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# EFFECT OF FARMING SYSTEM MODULES AND VARIETIES ON GROWTH AND YIELD OF FENUGREEK IN NORTHERN DRY ZONE OF KARNATAKA INDIA

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**ABSTRACT**

The field experiment was conducted at college of horticulture, Bagalkot, Karnataka in *Rabi* season 2024-25 revealed that interaction of package of practices farming system module ($M_4$) with AFg-5 ($V_4$) variety recorded significantly higher seed yield of 913 kg/ha compare to the other interactions and influence of package of practices farming system module recorded higher seed yield of 884 kg/ha and natural farming system module recorded *on par* results of 830 kg/ha. The interactions of Package of practices farming system module ($M_4$) and Natural farming system module ($M_1$) with these fallowing varieties viz., KPD-1, AFg-3, AFg-4, AFg-5 found *on par* with respect to the seed yield of $M_4V_4$. However, interaction of organic farming system module ($M_2$) with all varieties recorded least seed yield per hectare and lowest seed yield recorded with interaction of organic farming system module with AFg-4 ($M_2V_3$).
***Keywords***: Fenugreek varieties, Farming system modules, Fenugreek seed yield.

## Introduction

Fenugreek (*Trigonella foenum-graecum* L.) is an important seed spice crop of the family Fabaceae, widely cultivated during the rabi season across northern and western India, particularly in Rajasthan, Madhya Pradesh, Gujarat and Uttar Pradesh. Both seeds and leaves are valued for their nutritional and medicinal properties, being rich in protein, minerals and bioactive compounds such as diosgenin and trigonelline. Despite its economic importance, fenugreek is often grown under marginal conditions with low soil fertility, resulting in poor productivity. Excessive dependence on chemical fertilizers in conventional farming has led to soil degradation and environmental issues, prompting renewed emphasis on organic and natural farming systems that improve soil health and sustainability. Integrating organic manures and balanced nutrient management can enhance crop seed yield while maintaining ecological balance. Therefore, the present investigation entitled "Evaluation of fenugreek varieties (*Trigonella foenum-graecum* L.) under different farming system modules for seed production potential in the Northern dry zone of Karnataka" was undertaken to assess the performance of varieties under varied farming modules with respect to growth and yield.

## Material and Methods

The field experiment was conducted during the *rabi* season of 2024–25 at the College of Horticulture, UHS, Bagalkot. The site is located at 16°18′ N latitude, 75°69′ E longitude, and 542 m above MSL, representing the Northern dry zone (Zone III) of Karnataka. The soil was light black loam, slightly alkaline (pH 8.46) with low nitrogen, high phosphorus and medium potassium status. The experiment was laid out in a split-plot design with four farming system modules as main plots; natural farming system module ($M_1$), organic farming system module ($M_2$), integrated farming system module ($M_3$), recommended package of practices farming system module ($M_4$) and four fenugreek varieties, Krishna Prabha Devimenthe 1, AFg-3, AFg-4 and AFg-5, as subplots and replicated thrice. Healthy and disease-free seeds were sown at 30

× 10 cm spacing. The $M_1$ module comprises of jeevamrutha, beejamrutha and mulching practices were practiced, $M_2$ module comprises vermicompost applied on nitrogen equivalent base, $M_3$ with 50% RPP + vermicompost @ 2t/ ha + FYM 5 t/ha and $M_4$ with NPK @ 50: 25: 40 kg/ha + FYM 10 t/ha were followed. Full dose of phosphorus, potash and half dose of nitrogen is applied at the time of sowing as basal dose and remaining 50 per cent of nitrogen applied 30 days after sowing. Nutrient and crop management practices were followed as per respective modules.

