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Performance of Salt Tolerant Wheat Varieties in Salt Affected Soils

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ABSTRACT

The study was conducted in village Rupana of Sirsa district where about 120 ha land is salt affected. In kharif season, the field remained fallow due to hazardous effect of salts. Even in *Rabi* season, the traditional wheat varieties could not withstand owing to higher salt accumulation in root zone. In the *Rabi* 2013-14, KVK demonstrated a salt tolerant wheat variety for salt affected area of the village. Initially seed of variety was demonstrated to 15 farmers in the year 2013-14. This variety registered an average yield of 32.4 q/ha as compared to PBW-343 (10.2 q/ha). In the next year 2014-15, a new salt tolerant variety No. 2 (KRL-213) was also introduced in the village which proved to be more effective than salt tolerant variety no 1. In all, both salt tolerant varieties were superior and economically viable as compared to PBW-343.

Key Words: Salt, Tolerance, Variety, KRL 210, KRL 213, Wheat.

INTRODUCTION

The soil salinity is a severe abiotic stress caused primarily by an abundance of sodium chloride, from both natural accumulations and from irrigation and crop evapo transpiration (Flower and Flower, 2005). The adverse effects of salinity are well known. Salinity can reduce yield with a significant metabolic effort afforded to plant adaptation, growth maintenance and stress responses with a subsequent decrease in yield (Munns and Gilliham, 2015). In Sirsa District of Haryana, about 3000 ha area is salt affected. The similar problem exists in village Rupana Khurd adopted under NICRA (National Innovations in Climate Resilient Agriculture) project by the Krishi Vigyan Kendra, Sirsa. The Village Rupana Khurd has approximately 120 ha of area affected with salts. The water table is also high as a result of which salts could not be leached down. Even in *Rabi* season, the traditional wheat varieties could not withstand owing to higher salt accumulation in root zone. So the demonstrations of salt tolerant varieties were conducted to assess the suitability of these varieties under village eco climatic conditions and to increase the economic return to the farmers.

MATERIALS AND METHODS

The soil samples were collected and analysed for basic physicochemical properties *viz.*, pH, EC, OC and available nutrients. During the year 2013-14, the demonstrations on salt tolerant variety 1 (KRL 210) and Salt tolerant variety 2 (KRL 213) were conducted on different locations in salt affected soils. The existing variety PBW 343 was used as the local check. Recommended doses of NPK @150kg/ha, 60kg/ha and 30kg per ha, respectively and ZnSo4 @25 kg/ha was applied. The demonstrations were supervised by regular visits of KVK experts and yield was recorded at harvest. Net returns and benefit cost ratio were calculated and compared between demonstrations and local check.

Table 1. Physicochemical properties of demonstration area.

Sr. No.	Physicochemical properties	Range
1.	pH (1:2)	7.8-8.2
2.	EC (1:2)	3.0-4.0 dSm-1
3.	OC	0.2-0.3 %
4.	Available N	110-13Kg/ha
5.	Available P	14-16 Kg/ha
6.	Available K	240-290 Kg/ha
7.	Texture	Sandy loam

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Table 2. Yield and Economics of Wheat demonstrations in salt affected soils.

Variety	Area (ha)	Yield (q/ha)	Economics of Demonstration (Rs./ha)			
			Gross Cost	Gross Return	Net return	B:C Ratio
PBW 343	14	10.2	28400	14280	-14120	0.5
KRL 210	6	32.4	28400	45360	16960	1.5

RESULTS AND DISCUSSION

The demonstrations were conducted in salt affected soils and the results are being explained as average of different locations

It was observed that the germination and growth of salt tolerant variety was better as compared to the traditional local check. The difference in the growth and development of cultivar may be attributed to more salt tolerance of variety KRL 210 as compare to PBW 343. Datta *et al* (2005) suggested that different cultivars exhibit different levels of salt resistance and salt sensitivity due to more exclusion of Na and Cl ions by salt tolerant varieties and possible salt injuries which may be due to less effective sequestration or mobility of ions towards some innocuous centres of plant tissues. The wheat variety KRL 210 registered an average yield of 32.4 q/ha as compared to PBW 343 (10.2 q/ha). For the ease of understanding, economic impact of demonstrations was calculated. The growing of variety PBW 343 was not recommended in salt affected as it caused an average a loss of (-) Rs. 14120/-ha whereas KRL 210 proved to be a boon for the farmers causing a net return of Rs.16960/-ha. The respective B: C ratios were 0.5 and 1.5 for local check and demonstrations. The poor yield of PBW 343 may be attributed to damage of roots of the plant by salts prevailing in the soil thereby reducing nutrient uptake while being a salt tolerant variety, the plants of KRL 210 were healthy and gave good crop yield.

The data (Table 3) show the yield of two salt tolerant varieties, KRL 210 and KRL 213. The wheat variety KRL 210 proved to be very good variety for the existing eco-climatic situation in the village. The economics of demonstrations was also calculated to have a clear cut idea of what the farmers gained by adopting these varieties. The grain yield expressed as an average of 15 locations of variety KRL 213 was recorded more as compared to KRL 210. The yield of KRL 213 was recorded 14.7 percent more as compared to KRL 210 providing a net return of 26050/-.

Dry Matter Production

It was evident that in terms of dry matter production, KRL 213 was superior to other varieties. Both salt tolerant Wheat (KRL 201 and KRL 213) varieties produced more dry matter than existing wheat variety PBW 343. The more dry matter production was attributed to better root development followed by better nutrient uptake which in turn has resulted in profuse tillering and shoot development. The similar findings have also been reported by Ahmad *et al* (2005).

Table 3. Yield and Economics of Wheat demonstrations in salt affected soils.

Variety	Area (ha)	Yield (q/ha)	Economics of Demonstration (Rs./ha)			
			Gross Cost	Gross Return	Net Return	B:CRatio
KRL-210	32	34	30500	49300	18800	1.6
KRL-213	6	39	30500	56550	26050	1.8

CONCLUSION

The salt tolerant varieties proved to be beneficial among the existing agro-climatic situation of the village. Both salt tolerant varieties performed better that PBW 343 in terms of yield. The sowing of traditional varieties was not economically viable but the salt tolerant varieties proved to be boon for the farmers. Between the two salt tolerant varieties, KRL 213 proved to be more effective in the existing village agro-climatic situation and performed better as compared to KRL 210.The field experiences exhibited that these salt tolerant varieties got favourable response from the farmers due to fitting well in village eco-climatic situation.

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