International Journal of Plant & Soil Science

Volume 37, Issue 6, Page 250-259, 2025; Article no.IJPSS.137408
ISSN: 2320-7035

Effect of Different Nitrogen Sources on Seed Quality and Economics of Kasuri Methi (*Trigonella corniculata* L.)

Shiv Kumar [a], Suresh Kumar Tehlan [a], Sumit Deswal [a], Uday Singh [a], Randeep Singh [a], Amit Kumar [a]* and Sumit Kumar [a]

[a] Department of Vegetable Science CCS HAU, Hisar, India.

Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Article Information

DOI: https://doi.org/10.9734/ijpss/2025/v37i65505

Open Peer Review History:
This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: https://pr.sdiarticle5.com/review-history/137408

Original Research Article

Received: 01/04/2025
Accepted: 04/06/2025
Published: 07/06/2025

ABSTRACT

Kasuri methi (*Trigonella corniculata* L.) has a number of therapeutic purposes, including lowering cholesterol levels, eliminating skin blemishes and markings, serving as a carminative, an antipyretic tonic, and an aphrodisiac, as well as being incredibly effective in treating dyspepsia and impaired liver function. The present investigation was carried out at Vegetable Research Farm and in the laboratories of the Department of Seed Science and Technology, CCS Haryana Agricultural University, Hisar, during the *Rabi* season of 2022-23 to assess the effect of different nitrogen sources on seed quality and economics of kasuri methi. The material consisted of a newly developed kasuri methi variety "Hisar Kasuri Methi - 7" which was grown with eighteen treatment combinations of organic manures (Farmyard manure (FYM), Vermicompost), inorganic fertilisers

**Corresponding author: E-mail: amitkn1997mi@gmail.com;*

Cite as: *Kumar, Shiv, Suresh Kumar Tehlan, Sumit Deswal, Uday Singh, Randeep Singh, Amit Kumar, and Sumit Kumar. 2025. "Effect of Different Nitrogen Sources on Seed Quality and Economics of Kasuri Methi (Trigonella Corniculata L.)". International Journal of Plant & Soil Science 37 (6):250-59. https://doi.org/10.9734/ijpss/2025/v37i65505.*

and biofertilizer (*Rhizobium*). The crop was sown on 20 November 2022 with a randomised block design (RBD). All the treatment combinations were evaluated for different seed quality parameters. The collected data for various parameters were statistically analysed using OPSTAT, and the treatments were compared at a 5% level of significance. Experimental results revealed that significantly highest seed quality attributes *viz.,* test weight (1.70 g), standard germination (89.67 %), seedling length (9.10 cm), seedling dry weight (3.98 mg), vigour index-I (807.33) and vigour index- II (357.17) were observed under treatment T_5 (100 % RDN through Vermicompost + *Rhizobium* (seed treatment)**,** whereas, minimum was recorded under treatment T_{18} (Control). From the economic point of view, the treatment combination having 100 % RDN (Inorganic) + *Rhizobium* (T_1) gave maximum net returns (Rs 47607.20) and minimum net returns was found under control (Rs.18950.00). The benefit - cost ratio (1.87) was found maximum under treatment T1 (100 % RDN (Inorganic) + *Rhizobium)* and minimum was found under control (0.75).

Keywords: Kasuri Methi; vermicompost; rhizobium; farmyard manure; seed quality; germination; economics.