## Result and Discussion

**Table 1 :** Plant height and total number of branches of fenugreek (*Trigonella foenum-graecum* L.) varieties at harvest stage as influenced by different farming system modules

| Treatments | Plant height (cm) | | | | | Total number of branches per plant | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Farming system modules (M) | Fenugreek varieties (V) | | | | | | | | | |
| | $V_1$ KPD-1 | $V_2$ AFg-3 | $V_3$ AFg-4 | $V_4$ AFg-5 | Mean | $V_1$ KPD-1 | $V_2$ AFg-3 | $V_3$ AFg-4 | $V_4$ AFg-5 | Mean |
| $M_1$: Natural farming system module | 50.67 | 58.33 | 53.33 | 55.00 | **54.33** | 10.67 | 11.00 | 11.00 | 11.33 | **11.00** |
| $M_2$: Organic farming system module | 60.00 | 50.00 | 46.67 | 54.33 | **52.75** | 9.00 | 9.33 | 9.67 | 10.00 | **9.50** |
| $M_3$: Integrated farming system module | 58.33 | 51.67 | 55.67 | 55.00 | **55.17** | 10.33 | 10.00 | 10.00 | 10.67 | **10.25** |
| $M_4$: Package of practices farming system module | 59.33 | 61.67 | 51.67 | 59.33 | **58.00** | 13.00 | 12.67 | 12.67 | 13.33 | **12.92** |
| **Mean** | **57.08** | **55.42** | **51.83** | **55.92** | **55.06** | **10.75** | **10.75** | **10.83** | **11.33** | **10.91** |
| | **S. Em ±** | | **CD at 5 %** | | | **S. Em ±** | | **CD at 5 %** | | |
| **Main Plot (M)** | 2.58 | | NS | | | 0.34 | | 1.18 | | |
| **Subplot (V)** | 1.83 | | NS | | | 0.22 | | NS | | |
| **Interaction (M × V) at same or different level** | 4.21 | | NS | | | 0.53 | | 1.81 | | |

**Table 2 :** Plant spread at grand growth stage (45 DAS) of fenugreek (*Trigonella foenum-graecum* L.) varieties as influenced by different farming system modules

| Treatments | Plant spread | | | | |
|---|---|---|---|---|---|
| Farming system modules (M) | Fenugreek varieties (V) | | | | |
| | $V_1$ KPD-1 | $V_2$ AFg-3 | $V_3$ AFg-4 | $V_4$ AFg-5 | Mean |
| $M_1$: Natural farming system module | 261.67 | 281.67 | 265.00 | 281.67 | **272.50** |
| $M_2$: Organic farming system module | 241.67 | 214.67 | 227.00 | 210.00 | **223.33** |
| $M_3$: Integrated farming system module | 226.67 | 233.33 | 258.33 | 243.33 | **240.42** |
| $M_4$: Package of practices farming system module | 275.00 | 311.67 | 285.00 | 315.00 | **296.67** |
| **Mean** | **251.25** | **260.33** | **258.83** | **262.50** | **258.23** |
| | **S. Em ±** | | **CD at 5 %** | | |
| **Main Plot (M)** | 11.00 | | 38.00 | | |
| **Subplot (V)** | 8.00 | | NS | | |
| **Interaction (M × V) at same or different level** | 18.00 | | 60.00 | | |

The height of fenugreek differed non-significantly due to the influence of different farming system modules, varieties and interaction of farming system modules with varieties. Total number of branches found significant with respect to effect of farming system modules and interaction effect. Similar trend was also noticed with respect to plant spread, The $M_4$ module recorded significantly higher results and $M_1$ module recorded *on par* results with respect to total number of branches, plant spread except plant height. The $M_4V_4$ interaction recorded significantly higher total number of branches (13.33) and plant spread (315 $cm^2$).

