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EFFECT OF NITROGEN, PHOSPHORUS AND POTASSIUM ON YIELD POTENTIAL OF *MOTIHARI* TOBACCO

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Tobacco an important commercial cash crop of West Bengal grows mainly in the northern district of Cooch Behar, Jalpaiguri and Malda, covering an area of 14,000 ha. The present study was under taken to study effect of different inorganic and organic fertilization on yield and quality of *Motihari* tobacco during 2021-2022 crop season. A total of 10 treatment combinations were followed in RBD with three replications and the fertilizers were applied as Urea, SSP and MOP. The results showed that nutrients applied in the form of inorganic @ 112 kg N+ 112 kg P_2O_5+ 112 kg K_2O/ha plus50 kg N+ 20 kg P_2O_5+ 50 kg K_2O/ha in the form of FYM (10 t FYM/ ha) (NPKF) recorded in the cured leaf yield (2265.6 kg/ha), first-grade leaf yield (845.0 kg/ha), and quality outturn (38.0%). The result of this study will be useful for increasing yield of tobacco.

INTRODUCTION

Motihari tobacco (*N. rustica*) has been the major cash crop in *Terai* agro - ecological zone of North Bengal for small and marginal farmers since time immemorial. Its cultivation is distributed mainly in Cooch Behar and Jalpaiguri district in about 10,000 ha. The crop is unique for the reason that almost all portions of the plant have commercial value in the market. Leaf is popular for end users in the manufacture of khaini, Gurakhu, hookah paste, gul etc. and its dried stem is exported to Bangladesh for the manufacture of cigarette bidi i.e. the kandi (small bits) of stem is blended with bidi tobacco and rolled in paper to enhance the burning quality of the product. A good soil quality is the key factor for higher yield and quality production (Arvidsson *et al.,* 2019). The traditional farming system and extreme use of chemical fertilizers affect the soil quality of cultivated land (Delpin Malvezi *et al.,* 2019), resulting in soil compaction, enhanced root resistance and deterioration of soil physical properties (such as soil aeration and water content) in many areas (Kuncoro *et al.,* 2014). Tobacco requires a large amount of nitrogen, phosphorus and potassium and the average nitrogen application rate is 180 kg ha^{-1} (Zheng *et al.,* 2022). To improve crop growth and production, farmers use increased rate of NPK fertilizer. Cameron et al (2013) reported that excessive application of chemical fertilizers can reduce the nitrogen use efficiency and leads to nitrogen loss resulting in land pollution and less farmers' income. However there is no information about the response of *Motihari* tobacco variety to NPK fertilizer in Terai region of West Bengal. Therefore, the present study was under taken to study effect of different inorganic and organic fertilization on yield and quality of *Motihari* tobacco.

MATERIALS AND METHODS

The present experiment was conducted from September to December 2021 at the experimental farm of ICAR-Central Tobacco Research Institute Research Station Dinhata, West Bengal. Field was layed out as permanent plot without disturbing with plot size of 6.3 m 5.4 m since beginning. A total of 10 treatment combinations were followed in RBD with three replications. All the fertilizers were applied as Urea, SSP and MOP. Well rotten cow dung manure was applied 15 days before planting. The seeds of *Motihari* tobacco was sown in the month of October, 2021 and one month old

Key words: Tobacco, yield, quality, NPK, FYM

seedling were transplanted. All other recommended intercultural practices and plant protection measures were followed in all the treatments. The layout of the trail is given in Figure 1. The observations were taken at maturity stage from 5 randomly selected plants for cured leaf yield, first grade leaf yield and quality out-turn. The data were analysed by adopting standard statistical package.

Figure 1: Layout of the experiment

RESULTS AND DISCUSSION

The results showed that nutrients applied in the form of inorganic fertilizers @ 112 kg N+ 112 kg P_2O_5+ 112 kg K_2O/ha plus 50 kg N+ 20 kg P_2O_5+ 50 kg K_2O/ha in the form of FYM (10 t FYM/ha) (NPKF) recorded the maximum cured leaf yield (2265.6 kg/ha), first-grade leaf yield (845.0 kg/ha), and quality out turn (38.0%). Moreover, NPKF recorded 2.4-fold higher cured leaf yield, 5.8-fold higher first grade leaf yield compared to control. Furthermore, nitrogen applied plots found higher leaf yield than nitrogen omission plots. Thus, nitrogen fertilizer plays crucial role to determine the leaf yield and quality of *Motihari* tobacco. Optimizing nitrogen application methods can improve nitrogen use efficiency, and it has been proved that the best way to improve fertilizer use efficiency is to reduce nitrogen application rates (Beatriz Restovich *et al.,* 2019). It is concluded that balanced fertilizer can increase yield and quality of tobacco. In the specific case of tobacco production, both nutrients play a key role in controlling important quality parameters such as cured leaf yield, first grade leaf yield and quality out-turn. Monitoring N applications thoroughly for form, quantity, and timing of application is a

Table 1: Effect of different inorganic and organic fertilization on cured leaf and first grade leaf yield, and quality out-turn

Treatment	Cured leaf yield (kg/ha)	First grade leaf yield (kg/ha)	Quality out-turn (%)
N	1391.3	498.6	33.6
NK	1490.3	545.0	35.8
NP	1784.2	667.1	37.0
NPKF	2265.6	845.0	38.0
PK	1173.9	217.0	19.8
P	1100.2	355.9	11.6
K	1058.8	199.5	19.6
25t FYM	1199.5	234.4	20.8
50 t FYM	1300.7	300.4	25.8
Control	955.1	145.1	15.8
SEm±	43.26	13.37	-
CD	125.32	38.73	-

N: 112 kg/ha, P_2O_5: 112 kg/ha, K_2O: 112 kg/ha

prerequisite in modern agriculture. As in other field crops, balanced N-K fertilization enhances tobacco growth and improves the uptake of both nutrients, which in turn reduces nitrate losses during and after the cropping season. Marchand (2010) reported that more leaf production occur at early N application followed by a later application of K in response to plant requirement.

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