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Morphological response of barley cultivars to different dates of sowing

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Abstract

A study was conducted during *rabi* 2013-14 at Barley Research Area of CCS Haryana Agricultural University, Hisar. The experiment was laid out in a split plot design with five date of sowing (30th October, 10th, 20th, 30th November and 10th December) in main plots and four cultivars (BH 902, RD 2552, DWRUB 52 and RD 2668) kept in sub plots replicated thrice. Overall results depicted that growth parameter of barley viz, plant height, dry matter, LAI and number of tillers decreased significantly with delay in sowing. Crop sown on 30th October produced significantly higher values of growth parameters as compared to but it was statistically at par with 10th November sowing date. Significantly taller plants and higher dry matter accumulation at all the growth stages were recorded in BH 902 followed by RD 2552 than all other cultivars. At all the stages of crop growth, maximum number of tillers was recorded in DWRUB52 and LAI in BH 902 as compared to other cultivars.

Keywords: Barley, sowing time, cultivars, phenology, morphology

Introduction

Barley (*Hordeum vulgare*) is the world's fourth most important cereal crop after wheat, rice and maize with a share of seven percent of the global cereals production and 15 percent of coarse grains consumption. It is a hardy crop and can be successfully grown in adverse climatic conditions of drought, salinity and alkalinity. Both the two-row and six-row cultivars are used for malting. Six-rowed cultivars are ideal for beer, and two-rowed are suitable for pure malts. It is preferred over other cereals for malting purpose because its glumes and hulls are firmly cemented to the kernel and remain attached to the grain after threshing Barley is photo and thermosenstive long day plant so it is important to determine duration of development phase in a particular environment and their association with yield attributes for achieving higher yield. Variation in sowing time and temperature interact to influence growth and development and also result in yield variation. Sowing time depends on the weather, topography and harvesting time preceding crop. Matching the phenology to the weather conditions is most important factor to maximize the yield of barley. Very early planting may expose the crop to higher temperature at tillering stage while late planting may results in low biomass production and poor grain development due to higher temperature conditions at the time of maturity. To make barley as better crop for changing climate with low inputs, incorporation of genetic resistance to various biotic and abiotic stresses and development of suitable crop production technologies has become the major priority. These efforts have led to the development of a range of new cultivars for different purposes, production conditions and production technologies. Keeping this in view the present study was carried out to study morphological response of barley cultivars to different date of sowing.

Materials and Method

The study was conducted at Research Area of Wheat and Barley Section, Chaudhary Charan Singh Haryana Agricultural University, Hisar, Haryana (India) during rabi season, 2013-14 on sandy loam soils. The experiment was laid out in a split plot design with five date of sowing (30th October, 10th, 20th, 30th November and 10th December) in main plots and four cultivars (BH 902, RD 2552, DWRUB 52 and RD 2668) kept in sub plots replicated thrice. The crop was sown with common row spacing of 22 cm as per the dates of sowing manually with the help of hand plough by *pora* method. The soil of the experimental site was

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deep sandy loam having pH of 7.8, EC of 0.24 dS/m and low in organic carbon (0.43%), low in available N status (138 kg ha^{-1}), low in available P_2O_5 (17 kg ha^{-1}) and high in available K_2O (375 kg ha^{-1}). Three post sowing irrigation in 30th October, 10th and 20th November sown plots and two in 30th November and 10th December sown plots. The morphological traits like plant population, plant height and dry matter accumulation were recorded on three randomly selected plants.

Results and Discussion

Effect of date of sowing

The data depicted in Table 1 and fig 1 indicate that plant population, LAI and dry matter accumulation of barley cultivars reduced significantly with delay in sowing from 30th October to 10th December. Sowing barley on 30th October recorded highest LAI at all the stages, while lowest LAI was recorded in 10th December date of sowing .Sowing barley on 30th October, 10th November and 20th November resulted in significantly taller plants as compared to 30th November and 10th December dates of sowing at all the stages of crop growth which might be due to shorter growing period in late sown barley. Similar results were also reported by Singh *et al*. (2013).