1. INTRODUCTION

Kasuri methi (*Trigonella corniculata* L.) is a member of the Fabaceae family, and it is a semi-arid crop. Depending on the region, it is referred to as kasturi methi, Marwari methi, champa methi (Hindi), pirang (Bengali), and sickle-fruited fenugreek in English. It is a significant source of vitamins, minerals, and dietary fibre. Its extract is used as a flavouring, baldness treatment, and digestive and metabolic enhancer. The yield of Kasuri methi is about three times less than that of desi methi or fenugreek, but it is a more profitable crop than fenugreek (*T. foenumgraecum* L.) because its leaves and seeds both are economic. It is used as a vegetable, spice, as well as fodder and to some extent for medicinal purposes (Sapra et al., 2025). According to Sethi *et al*. (1990), it has a number of therapeutic purposes, including lowering cholesterol levels, eliminating skin blemishes and markings, serving as a carminative, an antipyretic tonic, and an aphrodisiac, as well as being incredibly effective in treating dyspepsia and impaired liver function. The seeds are used to cure a variety of conditions, including dropsy, chronic cough, diarrhoea, dysentery, diabetes, rickets, enlargement of the liver and spleen, and gout. The green leaves of kasuri methi contain 86.1% water, 4.4% protein, 0.9% fat, 1.1% fibre, 6.0% other carbs, and 1.5% ash. Furthermore, leaves are rich in vitamins, including carotene (2.34 mg/100g of fresh edible portion), thiamine (0.04 mg), riboflavin (0.31 mg), nicotinic acid (0.8 mg), and vitamin C (52.0 mg/100g of edible portion), as well as a number of alkaloids, including trigonelline, choline, gentianine, and carpain (Anupama *et al*., 2017). Additionally, steroidal substances such as diosgenin (73.2%), trigogenin (2.5%), yuccagenin (19.9%), and gitogenin (4.4%) are known to be present in fenugreek seeds (mg/g dry weight).

“India is known as a home of spices, and it is the world's largest producer, consumer and exporter of spices, which are being cultivated widely in the country over different agro-climatic zones” (Bhati et al., 2022). The country leads the globe in both kasuri methi’s production (248203 tons) and area (167468 ha). Rajasthan, Madhya Pradesh, Maharashtra, Haryana, Punjab, Gujarat, and Uttar Pradesh are the primary kasuri methi-producing states in India. More than 65 % of the total acreage and production (971340 ha and 1161352 tons) were produced by Rajasthan alone during 2021-22. It is mostly cultivated commercially in the south-western districts of Haryana, particularly in Hisar, Bhiwani, Rohtak, Sirsa, Mohindergarh, and Rewari, where both soil and climate are favourable for its growth and development (Anonymous, 2015).

It is a slow-growing plant and remains in a rosette condition during vegetative growth, and bears bright orange-yellow flowers, which are borne on long stalks. Its pods are 2-3 cm long and sickle-shaped, seeds are smaller and scented. Its seed matures in 130-140 days after sowing. The average yield of green is 150-225 q/ha (Fageria, 2015).

“Nitrogen is vital to plants because it is a major component in chlorophyll, amino acids and is also required for the growth of the plants. Nitrogen promotes the leaf, stem and other vegetative growth. It also increases the protein content” (Yadav et al., 2024). Kasuri methi is highly responsive to nitrogenous fertiliser application, especially in the early stage.

Nitrogen supports the leaf, stem and root growth and development. The plant needs nitrogen for vegetative growth, resulting in higher green and seed yield. Nitrogen plays a very important role in chlorophyll synthesis in plants. Nitrogen is a crucial component of many substances that help plants to synthesise many amino acids, proteins, nucleic acids, porphyrin, flavin, pyridines, nucleotides, enzymes, coenzymes, and alkaloids. Kasuri methi cultivation helps in fixing the atmospheric nitrogen because it is a legume crop, and improper nutrient management leads to poor seed quality. “The production of a sufficient quantity of FYM has great potential for supplementing chemical fertilisers. Besides being a source of plant nutrients, it has a wonderful effect on the physical, chemical and biological properties of the soil. The limitations associated with its minimum use in agriculture lie in its unavailability, bulkiness and prior microbial decomposition, requiring time to release nutrients. On the other hand, the synthetic source of nitrogen (*eg,* Urea) is water soluble and gives an immediate greening effect on the crops, attracting the farmers to blindly apply urea as soon as symptoms of chlorosis appear.Seed quality of kasuri methi is known to be influenced by different factors such as nutrition, cultural practices, etc. Among these, nutrition plays an important role and has a great influence on seed quality” (Sharma *et al.,* 2006).

“Use of organic manures (vermicompost, FYM) and biofertilizers such as nitrogen-fixing bacteria (*Rhizobium*) has led to a decrease in application of chemical fertilisers and has provided high-quality seeds free from harmful agrochemicals for human safety” (Migahed *et al.,* 2004; Khalid *et al.,* 2005).

