

- Annual soil samples are taken for irrigated lands and assessed for total soluble salts and sodium absorption ratio and practices are adapted when required

Salinity and Sodicty

Salinisation is generally caused by poor water management such as inadequate drainage or over irrigation and/or non-uniform irrigation. Salts accumulate in the soil thereby affecting soil sustainability and crop production. Different types of salt-affected soil conditions (e.g. saline, sodic or saline-sodic soils), together with their management are discussed in SASRI Information Sheet 5.11.

Soils from irrigated lands should be sampled at 300mm intervals up to 900mm in depth and be assessed for total soluble salts measured by the electrical conductivity (EC) and sodium adsorption ratio (SAR). The threat of salinity and sodicity on sugarcane land, based on soil EC values and SAR, is given in the three tables below.

Categories and properties of saline and sodic soils:

Type	Electrical conductivity (mS/m)	SAR (ESP)	Dominant cation(s)	pH (water)	Effect on soil structure
Normal	< 400	< 6 (< 7)	None	< 8.5	None
Saline	> 400	< 6 (< 7)	Mainly Ca and Mg	< 8.5	None (osmotic interference of plant uptake of water)
Saline-sodic	> 400	> 6 (> 7)	Ca, Mg and Na	< 8.5	Early stages of dispersion
Sodic	< 400	> 6 (> 7)	Mainly Na	> 8.5	Severe dispersion and possible Na toxicity

Salinity hazard to sugarcane based on electrical conductivity (EC) value of the soil saturation extract:

Soil EC value (mS/m)	Salinity level	Effect on sugarcane growth
0-200	Non saline	None
200-400	Slightly saline	Slightly affected
400-600	Moderately saline	Severely affected
>600	Strongly saline	Very severely affected

		<p>Sodicity hazard to cane based on critical SAR values for various soil forms:</p> <table border="1" data-bbox="741 213 2123 703"> <thead> <tr> <th data-bbox="741 213 1200 268">Critical SAR 6 (Critical ESP 7)</th> <th data-bbox="1200 213 1659 268">Critical SAR 10 (Critical ESP 12)</th> <th data-bbox="1659 213 2123 268">Critical SAR 15 (Critical ESP 17)</th> </tr> </thead> <tbody> <tr> <td data-bbox="741 268 1200 384">Generally poorly drained, highly dispersed grey soils derived mainly from Dwyka tillite, Vryheid sediments and sandy alluvium.</td> <td data-bbox="1200 268 1659 384">Mainly slowly draining black swelling clays associated with dolerite Pietermaritzburg and Vryheid shales, Swazi basic rocks and heavy alluvium</td> <td data-bbox="1659 268 2123 384">Mainly well drained, non –dispersive soils associated with Recent Sands and other parent materials in upland positions.</td> </tr> <tr> <td data-bbox="741 384 1200 411">Estcourt</td> <td data-bbox="1200 384 1659 411">Arcadia</td> <td data-bbox="1659 384 2123 411">Champagne</td> </tr> <tr> <td data-bbox="741 411 1200 438">Glenrosa</td> <td data-bbox="1200 411 1659 438">Rensburg</td> <td data-bbox="1659 411 2123 438">Inanda</td> </tr> <tr> <td data-bbox="741 438 1200 466">Katspruit</td> <td data-bbox="1200 438 1659 466">Bonheim</td> <td data-bbox="1659 438 2123 466">Cartref</td> </tr> <tr> <td data-bbox="741 466 1200 493">Longlands</td> <td data-bbox="1200 466 1659 493">Mayo</td> <td data-bbox="1659 466 2123 493">Clovelly</td> </tr> <tr> <td data-bbox="741 493 1200 520">Mispah</td> <td data-bbox="1200 493 1659 520">Milkwood</td> <td data-bbox="1659 493 2123 520">Dundee</td> </tr> <tr> <td data-bbox="741 520 1200 547">Kroonstad</td> <td data-bbox="1200 520 1659 547">Tambankulu</td> <td data-bbox="1659 520 2123 547">Fernwood</td> </tr> <tr> <td data-bbox="741 547 1200 574">Swartland</td> <td data-bbox="1200 547 1659 574">Willowbrook</td> <td data-bbox="1659 547 2123 574">Griffin</td> </tr> <tr> <td data-bbox="741 574 1200 601">Valsrivier</td> <td data-bbox="1200 574 1659 601"></td> <td data-bbox="1659 574 2123 601">Hutton</td> </tr> <tr> <td data-bbox="741 601 1200 628">Wasbank</td> <td data-bbox="1200 601 1659 628"></td> <td data-bbox="1659 601 2123 628">Oakleaf</td> </tr> <tr> <td data-bbox="741 628 1200 655">Westleigh</td> <td data-bbox="1200 628 1659 655"></td> <td data-bbox="1659 628 2123 655">Shepstone</td> </tr> <tr> <td data-bbox="741 655 1200 683"></td> <td data-bbox="1200 655 1659 683"></td> <td data-bbox="1659 655 2123 683">Shortlands</td> </tr> </tbody> </table> <p data-bbox="741 735 2123 794">SASRI recommends that soils suitable for irrigation have an SAR less than 15 and EC less than 200 mS/m in the top 900mm of soil.</p> <p data-bbox="741 831 2123 890">Reclamation measures are discussed in SASRI Information Sheet 5.11 and include surface and subsurface drainage, leaching of salts by over-irrigation, and amelioration with gypsum and filtercake.</p>	Critical SAR 6 (Critical ESP 7)	Critical SAR 10 (Critical ESP 12)	Critical SAR 15 (Critical ESP 17)	Generally poorly drained, highly dispersed grey soils derived mainly from Dwyka tillite, Vryheid sediments and sandy alluvium.	Mainly slowly draining black swelling clays associated with dolerite Pietermaritzburg and Vryheid shales, Swazi basic rocks and heavy alluvium	Mainly well drained, non –dispersive soils associated with Recent Sands and other parent materials in upland positions.	Estcourt	Arcadia	Champagne	Glenrosa	Rensburg	Inanda	Katspruit	Bonheim	Cartref	Longlands	Mayo	Clovelly	Mispah	Milkwood	Dundee	Kroonstad	Tambankulu	Fernwood	Swartland	Willowbrook	Griffin	Valsrivier		Hutton	Wasbank		Oakleaf	Westleigh		Shepstone			Shortlands
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<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Legal requirement</p>	<p>Irrigation with wastewater</p> <ul data-bbox="241 1018 705 1294" style="list-style-type: none"> • Irrigation with wastewater is authorised • The conditions of that authorisation are complied with • Precautionary monitoring is executed according to the National Water Act, 36 of 1998 	<p>Irrigation with wastewater</p> <p data-bbox="772 1018 2094 1166">Irrigation with industrial wastewater or water from waterworks is regarded as a controlled activity (a water use in terms of sections 21(e) and 37(1) of the National Water Act, 36 of 1998) and is subject to authorisation by the Department of Water Affairs. Where the use falls within the scope of the General Authorisation (GN 399 of 26 March 2004, revised by GN 665 of 6 September 2013), then it must be registered. If not, then a water use licence is required.</p> <p data-bbox="772 1203 2038 1326">In terms of the General Authorisation, water samples should be taken monthly to monitor and control any detrimental impact on the environment of accumulated salts, nutrients and trace elements in the soil. Samples should be analysed in a laboratory accredited in terms of SANS 17025:2005, or one which participated in a recognized Proficiency Testing Scheme or which has proof of intra- and inter-laboratory proficiency.</p>																																							