

EFFECT OF NITROGEN LEVELS ON GREEN FODDER YIELD OF OAT (*AVENA SATIVA*) VARIETIES

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SUMMARY

Livestock is the integral component of agriculture since times immemorial and its contribution to national economy through milk, meat, wool as well as farm yard manure is enormous. However, the low productivity of our livestock is mainly due to poor availability of feed resources. Amongst several fodder crops, oat proved to be the most successful and suitable fodder crop (Singh, 1971) with the availability of high yielding early, medium and late maturing varieties. Keeping the above view over fodder production, this experiment was conducted under factorial randomized block design with three replications in year **rabi** 2006 for knowing economic outfit. The variety OS-6 with 120 kg nitrogen/ha proved significantly superior in producing maximum green fodder, dry matter and crude protein yields and fodder oat cultivar OS-6 with 120 kg nitrogen/ha fetched maximum monetary advantage and proved most remunerative with benefit : cost ratio of 2.87.

Key words : Oat, forage, N levels, varieties

Oat is an important cereal forage crop of winter season, which provides energy rich nutritious and palatable fodder. Under the situation water supply is limited and farmer cannot grow legumes like berseem and lucerne, oat would be better choice as an alternative fodder crop. Amongst various nutrients, oat responds well to nitrogen application, which produces more tonnage in per unit area per unit time under favourable environmental conditions (Patil *et al.*, 1993; Purshotam *et al.*, 1995). However, excess application of nitrogen to oat under certain environmental conditions causes large quantities of nitrate accumulation in plant leaves, which may be toxic to ruminants. These facts necessitate to determinate the adequate supply of nitrogen to the oat based on field experimentation for realizing the genetic yield potential of newly evolved varieties. A vast varietal diversity of oat enables its cultivation over wide range of oat have been evolved which have high yield potential are grown for producing green fodder as well as seed. These varieties are highly responsive to high doses of fertilizers. Hence, substantial increase in yields of these varieties in per unit area per unit time can be achieved by providing balanced fertilization. Hence, the present investigation

was undertaken to assess the effect of nitrogen levels on green fodder yield of forage varieties of oat.

MATERIALS AND METHODS

A field experiment was conducted at Research Farm, Department of Agronomy, Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur (M. P.) during **rabi** season of 2006-07. The soil of experimental field was clay loam in texture, neutral (7.2) in reaction with low organic carbon (0.44%) and normal electrical conductivity (0.34 dS/m) and analyzing low in available N (228 kg/ha), medium in available P (16.2 kg/ha) and available K (297 kg/ha) contents. Treatments were laid out in factorial randomized block design with three replications, keeping four levels of each of N (0, 40, 80 and 120 kg/ha) and varieties (JHO-851, JHO-822, Kent and OS-6). Sowing was done on November 16, 2006 by using 100 kg/ha of each variety in rows 25 cm apart with uniform dose 40 kg P₂O₅+20 kg K₂O/ha. Nitrogen was given as per treatments. At the harvest, green fodder yield and growth parameters viz., plant height, tiller number, leaf area index and leaf-stem ratio were recorded. The crude protein yield was calculated by a factor of 6.25. The dry matter yield was recorded.

RESULTS AND DISCUSSION

Crop Growth Pattern

The growth parameters like plant height, number of tillers and leaf area index gradually increased under all treatments with the advancement in growing periods till the harvesting of crop. The increase in plant height continued till the final stage, but rate of increment in height of plant was most rapid after 60 DAS, because of phasic changes in plants from vegetative phase to reproductive phase. Similarly, the LAI showed rapid rate of increment during the period between 30 to 60 DAS. Similar growth pattern in forage oat was also reported by Singh and Nanda (1998) and Kumar *et al.* (2001).

Relative Performance of Oat Varieties

Production of green fodder is directly correlated with various growth parameters of crop. The cultivar Kent attained highest plant height among tested cultivars, whereas variety OS-6 produced maximum number of tillers/m² with highest LAI at all growth stages (Table 1). The quality of fodder is determined by leaf-stem ratio and it was almost comparable among all the varieties, however, variety JHO-851 was numerically superior to others with regard to leaf-stem ratio. Different growth parameters like plant height, number of tillers per plant,

leaf area index, and dry matter accumulation by plant have directly correlated with the green fodder yield. The oat cv. OS-6 produced the highest green fodder yield as well as dry matter yield of 464.8 and 100 q/ha, respectively, followed by Kent (455.3 q/ha green fodder and 97.2 q/ha dry matter yield). Varieties JHO-851 and JHO-822 were next to these two in descending order for green fodder yield along with green fodder and dry matter yields of these varieties ranged between 393.7 to 421.5 and 85.1 to 90.3 q/ha, respectively. These varieties mainly attributed to their genetic ability and influence of macro and micro environmental conditions. These results are in close conformity with the findings of Agrawal *et al.* (1993), Kumar *et al.* (2001) and Pradhan *et al.* (2005).

