



Response Of Oat (*Avena Sativa* L.) To Nitrogen And FYM Application In Sandy Loam Soil Of Agra.

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Abstract

A research project was conducted at Deptt. of Agricultural Chemistry and Soil Science Research Farm of R. B. S. College Bichpuri, Agra during Rabi season 2022-23 in a sandy loam soil. To assess response of oats (*Avena sativa* L.) crop to nitrogen and FYM fertilization. The treatment consisted four nitrogen doses (0, 40, 80, 100kg N/ha) and three FYM doses (0, 5 and 10 tons FYM/ha). The experiment was tested in Randomized Block Design, with three replication. The application of nitrogen significant response on plant height, number of tillers/plant, spike length, yield attributing character i.e. Grains/spike, 1000 grain weight and grain and straw yield and N, P and K uptake. The highest value shown under 100 kg N/ha as comparison to different treatment and minimum value recorded under control. However, treated with 10 t/ha FYM significant effect on growth, yield attributes and yield, protein content in grain and nutrient uptake followed by 5t/h FYM and minimum under unfertilized control. Fertilizer with 100kg N/ha and FYM 10 t/ha improve grain and straw yield of oats. The maximum grain (31.25 kg/ha) and straw (40.45 kg/ha). The value of protein in grain both nitrogen and FYM (12.74 and 12.11 %) noticed under nitrogen 100 kg/ha and FYM 10 t/ha treatments.

Key word: Oat, Nitrogen and FYM

Introduction

Oat (*Avena sativa* L.) is important cereal crop belongs to the family Poaceae. It is a minor cereal crop grown as multi purpose for grain, forage and pasture in many parts of the world. Cultivation of oats crop is similar barley and wheat, it survive poor fertile soil hard in nature. It is mainly grown on temperate and sub-tropical and high altitude tropics. They are very popular due to their health benefits. It is very famous food rich in protein and fiber and very digestive and industrial value is very high. The poor yield of oats crops in our country is mainly due to their cultivation in poor soil, low fertility status, inadequate fertilizer application, mainly grown in rain fed areas. The proper and optimum use of fertilizer not only increases the yield but also affects the quality of its produces. The better production of oats in our country and state the

application of inorganic and organic sources of fertilizer, i.e. nitrogen and FYM and better nutrient management is the most important factor for enhancing the quality oats production.

Materials and Methods

A field experiment was conducted during *Rabi* winter season, 2022-23 at research farm of Deptt. of Agricultural Chemistry and Soil Science, R.B.S. College Bichpuri, Agra intersect of 27.2° N latitude, 77.9° E longitude and 168 meter altitude above mean sea level. Soils of experimental field is sandy loam in texture, their physic-chemical property i.e. pH 8.3, EC 0.34 dSm⁻¹ organic carbon 0.38%, available nitrogen 177.5 kg/ha, available phosphorus 11.8 kg/ha, and available potassium is 190.5 kg/ha. The experiment treated four levels of nitrogen (0, 40, 80 and 100 kg/ha) and three levels of FYM (0, 5 and 10 t/ha) replicated thrice in Randomized Block Design. The oat crop variety Kent was sowed in furrow 5 cm depth in line 20 cm apart using seed rate 100 kg/ha on 29 October, 2022. the nitrogen was applied in the form of Urea and FYM was applied as per treatment in below seed followed by planking. The weeding, irrigation was done as per requirement. The observation on growth, yield attributes and yield other parameters recorded. The crops were harvested on 31 march, 2023.

Result and Discussion

Growth parameters

The growth parameters i.e. plant height, number of tillers/plant and spike length of oat crop presented in (Table 1). The data clearly indicates that the different growth parameters wear significantly increase with every increment of nitrogen levels as comparison to control. The highest plant height, number of tillers and spike length were obtained under the treatment N₃ (100 kg N/ha) followed by N₂ (80 kg N/ha), N₁ (40 kg N/ha) and lowest under N₀ (control), respectively. Similar result ware also observed by **Prasad and Singh (2007)** and **Kumar et. al (2010)**.

