Effect of different levels nitrogen on fodder quality and yield of Oats: A Review

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Abstract

The application of nitrogen to the oat crop has a major effect Plant height, growth, and leaf length all increased significantly after nitrogen was applied. The productivity and quality of fodder oats improve as nitrogen levels rise. Nitrogen application resulted in higher green and dry fodder yields, as well as improved green and dry fodder output efficiency and quality parameters such as ether extract, crude fibre. The current article was analyzed in the View to investigate the impact of nitrogen fertilizer on oats.

Keywords: Nitrogen, Growth of Oats, Fodder Quality, yield

Introduction

Oats (Avena sativa L.) are a common winter cereal crop used for fruit, feed, and fodder around the world. It is a member of the Poaceae family and ranks sixth in the world's cereal production after wheat, maize, rice, barley, and sorghum. The majority of the oats provided around the world are used as a primary source of feed for livestock. Just 17 percent of grain is used as human food. The ever-rising demand for fodder and feed for sustaining placental mammal production is met through increasing productivity of fodder. According to the projected scenario, the imbalance in demand and supply of fodders require quick attention to establish appropriate strategies to close the gap. Because of its excellent growth habit, fast regeneration potential, and better palatability with more protein and minerals content, oats is the most important rabi season crop grown for animal food under irrigated conditions in the northern and north-western regions of India. In addition, it is used to make animal silage (Chakraborty *et al*., 2016; Kumari *et al*., 2014).

Nitrogen is used extensively by all crops in general, and non-legumes in particular. Nitrogen is a significant constituent of protein and chlorophyll in green plants, in addition to its other functions. Forage digestibility is calculated by a single index. However, because of crop lodging, a higher nitrogen dose is needed. Nitrogen is essential for fodder production since it is consumed in large quantities by the crop. A sufficient nitrogen supply is relate to high photosynthetic activity, vigorous development, and a dark green colour in fodder, as well as being known to aid carbohydrate utilization and increase fodder juiciness. Nitrogen fertilizer is also the key element which influences yield and quality oat forage (Singh and Dubey, 2007; Subrahmanya *et al*., 2017; and Yadav *et al*., 2017).

Effect on Growth

Nitrogen is effect on plant height, leaf length, no of leaves, number of shoots. Singh *et.al*. (2002) studied highest plant height and number of tillers with $N_{80}P_{40}$ Kg ha application. Kumar and Ramavat (2006) found that applying 100% of the recommended NPK (80-60-30 kg ha) resulted in more plant height and shoot number per unit area of oat over the course of all years than applying 75% of the recommended NPK dose. he application of nitrogen to fodder oats substantially increased growth and yields, according to Rawat and Agarwal (2010). Under 100 kg N ha, the maximum plant height and number of leaves per plant (103.3 cm and 25.7/plant, respectively) were reported. Midha *et al*., 2015 found that applying nitrogen at a rate of 120 kg ha-1 increased the height of oat plants from 89.9 to 126.8 cm. According to Godara *et al*. (2016), rising nitrogen levels from 40 to 120 kg ha had a substantial impact on all growth parameters.

Effect of Quality

The protein content of oats was substantially increased after nitrogen was applied. Waheed and his colleagues (2012.) In comparison to other treatments, inorganic sources (N: P_2O_5 150:60) reacted well in terms of maximum crude protein (10.76%), crude fibre (37.00%), and ash (15.14%). Nitrogen content in fodder, hay, and straw, as well as in soil after harvest of an oats crop, was significantly affected by nitrogen levels, according to Devi *et al*. (2010). During both years, nitrogen application increased the protein content of fodder, grain, and straw. According to Jat and Kaushik (2018), applying 110 kg N ha improved quality parameters such as crude protein 1937.13 kg ha, crude fibre 5061.22 kg ha, ether extract 303.25 kg ha, mineral matter 1277.18 kg ha, nitrogen free extract 8877.58 kg ha, and total digestible nutrient 12595.7 kg ha.

Typical Analysis	
Dry matter	89%
Crude Protein	12%
Fat	04.5%
Crude fiber	12.0%
Neutral detergent fiber	28.5%
Acid detergent fiber	14.2%
calcium	0.07%

Source: National Grain & Feed Association

Yield Attributes

In terms of nitrogen amounts, the green fodder yield and dry fodder yield of fodder oats differed significantly. Low to moderate N values increased yield substantially, according to Mohr *et al*. (2007), with an optimum relative yield achieved with a plant-available N supply of approximately 100 kg N ha. Increasing the N rate increased lodging and decreased test weight, kernel weight, and kernel plumpness, implying that optimal N management must strike a balance between yield improvement and grain quality reductions. According to Mahale *et al*. (2003), nitrogen application at 80 kg ha resulted in substantially higher green and dry fodder yields in oats. Significantly lower green fodder yield and dry fodder yield of fodder oats were observed with later sowing dates, which may be attributable to reduced photosynthetic activity as a result of unfavourable weather conditions prevailing during various stages of crops, which negatively affect fodder oats growth efficiency.

