International Journal of Science, Environment and Technology, Vol. 6, No 3, 2017, 2030 – 2035

ISSN 2278-3687 (O)
2277-663X (P)

EFFECT OF SOWING DATES AND INITIAL CUTTING TIME ON FORAGE YIELD AND QUALITY OF OAT IN MID HILLS OF NORTH WEST HIMALAYAS

Vinod Sharma, Prabhjot Singh and Suman Sharma
Department of Agronomy, Forages and Grassland Management
CSK Himachal Pradesh Krishi Vishva Vidyalaya, Palampur-176 062

Abstract: A field experiment was conducted during *rabi* 2010-11 at Research Farm of Department of Agronomy, Forages and Grassland Management, CSK Himachal Pradesh Krishi Vishvavidyalaya, Palampur to study the effect of sowing dates and initial period of cutting on forage yield of oat (*Avena sativa* L.). Sowing of crop on 15th October recorded significantly higher forage yield (111.9q/ha) than that of 30th October and 14th November sowing. Variety JHO 99-2 recorded highest forage yield (103.07 q/ha). The oat initially cut at 90 days after sowing and left for seed production recorded significantly highest forage yield (114.06 q/ha) than the oat initially cut at 60 and 75 days after sowing (DAS).
Keywords: Forage yield, initial cutting, oat, sowing dates.

Introduction

Oat (Avena sativa L.) is a crop which can suitably be introduced in areas with limited irrigation facilities. It is known to produce high yields of nutritive forage. The oat crop is known to have high yielding potential and multicut ability. There is possibility of utilizing the regrowth and its yield potential both for forage production and as seed production making it a dual purpose crop. Generally farmers leave the crop for seed production after taking one cut for forage. Thus, in the former case he has to forego the forage yield and in the later case he gets poor seed yield. So, in order to get higher forage and seed yield simultaneously, its initial period of harvest is required to be worked out. The time of sowing and suitable variety is another important factor which need specific attention for such crop management. Keeping these points in view, the experiment was taken up to find out the optimum date of sowing and period of initial cutting for higher seed production of promising varieties.

Material and methods

A field experiment was conducted during rabi 2010-11 at Research Farm of Department of Agronomy, Forages and Grassland Management, CSK Himachal Pradesh Krishi Vishvavidyalaya, Palampur. The experiment was laid out in split plot design with three replications. The main plot consisted of three different dates of sowing (15th October, 30th

*Received May 8, 2017 * Published June 2, 2017 * www.ijset.net*

October and 14th November) and two varieties (Palampur-1 and JHO 99- 2), whereas sub-plot had three initial periods of cutting (60, 75 and 90 DAS). The soil of the experimental field was silty clay loam in texture, having pH 5.3, organic carbon 1.10 per cent, available nitrogen 323.4 kg/ha, available P 323.4 kg/ha and available K 276.4 kg/ha. The healthy seeds of variety Palampur-1 and JHO 99-2 as per the treatment were sown at the rate of 100 kg/ha in rows 25 cm apart by Kera method. The first, second and third sowings were done on October 15, October 30 and November 14, respectively. Half of the nitrogen (40 kg N/ha), 60 kg P2 O5 and 40 kg K2 O/ha were applied at the time of sowing. The remaining half of the nitrogen was applied after respective cutting stages for forage production. Urea (46% N), single super phosphate (16% P2 O5) and muriate of potash (60% K2 O) were used as a source for nitrogen, phosphorus and potash, respectively

Results and discussion

Effect of Date of sowing

A critical examination of data (Table1) revealed that early sowing (15th October) produced significantly taller plants, more number of tillers per metre row length, more number of leaves per plant and higher leaf: stem ratio than sowing on 30th October and 14th November. All growth parameters showed consistent decrease with delay in sowing. The decrease may be attributed to slow germination and poor growth due to environmental stresses particularly the low temperature and shorter day length resulting in slow vegetative growth as a result of poor growth and development of the root system in comparison with early sowing. Similar observations were noticed by Sharma and Bhunia (2001). The data on green weight (g/m^2) and dry weight (g/m^2) (Table 2) of oat was significantly influenced by the dates of sowing. Sowing of the crop on 15th October registered significantly higher green weight over 30th October and 14th November sowing. The higher green weight with earlier sowing may be ascribed to better growth and development of the crop as indicated by corresponding increase in plant height, number of tillers and number of leaves per plant (Table1). Leaves are said to be the seats of photosynthetic activity which is necessary for the production of dry matter. It is therefore apparent that more number of functional leaves in the early sowing was conducive in increasing total green and dry weights per unit area. Green fodder yield (111.9 q/ha) and dry fodder yield (22.7 q/ha) of oat (Table 3) were significantly influenced by the date of sowing. The data clearly indicated a significant reduction in forage yield with successive delay in sowing. 15th October sown crop registered significantly higher green and dry fodder yield over 30th October and 14th November sowing. Sowing date is likely to change the plant environment including the climatic parameters like temperature, relative humidity, sunshine hours etc., the reasons for the superiority of early sowing are inherent in

