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Effect of Promising Entries and Nitrogen Levels on Yield and Quality of Oat (Avena Sativa L)

Mahendra Singh Pal

Author's Affiliation: Professor Agronomy, Department of Agronomy, College of Agriculture, G B Pant University of Agriculture and Technology, Pantnagar 263145, Uttarakhand, India.

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Abstract

Field experiment was carried out at Instructional Dairy Farm, G B pant University of Agriculture and Technology, Pantnagar during winter season of 2016–17 to study the effect of promising entries and nitrogen levels on yield and quality of oat (Avena sativa L.). The experimental site was sandy loam with neutral soil pH and available nitrogen, phosphorus and potassium were 278.5, 27.7 and 232.8 kg/ha, respectively. The experiment consisted of 11 oat entries i.e. Kent, OL–1766–1, OL–1802, UPO–10–3, OS–6, SKO–225, OL–1769–1, OS–424, OS–432, JO–04–19 and OL–125 in main plot and 03 N levels i.e. 40, 80 and 120 kg/ha in sub plot was laid out in split plot design with three replications. The 50% flower, the plant height, number of tillers/m row length, green and dry fodder yield were affected significantly by oat entries (Table 2). The maximum and minimum days to 50% flowering were observed under OS–6 and OL–1802, respectively. Significantly tallest plants were found under OS–432, while OS–424 gave the shortest plants. Entry JO–04–19 gave the highest green and dry fodder yield followed by OS 424. The highest and the lowest CP were recorded in OL–1802 and OS 424 entries. The green and fodder yield, CP and NDF increased from 40 to 80kg N/ha, while ADF was recorded lowest at 120 kg N/ha.

Keywords

Oat (Avena sativa L); Crude protein; NDF; ADF.

Corresponding Author: Mahendra Singh Pal, Professor Agronomy, Department of Agronomy, College of Agriculture, G B Pant University of Agriculture and Technology, Pantnagar 263145, Uttarakhand, India.

E-mail: drmspal1@gmail.com

Oat (Avena sativa L.) is the most important Rabi season fodder cropof North,East and CentralIndia next to berseem. It possesses many qualities like fast growth leading to early fodder availability, highyield potential and nutrition, highregeneration capacity particularly during theearly winter months and also producesvery high green fodder per unit area and perunit time with minimum irrigation. Its fodderand grains are highly nutritious, rich in fat, 7–9% crude protein in green fodder, vitamin-B, phosphorus and iron. It isespecially preferred bymilch cattle and droughtanimals particularly horses and pigs. The grains are very much relished by horses, sheep, poultry and equines. It is an ideal fodder as a green chop, silage and hay mostly covering the lean periods of year. Oat contains protease inhibitor as antinutritional factor. Despite potential of growing underintensive cropping system, there is lack ofadequate information on proper varieties, doses of fertilizers and management practices. Nitrogen content of fodder has been said to be the best single index for forage digestibility. However, higher dose of nitrogen because lodging of crop and may also result in nitrate poisoning to animals. Nitrogenplays a vital role in fodder production as it is associated with high photosynthetic activity, vigorous growth and a dark green color of fodder and known to help in carbohydrate utilization and increasing succulence of the fodder. Therefore, an attempt was made to study theeffect of new entries and nitrogen on growth and yield of forage oatin Tarai region of Uttarakhand.

Materials and Methods

Field experiment was carried out at Instructional Dairy Farm, G B pant University of Agriculture & Technology, Pantnagar during winter season of 2016–17 to study the effect of promising entries and nitrogen levels on yield and quality of oat (Avena sativa L.). The experimental site was sandy loam with neutral soil pH and available nitrogen, phosphorus and potassium were 278.5, 27.7 and 232.8 kg/ha, respectively. The experiment consisted of 11 oat entries i.e. Kent, OL–1766–1,OL–1802, UPO–10–3, OS–6, SKO–225, OL–1769–1, OS–424, OS–432, JO–04–19 and OL–125 in main plot and 03 nitrogen levels i.e. 40, 80 and 120 kg/ha in sub plot was laid out in split plot design with three replications. The crop was grown under recommended agronomy. Pendimethalin @ 3.3 l/ha was sprayed uniformly after sowing of the crop. The crop was irrigated once after 25 days of sowing. The experiment was planted on 5th November and harvested at 50% flowering stage. Half nitrogen and full phosphorus (60kg/ha) and full potassium (40 kg/ha) was applied at sowing time and remaining half nitrogen was top dressed after 1st irrigation. At harvesting, observation on growth attributes, green and dry fodder yield were taken. The green sample was taken from 1m^2 and dry fodder yield was estimated based on dry samples. The dry samples were grounded and analyzed for fodder quality i.e crude protein, NDF and ADF.

Results and Discussion

I. Effect of entries

The 50% flower, the plant height, number of tillers/m row length, green and dry fodder yield were affected significantly by oat entries (Table.1). The maximum days taken to 50% flowering were observed under OS–6 and OS–432 followed by OL–1766–1 and Kent, while OL–1802 had lowest days for 50% flowering. Significantly tallest plants were found under OS–432 followed by OS–6, while OS–424 gave the shortest plants that was significantly at par with OL–1802. The number of tillers was observed significantly higher under SKO–225 that was significantly similar to OS–424, while OS–432 gave the lowest tillers/m row length.

The green fodder yield was recorded significantly higher under JO–04–19 that remained significantly similar to OS–424, OL–1766–1, SKO–225, UPO–10–3 and OL–125 oat entries and similar trend was also observed for dry fodder yield with maximum under JO–04–

Table 1: Effect of nitrogen levels on forage yield of promising entries of oat in Tarai region of Uttarakhand.

