Original Research Article

Impact of biofertilizers and organic manures on Herbage Production of KasuriMethi (*Trigonellacorniculata* L.) CV. – Pusa Kasuri

ABSTRACT

A study was conducted at the Research field, Department of Horticulture, College of Agriculture, Gwalior M.P. during rabi 2021-22. The purpose of the study is to evaluate the plant in terms of various parameters such as AGR, CGR, leaf area, fresh leaf yield and dry leaf yield. The results of the study indicated that the application of organic manures and biofertilizers improved the plant growth and yield. The highest ***median*** AGR (0.311 and 0.395 g/day) at 30-60 and 60-90 DAS, CGR (7.99 and 12.21 g/m^2/day) at 30-60 and 60-90 DAS, leaf area (93.90 cm^2), fresh leaf yield (5.78 Kg/plot) and (96.26 q/ha), dry leaf yield (0.49 Kg/plot) and (8.18 q/ha) were observed in the plants treated with FYM (16 t/ha) + Vermicompost (4 t/ha) + *Rhizobium* (10 ml/kg seed) + PSB (10 ml/kg seed) + KSB (10 ml/kg seed) as compared with control.

1. INTRODUCTION

Kasurimethi (*Trigonellacorniculata* L.) member of the family *Fabaceae* is an herbaceous, bushy, slow growing annual spice crop mainly grown for herbage that to dry herb. It is mainly grown as leafy vegetable and seeds in the plains of north India. It contains important nutrients required for growth and maintenance of human body (Singh *et al.* 2012). Kasurimethi is a semi-arid crop, grows up to 30 cm height and its leaves are pinnate with the size of leaflets being 1.25-2.0 cm and consists bright orange-yellow colored flowers. Pods are 1.2-2.2 cm long, sickle shaped with 4-8 seeds per pod. Kasurimethi is mainly grown for herbage as well as for seed and used as a spice to add aroma and flavour to the food products.

Bio-fertilizers are one of the important nutrient sources in the integrated nutrient management system. Application of *bio-fertilizers* helps in fixing the nitrogen, mobilizes the availability of nutrients and also helps in buildup of the micro flora. Combination effect of organic manures and nitrogen fixing biofertilizers and phosphate solubilizing bacterium helps to increase the availability of nutrients (Babaleshwar*et al*. 2017).

2. MATERIAL AND METHODS

The experiment was conducted Experimental Field, Department of Horticulture, College of Agriculture, Gwalior (M.P.). The experiment was laid out in the Randomized Block Design with three replications. Each replication was comprised of sixteen treatments consisting organic manures i.e.

FYM and Vermicompost and bio-fertilizers i.e. *Rhizobium*, PSB and KSB were applied for enhancing the crop physiological parameters and herbage yield of kasurimethi (*Trigonellacorniculata* L.) cv. Pusa Kasuri. The details of treatment combination used are T_0 - Control, T_1 – FYM (16 t/ha), T_2 - Vermicompost (4 t/ha), T_3 - *Rhizobium* (30 ml/kg seed), T_4 - PSB (30ml/kg seed), T_5 - KSB (30 ml/kg seed), T_6 - FYM (16 t/ha) + *Rhizobium* (30 ml/kg seed), T_7 - FYM (16 t/ha) + PSB (30 ml/kg seed), T_8 - FYM (16 t/ha) + KSB (30 ml/kg seed), T_9 - Vermicompost (4 t/ha) + *Rhizobium* (30ml/kg seed), T_{10} - Vermicompost (4 t/ha) + PSB (30 ml/kg seed), T_{11} - Vermicompost (4 t/ha) + KSB (30 ml/seed), T_{12} - FYM (16 t/ha) + *Rhizobium* (10 ml/kg seed) + PSB (10 ml/kg seed) + KSB (10 ml/kg seed), T_{13} - Vermicompost (4 t/ha) + *Rhizobium* (10 ml/kg seed) + PSB (10 ml/kg seed) + KSB (10 ml/kg seed), T_{14} - FYM (16 t/ha) + Vermicompost (4 t/ha) + *Rhizobium* (10 ml/kg seed) + PSB (10 ml/kg seed) + KSB (10 ml/kg seed), T_{15} - *Rhizobium* (10 ml/kg seed) + PSB (10 ml/kg seed) + KSB (10 ml/kg seed).

