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Fodder yield, nutrient uptake and quality of oats (*Avena sativa* L.) as influenced by different agronomic practices

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Introduction

The green fodder requirement and availability in India does not match and leaves a shortfall of about 63%. There is a little possibility of any tangible increase in fodder area due to competition from other economically competitive agricultural crops (Aulakh *et al.,* 2012). Therefore, there is urgent need to maximize the tonnage and quality of fodder within the existing farming systems. Multicut nature of the crop ensures continuous supply of fodder. Kashmir valley possesses temperate type of climate, with snowfall and harsh conditions in the winter. Behaviour of crop under these conditions is entirely different from rest of country, which can be modified through different agronomic manipulations to derive maximum benefits. Sowing time has great impact on fodder yield. In agronomic techniques fertilizer management is the most important aspect. To improve supply of fodder over a period best cutting management needs to be evaluated. In view of these an experiment was undertaken to study the response of fodder oat to different sowing dates, fertility levels and cutting managements.

Materials and Methods

The experiment was conducted during *Rabi* seasons of 2009-10 and 2010-11 at Shalimar campus of Sher-e-Kashmir University of Agricultural Sciences and Technology, Kashmir. The experiment was laid out in factorial randomized block design, having 18 treatment combinations with three replications. The treatments comprised of three sowing dates *viz*. 20 September, 30 September and 10 October; three fertility levels *viz.*, 150:70:40, 125:60:30 and 100:50:20 kg $N:P_2O_5:K_2O$ /ha and two cutting management *viz*., single cut at 50% flowering and double cut on 15 December and 50% flowering stage. The 'sabzar' variety was used. Light pre sowing irrigation was given during both the years of experimentation. Half dose of nitrogen and full dose of phosphorous and potassium was applied to each plot as per treatment through urea, Di-ammonium phosphate, and muriate of potash, respectively as basal. Remaining half dose of nitrogen was applied in two equal splits *i.e*. 30 days after sowing and first week of March, each after weeding. The green fodder yield from net plots, leaving border and penultimate rows, was recorded immediately after the harvesting. Representative plant samples from 25 cm row length in penultimate rows were oven dried at 60-65^{0}C to a constant weight to determine dry matter content. The dried samples were finely powdered and digested. Crude protein was computed form N content in the plants. Crude fiber and Ash content were determined by method described by A.O.A.C. (1995).

Results and Discussion

Crop growth and yield: Early sown crop recorded higher dry matter yield up to 120 days after sowing, which could be attributed to congenial weather for better germination, growth and development of the crop. Sowing on 10 October recorded significant increase in plant height and dry matter towards maturity, followed by 30 September sowing. This was attributed to better regeneration of growth after winter and longer growth period. Increase in the fertility level brought subsequent improvement in growth parameters. Application of higher dose of fertilizer 150:70:40 $N:P_2O_5:K_2O$ kg/ha resulted in higher values for plant growth and dry matter accumulation. This might be due to improvement in soil fertility with respect to primary essential nutrients. Single cut crop recorded significantly higher plant height as compared to double cut crop. This could be attributed to slow growth process after first cut during winter in the later treatment. Green fodder yield showed discernible variation under different sowing dates, fertility and cutting management. There was marked reduction in yield to the tune of 42% in late sown crop. Delayed sowing exposes crop to unfavourable environment and drastically decrease yield (Mubarak and Singh, 2011). Green fodder yield increased with the increase in fertility from lower to higher level. Application of 150:70:40 $N:P_2O_5:K_2O$ kg/ha produced more green fodder yield (36.2 t/ha) over other treatments. This might be due to better growth of crop with enhanced availability of primary essential nutrients *viz*. N, P and K. Higher dose of nitrogen used in combination with phosphorus and potassium increases green fodder yield (Velayudham *et al.,* 2011). Increase in green fodder yield with higher fertility level 150:70:40 $N:P_2O_5:K_2O$

/ha was to the tune of 19 % over lower fertility level 100:50:20 kg $N:P_2O_5:K_2O$ /ha. Double cutting practice recorded higher green fodder yield (35.9 t/ha) as compared to single cutting management. This may be attributed to the fact that the double cutting practice in addition to the supply of fodder at 50% flowering stage, provided additional fodder in December cut. The magnitude of increase in green fodder yield was 15.6 % over single cut crop.

Nutrient uptake: Nutrient uptake with respect to NPK was significantly higher in 30 September sown crop. This may be attributed to the increased fodder and dry matter yield with this treatment. Application of 150:70:40 $N:P_2O_5:K_2O$ /ha had a marked effect on nutrient uptake, which was 29%, 51% and 38% higher over lower fertilizer dose 100:50:20 $N:P_2O_5:K_2O$ kg/ha with respect to N, P and K. Better crop growth, higher crop yield and improvement in nutrient contents due to increased availability of nutrients could be the reason.

Quality parameters: Among the sowing dates 10 October sown crop recorded higher crude protein content, lower crude fiber and ash content. Since protein content is inversely proportional to fiber content, so was decrease in fiber content in 10 October sown crop compared to other treatments. Lower ash content might be due to higher moisture content and lower dry matter yield in this treatment. Increase in fertility level improved crude protein and ash content. This could be attributed to vigorous and luxuriant vegetative growth with higher nitrogen content in the plant tissues. Crude fiber content remained non significant among all the treatments. Higher fertility level registered significant improvement in the ash content over lower fertility levels. Double cut management practice recorded significantly higher crude protein content than single cut crop. However, crude fiber and ash content was significantly higher in single cut.

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