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Influence of Cutting Management and Nitrogen Levels on Seed Production in Oats

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ABSTRACT

A field experiment on oats comprising three cutting management practices (no cut, one cut for forage at 50-55 days and then left for seed and one cut for forage at 70-75 days and then left for seed) and three nitrogen levels (40, 80 and 120 kg N/ha) was conducted at Forage Research Farm, Anand during *rabi* seasons of 1988, 1989 and 1990. The results indicated that the cutting practices of no cut and one cut at 50-55 days for forage produced significantly higher seed yield of oats than the system of one cut for forage at 70-75 days and then left for seed. Early cutting of oats crop at 50-55 days for forage marginally reduced the seed yield by 12.9% and total dry matter yield by 10.7% but gave an additional green forage yield of 244 q/ha as compared to no cut system. The seed yield did not differ significantly due to nitrogen levels. However, increase in nitrogen levels from 40 to 80 and 120 kg N/ha showed linear response in increasing green forage and crude protein yields. Application of 120 kg N/ha being at par with 80 kg N/ha produced significantly higher dry matter yield during 1989, 1990 and on pooled basis. Application of 80 kg N/ha to oats crops was found optimum and economic dose as it produced the highest seed yield (1350 kg/ha) and cost benefit ratio (2 : 01).

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INTRODUCTION

Oats (*Avena sativa,* L.) is one of the most important forage crops in India for *rabi* season and used as both feed and fodder. It is, therefore, essential to increase its production through agronomic management. Oats offers several advantages such as early forage availability, high yield potential, better regeneration capability, nutritive forage and high dry matter content. Provision of seed in sufficient quantities is important in forage production programme, therefore this experiment was planned to asses seed production potential of oats, variety Kent after taking cut for forage production

MATERIALS AND METHODS

A field experiment was conducted at the Forage Research Farm, Gujarat Agricultural University, Anand in the *rabi* seasons of 1988, 1989 and 1990 to study the effect of cutting management and nitrogen levels on seed production of oats. The soil was alluvial type and neutral in reaction, low in available nitrogen (193.2 kg N/ha), medium in available phosphorus (51.0 kg P_2O_5/ha) and medium in available potash (228.5 kg K_2O/ha).

The treatment consisted of three cutting managements [(1) no cut (2) one cut for forage at 50-55 days and then left for seed

TABLE 1

Effect of cutting management and nitrogen levels on the seed yield, dry matter and crude protein yields of oats.

Treatment	Seed yield (kg/ha)				Dry matter yield (q/ha)				Crude protein yield (q/ha)			
	1988	1989	1990	Pooled	1988	1989	1990	Pooled	1988	1989	1990	Mean
Cutting management												
No cut (only seed)	1457	917	3067	1813	87.5	108.3	125.7	107.2	4.47	6.27	3.41	4.72
One cut at 50-55 days, then left for seed	1309	754	2674	1579	98.9 (273)	93.2 (325)	95.0 (133)	95.7 (244)	7.95	8.15	4.96	7.02
One cut at 70-75 days, then left for seed	431	226	1090	583	83.2 (455)	83.3 (492)	79.5 (275)	82.0 (407)	7.56	8.66	5.29	7.17
S.Em. ±	90	70	180	204	3.1	2.3	2.6	7.1	–	–	–	–
C.D. at 5%	270	209	539	803	9.3	6.8	7.9	NS	–	–	–	–
Nitrogen levels (kg/ha)												
40	961	619	2328	1303	84.4 (315)	89.5 (386)	95.3 (173)	89.7 (291)	5.75	6.39	3.99	5.38
80	1170	686	2194	1350	94.0 (372)	95.1 (418)	98.8 (205)	95.9 (332)	6.74	7.52	4.53	6.26
120	1065	592	2308	1322	91.2 (405)	100.2 (421)	106.1 (234)	99.2 (353)	7.49	9.17	5.15	7.27
S. Em. ±	90	70	180	71	3.1	2.3	2.6	1.6	–	–	–	–
C. D. at 5%	NS	NS	NS	NS	NS	6.8	7.9	4.4	–	–	–	–

Figures in parentheses indicate green forage yield of oats during first cut.

TABLE 2

Effect of cutting management and nitrogen levels on crude protein content and other ancillary characters of oats.

Treatment	Crude protein content (%)				Plant height (cm)				No. of tillers/m row at harvest				1000 grain weight (g)		
	1988	1989	1990	Mean	1988	1989	1990	Mean	1988	1989	1990	Mean	1989	1990	Mean
Cutting management															
No cut (only seed)	5.19	5.77	2.69	4.55	123.5	123.4	165.4	137.4	82	58	51	64	44.5	38.7	41.6
One cut at 50-55 days, then left for seed	5.45	4.54	2.70	4.23	76.5	105.5	133.8	105.3	86	69	52	69	37.6	37.6	37.6
One cut at 70-75 days, then left for seed	5.31	6.05	3.17	4.84	118.9	93.8	110.5	107.7	75	50	70	65	34.6	39.5	37.1
Nitrogen levels (kg/ha)															
40	4.83	5.03	2.66	4.17	103.0	110.3	134.2	115.8	80	56	57	64	39.0	38.5	38.8
80	5.29	4.94	2.77	4.33	108.1	107.0	139.2	118.1	87	60	58	68	37.6	39.1	38.4
120	5.82	6.39	3.13	5.11	107.8	105.3	136.4	116.5	77	61	58	65	40.1	38.2	39.2

TABLE 3

Economics of oats as influenced by cutting management and nitrogen levels. (Av. of three years).

