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EMERGING DUAL PURPOSE BARLEY FOR GREEN FORAGE AND GRAIN YIELD UNDER PARTIALLY RECLAIMED SOILS

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During pre green revolution period, barley was the major staple cereal for food, feed and forage. Dual-purpose barley is generally midway in vigour between tall, late and newly improved dwarf barley varieties. Grain and fodder (green forage) are given equal importance though it may vary from region to region and even year to year. In recent years it has been observed that because of severe drought in the drier part of Northern plains (Rajsthan), southern Haryana, south west Punjab and western U. P.). There was an acute shortage of green fodder in the winter season. Since berseem and sugar cane top are mostly used as green fodder in Northern India in addition to oat, but all these crops requires frequent irrigation which are not available under water scarcity condition. The crop can be given one cut at 50- 55 days after sowing and the regenerated crop may be utilized for grain purposes. Since both the fodder and grain can be utilized as dual purpose thus barley is advantageous over oat. An experiment therefore planned to evaluate green forage as well as grain yield in emerging dual purpose barley under vicinity of partially reclaimed saline-sodic soils of eastern U.P. At present the country faces a net deficit of 61.1% green fodder, 21.9% dry crop residue and 64.0% feeds. Ofcourse there was an acute shortage of green fodder in winter from November to February. Thus, it is essential that green forage supply has to grow 3.2% more to meet the above said deficit. Barley accounts for about 12% to the total cereal as munch as green fodder is concerned. It is better replacement when berseem is not available from November to February or a period when green forage is less for livestocks.

Twenty-two elite lines of barley including an standard check-RD 2552 received from different barley coordinating units namely, Durgapur (Rajasthan), N.D. University of Agri. and Tech., Kumarganj, Faizabad (UP), PAU Hisar, Ludhiana, JNKVV, Rewa (MP), CSA University of Agriculture and technology, Kanpur (UP) and BHU, Vanarasi (UP), were evaluated during *Rabi* 2009-10 at Genetics and Plant Breeding Research Farm, Kumarganj, Faizabad (26°47' North latitude, 82°12' East longitude and 113m sea level) with three replications. The experiment site had partially reclaimed saline-sodic soil (pH=8.5-8.9 and Ece=2-4 dS/m, ESP=45). Planting was done in last week of November. Each plot consisted of six rows of 5m length. The row to row and plant to plant distance was kept 23cm and 10 cm, respectively. Green fodder yield and grain yield was recorded only from four middle rows excluding border rows. Other observations were recorded on 5 competitive random plants from middle row of plot. Fertilizers was given @ 60kg N and 30kg P_2O_5/ha. Nitrogen was given three splits 1/3 was given as basal, 1/3 after 1st irrigation and 1/3 after taking forage cut 50 days after sowing. After cutting the forage, the crop was left for regeneration to obtain grain yield simply. All other cultural practices were applied to grow better normal crop.

The experimental results have clearly indicated that there is large variability among the entries for green fodder yield as well as regeneration capacity. In the present study entries with good yield either for green fodder or grain yield from regenerated crop was observed carefully. However the crop was also observed for salt tolerance. A highly tolerant variety may be defined as one with ability to grow or reproduce itself or to repair injury to a marked degree inspite of supporting damage in term of green forage and /or grain yield (1). On the basis of average yield performance (forage + grain) Table 1, five entries of barley showed high to average salt tolerance against aboitic stresses. Of these, five genotypes namely NBD 1494, JB 188, K 958, HUB 208 and HUB 210 were found promising and ranked 1st and 5th, respectively for grain yield. Green forage and grain yield from regenerated crop ranged from 153.99 to 217.39 q/ha and 25.97 to 36.35 q/ha yield at 50 days after sowing, respectively. Different genotypes of same crop exhibited different tolerance level. Low yield in few strains may be due to genotypic variation as well as salt effect.

Saline-sodic adversely affects plant growth and development, mainly due to gross nutritional imbalance (2) and severally restricted root system owing to poor soil physical condition and sodicity. The presence of excessive soluble impairs the growth of most crop plants by increasing the osmotic pressure of soil solution and alkaline ones. Carbonate, bicarbonate of sodium and potassium leads to alkalinity of soil (3). Actually the stresses imposed by salinity are mainly due to ion composition and concentration in rhizosphere and also in plant tissues. With a careful perusal; of Table 1 genotype HUB 209 (217.39 q/ha) followed by K 958 (197.46 q/ha), RD 2552 (196.86 q/ha), NDB 1494 (195.46 q/ha) and RD

Table-1: Performance of barley entries at Faizabad centre.

S.No.	Entry	Plant height (cm)	Tillring/meter	Grain yield (q/ha)	Rank	Forage Yield (q/ha)	Rank
1	BH 932	72	181	28.20		170.89	
2	BH 933	76	144	28.02		165.46	
3	HUB208	77	135	33.57	IV	160.63	
4	HUB 209	79	143	30.37		217.39	I
5	HUB 210	74	131	33.51	V	165.46	
6	JB 186	68	144	31.04		185.39	
7	JB 187	74	128	31.10		181.76	
8	JB 188	70	126	35.21	II	153.99	
9	K 944	72	150	32.00		162,44	
10	K 958	75	128	33.82	III	197.46	II
11	RD 2788	73	139	25.97		166.67	
12	RD 2789	70	106	28.74		170.89	
13	RD 2790	79	112	30.56		188.41	
14	RD 2791	75	134	32.49		190.22	V
15	NDB 1490	71	144	31.04		172.10	
16	NDB 1494	80	138	36.35	I	195.65	IV
17	PL 851	64	138	32.49		157.61	
18	PL 852	69	137	31.04		181.76	
19	RD 2035 (C)	69	131	31.10		164.25	
20	RD 2552 (C)	74	138	33.45		196.86	III
21	Azad (c)	82	132	31.52		178.74	
22	RD 2715 (C)	86	142	33.09		176.33	
	GM			31.58		177.29	
	SE (M)			0.59		3.55	
	CD			1.66		10.04	
	CV			3.72		4.00	

Date of sowing-24/ 11/ 2009

Soil type-Partially reclaimed saline-sodic pH = 8.4-8.9, EC (dSm-1)=2-4 and ESP=45

2791 (190.22 q/ha) was noted an average green forage yielder under partially reclaimed saline-sodic soil. NDB 1494, a medium dwarf genotype matured in 122 days and have average tillering ability and its regeneration capacity is quite good. Among average salt tolerant group promising genotypes were NBD 1494 (36.35 q/ha), JB 188 (35.21 q/ha), K 958 (36 82 q/ha), HUB 208 (33.57 q/ha) and HUB 210 (33.51 q/ha). These were agronomically superior and gave comparable satisfactory grain yield after regeneration of crop. Based on one year crop observation and also considering the green forage yield and grain from regeneration crop it can be suggested that barley varieties namely, NDB1494 and K 958 suitable for utilization of dual purpose can be used as donor for salt tolerance also. Crude protein in grain of forage regeneration after 50 days of one cut ranged from 11.55% to 17.60%. Highest protein was reported in HUB 209 and JB 186 (17.60%) while lower value was seemed in RD 2791 (11.55%). Days of fodder cut was set 50 days after sowing (DAS) then the crop was left for regeneration for grains. Using additional 25 per cent of seed and fertilizers the productivity of fodder as well as grain can be increased to a significant level (4). In totality barley can be utilized as green fodder in the drier areas of Northern Plains. Barley gives fodder at crucial stage (during winter) when no other green fodder is available for feed in the hills areas.

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