Treatments	Plant population /m.r.l at 20 DAS	Leaf Area Index		
		30 DAS	60 DAS	90 DAS
Date of sowing				
30th October	37.95	1.53	2.56	3.62
10th November	36.58	1.52	2.40	3.54
20th November	35.95	1.12	2.27	3.46
30th November	35.79	0.89	1.85	3.28
10th December	31.00	0.67	1.59	2.98
SEm ±	1.1	0.02	0.01	0.01
CD at 5%	3.9	0.06	0.05	0.04
Genotypes				
BH 902	35.10	1.29	2.37	3.53
RD 2552	35.96	1.16	2.12	3.42
RD 2668	34.23	1.04	1.96	3.21
DWRUB 52	36.53	1.1	2.08	3.34
SEm ±	1.1	0.01	0.02	0.01
CD at 5%	NS	0.03	0.06	0.03

Table 1: Effect of different date of sowing on plant population and LAI of barley cultivars

Early sowing at 30th October resulted in significantly higher dry matter production at all the stages of crop growth which are in agreement with Alam *et al.* (2007) and Kumar (1997). This positive effect in early sowing might be due to the favourable environmental conditions in terms of availability of more vegetative period for growth and development as compared to delayed sowing (30th November and 10th December).Timely germination, good vigour and early establishment of the crop before the start of cold spell was also responsible for higher dry matter production. Delay in sowing after 20th November significantly reduced the tillers per mrl at all the stages of crop growth which corroborated the findings of Patel *et al.* (2004), Chun *et al.* (2000), Alam *et al.* (2007) and Singh *et al*. (2013).

Performance of barley cultivars

Various barley cultivars did not markedly influence the plant population at 20 DAS. Among the cultivars, BH 902 produced significantly higher LAI as compared to other cultivars, while, lowest LAI was recorded in cultivar RD 2668 at all the growth stages. Among different cultivars, significantly taller plants at all the crop growth stages were recorded in cultivar BH 902 (98.9 cm) (Table 2). Significant variation in plant height of barley due to varieties was also reported by Sharma *et al.* (2007) and Todar Mal (2013).

A close perusal of the data in Fig. 1 on dry matter accumulation reveals that cultivars, BH 902 accumulated significantly higher dry matter followed by RD 2552 at all stages i.e. from 30 DAS till maturity. Sharma *et al.* (2007) and Todar Mal (2013) also reported the variation in growth parameters of barley genotypes. Among the different cultivars, maximum numbers of tillers were recorded in cultivar DWRUB 52 and least number of tillers was obtained by the cultivar RD 2552 at all the stages of crop growth (Table 2). The difference among the cultivars may be due the individual capacity of the cultivars to produce tillers. Alam *et al*. (2007) also reported significant differences for tiller number per plant in barley varieties.

Table 2: Effect of different date of sowing on plant population and LAI of barley cultivars

Treatments	Plant height (cm)				No. of tillers/m.r.l			
	30 DAS	60 DAS	90 DAS	Maturity	30 DAS	60 DAS	90 DAS	Maturity
Date of sowing								
30th October	33.7	63.5	94.8	105.4	66.62	138.7	151.2	115.29
10th November	34.7	64.3	94.4	100.2	65.91	135.4	149.4	112.25
20th November	30.1	65.4	90.8	96.6	62.82	130.7	143.3	109.04
30th November	24.4	59.8	90.3	91.6	52.69	121.1	132.4	102.02
10th December	16.8	53.0	74.1	83.8	42.12	109.8	108.6	94.72
SEm ±	0.5	0.7	1.7	0.63	0.92	4.13	4.3	1.48
CD at 5%	1.7	2.3	5.6	2.11	3.04	13.7	14.49	4.92
Cultivars								
BH 902	31.6	63.8	91.8	98.9	55.30	126.0	135.26	94.06
RD 2552	29.2	61.4	90.5	95.7	55.62	125.0	130.80	92.63
RD 2668	23.8	59.1	85.3	93.0	60.13	128.5	140.73	115.66
DWRUB 52	27.0	60.4	87.9	94.6	61.08	130.5	141.60	124.30
SEm ±	0.2	0.7	0.6	0.64	0.91	1.2	2.17	1.66
CD at 5%	0.7	2.0	1.9	1.84	2.65	3.8	6.30	4.81

