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Effect of Row Spacing and Cutting Management on Fodder Yield of Dual Barley (*Hordeum vulgare* L.) Varieties/Genotypes

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Abstract

A field study on barley varieties/genotypes was conducted to see the effect of row spacing and cutting management on its green and dry fodder yield in a dual purpose production system during *rabi* 2006-07 and 2007-08. The experiment was conducted in factorial split plot design keeping combination of three varieties (PL 172, PL 426 and RD 2552) and two row spacing (15 cm and 22.5 cm) in main plots and time of cutting for forage (at 45 and 60 days after sowing) in sub-plots with three replications. Barley variety PL 172 produced significantly higher green fodder yield (129.8 and 80.5 q/ha during first and second year, respectively) than the other two varieties i.e. PL 426 and RD 2552, the latter two being statistically at par with each other during both the years. The variety PL172 produced significantly higher dry fodder yield (19.4 q/ha) than PL426 (16.8 q/ha) and RD 2552 (16.8 q/ha), the latter two being statistically at par with each other, during first year, but the differences were non significant in second year. The closer row spacing of 15 cm produced significantly higher green fodder yield (127.3 q/ha and 82.6 q/ha) and dry fodder yield (18.4 q/ha and 16.2 q/ha) than the wider row spacing of 22.5 cm during 2006-07 and 2007-08, respectively. The forage cut at 60 days after sowing (DAS), produced significantly higher green fodder (165.3 q/ha and 102.0 q/ha) and dry fodder yield (24.2 q/ha and 22.5 q/ha) than the forage cut at 45 DAS during 2006-07 and 2007-08, respectively. The variety PL 172 of barley sown at 15 cm row spacing under dual purpose system was found to be to best suited for fodder purpose. Forage cut at 60 days after sowing gave almost double production of green fodder than that at 45 DAS but at the cost of 25% reduction in grain yield.
Key words : Barley, *Hordeum vulgare,* Fodder yield, Row spacing, Cutting management.

The forage crops, covering about 5% of the total cultivated area of the country, play an important role in agricultural economy of India. A rapid decline in area of grazing lands due to diversion for arable crop production, indiscriminate use of natural vegetation and decrease in area under fodder production against increasing animal population have widened the gap between the demand and supply of green and dry fodder which needs to be bridged. The time of fodder availability during deficit or lean periods is more important than the total quantity of fodder available. In winters, farmers have only dry stalks of cereals to supplement the small amount of forage grown. The restricted growth of *rabi* fodders due to low temperature conditions during winter season, further aggravates the existing fodder shortage. This necessitates the need for an alternative source of fodders. Barley has considerable potential to provide feed during deficit periods and low temperatures due to its fast growth. The crops like oats and barley possess good regeneration capacity after taking first cutting as fodder (1). Barley, as a dual crop, has a considerable potential to provide nutritious fodder during low temperature deficit periods and grains after taking cutting due to its fast growth. The performance of barley as a dual crop depends upon selection of variety, its ability to rapidly utilize the growth factors especially during early growth stage and time of lopping for forage purpse. Thus keeping in view all these factors the present investigations were planned to see the effect of row spacing and cutting management on green and dry fodder yield of barley varieties/genotypes.

Methods

The experiment was conducted at students' research farm in the Department of Agronomy, Punjab Agricultural University, Ludhiana, during *rabi* 2006-07 and 2007-08. The experiment was laid out in factorial split plot design keeping combination of three varieties (PL 172, PL 426 and RD 2552) and two row

Table 1. Plant height, tiller count, green and dry fodder yield of barley as affected by various treatments.

Treatments	Plant height (cm)			Number of tillers/m²			Green fodder yield (q/ha)			Dry fodder yield (q/ha)		
	06-07	07-08	Mean	06-07	07-08	Mean	06-07	07-08	Mean	06-07	07-08	Mean
Varieties												
PL172	51.2	49.4	50.3	654.7	620.1	637.4	129.8	80.9	105.4	19.4	16.4	17.9
PL426	49.3	50.6	50.0	656.8	437.4	547.1	113.9	73.8	93.9	16.8	14.4	15.6
RD2552	47.4	40.9	44.2	835.0	777.9	806.5	119.1	76.4	97.8	16.8	15.0	15.9
CD (*P*=0.05)	NS	3.0	–	45.3	47.2	–	6.1	3.6	–	1.3	NS	–
Row Spacing												
15 cm	49.7	48.3	49.0	729.0	705.4	717.2	127.3	82.6	105.0	18.4	16.2	17.3
22.5 cm	48.9	45.6	47.3	702.0	518.3	610.2	114.6	71.5	93.1	16.1	14.3	15.2
CD (*P*=0.05)	NS	2.5	–	NS	38.6	–	5.0	2.8	_	1.1	1.7	–
Time of Cutting for Forage												
45 DAS	44.2	39.6	41.9	674.3	505.7	590.0	76.6	52.1	64.4	11.1	8.0	9.6
60 DAS	54.4	54.3	54.4	756.7	717.9	737.3	165.3	102.0	133.7	24.2	22.5	23.4
CD (*P*=0.05)	2.3	2.8	–	27.5	34.2	–	6.3	2.5	–	1.0	1.6	–