“Seeds are an important component of agricultural production in India. Quality seed is a must for a successful crop production programme. The quality of seed plays an important role in agricultural production as well as in the national economy. Therefore, it is necessary to always use good-quality seed for sowing that enhances the production and productivity of crops. Availability of viable and vigorous seed at the sowing time is a must for achieving targets of agricultural production because good quality seed acts as a catalyst for realising the full potential of other inputs. With time, the total cultivable area is decreasing due to an overgrowing population, so increased agricultural productivity is the only option that we have. Good seed in good land always yields abundant. The use of good-quality seeds increased the productivity of the crop by 15-20%” (Gopalsamy et al., 2025).

Because seeds are the basis of agriculture, yields and crop quality would suffer significantly without a consistent supply of high-quality seed. Planting quality seed is one technique to boost productivity without significantly expanding the area of land already under cultivation. Seed quality is most important and necessary for crop development. The desired outcome after using quality seeds is the increase in crop production, resistance to insect-pests and diseases.

Hooda and Tehlan (2014) found that the maximum test weight (18.6 g) and germination percentage (85%) were obtained with the seed treatment with *Rhizobium* + N 45 kg/ha, while maximum seed vigour index (2465) was found in treatment *Rhizobium* + FYM 20 t/ha in coriander.

Sen *et al.* (2022) found that in treatment T_{12}, when 100% RDF + FYM + bio-fertiliser was used, the highest and nearly double gross return (Rs 2,56,200/-) was recorded in coriander.

According to Somdutt *et al*. (2019), the conditions that produced the highest net return (Rs 70,781.15/ha) and the highest BC ratio (1.96 /ha) were 100% RDF + vermicompost 2.5 t/ha + *Rhizobium* in fenugreek. The present investigation was carried out to assess the effect of different nitrogen sources on seed quality and economics of kasuri methi.

2. MATERIALS AND METHODS

The present experiment was carried out at the Research Farm, Department of Vegetable Science and in the laboratories of the Department of Seed Science and Technology, CCS Haryana Agricultural University, Hisar, Haryana, during the *Rabi* season of 2022-23. The field is located 215.2 m above mean sea level between 29°10' North latitude and 75°46' East longitude. The soil texture of the experimental site was sandy loam with pH 8.11, E.C. of 0.39 dS/m and organic carbon of 0.39 %. Available nitrogen, phosphorus and potassium contents were 140, 20.00 and 214.00 kg/ha, respectively. The variety “Hisar Kasuri Methi - 7” of kasuri methi was grown with the recommended cultural practices. The biofertilizer *Rhizobium* was used as seed treatment @ 62.5 ml/ha of seed while FYM and Vermicompost were used @ 20 t/ha and 3.125 t/ha respectively. The samples were analysed for quality characters viz., test weight (g), standard germination (%), seedling length (cm), dry weight (mg), seedling vigour index-I and seedling vigour index-II. The crop was sown on 20 November 2022 with a randomised block design (RBD) having three replications, with eighteen treatments in each replication and having plot size of 3 m × 2.4 m with a spacing of 30 cm × 10 cm was used to conduct the experiment. All agronomic practices were followed timely manner for the successful raising of the crop. Crop harvesting on 5 April 2023 and threshing on 18 April 2023 were done.

Treatment details:

T_1: 100% RDN (Inorganic) + *Rhizobium* (seed treatment)
T_2: 75% RDN (Inorganic) + *Rhizobium* (seed treatment)
T_3: 100% RDN through FYM + *Rhizobium* (seed treatment)
T_4: 75% RDN through FYM + *Rhizobium* (seed treatment)
T_5: 100 % RDN through Vermicompost + *Rhizobium* (seed treatment)
T_6: 75% RDN through Vermicompost + *Rhizobium* (seed treatment)
T_7: 75% RDN (Inorganic) + 25 % RDN through FYM + *Rhizobium* (seed treatment)
T_8: 50% RDN (Inorganic) + 50 % RDN through FYM + *Rhizobium* (seed treatment)
T_9: 75% RDN (Inorganic) + 25 % RDN through Vermicompost + *Rhizobium* (seed treatment)
T_{10}:50% RDN (Inorganic) + 50 % RDN through Vermicompost + *Rhizobium* (seed treatment)
T_{11}: 75 % RDN through FYM + 25 % RDN through Vermicompost + *Rhizobium* (seed treatment)
T_{12}: 50% RDN through FYM+ 50 % RDN through Vermicompost + *Rhizobium* (seed treatment)
T_{13}: 75 % RDN through Vermicompost + 25 % RDN through FYM + *Rhizobium* (seed treatment)
T_{14}: 100% RDN (Inorganic)
T_{15}: 100% RDN through FYM
T_{16}: 100 % RDN through Vermicompost
T_{17}: *Rhizobium* (seed treatment)
T_{18}: Control

