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RESEARCH PAPER

Relative RSC tolerance of groundnut

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Abstract : A pot experiment was conducted during summer-2019 to evaluate four varieties of groundnut with four RSC level of irrigation water, A_0, A_1, A_2 and A_3 - 0, 2.5, 5.0 and 7.5 meq L^{-1}, respectively, at Department of Agricultural Chemistry and Soil Science. Junagadh Agricultural University, Junagadh. The pod yield of different varieties of groundnut significantly decreased with increasing in the RSC levels of irrigation water. Among the different varieties of groundnut, variety TPG-41 gave highest pod yield (8.41 g pot^{-1}) at RSC level of 0 meq L^{-1} of irrigation water. The variety TPG-41 recorded highest mean pod yield (7.82 g pot^{-1}), mean salinity index (92.96 %) minimum yield reduction (11.72) at high RSC levels (7.5 meq L^{-1}) and 50 % yield decline at 30.40 meq L^{-1}.

Key Words : RSC tolerance, Groundnut

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INTRODUCTION

In some parts of Gujarat, Rajasthan, Punjab, Haryana, Uttar Pradesh, Andhra Pradesh and Karnataka, the underground water available for irrigation has high sodicity (EC- variable, SAR> 10 and RSC> 4 meq L^{-1}). The sodic water containing residual sodium carbonate (RSC) more than 2.5 meq L^{-1} has been considered unsatisfactory for the irrigation.

In the Saurashtra region, groundnut is the major oilseed crop and the farmers use well and tubewell water for irrigating crop in this region. The groundwater in this area not only contain soluble salts like cations of sodium, calcium, magnesium and anions like chloride, sulphide and bicarbonate, but also contains salts like sodium carbonate, sodium bicarbonate, calcium carbonate, calcium bicarbonate etc. The quality of well and tube well water is becoming saline and sodic (alkali) day by day. The use of such sodic or alkali water is indispensable in these areas where no alternative facility for irrigation is available. These salts increases the alkalinity (RSC) of the water and makes it unfit for irrigation. This poorquality water decreases the productivity of soil and finally reduces the yield.

MATERIAL AND METHODS

A pot experiment was conducted with four levels of RSC of irrigation water (A_0, A_1, A_2 and A_3 at 0, 2.5, 5.0 and 7.5 meq L^{-1}, respectively) and four varieties (V_1- TG-37-A, V_2- TPG-41, V_3- GJG-31 and V_4- GG-6) of groundnut in factorial CRD with three replication at JAU, Junagadh. The RSC water of 0, 2.5, 5.0 and 7.5 meq L^{-1} were prepared by dissolving calculated quantities

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Table 1 : Interaction effect between variable RSC levels of irrigation water and groundnut varieties on pod yield (g pot^{-1})

	A0 (0 meq L^{-1})	A1 (2.5 meq L^{-1})	A2 (5.0 meq L^{-1})	A3 (7.5 meq L^{-1})	Mean
V1: TG-37-A	7.42	7.34	6.65	5.53	6.74
V2: TPG-41	8.41	8.02	8.01	7.43	7.89
V3: GJG-31	5.82	5.48	5.38	3.81	5.12
V4: GG-6	8.10	6.92	6.74	5.96	6.93
Mean	7.44	6.94	6.70	5.68	
S.E.+	0.21		C.D. (P=0.05)	0.61	

Table 2: Salt tolerance criteria of groundnut varieties based on yield

Variety	Mean seed yield (g pot^{-1})	Mean salinity index (%)	Reduction at RSC 7.5 (meq L^{-1}) over control	RSC for 50% yield decline	Regression equation (Y=a+bX)
V_1: TG-37-A	6.51	87.69	25.35	15.61	Y = 7.6924 + - 0.2551 X r^2 = - 0.8868**
V_2: TPG-41	7.82	92.96	11.72	30.40	Y = 8.7090 + - 0.1484 X r^2 = -0.6948**
V_3: GJG-31	4.89	84.11	34.44	12.25	Y = 6.6515 + - 0.3057 X r^2 = -0.8695**
V_4: GG-6	6.54	80.72	26.41	13.76	Y = 8.5818 + - 0.3300 X r^2 = -0.8491**

of salts of NaCl, Na_2SO_4, $CaCl_2.2H_2O$, $MgSO_4.7H_2O$ and $NaHCO_3$ in rain water collected and stored during monsoon keeping common EC 2.0 dS m^{-1} and SAR 10. The Cl: SO_4 and Mg: Ca ratios in these waters were kept as 1:1 and 2:1, respectively.

Relative salt tolerance criteria of groundnut varieties was computed by using the following formulae:

$$\text{Mean pod yield} = \frac{A1 + A2 + A3}{3}$$

$$\text{Mean salinity index} = \frac{\text{Mean pod yield} * 100}{(\text{Variety yield at 2.5 RSC levels})}$$

$$\text{Reduction at 7.5 (meq L}^{-1}\text{) over control} = 100 - \frac{\text{Variety yield at 7.5 RSC} * 100}{\text{Variety yield at 2.5 RSC}}$$

$$\text{RSC for 50\% yield decline} = Y = a + bX$$

Y = variety yield/ 2

$X = (a-Y)/b$

RESULTS AND DISCUSSION

The interaction effect between variable RSC levels of irrigation water and groundnut varieties of pod yield gave significantly the highest pod (8.02 g pot^{-1}) yield at control (0 meq L^{-1}) and it was minimum with GJG-31 at A3 (7.5 meq L^{-1}) RSC level (Table 1). In general the variety TPG-41 showed better performance at all RSC levels as compared to remaining varieties.

The result further showed that the variety TPG-41 recorded better performance with value of different RSC tolerance criteria, like highest value of mean salinity index (92.96 %) as well as mean seed yield (7.82 g pot^{-1}) and lowest value of yield decline (11.72 %) at RSC 7.5 meq L^{-1}as well as RSC for 50 per cent yield declined (30.40). Being the lower value of regression slop (b) for this variety, the yield of the variety is least sensitive to RSC levels as compared to remaining tested varieties. Similar result were also reported by polara *et al*. (2010) for chick pea.

Conclusion :

It is concluded that variety TPG-41 was found more RSC tolerant compared to TG-37-A, GG-6 ans GJG-31 on the basis of RSC indices.

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