spacings (15 cm and 22.5 cm) in main plots and two time of cutting for forage (cutting at 45 and 60 days after sowing) in sub-plots with three replications. The crop was sown with a uniform seed rate of 90 kg/ha during first week of November and a basal dose of 62.5 kg N, 30 kg P_2O_5 and 15 kg K_2O/ha was applied. An additional 25% N was applied in the plots where one cutting for forage was taken. The soil was loamy sand, low in available nitrogen (201 kg/ha) and medium in available phosphorus (19.7 kg/ha) and potassium (218 kg/ha). The plant height, number of tillers per meter square and green fodder yield were recorded at the time of fodder harvest. The crop for green fodder was cut at a height of 5 cm from the ground after 45 and 60 days after sowing as per treatments. Dry fodder yield was calculated by multiplying dry matter percentage with total green fodder yield. The data were statistically analyzed by the method of Cochran and Cox (2).

Results and Discussion

Effect of Varieties

The different varieties of barley did not differ significantly for the crop plant height at the time of forage cut during the first year but during the second year RD 2552 attained significantly less height than PL 172 and Pl 426, the latter two being statistically at par (Table 1).

The variety RD 2552 produced significantly more number of tillers/m than PL 172 and PL 426 during both the years. But variety PL 172 produced significantly more number of tillers than PL 426 during the second year where as it was statistically at par with PL 426 during first year. More number of tillers of RD 2552 variety might be due to its more tillering capacity. Varietal differences for tiller count have also been reported by Alukonya (3). Different varieties differed in their fodder production potential. PL 172 variety produced significantly higher green fodder yield (129.8 and 80.9 q/ha during first and second year, respectively) than the other two varieties i.e. PL 426 and RD 2552, the latter two being statistically at par with each other during both the years. Green fodder yields were positively correlated with plant height and tillers per plant (4). PL 172 variety produced significantly higher dry fodder yield (19.4 q/ha) than PL 426 (16.8 q/ha) and RD 2552 (16.8 q/ha), the latter two being statistically at par with each other, during first year but the differences were non-significant in second year. The higher dry fodder yield might be due to more green fodder yield. The dry matter production was truly correlated with the green forage yield of barley (5).

Effect of Row Spacing

Row spacing also plays an important role in total green fodder production. The crop with a closer row spacing of 15 cm attained significantly more plant height and produced significantly more number of tillers m^2 than wider row spacing of 22.5 cm during second year but the differences for the same were non significant in first year (Table 1). The closer row spacing of 15 cm produced significantly higher green (127.3 q/ha and 82.6 q/ha) and dry (18.4 q/ha and 16.2 q/ha) fodder yield than the wider row spacing of 22.5 cm during first and second year, respectively. The more green and dry fodder yield in closer spacing might be due to more number of tillers/m^2 (Table 1). Shaikh et al. (6) also reported significantly higher total fresh forage yield in 22.5 cm row spacing than 30 cm spacing due to increased number of tillers per unit area.

Effect of Cutting Management

The plant height, number of tillers/m^2 and forage yield differed significantly with time of cutting for forage. Significantly more plant height and higher number of tillers/m^2 at forage cut stage of 60 days after sowing (DAS) were observed than that at the forage cut at 45 DAS. It might be due to longer vegetative growth period in the former which resulted in more plant height and more number of tillers/m^2. The forage cut at 60 DAS, produced significantly higher green (165.3 and 102.0 q/ha) and dry (24.2 and 22.5 q/ha) fodder yield than the forage cut at 45 DAS during both the years, respectively. It might be due to more plant height and number of tillers/m^2 at 60 DAS. Midha et al. (7) also reported maximum green herbage yield with cutting at 80 DAS than cutting at 50 DAS due to higher dry matter accumulation and increased plant height. The higher fodder yields with delayed forage harvests have also been reported by Sidhu et al. (8), Dunphy et al. (9) and Singh et al. (10).

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