The experimental plot was ploughed thrice by tractor drown cultivator and leveled. The clods were crushed weeds were removed and brought to fine tilt. The land was divided into plots of required size (1.90 m x 2.70 m). Provision was made for bunds and irrigation channels. The seeds of the variety Pusa Kasuri were used with the seed rate of 18-20 Kg/ha.

Observation were done at different stages of growth period such as AGR (g/day) at 30-60 and 60-90 DAS, CGR (g/m^2/day) at 30-60 and 60-90 DAS,Leaf area (cm^2) at 60 DAS and yield parameter like Fresh leaf yield (kg/plot), Fresh leaf yield (q/ha), Dry leaf yield (kg/plot), Dry leaf yield (q/ha).

3. RESULT & DISCUSSION

There was significantly effect of various treatments on AGR and CGR at different interval from day after sowing.Among Different level of treatment T_{14} was excellent treatment for enhancing AGR (g/day) and CGR (g/m^2/day) in kasurimethi plant at different development stages and it also approved the maximum AGR (0.311 g/day) and CGR (7.99 g/m^2/day)at 30-60 DAS and AGR (0.395 g/day) and CGR (12.21 g/m^2/day) at 60-90 DAS, whereas minimum AGR and CGR was recorded in T_0 – Control.It may be due to higher nutrient uptake and bioactive substances which have a similar effect of GA_3 and cytokinin. This helps in breaking of apical dominance and accelerated higher number of branches, which increased the AGR and CGR of the plant. The results are in confirmation with the results achieved byKusuma *et al.* (2019), Babaleshawar*et al*. (2020) and Raghuwanshi*et al*. (2021).

The result revealed that the different organic manures and bio-fertilizers was significantly enlarge the leaf area of kasurimethi and the treatment T_{14} was outstanding treatment for extension of leaf area in kasurimethi, it also established the maximum leaf area (3.90 cm^2) at 60 DAS, treatment T_0 – Control was documented the minimum leaf area (2.00 cm^2) at 60 DAS. This may be due to production of more number of branches and plant height and which enhanced availability of nutrients at the appropriate time, which has increased the leaf area. Findings are in agreement with those ofRaiyani*et al*. (2018), Suman *et al*. (2019), Kusuma *et al.* (2019) and Sahu *et al*. (2020).

Among the different levels of treatment T_{14} was recorded maximum fresh leaf yield (5.78 kg/plot).It was at par to treatment T_9, T_{10}, T_{11}, T_{12} and T_{13}. Otherwise, treatment T_0 – Control was recorded the minimum fresh leaf yield.Among the different levels of treatment T_{14} was recorded maximum fresh leaf yield (96.26 q/ha) were as the minimum fresh leaf yield (80.57 q/ha) was recorded in T_0 – Control,respectively. Similar finding were also reported by Meena*et al*. (2018), Kusuma *et al.* (2019), Babaleshawar*et al*. (2020) and Chandan *et al*. (2021).

Amongthe different levels of treatmentT_{14} was recorded significantly maximum dry leaf yield (0.49 kg/plot), were as the minimum dry leaf yield (0.41 kg/ha)was recorded in treatment T_0 – Control, respectively. Amongthe different levels of treatmentT_{14} was recorded significantly maximum dry leaf yield (8.1 q/ha), were as the minimum dry leaf yield (6.85 q/ha)was recorded in treatment T_0 – Control, respectively.It might be due to combined application of *Rhizobium,* PSB and KSB with different organic manures, which resulted in better utilization of inorganic nitrogen, greater biological N fixation and more synthesis of plant growth hormones. It enhances the dry matter accumulation in leaves and dry leaf yield in kasurimethi. Similar results for most of the characters were also reported by Murali *et al*. (2018), Raiyani*et al*. (2018), Babaleshawar*et al*. (2020) and Sahu *et al*. (2020).