the effect of the environment on the growth and development of the crop plants. Similar results were also obtained by Joon *et al.* (1993). Crude protein and Crude fibre content (%) of green herbage was significantly influenced by the dates of sowing. October sowing of the crop i.e. October 15th or 30th October did not show any significant influence on the crude protein and fibre content.

Table 1: Effect of different treatments on growth parameters

Treatments	**Plant height (cm)**	**Number of tillers per metre row length**	**No. of leaves/plant**	**Leaf: stem ratio**
A. Dates of sowing				
15th October	113.1	138.9	13.2	1.3
30th October	104.8	127.1	11.0	1.2
14th November	88.1	113.2	7.2	1.1
CD (P=0.05)	6.6	7.9	1.3	0.1
B. Varieties				
Palampur-1	107.3	121.9	9.4	1.1
JHO 99-2	96.7	130.9	11.4	1.3
CD (P=0.05)	5.4	6.5	1.0	0.1
C. Initial periods of cutting				
60 DAS	112.4	104.9	8.1	1.0
75 DAS	101.4	124.7	10.4	1.1
90 DAS	92.2	149.6	12.6	1.4
CD (P=0.05)	3.0	2.8	0.9	0.1

Effect of Varieties

Variety JHO 99-2 recorded significantly higher green fodder yield (103.1 q/ha) and dry fodder yield (22.1 q/ha) over the variety Palampur-1. The higher dry matter production in the oat variety JHO 99-2 seems to have been contributed by higher green forage and dry matter production. These findings are in conformity with the findings of Hassan *et al.* (1995) and Singh and Singh (1995). The higher green and dry fodder yield and comparatively better performance of variety JHO 99-2 over varietyPalampur-1 could be ascribed to its better

performance in growth contributing characters such as number of tillers per metre row length, number of leaves per plant and leaf: stem ratio (Table 1) except plant height as Palampur-1produced taller plants than variety JHO 99-2. Varieties had also significant influence on the green and dry weight production (Table 2). Variety JHO 99-2 recorded significantly higher green weight (g/m^2) and dry weight (g/m^2) over Palampur-1. The differences between the two varieties in this respect may be due to differences in number of tillers per metre row length and plant height. The results are in close conformity with the findings of Harika and Tomer (1984) and Ghosh (1985). Varieties did not differ significantly in crude protein and crude fibre content.

Table 2: Effect of different treatments on green and dry weight (g/m^2)

Treatments	Green weight (g/m^2)	Dry weight (g/m^2)
A. Dates of sowing		
15th October	1193.8	242.9
30th October	1089.1	222.8
14th November	900.1	214.3
CD (P=0.05)	77.0	12.8
B. Varieties		
Palampur-1	1013.9	216.4
JHO 99-2	1108.0	236.9
CD (P=0.05)	62.9	10.4
C. Initial periods of cutting		
60 DAS	900.0	193.5
75 DAS	1069.0	227.4
90 DAS	1213.9	259.1
CD (P=0.05)	54.9	13.9

Effect of Initial Period of Cutting

All growth parameters were affected significantly by the initial period of cutting. The oat initially cut at the 90 days after sowing recorded significantly more number of tillers per metre row length, number of leaves per plant and leaf: stem ratio (Table 1) than the oat initially cut at 60 and 75days after sowing. This may be due to more number of tillers in the treatment of initial period of cutting at 90 days after sowing which produced more number of leaves. These results are in conformity with the earlier findings of Bhatti *et al*. (1992) and Sharma and Verma (2007). But in case of plant height oat initially cut at the 60th day growth stage produced taller plants than the oat initially cut at 75 and 90 days after sowing. Similar results were also reported by Mohammad *et al.* (1992). Green weight and dry weight were also influenced significantly by initial period of cutting (Table 2). The oat initially cut at 90th days after sowing recorded significantly higher green weight and dry weight than the oat initially cut at 60 and 75 days after sowing. The increase in green weight with initial cut at 90days after sowing may be due to differences in plant height and number of tillers per metre