Treatment	*Seed yield (kg/ha)*	*Dry fodder yield (q/ha)*	*Green fodder yield (q/ha)*	*Total income (Rs/ha)*	*Cost of production (Rs/ha)*	*C.B.R.*	*Net realization (Rs/ha)*
Cutting management							
No cut (only seed)	1813	123.5	—	11863	6918	1.72	4945
One cut at 50-55 days. then left for seed	1579	84.4	244	13297	7348	1.81	5949
One cut at 70-75 days, then left for seed	583	31.2	407	9664	7348	1.32	2316
Nitrogen levels (kg/ha)							
40	1303	74.3	291	12457	6490	1.92	5967
80	1350	81.3	332	13494	6704	2.01	6790
120	1322	83.5	353	13749	6918	1.99	6831

Selling price of seed, dry fodder and green fodder of oats was considered Rs. 4.5/kg, Rs. 30/q and Rs. 15/q, respectively.

Cost of harvesting of green forage was considered Rs. 440/ha and cost of nitrogen fertilizer was considered Rs. 5.35/kg N.

and (3) one cut for forage at 70-75 days and then left for seed)] with three levels of nitrogen (40,80 and 120 kg N/ha). The experiments was conducted in factorial randomized block design with three explication. Ths gross and net plot size were 5.0 m x 3.0 m and 4.0 m x 2.0 m respectively. A basal application of fertilizer @ 40 kg P_2O_5/ha and half of nitrogen as per treatment was made before sowing. The remaining dose of nitrogen as per treatments was applied in two equal splits at tillering and boot stage for no cut treatment, while remaining half dose of nitrogen in both the treatments of one cut at 50-55 days and one cut at 70-75 days for forage and then left for seed production was applied after first cut. The crop was harvested as per cutting management treatments for forage production and was left for seed formation. Green forage and dry matter yield were recorded from cuttings taken for forage, while straw yields were recorded at maturity alongwith data on seed yield. The crude protein percentage was worked out from oven dried samples of fodder by micro-Kjeldahl's method.

RESULTS AND DISCUSSION

Effect of cutting management

The results indicated that the practice of no cut and one cut at 50-55 days for forage and then left for seed production gave significantly higher seed yields than the practice of one cut at 70-75 days for forage and then left for seed production during all the individual years as well as on pooled basis (Table 1). However, differences between no cut and one cut at 50-55 days for forage were not significant. The practice of one cut at 50-55 days also gave the highest cost benefit ratio (CBR) of 1:81 as well as net realization of Rs.5949/ha (Table 3). The treatment of one cut at 70-75 days produced higher green forage yield than one cut at 50-55 days during all the three years and it also gave the highest crude protein yield (7.17 q/ha) and crude protein content (4.84 %) on an average of three years. No cut treatment produced higher total dry matter yields than one cutting management treatment during 1989 and 1990, but the differences among cutting treatments were not significant on pooled basis.

The reduction in grain yield of oats due to cut taken for forage production at 70-75 days seems to be due to loss of plant vigour after cut, which resulted in reduction in plant height and 1000 grain weight (Table 2). These findings are in confirmity with those reported by Crowder (1954), Deo and Rai (1975), Desai and Deore (1982), Gardener and Wiggans (1960) and Gill *et al.* (1973).

Effect of Nitrogen

The differences in seed yield among 40, 80 and 120 kg N/ha were not significant during all the individual years as well as on pooled basis. However, application of 80 kg N/ha produced the highest grain yield (Table 1). Kumar and Verma (1981) also reported that response to increase in nitrogen dose beyond 40 kg N/ha was not appreciable for grain production in oats. Application of 120 kg N/ha produced significantly higher dry matter yield than 40 kg N/ha during 1989 and 1990 and on pooled basis, however it was at par with 80 kg N/ha. Application of 80 kg N/ha oats crop gave the maximum value of CBR (2.01). An increase in nitrogen application from 40 to 80 and 120 kg N/ha increase the green forage and crude protein yields during all the three years and also increasesd crude protein content on an average of three years. Ghosh (1985) reported that application of 80 kg N/ha recorded maximum grain, straw and green forage yields

of oats and the highest dry matter yield in lateritic acid soils. The results revealed that for obtaining maximum seed yield and dry matter production, oats var. Kent should be harvested for seed production only. However, early cutting at 50-55 days marginally reduced seed yield by 12.9 % but gave an additional green forage yield of 244 q/ha and it also showed the highest value of CBR and net realization. Among nitrogen levels, 80 kg N/ha was found economical dose for oats crop sown for seed production.

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