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SHORT COMMUNICATION

GROWTH, YIELD OF FODDER OAT (*AVENA SATIVA* L.) AND AVAILABLE SOIL NITROGEN AS INFLUENCED BY IRRIGATION AND NITROGEN MANAGEMENT

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SUMMARY

A field experiment was conducted during **rabi** 2013-14 at Instructional Farm, Rajasthan College of Agriculture, Udaipur. The experiment comprised combinations of four irrigations and three nitrogen levels. Thus, all 12 treatments were evaluated in split-plot design with three replications keeping irrigation in main and nitrogen in sub-plots. The results indicated that application of irrigations produced significantly higher crop growth rate and dry fodder yield as well as available soil nitrogen after harvest of fodder oat crop. Similarly, addition of 110 kg N/ha significantly enhanced the crop growth rate and dry fodder yield as well as available soil nitrogen after harvest of oat crop. Application of irrigation and nitrogen did not significantly affect relative growth rate of fodder oat (*Avena sativa* L.) during the year of experiment.

Key words : Irrigation, nitrogen, CGR, RGR, yield, fodder oat

Oat (*Avena sativa* L.) is most important winter cereal forage crop of the north-western and central zone of the country due to congenial climate grown during winter season. Its popularity among the farmers as a fodder crop in the agro-climatic zone IV 'a' of Rajasthan (India) is increasing because of excellent growth habit, quick regrowth/regeneration and high nutritive value. The agronomic requirements such as irrigation and nitrogen fertilization may vary within the region. The identification of the irrigation and nitrogen levels for fodder production and nutritional requirement especially of irrigation and nitrogen are important for getting higher nutritive fodder yield under varying environments.

The field experiment was conducted at Instructional Farm, Rajasthan College of Agriculure, Udaipur during **rabi** 2013-14 to assess appropriate irrigation and nitrogen level for increasing yield of fodder oat and to assess available nutrient (nitrogen) status of soil. The experiment consisted of 12 treatment combinations, comprising four irrigation levels (Two–20 & 60 DAS, Three–20, 40 & 60 DAS, Four–20, 40, 60 & 80 DAS and Five–20, 40, 60, 80 & 100 DAS) and three nitrogen levels (70, 90 and 110 kg N/ha) tested in split-plot design with three replications. The experimental soil was clay loam in texture, slightly alkaline in reaction pH, medium in available nitrogen (295.3 kg/ha), low in available phosphorus (16.60 kg/ha) and high in potassium (275.70 kg/ha). The crop was sown on 26 October 2013 with recommended seed rate of 100 kg/ha. Total rainfall (18.4 mm) was recorded during crop season. The data pertaining to growth parameters, CGR and RGR between 30-60 and between 60-90 DAS and dry fodder yield of the crop at both first and second cuttings and available soil nitrogen after harvest of the crop were evaluated.

Irrigation Levels

It is evident from the data given in Table 1 that the four irrigations gave significantly higher crop growth rate (74.1 and 34.2 g/m^2/day) between 30-60 and 60-90 DAS over two irrigations but three and four irrigations were found statistically at par with it, while between 60-90 DAS only five irrigations were statistically at par. Different irrigations did not significantly affect on relative growth rate during experimental year. Highest dry fodder yield was recorded with the application of three irrigations (8426 kg/ha) followed by four irrigations (8416 kg/ha) at first cutting, whereas at second cutting five irrigations produced significantly higher dry fodder yield (11156 kg/ha) over rest of the treatments. It might be due to dry fodder yield being the function of several yield components depending on complementary interaction between vegetative and reproductive growth of crop was optimized in fodder oat by irrigation, because irrigation maintained most optimum soil moisture for

TABLE 1
Effect of irrigation and nitrogen on CGR, RGR, dry fodder yield and available soil nitrogen

Treatment	CGR ($g/m^2/day$)		RGR (g/g/day)		Dry fodder yield (kg/ha)		Soil available nutrient
	Between 30-60 DAS	Between 60-90 DAS	Between 30-60 DAS	Between 60-90 DAS	First cutting 60 DAS	Second cutting 120 DAS	Nitrogen (kg/ha)
Irrigation levels							
Two	48.9	27.5	48.9	27.5	7213	7098	276.94
Three	69.4	29.9	69.4	29.9	8426	8252	274.85
Four	74.1	34.2	74.1	34.2	8416	9706	272.96
Five	67.6	32.1	67.6	32.1	8405	11156	230.99
S. Em±	4.1	1.2	4.1	1.2	272	254	6.20
C. D. (P=0.05)	14.0	4.1	14.0	4.1	941	881	21.44
Nitrogen levels (kg/ha)							
70	58.6	27.7	58.6	27.7	7405	8328	244.27
90	66.3	31.1	66.3	31.1	8229	9206	267.24
110	70.1	34.1	70.1	34.1	8709	9624	280.29
S. Em±	2.0	1.0	2.0	1.0	207	211	4.23
C. D. (P=0.05)	6.0	2.9	6.0	2.9	621	635	12.69

growth, yield attributes and yield performance. Two irrigations recorded maximum available nitrogen content in soil (276.94 kg/ha) which was significantly higher over five irrigations but statistically at par with three and four irrigations. Available N content of soil decreased due to increased irrigations (Table 1). This was due to nitrogen being an essential plant nutrient for luxuriant and lush growth; plant takes it in abundant quantity. The results of present investigation are in accordance with those of Kumar *et al*. (2012) and Kumar *et al*. (2013).

Nitrogen Levels

Application of 110 kg N/ha was recorded significantly superior crop growth rate over 70 and 90 kg N/ha. The per cent increase in crop growth rate by 110 kg N/ha was 16.6 and 5.7, 23.1 and 9.6 over 70 and 90 kg N/ha, between 30-60 and 60-90 DAS, respectively. Relative growth rate of fodder oat did not differ significantly due to nitrogen application. It was observed that the dry fodder yield increased significantly with addition of nitrogen levels and the maximum was recorded with the application of 110 kg N/ha (8709 and 9624 kg/ha) during both first and second cuttings (Table 1). The higher dry fodder yield with increasing levels of nitrogen might be attributing to the cumulative effect of yield attributing characters viz., crop growth rate and relative growth rate which ultimately increased the fodder yield. The beneficial effect of nitrogen on the CGR may be due to increased cell division, cell enlargement and chlorophyll synthesis ultimately positive effect was observed on the fodder yield. The maximum available soil nitrogen (280.29 kg/ha) was recorded with 110 kg N/ha which was significantly higher over 70 and 90 kg N/ha after harvest of crop. On the basis of analysis, soil available nitrogen varied from 244.27 to 280.29 kg/ha. However, the available status of nitrogen in soil after harvest of crop was observed with increasing fertility levels which was due to build up of nutrients in soil as a result of addition of nitrogenous fertilizer into the soil. The results corroborate the findings of Malakar *et al*. (2009), Devi *et al*. (2010), Sheoran *et al*. (2010) and Patel *et al*. (2011).

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