The application of organic sources FYM significantly improved growth parameter of oat crop. The maximum value was recorded under F₂ (FYM 10 t/ha) as comparison to F₁ (FYM 5 t/ha) and minimum under F₀ (control). The farm yard manure provide favorable environment in soil and improve the availability of nutrients in soil, which improve the plant height, number of tillers and spike length. Similar result wearer observed by **Kumar et.al (2010)** **Singh and Singh (2017)**. **And Pandey et. al (2020)**

Yield attributes

The yield attributing character i.e. number of grains per spike and 1000 grain weight of oat crop was (Table -1) significantly increase with increasing the levels of nitrogen. The highest value was recorded under N₃ (100 kg N/ha) as compared to other treatment N₂, N₁ and lowest under N₀ (control). Applications of nitrogen improve the availability of nitrogen and other nutrients. Similar results were also reported by **Singh et.al (2009)** **Singh and Singh (2017)** and **Kumar et. al (2018)**.

In other hand the application of FYM on oat crop the number of grains pre spike and 1000 grain weight significantly affected. The FYM 10 t/ha showed highest result followed by F₁ (FYM 5 t/ha) and lowest under control treatment. The results confirm the findings of **Chauhan et.al (2005)**, **Singh et.al (2013)** and **Pandey et.al (2020)**

Grain and straw yield

The results of grain and straw yield of oat crop are given in (Table 1). The result clearly indicated that the application of nitrogen significantly improve the yield of oat as comparison to control. The superiority of various nitrogen treatments may be arranged in descending order N₃, N₂, N₁ and N₀ control. The highest yield of grain 31.25 q/ha and straw 40.45 q/ha under N₃ treatment and lowest grain 19.17 q/ha and straw 29.4 q/ha under N₀ treatment. Increase the levels of nitrogen was responsible for growth and development of crop causing more photosynthesis and assimilation rates and metabolic activity, which wear responsible for improving the yield of oat crop. Similar results wear also reported by **Kumar et. al (2010)**, **Singh and Singh (2017)** and **Kumar et. al (2018)**.

The grain and straw yield of oat significantly affected with increasing the levels of farm yard manure as comparison to control. The highest grain and straw yield was recorded under F₂ (grain 30.70 q/ha and straw 38.6 q/ha) followed by F₁ (grain 26.47 q/ha and straw 35.50 q/ha) and lowest under F₀ control (grain 20.45 q/ha and straw 30.33 q/ha). The FYM applied in soil improve the soil biological activity and improve available nutrient to plant and increase yield of oat crop. Our findings are in accordance with those of **Patel et. al (2008)**, **Kumar et. al (2010)**, and **Pandey et. al (2020)**.

Table-1 Effect of different treatments on growth and yield of oat crop

Treatments	Plant height(cm)	No of tiller per plant	Spike length(cm)	No of grains per spike	Test weight	Grain yield q/ha	Straw yield q/h	Protein content in grain (%)
Nitrogen levels								
No	94.5	5.81	36.14	74.15	32.24	19.17	29.4	12.11
N1	100.5	7.91	38.03	81.90	32.75	23.98	33.87	12.41
N2	104.4	9.31	39.33	88.64	33.84	28.34	38.30	12.55
N3	107.6	10.21	40.60	93.80	35.50	31.25	40.45	12.74
SE m±	0.38	0.07	0.19	0.36	0.31	0.17	0.20	0.007
CD at 5%	1.12	0.17	0.56	0.81	0.78	0.40	0.48	0.018
Phosphorus levels								
F0	96.5	6.40	37.10	76.05	29.95	20.45	30.33	12.14
F1	102.6	8.52	38.6	85.57	33.42	26.47	35.50	12.30
F2	106.7	10.02	40.5	92.85	35.58	30.70	38.60	12.60
SE m±	0.20	0.06	0.09	0.26	0.27	0.70	0.66	0.08
CD at 5%	0.62	0.14	0.27	0.60	0.76	1.46	1.41	0.16

Protein content in grain

Protein content (Table 1) in oat grain significantly increased as comparison to control. The maximum protein content was observed N₃ treatment followed by N₂, N₁ and lowest under N₀ control. The nitrogen and protein is inter-related and the main components of protein make more available to plant and grain,

the protein content already increased. The results are in close agreements with those of **Prased and Singh (2007)** ,**Kumpawat (2009)** and **Singh and Singh (2017)**.

The FYM treatment improved more vigorous growth of plant due to the availability of more nutrient in soil improve significant effect on protein content in oat grain. The protein content arranged as F₂, F₁ and lowest under F₀ treatment. Similar result reported by **Singh and Singh (2017)** and **Pandey et. al (2020)**.

