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YIELD, QUALITY AND ECONOMICS OF OAT FODDER (*AVENA SATIVA* L.) AS INFLUENCED BY NITROGEN AND VARIETIES

EDWIN LUIKHAM*, SONIA KAMEI AND P. S. MARIAM ANAL

College of Agricultural
Central Agricultural University, Iroisemba, Imphal-795004,
Manipur, India
*(e-mail : eduikhan@rediffmail.com)

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SUMMARY

A field experiment was conducted during the **rabi** season of 2008-09 at the experimental field of college of Agriculture, Central Agricultural University, Imphal to evaluate the effect of nitrogen levels on the yield and quality of promising varieties of oat. On the basis of results, the highest green and dry fodder yield, protein content and protein yield was associated with the application of 80 kg N/ha in the variety JHO-822. Maximum gross and net income and benefit cost ratio were associated in the same treatment.

Key words : Oat, nitrogen, yield, quality and economics

One of the causes for poor performance of draught animals and productivity of livestock in terms of milk, meat, wool etc. in the state is mainly due to the malnutrition, under nutrition or both. With proper feeding the productivity of these animals can be enhanced. In Manipur the area under fodder crops and permanent pastures and other grazing land constitute about 1% only. The dry and fresh fodder production is 549 tones and 903 tones, respectively (Anonymous, 2008). Thus, there is a huge gap between demand and supply in the state. Again during the winter months the animals depend mainly on rice straw and semi-dried standing grasses found in fallow lands leading to the low production and productivity of livestock. So, to alleviate the acute shortage of green fodder during the lean period of winter season, oat can be cultivated successfully after rice fallow lands in both plain and hilly areas. Among the agro-techniques application of adequate dose of nitrogen and selection of well adapted variety to the agro-climatic conditions of Manipur will play an important role in increasing the productivity and improving the quality of the fodder. As there is no information on these aspects under agro-climatic conditions of Manipur, hence the present investigation was undertaken.

MATERIALS AND METHODS

A field experiment was conducted during the **rabi** season of 2008-09 at College of Agriculture, Central Agricultural University, Imphal. The soil of the experiment field was clay in texture, acidic in reaction (Ph5.0), high in organic carbon (2.2%), medium in available nitrogen (345 kg/ha) and P (38 kg P2O5/ha) and high in available K (315 kg K2O/ha). The experiment was laid out in the Factorial Randomized Block Design with three replications. The treatments consist of four levels of nitrogen (0, 40, 80 and 120 kg/ha) and four varieties (JHO-822, JHO-851, OF-6, and Kent). The crop was sown on 20th November, 2008. The required quantity of nitrogen in the form of urea (46%) as per the treatments along with uniform dose of 40 kg/ha phosphorus in the form of Single Super Phosphate (16% P_2O_5) and 30 kg/ha potash in the form of Muriate of Potash (60% K2O) was applied one day before sowing of the crop along the open furrow spaced 25 cm apart at 4-5 cm depth which were mixed properly with the soil. The total quantity of nitrogen was applied in 3 equal splits as basal, 25 and50 days after sowing. The crop was harvested at 50% flowering. The total rainfall received during the cropping season was 22 mm.

RESULTS AND DISCUSSION

Yield

The green fodder and dry matter yield were

significantly affected by nitrogen application. Application of 80 kg N/ha showed significantly superiority over that of control and 40 kg N/ha and was at par with 120 kg N/ha in respect of fodder yield. Such a positive yield response of nitrogen application is obvious when it is deficient in the growing medium. The soil samples analyzed before start of the experiment also showed that the available nitrogen status of the soil in the experimental site was in medium range (345 kg N/ha). Application of nitrogen fertilizer, therefore, provided better nutrient to oat which resulted in higher fodder yield. Increase in fodder production with the application of nitrogen may be due to better growth of plants as expressed in terms of plant height, number of tillers, fresh and dry weight of fodder which was favorably affected by nitrogen fertilizer. The beneficial effect of nitrogen on forage yield of oat has also been reported by Thakuria and Gogoi (2001) and Sheoran *et al*. (2002).