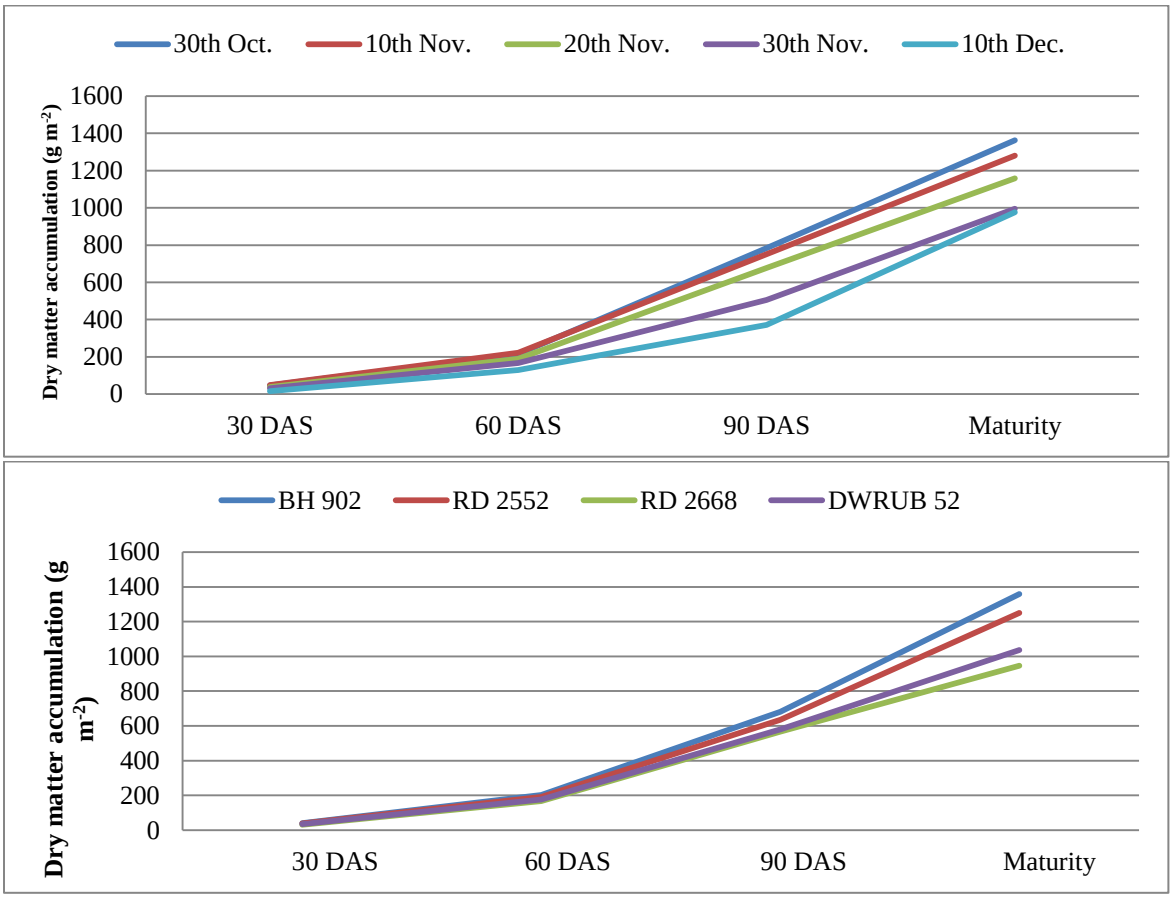

Fig 1: Effect of date of sowing and cultivars on dry matter accumulation at different growth stages of barley

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