**Table 3 :** Number of pods per plant and seeds per pod at harvest stage in fenugreek (*Trigonella foenum-graecum* L.) varieties as influenced by different farming system modules

| Treatments | Number of pods per plant | | | | | Number of seeds per pod | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Farming system modules (M) | Fenugreek varieties (V) | | | | | | | | | |
| | $V_1$ KPD -1 | $V_2$ AFg -3 | $V_3$ AFg -4 | $V_4$ AFg -5 | Mean | $V_1$ KPD -1 | $V_2$ AFg -3 | $V_3$ AFg -4 | $V_4$ AFg -5 | Mean |
| $M_1$: Natural farming system module | 25 | 27 | 26 | 28 | **26.50** | 9.00 | 10.00 | 8.00 | 10.00 | **9.25** |
| $M_2$: Organic farming system module | 18 | 20 | 18 | 19 | **18.75** | 9.00 | 9.00 | 7.00 | 8.00 | **8.25** |
| $M_3$: Integrated farming system module | 22 | 23 | 21 | 20 | **21.50** | 9.00 | 8.00 | 8.00 | 7.00 | **8.00** |
| $M_4$: Package of practices farming system module | 30 | 35 | 32 | 36 | **33.25** | 11.00 | 12.00 | 11.00 | 13.00 | **11.75** |
| **Mean** | **23.75** | **26.25** | **24.25** | **25.75** | **25.00** | **9.50** | **9.75** | **8.50** | **9.50** | **9.31** |
| | **S. Em ±** | | **CD at 5 %** | | | **S. Em ±** | | **CD at 5 %** | | |
| **Main Plot (M)** | 0.36 | | 1.25 | | | 0.23 | | 0.81 | | |
| **Subplot (V)** | 0.26 | | 0.76 | | | 0.31 | | 0.91 | | |
| **Interaction (M × V) at same or different level** | 0.59 | | 2.01 | | | 0.57 | | 1.95 | | |

**Table 4 :** Seed yield per hectare and biological yield of fenugreek (*Trigonella foenum-graecum* L.) varieties as influenced by different farming system modules

| Treatments | Seed yield per hectare (kg) | | | | | Biological yield (kg/ha) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Farming system modules (M) | Fenugreek varieties (V) | | | | | | | | | |
| | $V_1$ KPD -1 | $V_2$ AFg -3 | $V_3$ AFg -4 | $V_4$ AFg -5 | Mean | $V_1$ KPD -1 | $V_2$ AFg -3 | $V_3$ AFg -4 | $V_4$ AFg -5 | Mean |
| $M_1$: Natural farming system module | 805 | 838 | 827 | 852 | **830** | 2573 | 2673 | 2640 | 2715 | **2651** |
| $M_2$: Organic farming system module | 638 | 713 | 621 | 683 | **664** | 2074 | 2299 | 2024 | 2207 | **2151** |
| $M_3$: Integrated farming system module | 794 | 741 | 777 | 716 | **757** | 2540 | 2382 | 2490 | 2307 | **2430** |
| $M_4$: Package of practices farming system module | 863 | 899 | 860 | 913 | **884** | 2748 | 2857 | 2740 | 2898 | **2811** |
| **Mean** | **775** | **798** | **771** | **791** | **784** | **2484** | **2553** | **2474** | **2532** | **2510** |
| | **S. Em ±** | | **CD at 5 %** | | | **S. Em ±** | | **CD at 5 %** | | |
| **Main Plot (M)** | 34.21 | | 118 | | | 102.00 | | 355.00 | | |
| **Subplot (V)** | 24.19 | | NS | | | 72.00 | | NS | | |
| **Interaction (M × V) at same or different level** | 55.85 | | 189 | | | 167.00 | | 567.00 | | |

