

Effect of nitrogen and cutting management on grain production of multicut oat (*Avena sativa*)

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Received: October 1991

ABSTRACT

A field experiment was conducted during 1988-89 and 1989-90 to study the effect of 5 nitrogen levels (0, 40, 80, 120 and 160 kg N/ha) and 3 cutting-management practices (no cutting for fodder, 1 cutting for fodder 55 days after sowing and 1 at 75 days after sowing) on grain yield of oat (*Avena sativa* L.). Grain yield increased only up to 80 kg N/ha but the fodder production increased up to 160 kg N/ha. There was no significant difference among the cutting-management practices for grain yield, but the fodder yield was 3 times higher when cutting was done 75 days after sowing than when it was done 55 days after sowing. In terms of economics, taking grain after 1 cutting for fodder 75 days after sowing and fertilized with 120 kg N/ha was more profitable.

Oat (*Avena sativa* L.) is an important winter (*rabi*) fodder in northern India, particularly in areas with less irrigation facilities. However, its grain yield is poor because of its susceptibility to lodging at higher nitrogen doses (Taneja *et al.*, 1981). The problem of lodging in multicut varieties of oat can be averted by taking 1 cut for fodder and then allowed the crop for grain. Since information on optimum stage of cutting for fodder and its response to N application is meagre, an experiment was conducted on these aspects.

MATERIALS AND METHODS

A field experiment was conducted during the winter (*rabi*) seasons of 1988-89 and 1989-90 at Hisar. The treatments comprising 5 N levels (0, 40, 80, 120 and 160 kg N/ha) in main plots and 3 cutting-management practices (no cutting for fodder,

1 cutting for fodder 55 days after sowing and 1 cutting 75 days after sowing), in subplots were repeated thrice in split-plot design. The soil of the experimental field was sandy loam in texture with pH 8.2, organic carbon 0.28% and available N 198 and 210 kg/ha (during 1988-89 and 1989-90 respectively). 'Kent' variety of oat was sown on 16 November 1988 and 6 November 1989 in rows spaced at 30 cm using 100 kg seed/ha. Half dose of N was applied at sowing. In the treatments where no cutting for fodder was taken, 25% N at 30 days after sowing and rest 25% at 75 days after sowing was applied. However, where 1 cutting was taken 55 days after sowing and 75 days after sowing, 50% N was applied after taking the cutting for fodder.

The net plot of 11.4 m² was harvested for fodder as well as grain yields. The data on yield-attributing characters were

Table 1. Effect of N and cutting management on fodder yield, seed yield and its attributing characters of oat

Treatment	Plant height (cm)		Panicles/m row		Grains/panicle		1,000-grain weight (g)		Green-fodder yield (q/ha)		Dry-matter yield (q/ha)		Grain yield (q/ha)	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B
<i>N (kg/ha)</i>														
0	134.0	168.1	61.5	61.1	62.7	62.3	36.5	35.1	223	137	29	22	22.8	21.5
40	145.3	173.5	68.7	61.5	83.5	80.5	35.0	36.0	268	172	37	29	25.9	24.6
80	154.3	183.0	64.4	62.2	85.3	84.5	33.3	34.3	289	184	39	31	30.1	24.9
120	147.5	181.7	66.8	62.0	77.1	76.2	33.7	33.5	325	194	42	33	26.7	21.9
160	149.2	183.5	64.3	57.3	78.5	77.0	33.1	33.1	352	202	45	34	24.8	21.5
CD (P = 0.05)	6.6	5.4	NS	NS	6.5	7.2	0.8	1.0	33.0	8.0	4.7	2.1	4.1	3.1
<i>Cutting management</i>														
C ₁	166.5	193.2	65.7	60.0	77.3	76.3	35.9	35.1					25.7	22.0
C ₂	150.2	178.5	63.0	60.0	81.9	78.9	34.1	34.3	159	90	21	15	26.4	23.6
C ₃	122.2	161.3	67.4	62.5	78.6	76.8	33.3	33.8	424	266	56	45	26.2	23.1
CD (P = 0.05)	5.1	3.9	NS	NS	NS	NS	0.6	0.7	20.8	5.1	2.9	1.3	NS	NS

C₁, No cut for fodder; C₂, 1 cut for fodder at 55 days; and C₃, 1 cut for fodder at 75 days after sowing
 A, 1988–89; B, 1989–90

Table 2. Net income (Rs/ha) from different treatments (average of 1988–89 and 1989–90)

Cutting for fodder	Net income (Rs/ha) at					Average
	N ₀	N ₄₀	N ₈₀	N ₁₂₀	N ₁₆₀	
C ₁	–138	280	367	–254	–681	–142
C ₂	654	2,256	2,279	2,432	2,161	1,954
C ₃	4,128	5,668	5,993	6,885	6,664	5,868

C₁, No cut for fodder; C₂, 1 cut for fodder at 55 days; C₃, 1 cut for fodder at 75 days
 N₀, N₄₀, N₈₀, N₁₂₀: 0, 40, 80, 120 kg N/ha

recorded at harvest.

The economics of different treatments was worked out on the basis of existing market rates at the time of crop harvest.

RESULTS AND DISCUSSION

Effect of N

The green-fodder yield increased significantly up to 120 kg N/ha during 1988–89 and up to 160 kg N/ha during 1989–90. Dry-matter yield did not increase proportionately to green-fodder yield with the increasing levels of N, indicating more moisture content in the plants at increasing N levels (Table 1). The increase in green- and dry-fodder yields up to 160 kg N/ha was also recorded by Joon and Singh (1989) in the forage oat.

The grain yield of oat increased only up to 80 kg N/ha and decreased thereafter with increasing N up to 160 kg/ha. The decrease in grain yield at higher N levels may be attributed to lodging at peak-growth stage, which was expressed in terms of decrease in plant height, number of grains/panicle and 1,000-grain weight (Table 1). Taneja *et al.* (1981) also reported decrease in grain yield of oat at higher N levels due to lodging.

Effect of cutting management

The green- and dry-fodder yields increased significantly when oat was harvested at 75 days after sowing compared

with that harvested 55 days after sowing in both the years. This increase in yield was due to longer period for growth at 75 days after sowing compared with 55 days after sowing. Contrary to the green- and dry-fodder yields, cutting management had no significant effect on the grain yield (Table 1). A significant decrease in 1,000-grain weight might have been compensated by the integrated marginal increase in panicles/m row length and number of grains/panicle with cutting at 55 and 75 days after sowing compared with no cut for fodder. Taneja *et al.* (1981) and Singh *et al.* (1985) also observed the increase in panicles/m row length when crop was harvested once for fodder compared with the treatment where no cut for fodder was taken.

The maximum net income was obtained from the treatment where 1 cutting for fodder was taken at 75 days after sowing with the application of 120 kg N/ha (Table 2).

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