For Test weight, 1000 seeds replicated thrice in each treatment were counted, weighed, and the average seed weight of each treatment was calculated and expressed in grams. 100 seeds in three replications and each of treatment were taken and weighed on an electrical balance. Seed germination (%) was calculated by the no. of seeds germinated/no. of seeds sown × 100. The seeds from each treatment combination were tested for germination by using between paper towel method, kept at optimum conditions of temperature (25^{0}C). The no. of normal seedlings was counted at the end of 14 days, and the seed germination (%) was calculated by using the above formula. The seedling length (cm) was recorded at the end of the 14th day by randomly selecting 10 seedlings, which were averaged. The seedlings used for measuring length were kept in a paper bag and dried in a hot air oven at a constant temperature of 800^{0}C for 3 days, and then the seedlings were cooled in a dessicator and the weight was recorded by using an electronic balance and expressed in mg. Seedling vigour, index-1 and II was calculated by multiplying seed germination (%) with seedling length (cm) and seedling dry weight (mg), respectively.

Net returns of each treatment were calculated by deducting the total cost (TC) of cultivation from the gross return (GR). The Benefit Cost Ratio (BCR) was calculated by dividing gross returns by the cost of cultivation. The collected data for various parameters were statistically analysed using OPSTAT, and the treatments were compared at a 5% level of significance.

3. RESULTS AND DISCUSSION

Seed quality parameters: The highest seed quality attributes *viz.,* test weight (1.70 g), standard germination (89.67 %), seedling length (9.10 cm), seedling dry weight (3.98 mg), vigour index-I (807.33) and vigour index- II (357.17) were observed under treatment T_5 (100 % RDN through Vermicompost + *Rhizobium* (seed treatment)) followed by treatment T_{13} (75 % RDN through VC + 25 % RDN through FYM + *Rhizobium)*, which was at par with the treatment T_{10} (50 % RDN (Inorganic) + 50 % RDN through VC + *Rhizobium)* and treatment T_{12} (50% RDN through FYM+ 50 % RDN through Vermicompost + *Rhizobium*).

According to Deshmukh *et al.* (2020), application of 80 kg N + *Rhizobium* had the highest quality parameters in fenugreek in terms of seedling length, seedling dry weight, vigour index I, vigour index II and test weight.

Choudhary *et al.,* (2019), evaluated the effects of various nitrogen sources on fenugreek and found that FYM 5 t/ha + *Rhizobium* application and the 100% recommended dose of inorganic fertiliser resulted in significantly higher test weight, seedling length, seedling dry weight, vigour index I, vigour index II in seeds. With FYM 5 t/ha + *Rhizobium* and vermicompost 2.5 t/ha + *Rhizobium*, respectively, the absorption of nitrogen and phosphorus by the seed was greater.

In their research on the impact of integrated nutrient management on fennel seed quality, Kumar *et al.* (2019) found that both organic and inorganic fertilisers had a substantial impact on the fennel crop's seed quality. Maximum standard germination was observed to be 91.43 %, which was 21.7% higher than the control.

According to Sharma *et al.* (2016), higher coriander seed test weight was achieved using nitrogen doses of 90–120 kg/ha and 30 cm row spacing.

Highest vigour index-I and II were recorded in the seeds which received the treatment 100 per cent RDN through vermicompost along with biofertilizers due to release of certain enzymes by the metabolites responsible for conversion of macromolecules into micromolecules within the seed, and an increase in mobilization efficiency led to improved vigour index (Maruthi and Paramesh, 2016).

The higher germination percentage also might be due to the bolder seeds that contain greater metabolites for resumption of embryonic growth during germination and better accumulation of food reserves like protein and carbohydrates, as reported by Anitha *et al.* (2015) in fenugreek.

Anitha *et al*. (2015) also reported the increase in vigour index with combined application of inorganic and organic manure, which might be due to the availability of macro nutrients from inorganic sources and the positive effect of bio-inoculants on germination and seed quality (bold seeds) that directly improves vigour index.

