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Effect of Sowing Dates and Population on Yield and Yield Components and Forage in Dual Purpose Cultivation of Hulless Barley *(Hordeum vulgare L.)*

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ABSTRACT

In order to study the effect of sowing dates and clipping times on the yield components and forage in dual cultivation of barley , a split plot experiment in the form of randomized complete block design with for replications was carried out in Golestan agricultural and natural resources research farm in 2012-2013 .Three sowing dates i.e. Now 5, Dec 5 and Jan 5 were in main plots, and sub plot were different clipping times {30 Beginning of stem elongation ; first internode begins to elongate (clipping time1), 33 Node 3 at least 2 cm above node 2 (clipping time 2), as well as control (no clipping)}. Condition represented the effect of sowing dates was significant on feed and grain yield, Protein yield, Plant height, HI. Maximum Plant height, HI and grain yield was recorded in sterling. The highest Feed yield, grain yield was observed in clipping time1. sowing dates at dec 5 resulted in maximum Plant height, Harvest Index, feed yield, grain yield, Protein yield.Condition represented the effect of sowing dates was significant on feed and grain yield, Protein yield, Plant height, Weight of 1000. Maximum Plant height and grain yield was recorded in sterling.

Keyword: Barley, ClippingTimes, sowing dates

INTRODUCTION

Forage cereals play an important role in many grazing enterprises by helping to overcome winter feed shortages. They have higher winter growth rates than most pastures, and with their highercarrying capacity are able to ease the grazing pressure on pasture paddocks [3].Barley (*Hordeum vulgare* L.) is the major cereal in many dry areas of the world and is vital for the livelihoods of many farmers. Barley is an annual cereal crop and grown in environments ranging from the desert of the Middle East to the high elevation of Himalayas [7]. It is the major food source in many North African countries. In Iran, it is mainly grown for grain and straw for small ruminants during winter, with green fodder sometimes used for winter grazing. Barley can replace wheat as the dominant crop due to its tolerance to drought and salinity. Barley assumes fourth position in total cereal production in the world after wheat, rice, and maize. Barley is more productive under adverse environments than other cereals. Barley serves as a major animal fodder, base malt for beer and certain other distilled beverages.

Generally wheat like other cool season crop is seeded early to take maximum period for growth and development toward maturity before the (possible) heat stress. However, mid-season seeding of winter wheat for any locality is usually most favorable, whereas late sown wheat suffers more winter injury, which produces fewer tillers and may ripen in lower grain weight and number of grains per plant. The decline becomes prominent in the cultivars requiring more days for heading under normal planting. Increase in temperature cause shortens of headingperiod (Tashiro & Wardlaw, 1999). Similarly, cultivars matured earlier when planted late, indicating the forced maturity due to high temperature. Kristo et al. (2006) showed that winter wheat grown under more favourable conditions (October sowing with 600 seeds m-2) responded to the treatments more even compared to those grown under unfavourable conditions (November sowing with 300 seeds m-2). Similarly,
in a similar experiment on seed yield of barley stated seed yield is a complex character depending upon a large number of environmental, morphological and physiological characters. Grain yields also depend upon other yield components. [13],
[9] reported that the dry matter yield of several varieties of cereals, increased significantly when harvest delayed from the booting to the grain milk stage. There is a strong relationship between morphological structure and nutritional qualities of forage crops [9]. An important factor affecting the quality and yield of forage is the growth stage of the plant harvest [10]. Dry matter yield increases when the growth period before harvest extends,while certain important nutritional characteristics, such as crude protein and digestibility decreases [12]. Annual forages can be used for many purposes in cropping and livestock systems. This article focuses on forage yield and quality of unconventional annual forages and their potential for extending the livestock grazing season. Winter cereals offer good yields and good quality forage options for livestock grazing [7]. Annual cereal forages produce one cutting and typically result in a high biomass yield of hay suitable for feeding many types of livestock [8]. For forage crops, it is important to produce greater forage yields per hectare, higher nutritional quality (percentage composition of

selected nutrients) or combined nutrient yields. High forage yield is very important for producers but for livestock Enterprises, it is also important to produce high quality forages [9].