row length which were significantly higher in this treatment. The other possible reason may be due to more time provided to the crop for forage. Similar results were also reported by Sharma *et al.* (2001). The oat initially cut at 90 days after sowing recorded significantly higher green fodder and dry fodder yield than the oat initially cut at 60 and 75 days after sowing. It was revealed that initial cutting at 90 days after sowing resulted in 31.9 and 14.9 q/ha higher green fodder yield and 6.8 and 3.2 q/ha higher dry fodder yield over initial cut at 60 and 75 days after sowing, respectively. Initial period of cutting at 90 days after sowing had significantly taller plants, higher tillers per metre row length, higher green and dry weights and significantly more leaves compared to initial period of cutting at 60 and 75 days after sowing which reflected in increased green forage yield through their cumulative effect, as the yield per unit area in forage crops is the resultant of number of plants per unit area and weight per plant. The later depends upon growth characters viz. plant height, tillering capacity and growth rate. Moreover, the crop was in early growth stages when it was initially cut at 60 and 75 days after sowing. The results are in confirmative with the earlier findings of Bhatti *et al.* (1992) and Hussain *et al.* (2002). Crude fibre content was significantly increased with each delay in initial period of cutting. This was best obvious on the crop under delayed cutting at 90 days after sowing got enough time in the field to fiberized the various plant organelles. The higher dry matter production is testimony to this effect. Delayed cutting at 90 days after sowing increased the dry matter yield and resulted in corresponding decrease in crude protein content because of dilution effect. The trend of decrease in protein content with increase in yield is in conformation with the inverse yield nitrogen low.

Table 3: Effect of different treatments on fodder yield, crude protein and crude fibre

Treatment	Green fodder yield (q/ha)	Dry fodder yield (q/ha)
A. Dates of sowing		
15th October	111.9	22.7
30th October	101.4	20.9
14th November	83.0	19.6
CD (P=0.05)	7.7	1.2
B. Varieties		
Palampur-1	94.1	20.0
JHO 99-2	103.1	22.1
CD (P=0.05)	6.3	0.9
C. Initial periods of cutting		
60 DAS	82.7	17.8
75 DAS	99.6	21.2
90 DAS	114.1	24.3
CD (P=0.05)	5.5	1.3

Conclusion

Sowing of oat variety JHO 99-2 on 15th October with initial period of cutting at 90 DAS proved to be best for higher production of good quality forage.

References

[1] Bhatti, M.B., Hussain, A. and Mohammad, D. 1992. Fodder production potential of different oats cultivars under two cut system. *Pakistan Journal of Agricultural Research* 13(2): 184-190.

[2] Ghosh, D.C. 1985. Influence of nitrogen, phosphorus and cuttings on growth and yield of oat. *Indian Journal of Agronomy* 30(2): 172-176.

[3] Harika, A.S. and Tomer, P.S. 1984. Response of oat varieties to nitrogen fertilization. *Indian Journal of Agricultural Research* 18(2): 79-82.

[4] Hassan, B., Bali, A.S. and Singh, K.N. 1995. Performance of oat (*Avena Sativa*) genotypes in relation to cutting management under late sown condition. *Indian Journal of Agronomy* 40(3): 512-513.

[5] Hussain, A., Khan, S. and Mohammad, D. 2002. Forage yield and nutritive value of oat cultivar fatua at various intervals of harvesting. *Pakistan Journal of Agricultural Research* 17(2): 148-152.

[6] Joon, R.K., Yadav, B.D. and Faroda, A.S. 1993. Effect of nitrogen and cutting management on grain production of multicut oat (*Avena sativa* L.). *Indian Journal of Agronomy* 38(1): 19-21.

[7] Mohammad, D., Hussain, A., Khan, S. and Bhatti, M.B. 1992. Green forage yield, dry matter yield and chemical composition of oats with advance in maturity. *Pakistan journal of scientific and Industrial Research* 13(2): 180-183.

[8] Sharma, K.C. and Verma, R.S. 2007. Effect of weather parameters on the yield attributes and yield of multicut fodder oats (*Avena sativa* L.). *Forage Research* 33(1): 13-16.

[9] Sharma, S.K. and Bhunia, S.R. 2001. Response of oat (*Avena sativa* L.) to cutting management, method of sowing and nitrogen. *Indian Journal of Agronomy* 46(3): 563-567.

[10] Sharma, S.K., Bhunia, S.R. and Yadava, D.K. 2001. Response of oat to cutting management, method of sowing and nitrogen. *Forage Research* 27(3): 167-170.

[11] Singh, R. and Singh, A. 1995. Nutrient Uptake and biomass production by oat varieties as influenced by moisture regimes and nitrogen application. *Annual Agricultural Research* 16(3): 394-395.