Treatments	50% flowering (Days)	Pl ht (cm)	Number of plants/m row	Green fodder yield (q/ha)	Dry fodder yield (q/ha)	L:S ratio	CP%	NDF%	ADF%
Oat Entries=11									
Kent- NC)	110	160	114	598	119.03	0.50	9.23	63.91	59.29
OL–1766–1	111	167	113	630	126.80	0.48	9.72	63.51	57.44
OL–1802	95	153	116	608	123.06	0.46	10.01	63.82	59.54
UPO–10–3	109	161	116	618	127.04	0.48	9.82	65.51	58.18
OS–6	114	171	114	599	120.52	0.51	9.82	64.46	58.40
SKO–225	106	162	123	624	125.54	0.47	9.43	64.36	55.69
OL–1769–1	101	161	118	585	117.64	0.51	9.91	62.42	57.73
OS–424	106	152	122	631	127.53	0.49	9.19	65.00	54.33
V9 (OS–432)	114	173	107	607	123.75	0.47	9.62	63.76	55.24
V10 (JO–04–19	105	163	121	636	130.00	0.48	9.43	63.78	55.69
OL–125	101	160	117	617	125.56	0.47	9.62	63.51	55.74
SEm+	0.2	0.33	2.66	7.2	1.74	0.02	0.28	0.27	1.04
CD (P=0.05)	01	01	08	20	4.92	ns	ns	0.77	2.95
Nitrogen levels= 03									
40 (kg/ha)	105	161	116	604	116.66	0.48	9.45	63.59	57.13
80 (kg/ha)	106	163	117	617	125.26	0.48	9.54	63.93	57.11
120 (kg/ha)	109	163	117	621	126.09	0.49	9.86	964.41	56.84
SEm+	0.09	0.31	1.3	3.8	0.91	0.01	0.15	0.14	0.54
CD (P=0.05)	01	01	ns	11	2.57	ns	ns	0.40	ns
Interaction (T x CS)	s	s	s	s	s	s	ns	ns	ns

19 followed by OS–424 and OL–1766–1entries. The L:S ratio was not affected significantly by oat entries however the highest values were recorded in OS–6 and OL–1766–1 followed by Kent and Os–424, UPO–10–3 and JO–04–19 entries.The higher green and dry fodder yield might be due to differential genetic potential of entries. Sharma et al. (2018) reported significantly higher green and dry fodder yield in variety Palampur-1 followed by Kent and significantly lowest in variety JHO 882. This may be probably due to genetic superiority of cultivar Palampur-1. Nainwal and Singh (2000) also reported similar findings.

The crude protein did not differ significantly among oat genotypes, however the highest value was found in OL–1802 followed by OL–1769–1, UPO–10–3and OS–6 and the lowest in OS–424 and Kent. The NDF was varied significantly among oat entries with the highest value in UPO–10–3 followed by Os–424, while the lowest in OL–1766–1 genotype. The ADF % was affected significantly by genotypes and the highest value was recorded in OL–1802 that remained significantly equal to Kent, OL–1766–1, UPO–10–3, OS–6 and OL–1769–1 entries.

II. Effect of nitrogen level

The 50% flowering, plant height, green and dry fodder yield differed significantly, however number of plants/m row length and L:S ratio did not varied significantly by N levels (Table 1). The highest level of N level took significantly more days for 50% flowering. The plant height was found significantly higher at both 80 and 120 kg N levels than 40 kg N level but the plant height of all oat entries did not differ significantly at both 80 and 120 kg N levels.The number of plants/m row length did not differ significantly among N levels, however 80 and 120 kg Nlevels gave more number of plants than 40 kg N/ha. Godara et.al. (2016) reported that all growth parameters were influenced significantly by increasing levels of nitrogen from 40 to 120 kg ha–1

The green and dry fodder yield increased significantly from 40 to 80 kg nitrogen application but remained significantly equal to 120 kg N level. The green fodder yield was 2.2 and 2.8% higher at 80 and 120 kg N, respectively 40 kg N/ha. Similarly, the dry fodder yield was recorded 7.4, 8.1% higher at 80 and 120 kg N, respectively 40 kg N/ha. The L:S ratio was found significantly equal at all N levels. Sharma et al. (2018) reported similar findings. Alipatraet al. (2012) obtained highest green and dry fodder as well as crude protein yield and crude fibre yield of fodder oats in new alluvial soils of West Bengal at application of 90 kgN/ha.Joshi et al. (2015) revealed that the higher production of oat and net realization could be achieved with the application of 90 kg N ha–1.Sheoranet al. (1917) observed that green fodder and dry matter yield were influenced significantly with increasing levels of nitrogen from 40 to 120 kg ha–1.

The crude protein did not differ among N levels, however the highest CP% was recorded at 120kg N/ah. The NDF was affected significantly by N levels and significantly highest NDF % was found at application of 120 kg N/ha. Kumar et al. (2001) also reported that CP and NDF increased with N levels. The ADF% was not affected significantly by N levels and the highest value was recorded at 40 kg N and the lowest at 120 kg N/ha. Godara et al. (2016) found that crude protein content and its yield revealed increased trend with increasing levels of nitrogen and maximum with 120 kg N ha–1. Similar results were also reported by Sheroranet al. (2017).

Conclusion

It is therefore recommended that JO–04–19, OS–424 and OL–1766–1 oat entries may be grown at application of 80 kg N/ha for nutritious higher green and dry fodder yield during Rabi season in Tarai region of India.

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