MATERIALS AND METHODS

An experiment was conducted on the basis of split plot layout with completely randomized block design with 3 replications. Three sowing dates i.e. Now 5, Dec 5 and Jan 5 were in main plots, and sub plot were different clipping times {30 Beginning of stem elongation ; first internode begins to elongate (clipping time1), 33 Node 3 at least 2 cm above node 2 (clipping time 2), as well as control (no clipping)}. This research was conducted in 2012-2013, at research farm of farming building of Gorgan Research Station, Iran . A plot size of 5 m x 2.4 m having 12 rows, 20 cm apart was used. Phosphorus at the rate of 25 kg ha-1 was applied as basal dose. All other input and agronomic practices was carried out uniformly. It was added into three equal portions, the first part was applied in planting time and the second part was applied in double ridge Stage, and third part in booting stage. Other normal agronomic practices for barley production were followed. feed and grain yield, Protein yield, Plant height, Harvest Index was measured. All data are presented as mean values of three replicates. Data were analyzed statistically for analysis of variance (ANOVA) following the method described by [8]. SAS computer software was used to carry out statistical analysis. The significance of differences among means was compared by using Least Significant Difference (LSD) test.

RESULTS AND DISCUSSION

sowing dates had significant influence on feed and grain yield, Protein yield, Plant height, Weight of 1000 (Table 1). Our results are in line with [9] and [10] who reported that sowing dates had little or no effects on days to emergence. [2], in an experiment on the effects of sowing dates and clipping time on barley concluded the biomass-related trait of leaf area was also increased by the sowing dates . clipping time had significant influence on feed and grain yield, Protein content, Number of spike, 1000 grain weight (Table 1). [13], in an experiment on barley stated as expected, the main factors sowing dates. were significantly affected either on the yield parameters, but The interactions were less consistent.

The highest of feed and grain yield, Protein yield, Plant height was achieved in sowing dates dec 5 treatment. The lowest of them related to control (Table 2). [5], reported that wheat varieties with spikes are larger and longer than the smaller and shorter grains, have greater power-sharing for photosynthetic material. [16], showed that the highest levels in flag leaves of barley plants, the sowing dates dec 5. The highest of grain yield, Plant height achieved in (no clipping), highest of feed, Weight of 1000 , achieved in (clipping 2), but the highest of Protein yield, related to (clipping 2) (Table 2). sowing dates and clipping interaction had significant influence on ear length (Table 1). The maximum of feed and grain yield, Protein yield, Plant height achieved in sowing dates dec 5 (Table 2).

More feed yield (2446 kg/ha), grain yield (4076 kg/ha) Plant height (90.4 cm), Weight of 1000(42.7 gram), Protein yield (117.8 kg/ha) was produced by sowing dates dec 5 [4] who observed that sowing dates significantly affected productive tillers m^{-2}. [6, 11] observed similar results for grain spike-1 in barley. Weight and number of grains spike-1 was significantly increased with increasing sowing dates as reported by [10]. They further revealed that sowing dates significantly increased spike length, number of grains spike-1, 1000 grain weight, grain yield by the crop [9, 1, 12].

CONCLUSION

The results showed that, sowing dates dec 5, the feed and grain yield, Protein yield, Plant height was increased and led to increased production of seed yield too. So, the results show that consumption of dec 5, is sufficient for the plant needs and produce maximum yield [13]. also reported similar results for barley and stated sowing dates increased leaf area, tiller formation, leaf area index and leaf area duration and this increasing is led to much greater production of dry matter and grain yield. Also, the maximum of seed yield, related to clipping time(c1) . Then, on the basis of the results obtained, the sowing dates dec 5.

Table1. Analysis of variance (mean squares) for yield of barley

s.o.v	Df	Feed yield (kg/ha)	Grain yield (kg/ha)	Protein yield(kg/ha)	Plant height(cm)	Weight of 1000
Error a	6	56579	30653	132.7	20.7	5.20
sowing dates	2	6308218 **	345431 **	41567 **	1686 **	79.2 **
clipping time	2	303603522 **	131002085**	84353 **	9492 **	201.7 **
Interaction	4	407355 **	59 4354**	4578 **	9.13 n.s	16.4 **
Error b	24	20791	50317	4754	11.6	3.45
CV	-	11.3	11.5	8.98	9.21	5.88

ns = Non-significant * = Significant at 5% level of probability

Table2. mean compare sowing dates and clipping time for yield of barley

Treatment		Feed yield (kg/ha)	Grain yield (kg/ha)	Protein yield(kg/ha)	Plant height(cm)	Weight of 1000
	D1	2212 c	3778 c	89.5 c	79.4 b	40.3 b
sowing dates	D2	2446 a	4076 a	117.8 a	90.4 a	42.7 a
	D3	2353 b	3894 b	95.7 b	84.4.7 a	41.8 a
clipping time	C0	-	3902 a	-	90.1 a	40.5 a
	C1	2734 b	3621 b	704.1 b	78.9 b	39.8 b

	C2	4019 a	2121 c	977.2 a	67.1 c	37.8 c

Means followed by different letter(s) in a row are significant at 5% level of probability

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