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Yield of dill (*Anethum graveolens*) on saline black soils of different unirrigated farm sites of Bhal area in Gujarat*

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Salt has become a major agricultural threat to large areas of agricultural land world-wide. Substantial areas of earth's potentially productive lands are affected by salinity and alkalinity. The losses in soil productivity may also be accompanied by ecological obliteration and environmental degradation of the whole area. Salt-affected soils occur to a tune of 1.2 million ha in Gujarat, of which 0.9 million ha comprise the inland saline areas. In Bhal region, which covers parts of Ahmedabad, Bhavnagar, Bharuch and Kheda districts, the entire area is flat and natural slope is less than 0.1% with high water-table varying between 1 and 5 m. Soils in this region are very fine and their permeability is very low. Thus waterlogging conditions are quite familiar in the region. These factors are primarily responsible for limited agricultural potential of the region. The area received average rainfall of 650–700 mm which mostly occurs during July–September. Dill (*Anethum graveolens* L.), a seed spice crop, grows well on heavy-textured soils and also yields satisfactorily on saline black soils,having salinity up to 4–6 dS/m (Gururaja Rao *et al.* 2001). Singh and Bhargava (1995) and Nayak *et al.* (2001) reported that this species responded and yielded well when irrigated with saline water of 5 dS/m. As majority of the areas of this region do not have adequate irrigation, the lands, by and large remain fallow during winter(*rabi*) season. In the present study an attempt was made to grow dill on saline black soils of different farm sites of the Bhal region using residual moisture.

Three experimental sites, viz Farm site 1, Khanpur (Kalamsar watershed), Farm site 2, Warsada (Vejalka watershed) and Farm site 3, Bamangam (Pipaliya watershed), constituting a part of the project under the National Watershed Development Project were selected for the present study. These sites showed wide variation in soil salinity. Cropping pattern, landscape and climatic features of these sites are by and large uniform. Soil samples from 0–5, 15–30 and 30–60 cm depths were collected from these farm sites. The soils were ground, sieved and analysed for physical and chemical properties.The N, P (Olsen P) and K contents of the upper 0–15 cm layer of the 3 sites are in the range of 135–140 mg/kg, 6.5–7.0 mg/kg and 152–165 mg/kg respectively. The physical properties indicated that the soils of Warsada have high clay content (51–58%) and those at Khanpur and Bamangam had clay content varying from 40 to 44%. The bulk density of these soils, was in the range of 1.59–1.64 Mg/m^3 .The *p*H in the upper 0–15 layer of the soils was 7.5, 8.5 and 7.8 at Khanpur, Warsada and Bamangam respectively.

The selected sites were classified into different experimental units, depending on *in-situ* salinity, i.e 2–4 (S1), 4–6 (S_2), 6–8 (S_3) and 8–10 (S_4). Seeds of dill were sown in October last week and the crop was grown to maturity under residual moisture. Ten subsamples of soils and plants were taken from each salinity group, and the average yields of seed and straw (dry biomass) were calculated. A regression equation was developed by taking seed yield as dependent variable and soil salinity as independent variable. The analysis of variance was done by combining the data of seed yield and straw yield over the 3 farm sites with the help of randomized complete-block design. The experiment was conducted during 1996–98.

The *in-situ* salinity of the 3 farm sites significantly affected the growth and yield of dill. The higher seed yield of 0.4 tonne/ha and straw yield of 1.05 tonnes/ha (Table 1) were recorded at the farm site 2 (Warsada) at salinity level of 2–4 dS/m. Though the farm sites did not have any statistically significant effect on the growth and yield of dill, however, at farm site 2 (Warsada), highest yield was recorded at salinity of 2–4 dS/m than the other 2 sites, but at higher salinity level, the yield was lower than the other 2 farm sites. The higher seed yield at farm site 2 may be attributed to the higher clay content, resulting in better water-holding capacity. But at the same clay content, higher salinity level significantly lowered the seed and straw yields. The interaction effect of farm site× salinity was not significant indicating that the treatment performance was consistent over all the 3 farm sites. The regression equation showed that *in-situ* salinity level had negative correlation with seed yield of dill ($r = -0.844^{**}$), with unit increase in salinity the yield reduction will be to an

*Short note

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Table 1 Seed and straw yield of dill as influenced by different salinity levels under different farm sites

Salinity (dS/m)	Seed yield (tonnes/ha)			Straw yield (tonnes/ha)		
	Khanpur (Farm 1)	Warsada (Farm 2)	Bamangam (Farm 3)	Khanpur (Farm 1)	Warsada (Farm 2)	Bamangam (Farm 3)
2–4 (S_1)	0.37	0.41	0.32	0.90	1.05	0.99
4–6 (S_2)	0.30	0.23	0.24	0.79	0.90	0.83
6–8 (S_3)	0.23	0.18	0.16	0.70	0.72	0.75
8–10 (S_4)	0.20	0.14	0.16	0.61	0.64	0.64
LSD (P=0.05)						
Farm		NS			NS	
Salinity		0.013			0.065	
Farm × salinity		NS			NS	

extent of 0.04 tonne/ha. The study indicated that dill can be profitably grown on saline black soils of the Bhal region up to salinity of 4–6 dS/m without any irrigation.

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SUMMARY

An experiment was conducted during 1996–98 to study yield of dill (*Anethum graveolens* L.) on saline black soils of different unirrigated farm sites of Bhal area in Gujarat. The effect of different levels of *in-situ* salinity and 3 farm sites (Khanpur, Warsada and Bamangam) showed significant effect on yield of dill. Maximum yield of 0.409 tonne/ha and minimum of 0.136 tonne/ha were obtained at Warsada at salinity ranges of 2–4 and 8–10 dS/m respectively. The interaction of farm × salinity was not significant indicating that treatment performance was consistent over all the test farms.

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