Table 1: Effect of organic manures and bio-fertilizers on AGR (g/day) and CGR (g/m^2/day)) at 30-60 and 60-90 DAS of kasurimethi

Treatments detail	AGR (g/day) at 30-60 DAS	AGR (g/day) at 60-90 DAS	CGR (g/m^2/day) at 30-60 DAS	CGR (g/m^2/day) at 60-90 DAS
T_0	0.225	0.295	6.95	9.20
T_1	0.248	0.326	7.37	10.42
T_2	0.256	0.326	7.46	10.55
T_3	0.241	0.311	7.13	9.69
T_4	0.243	0.317	7.28	9.87
T_5	0.227	0.297	7.01	9.46
T_6	0.260	0.330	7.54	10.74
T_7	0.267	0.337	7.60	10.99
$T_{8\ median}$	***0.256***	***0.326***	***7.46***	***10.55***
T_9	0.274	0.350	7.80	11.52
T_{10}	0.280	0.369	7.85	11.56
T_{11}	0.272	0.344	7.75	11.43
T_{12}	0.299	0.380	7.89	11.72
T_{13}	0.310	0.389	7.90	12.01
T_{14}	0.311	0.395	7.99	12.21
T_{15}	0.247	0.318	7.32	10.22
SEm ±	**0.005**	0.005	**0.047**	0.077
CD 5%	**0.014**	0.014	**0.136**	0.222

Table 2;Effect of organic manures and bio-fertilizers on leaf area (cm^2) at 60 DAS,fresh leaf yield (kg/plot), (q/ha),dry leaf yield (kg/plot) and (q/ha) of kasurimethi

Treatments detail	Leaf area (cm^2) at 60 DAS	Fresh leaf yield (Kg/plot)	Fresh leaf yield (q/ha)	Dry leaf yield (Kg/plot)	Dry leaf yield (q/ha)

T_0	2.00	4.84	80.57	0.41	6.85
T_1	2.63	5.15	85.72	0.44	7.29
T_2	2.74	5.19	86.54	0.44	7.36
T_3	2.22	5.00	83.36	0.43	7.09
T_4	2.34	5.08	84.67	0.43	7.20
T_5	2.15	4.95	82.40	0.42	7.00
T_6	2.69	5.29	88.19	0.45	7.50
T_7	2.95	5.26	87.70	0.45	7.45
T_8	2.82	5.26	87.55	0.45	7.44
T_9	3.34	5.43	90.46	0.46	7.69
T_{10}	3.53	5.51	91.79	0.47	7.80
T_{11}	3.16	5.37	89.38	0.46	7.60
T_{12}	3.71	5.58	92.92	0.47	7.90
T_{13}	3.82	5.71	95.17	0.48	8.09
T_{14}	3.90	5.78	96.26	0.49	8.18
T_{15}	2.41	5.13	85.39	0.44	7.26
SEm ±	**0.155**	**0.157**	**2.612**	**0.013**	**0.222**
CD 5%	**0.447**	**0.453**	**7.544**	**0.038**	**0.641**

4. CONCLUSION

According to the current research, the use of organic manures and biofertilizers had a significantly positive impact on the growth and herbage yield of kasurimethi. Among the various treatments that were evaluated, T_{14} – FYM (16 t/ha) + Vermicompost (4 t/ha) + *Rhizobium* (10 ml/kg seed) + PSB (10 ml/kg seed) + KSB (10 ml/kg seed) yielded the most favorable results in terms of growth viz., AGR (0.311 and 0.395 g/day) at 30-60 and 60-90 DAS, CGR (7.99 and 12.21 g/m^2/day) at 30-60 and 60-90 DAS, leaf area (93.90 cm^2) and herbage yield viz., fresh leaf yield (5.78 Kg/plot) and (96.26 q/ha), dry leaf yield (0.49 Kg/plot) and (8.18 q/ha).

