Influence of Integrated Nutrient Management with differential substitution of Farm Yard Manure on Grain Yield and Straw Yield of dual purpose *rabi* fodders

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Abstract— *A field experiment was carried out at the Research Farm of Division of Agronomy of Sher-e-Kashmir University of Agricultural Sciences and Technology, Jammu, Chatha during the rabi season of 2017-18. The soil of the experiment was sandy clay loam in texture, slightly alkaline in reaction, low in organic carbon, available nitrogen and medium in available phosphorus and potassium. The experiment was carried out in randomized block design with 12 treatments and 3 replications. Three different dual purpose rabi fodders viz. Oat, Barley and Wheat were subjected to four integrated nutrient management treatments. The treatments consisted of oat with recommended dose of fertilizers + 25%N through FYM(T_1), oat with 75% recommended dose of fertilizers + 50% N through FYM (T_2), oat with 50% recommended dose of fertilizers+ 75% N through FYM (T_3), oat with 25% recommended dose of fertilizers+100% N through FYM (T_4), barley with recommended dose of fertilizers+ 25% N through FYM (T_5), barley with 75% recommended dose of fertilizers+50% N through FYM (T_6), barley with 50% recommended dose of fertilizers+75% N through FYM (T_7), barley with 25% recommended dose of fertilizers+100% N through FYM (T_8), wheat with recommended dose of fertilizers+25%N through FYM (T_9), wheat with 75% recommended dose of fertilizers+50% N through FYM (T_{10}), wheat with 50% recommended dose of fertilizers+75% N through FYM (T_{11}), wheat with 25% recommended dose of fertilizers+100% N through FYM (T_{12}). Among all the treatments, recommended dose of fertilizers along with 25% N through FYM proved superior in terms of grain and Straw yield. Similarly, the lowest values were obtained where 25% of recommended dose of fertilizers along with 100% of N through FYM was applied.*

Keywords— INM, Rabi fodders, dual purpose, grain yield, straw yield, harvest index.

I. INTRODUCTION

Agriculture is the backbone of the Indian economy and about 58% of the Indian population depends on agriculture (http://www.ibef.org). Due to diverse agro-climatic conditions, successful production of different types of crops could be possible. Different cereals, pulses, oilseeds, beverages, spices etc. are grown on Indian soils. However, we are still far behind in the production of forage, both quantatively and qualitatively for feeding the large livestock population (Sharma, 2008). With the decline in the size of agricultural land holdings and growing food security concern, there is no scope to increase area under fodder production. In order to meet the problems of land shortage and fodder scarcity, cultivation of dual purpose fodders could be a better option. Therefore, growing dual purpose cereal forages can serve both the concerns of growing food demand and food shortage. The demand and supply of green fodder can be covered upto a certain extent by growing dual purpose cereal varieties (Hundal *et al.,* 2014). Hence, it is very essential to maximize the quantity and quality of dual purpose fodder

production per unit area and time by proper management of grassland, pasture and also by utilising proper agro-techniques for fodder production (Jat *et al*., 2015).

II. MATERIALS AND METHODS

The experimental study was carried out at Research Farm of Faculty of Agriculture, Sher-e-Kashmir University of Agricultural Sciences and Technology of Jammu, Main campus Chatha, during *rabi* season of the year 2017-18. Geographically, the experimental site is situated in the sub-tropical Shiwalik foothills of Jammu and Kashmir at $32^{o}\,39'$ N latitude and $74^{0}\,53'$ E longitude at an elevation of 332 meter above mean sea level. The soil of the experiment was sandy clay loam in texture, slightly alkaline in reaction, low in organic carbon and available nitrogen but medium in available phosphorus and potassium with electrical conductivity in the safer range. The research site is endowed with hot and dry early summers followed by hot and humid summers and cold winters. The contribution of South-West monsoon rains which are usually received from June to September is about 75 percent, where as the remaining 25 percent of rains are received in the form of few showers of cyclonic winter rains from December to March with mean annual rainfall of about 1174mm. The experiment was laid out in Randomized Block Design with twelve treatments replicated thrice. The treatments comprised of three different dual purpose *rabi* fodders *viz*. oats, barley and wheat. Full dose of Phosphorus and Potassium along with half dose of N were applied as basal dose through urea, Diammonium phosphate (DAP) and Murate of potash (MOP) respectively and the remaining half was applied in two equal splits, one at first cut and second at 30 days after first cut.