N, P and K uptake in fodder

When nitrogen is in an inorganic form, it is taken up by the oat plant. About 98 percent of the nitrogen in the soil is in an organic form that the oat plant cannot absorb. Nitrogen content in fodder, hay, and straw, as well as in soil after harvest of an oats crop, was significantly affected by nitrogen levels, according to Devi *et al*. (2010). Preeti *et al*. (2015) found that applying nitrogen and phosphorus to oat fodder, grain, and straw substantially improved copper, manganese, and iron absorption compared to all other treatments.

Micronutrient removal by Oats

Nutrient	Kg/t of Harvested grain, 100% Dry matter				
	Ca	Na	Mn	Zn	Fe
Grain	0.8	0.2	0.07	0.04	0.05
Grain plus straw	3.6	0.4	0.13	0.06	0.12

Source: https://www.yara.co.uk/crop-nutrition/oats/oat-nutritional-summary

Conclusion

All of the growth parameters, yield attributes, yield, and quality parameters can be concluded from the above studies. In comparison to 40 kg N ha, an 80 kg N ha dose resulted in increased plant height, leaf length, and fodder yield. Green and dry fodder yields, as well as fodder production quality, crude protein, ether extract, and ash content, all increased after 120 kg N ha was applied.

Reference

Singh, S. D., & Dubey, S. N. (2007). Soil properties and yield of fodder oat (Avena sativa L.) as influenced by sources of nutrient and cutting management. *Forage Research*, *33*(**2**), 101-103.

Subrahmanya, D. J., Kumar, R., Tyagi, N., Ram, H., Singh, M., Meena, R. K., ... & Pande, A. K. (2017). Yield of fodder maize (Zea mays) and its chemical composition under varying plant densities and nutrient management. *Indian J. Anim. Nutr*, *34*(**4**), 425-429.

Yadav, M. R., Kumar, R., Parihar, C. M., Yadav, R. K., Jat, S. L., Ram, H., ... & Jat, M. L. (2017). Strategies for improving nitrogen use efficiency: A review. *Agricultural Reviews*, *38*(**1**).

Chakraborty, J. A. Y. E. E. T. A., Arora, R. N., Chhabra, A. K., & Aneja, D. R. (2016). Assessment of relative variability and its distribution pattern in some Avena species. *Forage Res*, *42*, 19-23.

Kumari, A., Kumar, P., Ahmad, E., Singh, M., Kumar, R., Yadav, R. K., ... & Chinchmalatpure, A. (2014). Fodder yield and quality of oat fodder (Avena Sativa) as influenced by salinity of irrigation water and applied nitrogen levels. *Indian Journal of Animal Nutrition*, *31*(**3**), 266-71.

Singh J, Yadav JS, Sheoran RS, Kumar V. Response of oat to nitrogen, phosphorus and sulphur in light textured soils. Haryana J. Agron. 2002; 18(1&2):36-38.

Kumar N, Ramawat N. Effect of NPK and sulphur application on forage production of oat (Avena sativa L.) under rainfed conditions of Northwestern Himalaya. Forage Res. 2006; 32(**1**):1-3.

Rawat. A, Agrawal SB. Effect of soil enrichment in conjunction with bio-organics and chemical fertilizers on yield and quality of fodder oat (Avena sativa L.). Forage Res. 2010; 35(**4**):190-192.

Midha, L. K., Duhan, B. S., & Arya, S. (2015). Performance of promising entries of oat (Avena sativa L.) under different nitrogen levels. *Forage Res*, *41*(**2**), 122-125.

Godara, A. S., Duhan, B. S., & Pahuja, S. K. (2016). Effect of different nitrogen levels on forage yield, quality and economics of oat (Avena sativa L.) genotypes. *Forage Research*, *41*(**4**), 233-236.

Waheed A, Waqas A, Shehzad MA, Shahid M. Nitrogen and phosphorus: impact on forage oat (Avena sativa L.) growth, yield and its quality attributes. Pak. J. Agri. Sci. 2012; 49(**4**):473-479.

Devi U, Singh KP, Sewhag M, Kumar S, Kumar S. Effect of nitrogen levels, organic manures and azotobacter inoculation on nutrient uptake of multi-cut oats. Forage Res, 2010: 36(**1**):9-14

Jat, Kaushik, Quality and economic of fodder oat (Avena sativa L.) as influnced by irrigation and nitrogen under southern Rajasthan. Forage Res. 2018; 44(**1**):28-31.

Mohr RM, Grant CA, May WE, Stevenson FC. The influence of nitrogen, phosphorus and potash fertilizer application on oat yield and quality. Can. J Soil Sci. 2007; 87:459-468.

Mahale BB, Nevase VB, Thorat ST, Dhekale JS. Effect of non-symbiotic nitrogen fixers on the forage yield of oats (Avena sativa L.). Ann. Agri. Res. 2003; 24(**1**):121- 123.

Devi U, Singh KP, Sewhag M, Kumar S, Kumar S. Effect of nitrogen levels, organic manures and azotobacter inoculation on nutrient uptake of multi-cut oats. Forage Res, 2010: 36(**1**):9-14

Preeti Duhan BS, Midha LK, Sheoran HS. Short communication interactive effect of nitrogen, phosphorus and cutting management on micro-nutrients uptake by oat (Avena sativa L.). Forage Res. 2015; 41(**1**):68-71.