Chaudhary and Tehlan (2014) found that an increase in seedling length of fenugreek seed might be due to the release of certain enzymes by metabolites, which are responsible for the conversion of macromolecules into micromolecules within the seed and an increase in mobilisation efficiency.

Tripathi *et al.* (2013) also reported an increase in test weight by supplementing inorganic fertilisers with organic sources, which improved the general soil environment, physico-chemical and biological conditions, and helped in improving the test weight in kasuri methi.

Economics: The treatment combination of 100 % RDN (Inorganic) + *Rhizobium* (T_1) gave maximum net returns (Rs 47607.20/ha), followed by the treatment having 75 % RDN (Inorganic) + 25 % RDN through VC + *Rhizobium* (T_9) and 75 % RDN (Inorganic) + 25 % RDN through FYM + *Rhizobium* (T_7), and minimum net returns were found under control (Rs. 18950.00/ha). The benefit-cost ratio (1.87) was found to be maximum under treatment with 100 % RDN (Inorganic) + *Rhizobium* (T_1), followed by T_9 (1.67), and minimum was found under control (0.75).

According to Pushpa *et al*., (2022) found that in fenugreek treatment T15 Vermicompost + *Rhizobium* produced the highest net profit of Rs. 100113.00 with a B:C ratio of 1.58, followed by treatment T14 (Vermicompost + *Rhizobium*), which produced a net return of Rs. 94212 and a B:C ratio of 1.13 compared to the control's Rs. 41939.00 and 0.74, respectively.

Sen *et al.* (2022) found that in treatment T_{12}, when 100% RDF + FYM + bio-fertiliser was used, the highest and nearly double gross return (Rs 2,56,200/-) was recorded in coriander. According to Somdutt *et al*. (2019), the conditions that produced the highest net return (Rs 70,781.15/ha) and the highest BC ratio (1.96 /ha) were 100% RDF + vermicompost 2.5 t/ha + *Rhizobium* in fenugreek.

According to a study by Desai *et al*. (2020), in alfalfa and found that 50% RDN through vermicompost + *Rhizobium* + 50% RDN through fertiliser (T9) was the treatment that produced the highest gross return of Rs 83817/ha, followed by 50% RDN through castorcake + 50% RDN through fertiliser + *Rhizobium* (T10) and 50% RDN through FYM + 50% RDN through fertiliser + *Rhizobium* (T8). Under 100% RDN treatment using FYM + *Rhizobium* (T2), the lowest gross realisation (Rs 60640/ha) was noted.

Shivran *et al.,*(2017), reported that among the different nutrient management practices, significantly higher mean values were recorded for seed yield (474 kg/ ha), gross monetary returns (75840 Rs /ha), net monetary returns (57861 Rs/ha) and benefit - cost ratio (3.22) in treatment with 50% recommended dose fertilizers through vermicompost + 50% RDF through chemical fertilizers in cumin. Therefore,