Different varieties of oat showed significant difference in green fodder and dry matter yield. JHO-822 recorded maximum yield which remained at par with Kent. The higher green fodder and dry matter yield of JHO-822 and Kent are attributed to better growth as expressed in term of plant height, fresh and dry weight. Similar findings have been reported by Sheoran *et al*. (2002).

Quality

Application of nitrogen upto 80 kg/ha resulted in significant increase in crude protein content and yield of oat fodder over that of control. Further, increase in the dose up to 120 kg N/ha could not show any significant improvement in content and yield of crude protein. Beneficial effect of nitrogen on crude protein content and yield was also reported by Pradhan *et al*. (1994), Midha *et al*. (1999) and Arvind *et al*. (2001). The improvement in quality may be due to the fact that nitrogen being as essential constituent of chlorophyll, protoplasm, protein and nucleic acids are needed for protein synthesis. As such adequate available nitrogen enhanced the protein synthesis, which resulted in higher content as well as yield of crude protein.

The quality component under study significantly varied among the different varieties. Significantly highest crude protein yield was recorded in JHO-822. This is in agreement with the finding of Pathan *et al*. (2007), who reported that the crude protein content was affected by different varieties of oat.

Economics

The efficiency of a treatment is finally decided in terms of economics of the treatment. The present investigation revealed that the highest gross return (Rs 56232.00/ha) net return (Rs 42853.74/ha) and cost benefit ratio (1:3.20) were associated with the treatment V1N2 (JHO-822 and 80 kg N/ha). This may be attributed to higher fodder yield resulting from nitrogen application in promising variety JHO-822. Studies carried out by Patel *et al*. (2003) indicated that higher monetary return was obtained with the application of nitrogen.

TABLE 1
Fodder yield and quality of oat as influenced by levels of nitrogen and varieties

Treatments	Plant height (cm)	Leaf stem ratio	Tiller/m row length	Green fodder (q/ha)	Dry matter yield (q/ha)	Crude protein content (%)	Crude protein yield (kg/ha)
Varieties							
V1	65.33	0.39	67.66	232.00	57.23	5.60	3.22
V2	37.62	0.29	96.00	183.81	35.77	4.91	2.26
V3	60.15	0.30	60.33	196.55	41.60	4.45	2.63
V4	61.14	0.38	63.91	2.12.41	47.06	5.01	2.66
SE d±	2.02	0.02	2.65	12.40	2.76	0.35	0.21
C. D. (P=0.05)	4.13	0.04	5.41	25.31	3.63	0.71	0.43
Nitrogen levels							
N0	48.29	0.27	59.91	157.09	30.88	4.38	1.99
N1	55.00	0.30	69.83	195.17	41.22	4.86	2.53
N2	60.83	0.40	79.83	238.20	55.78	5.19	3.15
N3	60.12	0.38	78.33	234.20	53.59	5.54	3.07
SE d±	2.02	0.02	2.65	12.40	2.76	0.35	0.21
C. D. (P=0.05)	4.13	0.04	5.41	15.31	5.63	0.71	0.43

TABLE 2
Relative economics of oat as influenced by levels of nitrogen and varieties

Treatments	Total cost of cultivation (Rs./ha)	Gross returns (Rs./ha)	Net returns (Rs./ha)	Cost : Benefit ratio
V1 N0	12197.42	37094.00	24896.00	1:2.04
V1 N1	12787.84	40626.00	27838.00	1:2.17
V1 N2	13378.26	56232.00	42853.00	1:3.20
V1 N3	13967.62	51654.00	37686.00	1:2.69
V2 N0	12197.42	28846.00	16648.00	1:1.36
V2 N1	12787.84	38306.00	25518.16	1:1.99
V2 N2	13378.26	40136.00	26757.74	1:2.00
V2 N3	13967.62	39760.00	25792.38	1:1.84
V3 N0	12197.42	29690.00	17492.58	1:1.43
V3 N1	12787.82	37782.00	24994.16	1:1.95
V3 N2	13378.26	45564.00	32185.74	1:2.40
V3 N3	221.04	44208.00	30240.38	1:2.16
V4 N0	150.24	30048.00	17850.58	1:1.46
V4 N1	197.13	39426.00	26638.16	1:2.08
V4 N2	243.58	48716.00	35337.74	1:2.64
V4 N3	258.69	51738.00	37770.38	1:2.70

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