REFERENCES

Babaleshwar, S.B., Shetty, G. R., Shivakumar, S. J. and Nadukeri, S. (2017). Influence of integrated nutrient management on growth and physiological attributes of kasurimethi (*Trigonellacorniculata*L.) under hill zone of Karnataka. *Environment & Ecology,* **35**(2): 661-665.

Babaleshawar, S., Shetty, G.R., Pooja, D.A. and Bhat, R. (2020). Performance of KasuriMethi (*Trigonellacorniculata*L) under Hill Zone of Karnataka. *International Journal of Current Microbiology and Applied Sciences,* **9**(6):1758-1762.

Chandan, T.K., Lakshminarayana, D., Seenivasan, N., Joshi, V. and Kumar, S.P. (2021). Growth and yield of KasuriMethi (*Trigonellacorniculata*L.) var. Pusa Kasuri as influenced by different organic manures and biofertilizers under Telangana conditions. *International Journal of Horticulture and Food Science*, **3**(2): 26-30.

Kusuma, M.V., Venkatesha, J., Ganghadarappa, P.M., Hiremath, J.S., Mastiholi, A.B. and Manjunatha, G. (2019). Effect of integrated nutrient management on growth and yield of fennel (Foeniculum vulgare Mill.).

Meena, R.D., Lal, G., Mehta, P., Sharma, Y.K., Meena, S.S., Meena, R.D., Meena, N.K., Mishra, B.K. R., Meena, R.L., Meena, N.L. and Tripati, G.K. (2018). Efficacy of soil solarization on growth and yield of cumin (*Cuminum cyminum* L.) under arid conditions. *International Journal of Seed Spices,* **8**(1): 74-79.

Murali, M., Rajiv, U. and Hemant, K. (2018). Effect of different levels of organic manure on the growth and yield of mustard (Brassica juncea L.) under jatropha (Jatropha circus L.) based agroforestry system. *Journal of Pharmacognosy and Phytochemistry,* **7**(4): 955-958.

Raghuwanshi, D., K., Tomar, K., S. (2021) 'Study of organic production techniques of fenugreek (*Trigonellafoenum-graecum* L.)' M. Sc (Ag/Horti) Thesis, RVSKVV Gwalior, College of Agriculture, Gwalior (M.P.).

Raiyani, V., N., Kathiriya, R., K., Thummer, V., M. and Rupareliya V., V. (2018) 'Effect of FYM and biofertilizers on growth, yield attributes and yield of fenugreek (*Trigonellafoenum-graecum* L.)'*International Journal of Chemical Studies*, 6(**4**): 746-748.Sahu, P.K., Naruka, I.S., Haldar, A., Chundawat, R.S. and Kumar, L. (2020). Studies on the effects of integrated nutrient management on fenugreek (*Trigonellafoenum-graecum*L.). *International Journal of Chemical Studies*, **8**(2): 1082-1089.

Singh, S., Choudhary ,M., R., Garhwal , O., P., Jakhar, M., L and Yadav, B., L. (2012) 'Effect of biofertilizers and inorganic sources of Nitrogen and Phosphorus on quality production of kasurimethi (*Trigonellacorniculata*)'*International J. Seed Spices* 2(2),38-40

Suman, P., Lakshminarayana, D., Prasanth, P. and Saida Naik, D. (2019). Effect of integrated nutrient management on yield parameters of coriander (*Coriandrum sativum* L.) cultivars under Telangana conditions. *International Journal of Chemical Studies,***7**(1): 392-394.