Table 1. Effect of different nitrogen sources on seed quality of kasuri methi

Sr. No	Treatments	Test weight (g)	Standard germination (%)	Seedling length (cm)	Seedling dry weight (mg)	Vigour index-I	Vigour index-II
T_1	100% RDN (Inorganic) + Rhizobium (seed treatment)	1.57	83.33	7.90	3.36	658.33	280.00
T_2	75% RDN (Inorganic) + Rhizobium (seed treatment)	1.45	80.00	7.50	3.24	600.00	259.47
T_3	100% RDN through FYM + Rhizobium (seed treatment)	1.50	81.33	7.66	3.29	623.28	267.86
T_4	75% RDN through FYM + Rhizobium (seed treatment)	1.40	78.67	7.43	3.11	584.49	244.92
T_5	100 % RDN through Vermicompost + Rhizobium (seed treatment)	1.70	89.67	9.10	3.98	807.00	357.17
T_6	75% RDN through Vermicompost + Rhizobium (seed treatment)	1.49	80.67	7.50	3.29	605.27	265.12
T_7	75% RDN (Inorganic) + 25 % RDN through FYM + Rhizobium (seed treatment)	1.53	81.67	7.75	3.32	633.19	270.86
T_8	50% RDN (Inorganic) + 50 % RDN through FYM + Rhizobium (seed treatment)	1.50	81.33	7.67	3.30	623.56	268.13
T_9	75% RDN (Inorganic) + 25 % RDN through Vermicompost + Rhizobium (seed treatment)	1.58	84.00	7.93	3.39	665.84	284.48
T_{10}	50% RDN (Inorganic) + 50 % RDN through Vermicompost + Rhizobium (seed treatment)	1.62	88.33	8.53	3.73	750.64	326.48
T_{11}	75 % RDN through FYM + 25 % RDN through Vermicompost + Rhizobium (seed treatment)	1.56	82.00	7.88	3.35	646.43	274.70
T_{12}	50% RDN through FYM+ 50 % RDN through Vermicompost + Rhizobium (seed treatment)	1.60	86.00	8.50	3.40	733.83	293.25
T_{13}	75 % RDN through Vermicompost + 25 % RDN through FYM + Rhizobium (seed treatment)	1.66	88.67	9.00	3.74	798.00	328.95
T_{14}	100% RDN (Inorganic)	1.44	79.67	7.49	3.17	596.97	252.28
T_{15}	100% RDN through FYM	1.43	79.67	7.48	3.16	595.91	251.48
T_{16}	100 % RDN through Vermicompost	1.52	81.67	7.73	3.31	631.56	270.59
T_{17}	Rhizobium (seed treatment)	1.35	78.33	7.43	3.05	581.76	238.92
T_{18}	Control	1.34	74.00	6.97	2.94	515.78	217.31
SE(m)		0.01	1.80	0.22	0.10	17.70	8.90
C.D .5%		0.11	5.09	0.64	0.25	51.03	20.58

Table 2. Economics of different treatment combinations

Sr.No.	Treatments	Cost of Cultivation	Gross Returns	Net returns	B:C Ratio
T_1	100% RDN (Inorganic) + *Rhizobium* (seed treatment)	25450	73057.20	47607.20	1.87
T_2	75% RDN (Inorganic) + *Rhizobium* (seed treatment)	25368	63588.10	38220.10	1.51
T_3	100% RDN through FYM + *Rhizobium* (seed treatment)	35125	64500.00	29375.00	0.84
T_4	75% RDN through FYM + *Rhizobium* (seed treatment)	32625	63400.00	30775.00	0.94
T_5	100 % RDN through Vermicompost + *Rhizobium* (seed treatment)	31375	66757.50	35382.50	1.13
T_6	75% RDN through Vermicompost + *Rhizobium* (seed treatment)	29812	63171.80	33359.80	1.12
T_7	75% RDN (Inorganic) + 25 % RDN through FYM + *Rhizobium* (seed treatment)	27868	70402.23	42534.23	1.53
T_8	: 50% RDN (Inorganic) + 50 % RDN through FYM + *Rhizobium* (seed treatment)	30287	64660.28	34373.28	1.13
T_9	75% RDN (Inorganic) + 25 % RDN through Vermicompost + *Rhizobium* (seed treatment)	26930	71936.72	45006.72	1.67
T_{10}	50% RDN (Inorganic) + 50 % RDN through Vermicompost + *Rhizobium* (seed treatment)	28412	69904.28	41492.28	1.46
T_{11}	75 % RDN through FYM + 25 % RDN through Vermicompost + *Rhizobium* (seed treatment)	34187	66953.77	32766.77	0.96
T_{12}	50% RDN through FYM+ 50 % RDN through Vermicompost + *Rhizobium* (seed treatment)	33250	68165.10	39915.10	1.05
T_{13}	75 % RDN through Vermicompost + 25 % RDN through FYM + *Rhizobium* (seed treatment)	32312	68311.53	35999.53	1.11
T_{14}	100% RDN (Inorganic)	25425	66010.38	40585.38	1.60
T_{15}	100% RDN through FYM	35100	64000.30	28930.00	0.82
T_{16}	100 % RDN through Vermicompost	31350	64413.80	33063.80	1.05
T_{17}	*Rhizobium* (seed treatment)	25125	61778.77	36653.77	1.46
T_{18}	Control	25100	44000.50	18950.00	0.75

in cumin, it can be recommended to apply 50% recommended dose of fertilisers through vermicompost + 50 % recommended dose of fertilisers through fertilisers, which will reduce the load of chemical fertilisers up to 50%.

Vineetha *et al.* (2013) found that dill plants fertilised with 30 t of FYM /ha had the highest net return /ha (Rs 36,145) and B:C ratio (1:1.57).