Nutrient Content

The nutrient content both grain and straw of oat crop are in (Table 2).The result clearly indicated that the application of nitrogen significant effect on nutrient (N, P and K) content in oats grain. Increase in each dose increase N, P and K over control. The treatment N₃ (100 kg N/ha) followed by N₂ (80 kg N/ha), N₁ (40 kg N/ha) and lowest under N₀ control. Similar results were dawned by **Singh et. al (2009)**, **Kumar et. al (2010)** **Singh and Singh (2017)**.

An evaluation of data (Table 2), the result indicated that the nutrient content (N, P & K) in oat grain and straw significantly increased the levels of FYM as compared to control. The FYM 10 t/ha gave better result as compared to FYN 5 t/ha and lowest under control. A similar finding was reported by, **Ravankar et. al (2005)** and **Patel et. al (2008)**.

Table-2 Effect of different treatments on nutrient content and uptake by oat crop

Treatments	Nitrogen content (%)		Phosphorus content (%)		Potassium content (%)		Nitrogen uptake Kg/ha		Phosphorus uptake Kg/ha		Potassium uptake Kg/ha	
	Grain	Straw	Grain	Straw	Grain	Straw	Grain	Straw	Grain	Straw	Grain	Straw
Nitrogen levels												
No	1.29	0.35	0.2	0.09	0.5	1.51	50.92	33.84	7.8	8.46	21.1	140.95
N1	1.33	0.39	0	0.11	4	1.64	58.93	39.12	3	11.0	5	164.52
N2	1.38	0.41	0.2	0.12	0.5	1.67	65.77	41.80	9.2	3	25.2	174.91
N3	1.45	0.43	1	0.13	7	1.69	71.23	44.11	3	12.5	5	180.76
SE m±	0.001	0.00	0.2	0.00	0.6	0.00	1.52	0.101	10.	4	27.8	1.80
CD at 5%	0.003	1	2	3	0	3	3.40	0.215	19	13.9	0	3.90
		0.00	0.2	0.00	0.6	0.00			11.	8	30.2	
		2	4	6	9	9			78	0.24	3	
			0.0		0.0				0.2	0.46	0.32	
			03		04				2		0.65	
			0.0		0.0				0.4			
			05		11				2			

Phosphorus levels												
	1.28	0.37	0.2	0.10	0.5	1.62	53.26	34.87	8.0	9.42	21.4	152.88
F0	1.33	0.39	0	0.11	5	1.65	61.34	39.72	9	11.2	3	168.05
F1	1.37	0.42	0.2	0.12	0.5	1.67	69.45	43.74	9.7	0	26.9	178.10
F2	0.002	0.00	1	0.00	8	0.00	1.91	0.076	5	12.7	5	2.56
SE m±	0.004	1	0.2	2	0.6	3	4.45	0.16	11.	9	30.4	6.42
CD at 5%		0.00	3	0.00	0	0.00			15	0.16	2	
		3	0.0	4	0.0	7			0.1	0.35	0.21	
			03		03				6		0.47	
			0.0		0.0				0.3			
			05		06				3			

Uptake of nutrients

The uptake of nutrients by oats grain and straw was affected by nitrogen and FYM levels are given in (Table 2). The result showed that the uptake of nitrogen, phosphorus and potassium by oat grain and straw increased significantly with application of nitrogen. The highest value were recorded under N₃ (100 kg N/ha) followed by N₂, N₁ and lowest under N₀ (control) treatment. This increment of nutrient may be due to increase grain and straw yield and their concentration as a result of nitrogen application. The related findings were also reported by **Kumpawat (2009), Singh and Singh (2017) and Kumar et. al (2018).**

Application of FYM in oats crop, significant improvement the nutrient uptake by both grain and straw, increasing the levels of FYM in comparison to control. The increment due to higher dose of FYM increases the nutrients in soil and improves grain and straw yield of oat crop. Confirming the findings with those of **Kumar et.al (2010), Singh and Singh (2017) and Pandey et. al (2020) .**

Conclusion:

On the basis of above results of the study concluded that the application nutrient in the form of Nitrogen and FYM sources perform better in terms of growth, yield, protein content and nutrient uptake by oat crop in sandy loam soils of Agra.

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