control

Substitute Calcium for Sodium

And then leach the Sodium

Gypsum Calcium Nitrate Sulfur to solve calcium









Figure 2. The 20 minor aquifers of Texas account for 3.7 percent of all groundwater withdrawals.

Common constituents of irrigation water

Cations Anions Amonium Bicarbonate HCO₃ NH_{A} Calcium Carbonate Ca CO_3 Hidrogen Nitrate NO_3 Magnesium Mg Phosphate PO_{4} Sodium Sulfate Na SO Potasium K

Water Testing

Routine analysis \$20

Conductivity, pH, Na, Ca, Mg, K, CO₃, HCO₃, SO₄, Cl, B, Nitrate, Hardness and SAR R+ Metals \$30 Zn, Fe, Cu Mn, and P R+ Metals+ Heavy Metals \$50 As, Ba, Cd, Pb, Cr, and Flouride

Soil Testing

Routine analysis \$10

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pH, NO₃, P, K, Ca, Mg, Na, S, and Conductivity

R+ Micro-nutrients \$20

Z, Fe, Cu, Mn

R+ Detailed Salinity \$25

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Total Dissolved solids				
	Excellent	Poor	Limit	
Humans	0-800	2,500-4,000	5,000	
Cattle	0-1,000	4,000-6,000	10,000	



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Boron Chloride

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Sodium

Salt Tolerance



Forage corps Field crops Vegetables

Fruits



Irrigation water salinity tolerances-Forages

Crop	100%	90%	75%	50%	
Tall wheat grass	5.0	6.6	9.0	13.0	
Wheat grass	5.0	6.0	7.4	9.8	
Bermuda grass	4.0	5.7	7.2	9.8	
Barely hay	4.0	4.9	6.3	8.7	
More Yield			Less Yi	Less Yield	
Less Salinity			More Sa	alinity	

Soil salinity tolerances

Crop	100%	90%	75%	50%
Bermuda grass	6.9	8.5	10.8	14.7
Corn forage	1.8	3.2	5.2	8.6
Alfalfa	2.0	3.4	5.4	8.8
Cantaloupe	2.2	3.6	5.7	9.1

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Salt accumulation

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5000 acres of SDI per year in District 6





Drip spacing





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Overlapping is important- Uniformity

Foliar injury: cotton (resistant) Alfalfa (medium)

Center pivot more than 400 GPM



not included supply line and pump

Surface irrigation- Need to level the land



Size of the borders



Border irrigation



End