Effect of Nitrogen on Growth and Yield

Increasing level of nitrogen dose from 0 to 120 kg/ha resulted in corresponding increase in plant height at all growth stages of crop, because of nitrogen attributed synthesis of food materials, resulting in greater cell division and cell elongation. Therefore, elongation in plant increased with increasing nitrogen application. Application of 120 kg/ha also recorded highest LAI, number of tillers/m² regardless the varieties, supported by several workers in growth parameters enhanced greatly by application of nitrogen (Singh and Nanda, 1988; Sharma and Verma, 2004). Both green and dry

TABLE 1
Characteristics of oat varieties influenced by different nitrogen levels

Treatment	Plant height (cm)			No. of tillers/m ²			Leaf area index		Crude protein yield (kg/ha)	Leaf : stem ratio	Dry matter yield (kg/ha)	Green fodder yield (kg/ha)	B : C ratio
	30 DAS	60 DAS	At harvest	30 DAS	60 DAS	At harvest	30 DAS	60 DAS					
Varieties													
JHO-851	25.50	47.20	82.2	168.80	340.90	360.40	3.12	4.95	6.57	1.11	21.71	393.70	1.92
JHO-822	42.20	66.30	100.80	171.00	352.10	372.20	3.24	4.84	7.06	1.05	21.47	421.50	2.06
Kent	42.30	74.30	113.20	171.00	343.50	363.00	3.12	4.84	7.73	1.05	21.45	455.30	2.23
OS-6	43.70	65.40	106.90	183.80	393.80	416.30	3.36	6.16	8.09	0.86	21.69	464.80	2.27
S. Em±	0.40	0.17	1.28	1.04	1.20	1.56	0.12	0.13	0.18	0.09	0.63	4.30	-
C. D. (P=0.05)	NS	0.48	3.66	2.96	3.60	4.88	0.34	0.38	0.54	NS	NS	12.50	-
N (kg/ha)													
0	31.40	52.90	82.40	151.20	308.60	308.60	2.52	3.08	5.12	1.24	22.38	302.90	1.58
40	38.00	61.70	99.10	171.60	373.30	373.30	3.12	3.80	6.73	1.04	21.44	401.80	2.01
80	41.00	66.70	108.20	180.40	405.50	405.50	3.48	5.83	8.20	0.91	21.44	480.70	2.32
120	43.00	71.90	113.30	191.80	424.80	424.80	3.72	6.60	9.38	0.88	21.06	549.90	2.57
S. Em±	0.17	0.47	1.28	1.04	1.56	1.56	0.12	0.13	0.18	0.09	0.63	4.30	-
C. D. (P=0.05)	0.48	1.35	3.66	2.96	3.60	4.48	0.34	0.38	0.54	0.27	NS	12.50	-
N x V interaction	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	-

NS–Not Significant.

matter yields correspondingly increased with increase in N levels up to 120 kg/ha. Thus, it is obvious that oat is highly responsive to this nutrient and oat responded to a very level of N application even up to 160 kg/ha depending on the varieties (Joon *et al.*, 1993; Pradhan and Mishra, 1994; Rohitashav *et al.*, 1998). Dry matter production also influenced with increasing levels of nitrogen up to 120 kg/ha mainly due to their corresponding increase in plant height, number of tillers/m² and leaf area thereby more photosynthetic area which ultimately increased the sink size and produced more dry matter in plants. These findings are closer with the results of Mahale *et al.* (2004).

Variety OS-6 topped (2.77) with respect of B-C ratio being close to Kent (2.23) and JHO-822 (2.06) and JHO-851(1.97) resulted in lesser B-C ratio. Increased rate of nitrogen i. e. 120 kg N /ha markedly increased the profitability as 2.01, 2.32 and 2.50, respectively.

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