Tripathi *et al.* (2013) found that the application of 50% recommended dose of fertilisers + FYM @ 5 t/ha recorded maximum seed yield (16.8 q/ha), net returns (Rs. 37280 /ha) and B-C ratio (4.38) over the remaining treatments in coriander. Singh (2015) observed that the treatment FYM (15 t/ha) + RDF (50N : 40P : 30K kg/ha) was found best in improving the growth attributes of coriander and increased the yield 105.26 per cent over control and gave the highest net returns of Rs.68,370 (/ha) with benefit-cost ratio of 2.67.

4. CONCLUSION

Based on the present study it can be concluded that the application of 100 per cent recommended dose of nitrogen through vermicompost along with biofertilizer (T_5) recorded significantly higher values for all the seed quality attributes *viz.,* test weight (1.70 g), standard germination (89.67 %), seedling length (9.10 cm), dry weight (3.98 mg), seedling vigor index-I (807.33), seedling vigor index-II (357.17). Net returns (Rs 47607.20/ha) and benefit cost ratio (1.87) were found to be maximum when 100 per cent recommended dose of nitrogen through inorganic sources, along with biofertilizer (T_1), was applied.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of this manuscript.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

Anitha, M., Swami, D.V. and Salomi, D.R.S. (2015). Seed yield and quality of fenugreek (*Trigonella foenum-graecum* L.) cv. Lam methi-2 as influenced by integrated nutrient management. *The Bioscan*, 10(1): 103-106.

Anonymous (2015). *Third advance estimate of area and production of horticultural crops.* National Horticulture Board, Ministry of Agriculture, Government of India.www.nhb.gov.in

Anupama, G., Hegde, L. N., Hegde, N. K., Devappa, V., Mastiholi, A. B. and Nishani, S. (2017). Effect of Nitrogen and Spacing Levels on Physiological and Yield Parameters of kasuri methi (*Trigonella corniculata* L.) var. Pusa Kasuri. *International Journal of Current Microbiology and Applied Sciences*, 6(9): 723-733.

Bhati, S. S., Baheti, B. L., Singh, I., & Chandrawat, B. S. (2022). Morphometrics of Plant Parasitic Nematodes Associated with Trigonella corniculata. *Indian Journal of Nematology*, *52*(2), 187-198.

Chaudhary, R. and Tehlan, S.K. (2014). Comparitive study of biofertilizers and organic manures on growth, yield and quality of fenugreek. *Green farming,* 5(3): 1-4.

Choudhary, S.J., Choudhary, P. and Bhadu, K. (2019).Consequence of inorganic and organic sources of fertilization on nutrient content, uptake and quality of fenugreek (*Trigonella foenum-graecum* L.) under agro-climatic conditions of Southern Rajasthan. *International Journal of Chemical Studies,*7(4): 3220-3224.

Desai, S., Bagyaraj, D. J., & Ashwin, R. (2020). Inoculation with microbial consortium promotes growth of tomato and capsicum seedlings raised in pro trays. *Proceedings of the National Academy of Sciences, India Section B: Biological Sciences*, *90*(1): 21-28.

Deshmukh, A.A., Nagre, P.K., and Wagh, A.P. (2020).Effect of nitrogen and phosphorus levels on yield and quality of fenugreek (*Trigonella-foenum-graecum*). *Journal of Pharmacognosy and Phytochemistry*, 9(4): 1567-1571.

Fageria, N. K., Ferreira, E. D. B., & Knupp, A. M.(2015). Micronutrients use efficiency in tropical cover crops as influenced by phosphorus fertilization.

Gopalsamy, A., Tamilmani, E., Shanmugam, K., Koilpitchai, N. N., Durairaj, V., Mylsamy, P., ... & Ranganathan, U. (2025). Seeds of Excellence: Review on impact of seed quality enhancement on babygreens biomass production. *Journal of Agriculture and Food Research*, *19*, 101597.

Hooda, V. and Tehlan, S.K. (2014). Effect of Biofertilizers, FYM and Nitrogen levels on seed yield and seed quality of coriander (*Coriandrum sativum* L.). *Annals of agri-bio research,* 19(1): 121-123.