III. RESULTS AND DISCUSSIONS

Persual of the data revealed that application of recommended dose of fertilizers along with 25% N through FYM recorded significantly highest grain yield which was statically at par with 75% recommended dose of fertilizers + 50% N through FYM in all dual purpose fodders under study whereas the application of 25% recommended dose of fertilizers+100% N through FYM recorded lowest grain yield in different dual purpose *rabi* fodders. Among different fodders under experimentation, wheat was found to be the most superior in attaining maximum grain yield of 35.88 q/ha under treatment T_9 followed by barley recording grain yield of 30.66q/ha under treatment T_5 and oats 19.62 q/ha under treatment T_1. Application of 25% recommended dose of fertilizers along with 100% N through FYM resulted minimum grain yield. Maximum straw yield was obtained with the application of recommended dose of fertilizers along with 25% N through FYM whereas the lowest straw yields recorded with the application of 25% recommended dose of fertilizers+100% N through FYM in all the dual purpose *rabi* fodders under study. Comparison of different dual purpose *rabi* fodders under study revealed that wheat was the most superior in attaining maximum straw yield of 47.55 q/ha under treatment T_9 followed by barley 38.12q/ha under treatment T_5 and oats 30.45 q/ha under treatment T_1 whereas the application of 25% recommended dose of fertilizers along with 100% N through FYM recorded minimum straw yield in oats (17.05 q/ha) under treatment T_4 followed by barley (24.25q/ha) under treatment T_8 and wheat (32.07 q/ha) under treatment T_{12} respectively. This might be due to the reason that the combined use of FYM along with inorganics supplied readily available nutrients which improved the formation of assimilates and their translocation from source to sink which ultimately resulted in maximum grain and straw yield. Among all the treatments of Integrated Nutrient Management, harvest index showed parity with each other whereas among different dual purpose *rabi* fodders, significantly highest harvest index was recorded in barley (45.05%) followed by wheat (42.99%) and oats (39.19 %). Similar findings have been reported by Sharma and Kumar (2009), Shinde *et al*., (2017), Saharan *et al*. (2018) and Jadhao *et al*.(2019).

TABLE 1

EFFECT OF INTEGRATED NUTRIENT MANAGEMENT ON GRAIN AND STRAW YIELD (q/ha) OF DUAL PURPOSE *RABI* FODDERS

Treatments	Grain Yield (q/ha)	Straw Yield (q/ha)
T_1 - Oats with recommended dose of fertilizers + 25 % N through FYM	19.62	30.45
T_2 - Oats with 75 % recommended dose of fertilizers + 50 % N through FYM	16.76	27.78
T_3 - Oats with 50 % recommended dose of fertilizers + 75 % N through FYM	13.51	22.35
T_4 - Oats with 25 % recommended dose of fertilizers + 100 % N through FYM	9.18	17.05
T_5 - Barley with recommended dose of fertilizers + 25 % N through FYM	30.66	38.12
T_6 - Barley with 75 % recommended dose of fertilizers + 50 % N through FYM	28.28	35.98
T_7 - Barley with 50 % recommended dose of fertilizers + 75 % N through FYM	23.72	29.07
T_8 - Barley with 25 % recommended dose of fertilizers + 100 % N through FYM	16.77	24.25
T_9 - Wheat with recommended dose of fertilizers + 25 % N through FYM	35.88	47.55
T_{10} - Wheat with 75 % recommended dose of fertilizers + 50 % N through FYM	33.03	42.87
T_{11} - Wheat with 50 % recommended dose of fertilizers + 75 % N through FYM	29.22	37.85
T_{12} - Wheat with 25 % recommended dose of fertilizers + 100 % N through FYM	21.47	32.07
Sem (±)	1.04	1.63
CD (5%)	3.07	4.78

IV. CONCLUSIONS

Based on one season study, it can be concluded that the application of recommended dose of fertilizers along with 25% N through FYM proved superior in terms of grain and straw yield. Among different dual purpose *rabi* fodders, wheat was found to be superior followed by barley and oat respectively.

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