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STUDIES ON THE EFFECT OF VARIETIES AND NITROGEN LEVELS ON YIELD AND ECONOMICS OF OAT

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Abstract: A field experiment was conducted during the Rabi season of 1996-97 at the experimental field of Department of Agronomy, Forages and Grassland Management, CSKHPKV, Palampur (Himachal Pradesh) to evaluate the effect of nitrogen levels on the yield and economics of promising varieties of oat. On the basis of result, the highest green and dry fodder yield was associated with the application of 80 kg N/ha in the variety Palampur -1. Optimum doses of nitrogen to oat varieties Palampur -1, Kent and JHO-822 were 98.52, 96.82 and 103.22 kg/ha, respectively. The corresponding net profit/ha were Rs. 26413.8, Rs. 23255.3 and Rs. 19058.0.

Keywords: Nitrogen, oat, varieties, yield and fodder.

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. Besides, regrowth being very leafy, produce profuse tillers and quick growth and it is nutrious too. With the various advantages offered by oat, it is regarded as useful yet the cheapest source of crude protein, carbohydrates and minerals in the livestock feeding. Oat, being cereal forage crop, responds well to nitrogen. Judious use of fertiliser, especially nitrogen, is essential for high yield of good quality fodder. In the last few years, new improved and high yielding varieties of oat have been released for cultivation in the country, but the scanning of literature indicates that very little work has been undertaken in the past on nitrogen application of multi-cut oat varieties for fodder production. Furthermore, the maximum and optimum doses of nitrogen for different varieties were computed to compare economics of the nitrogen fertilization.

Materials and Method

A field experiment was conducted during the *Rabi* season of 1996-97 at Research Farm of Department of Agronomy, Forages and Grassland Management, CSK Himachal Pradesh

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Krishi Vishvavidyalaya, Palampur. The experiment was laid out in Factorial Randomised Block Design with three replications. There were twelve treatment combinations comprising of three varieties (Palampur-1, Kent, JHO-822). The soil of the experimental field was silty clay loam in texture, moderately acidic in reaction, high in organic carbon and phosphorus and medium in available nitrogen and potassium. The healthy seeds of variety Palampur-1, JHO 822 and Kent as per the treatment were sown at the rate of 100 kg/ha in rows 25 cm apart by Kera method. The sowing was done on October 10, 1996. Half of the nitrogen as per treatment, 60 kg P_2O_5 and 40 kg K_2O per hectare 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% P_2O_5) and muriate of potash (60% K_2O) were used as a source for nitrogen, phosphorus and potash, respectively. The most profitable rate was derived by a model x = l/2c(q - p), where q represent the cost of unit fertilizer and p represent the cost of unit production. The dose for maximum production was calculated by employing the formula x = - b/2c. The constants band c are the same as in response equation. The net retums/ha and net return per rupee investment were worked out based on prevailing market prices.

Results and Discussion

Effect of Varieties

Data in Table 1 revealed that significantly higher green and dry fodder yield was recorded 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.

Effect of nitrogen

Total green and dry fodder yield were significantly influenced levels of nitrogen (Table 1). Total green and dry fodder yield (Total of three cuts) increased significantly and consistently upto 80kg N/ha. Further increase in nitrogen level from 80 to 120 kg N/ha did not show the significant difference in green and dry fodder yield. This may be due to the fact that the harvesting was done three times from each plot. At all the three cuts, the plants were more or less in early growth stages. At early growth stages the rate of dry matter accumulation through photosynthetic activity is lesser than the rate of nitrogen absorption which ultimately reflected in significant effect on green and dry fodder yield upto 80kg N/ha. The results are in conformity with the earlier finds of Sheoran et al.(2002) and Thakuria and Gagoi (2001).

Table 1: Effect of different treatments on fodder yield and yield contributing characters

Treatments	Green fodder yield (q/ha)	Dry fodder yield (q/ha)
A. Varieties		
Palampur-1	399.17	124.66
Kent	353.21	107.23
JHO-822	314.79	97.49
CD (P=0.05)	30.91	10.46
B. N levels (kg/ha)		
0	201.25	64.74
40	352.67	96.88
80	434.50	112.96
120	434.47	109.79
CD (P=0.05)	35.70	12.08

For working out the economics of nitrogen fertilization for different varieties, the following relationships between fresh fodder yield and nitrogen levels were obtained by using the quadratic function (Table 2).

Table 2. Production functions and coefficients of determination (R^2) of nitrogen

Regression equation	S.E. of the coefficients		R^2
	'b'	'c'	
$Y_p = 24284+486N – 2.416N^2$	71.94	0.57	0.9066
$Y_k = 18500+532.2N – 2.697N^2$	53.11	0.42	0.9538
$Y_j = 17444+418.7N – 1.980N^2$	55.95	0.44	0.9299

Where ,
Y_p = Green fodder yield of variety Palampur -1
Y_k = Green fodder yield of variety Kent
Y_j = Green fodder yield of variety JHO-822

Quadratic production function developed from the fresh fodder yield has been given in Table 2.

The optimum dose of nitrogen for varieties Palampur -1, Kent and JHO-822 was observed to be at 98.5, 96.8 and 103.2 kg/ha. While the maximum doses of nitrogen for these varieties in respective order was 100.6, 98.7 and 105.7 kg N/ha. Data in Table3 revealed that variety Palampur -1 gave maximum net return/ha of Rs. 26405.4 at maximum level whereas at

optimum nitrogen level, the net return per hectare from this variety was Rs. 26413.80, which showed that this variety is best under Himachal conditions.

Table 3. Yield and net return due to application of N for maximum production and most profitable level of production of green fodder

Particular	Palampur -1	Kent	JHO-822
Yield maximum dose	100.6	98.7	105.7
Yield maxima	48720.8	44754.8	39575.0
Revenue from fodder at yield maxima	38976.6	35803.8	31660.0
Net return (Rs/ha) at yield maxima dose	26405.4	23247.4	19048.2
Net profit per rupee invested at yield maximum dose	2.100	1.851	1.510
Optimum dose	98.5	96.8	103.2
Optimum yield	48710.5	44745.6	39562.5
Revenue from fodder at optimum dose	38968.4	35796.4	31650.0
Net return (Rs/ha) at optimim dose	26413.8	23255.3	19058.0
Net profit per rupee invested at optimim dose	2.104	1.854	1.514

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