Khalid, K. A. and Shafei, A. M. (2005). Productivity of dill (*Anethum graveolens* L.) as influenced by different organic manurerates and sources. *Arab Universities of Journal of Agricultural Sciences,* 13(3): 901-913.

Kumar, P., Phor, S. K., Tehlan, S. K., & Mathur, A. K. (2019). Effect of seed rate and row spacing on growth and yield of fenugreek (*Trigonella foenum-graecum*). *Journal of Pharmacognosy and Phytochemistry*, *7*(4): 93-96.

Maruthi, J B., and Paramesh R. 2016. Effect of integrated nutrient management on seed quality of vegetable soybean [*Glycine max* (L.) Merrill] cv. Karune. *Legume Research*, 39(4): 578–83

Migahed, H.A., Ahmed, A.E., Abdel Ghany, B.F. (2004). Effect of different bacterial strains as biofertilizer agents on growth, production and oil of *Apium graveolens* under calcareous soil. *Arab Universities Journal of Agriculture Sciences,* 12: 511-525.

Pushpa, K., Sharma, R. K., Aravindakshan, K., Maurya, I. B., Gautam, D., & Jakhar, R. K. (2022). Response of different organic fertilizers to growth, yield attributes and profitability in fenugreek under heavy clay soil of Southern Rajasthan.

Sapra, L., Tehlan, S. K., Singh, T., Bora, L., & Rout, B. M. (2023). Effect of seed rate and nutrition level on growth and seed yield of Trigonella corniculata L.

Sen, D., Debnath, P., Debnath, B., Bhaumik, S., & Debnath, S. (2022).Identification of potential inhibitors of SARS-CoV-2 main protease and spike receptor from 10 important spices through structure-based virtual screening and molecular dynamic study. *Journal of Biomolecular Structure and Dynamics*, *40*(2), 941-962.

Sethi, N., Nath, D., Singh, R.K., and Srivastava, R.K. (1990).Anti-fertility and teratogenic activity of some indigenous medicinal plants in rats. *Fitoterapia*, 61(1): 64-67.

Sharma, R. K., Sharma, S. K., & Dangi, N. L. (2016). Influence of different organic nutrient sources on productivity and profitability of groundnut (*Arachis hypogaea* L.) in southern Rajasthan, India. *Indian Journal of Agricultural Research*, *50*(6): 623-626.

Sharma, S. K. (2006). *Effect of different fertility levels on yield and nutrient uptake by kasuri methi (Trigonella corniculata L.)* (Doctoral dissertation, M. Sc. Thesis (Unpub.) Jawaharlal Nehru Krishi VishwaVidyalaya, Jabalpur).

Shivran, A.C., Jat, N.L., Singh, D. and Rajput, S.S. (2017). Influence of integrated nutrient management on yield, quality and economics of cumin (*Cuminum cyminum*) production under semi-arid conditions. *Indian journal of agricultural sciences,* 87(1): 29-35.

Singh, S.P. (2015). Effect of biofertilizer *Azospirillum* on growth and yield parameters of coriander (*Coriandrum sativum L.*) cv. Pant haritima. *Vegetable Science,* 40(1): 77-79.

Somdutt, J. C., Choudhary, P., & Bhadu, K. (2019).Consequence of inorganic and organic sources of fertilization on nutrient content, uptake and quality of fenugreek (*Trigonella foenum-graecum* L.) under agro-climatic conditions of Southern Rajasthan. IJCS, 7(4): 3220-3224.

Tripathi, M.L., Singh, H. and Chouhan, S.V.S. (2013). Response of coriander (*Cariandrum sativum* L.) to integrated nutrient management. *Technofame -A journal of multi-disciplinary advance research,* 2(2): 43-46.

Vineeta, V., Sharma, U. C., VANDANA, V., Gupta, A. K., & Srivastava, D. S. (2013). Irrigation and FYM effect on seed, oil and carvone yield and economics of European dill (*Anethum graveolens*).

Yadav, A. K., Singh, S. P., Yadav, D. K., Yadav, G. K., Singh, K., & Yadav, M. (2024). Influence of phosphorous and foliar nitrogen on the growth, quality and yield of Kasuri Methi (Trigonella corniculata L.). *Legume Research*, *47*(8), 1306-1312.

Peer-review history:
The peer review history for this paper can be accessed here:
https://pr.sdiarticle5.com/review-history/137408