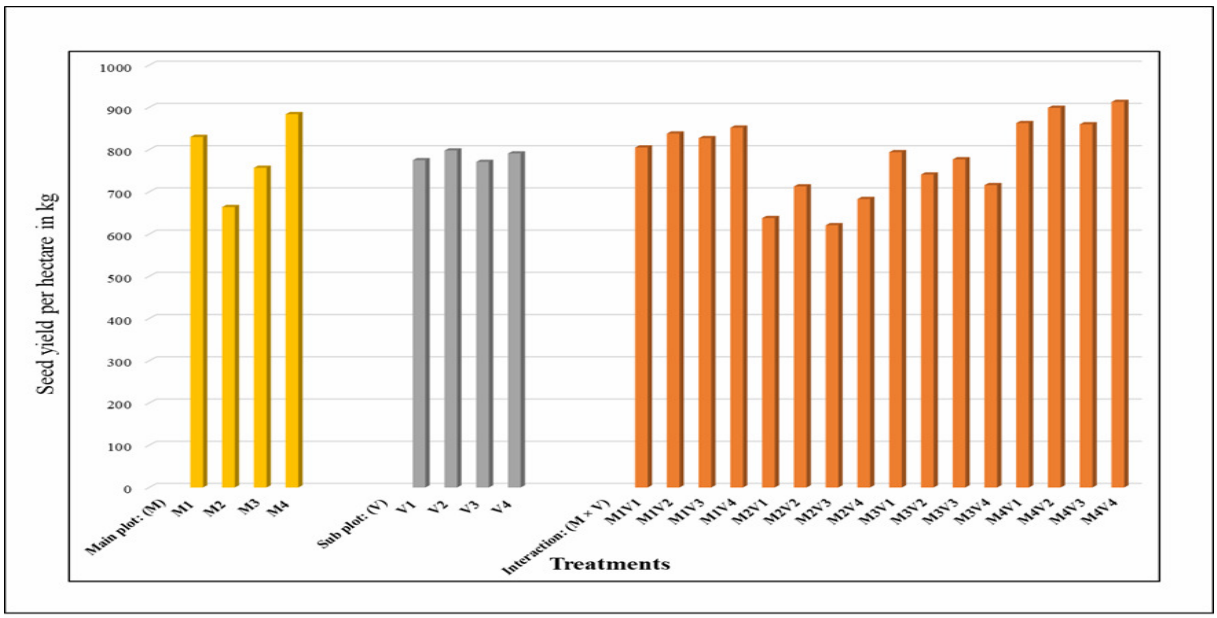


**Fig. 1 :** Seed yield per hectare

Number of pods per plant and number of seeds per pod found significant with respect to effect of different farming system modules, varieties and interaction. The seed yield and biological yield per hectare was found significant. Significantly, higher seed yield (884 kg/ha) and biological yield (2811 kg/ha) was recorded with $M_4$ module, however $M_1$ module recorded *on par* results. There was no varietal difference recorded non-significant results. There was no varietal difference recorded non-significant results. The interaction of $M_4V_4$ recorded significantly higher seed yield (913 kg/ha), however $M_4V_1$, $M_4V_2$, $M_4V_3$, $M_1V_1$, $M_1V_2$, $M_1V_2$, $M_1V_3$ and $M_1V_4$ recorded on par results. Lowest seed yield (621 kg/ha) and biological yield (2024 kg/ha) recoded with interaction $M_2V_3$.

These findings are in conformity with the study by Ruan *et al*. (2023) which showed that organic cultivation was less productive than conventional cultivation in terms of growth and yield of fragrant rice. Korat *et al*. (2022) also found that conventional or package of the practices farming system module recorded significantly higher yield attributes and lowest yield recorded with natural farming system module in chickpea crop. Natural farming module recorded higher yield next to the package of practices farming system module these results were in agreement with Goveanthan *et al*. (2020) and Kaur *et al*. (2021) where liquid formulation of Jeevamruth on foliar application resulted in higher biomass thereby increased seed yield. Devi *et al*. (2025) also showed that in paddy that the tiller number, number of panicles per unit area, number of filled grains per panicle and grain yield in organic and natural farming practices was lower than conventional farming practice

Natural faming system module ($M_1$) which recorded *on par* results with $M_4$ module with respect to growth and yield attributes due to application of Jeevamrutha, Beejamrutha and also mulching enhanced the microbial population in the soil, there by better availability of nutrients to the crop and also the effect of mulching resulted in enhanced soil moisture with reduced weed intensity these results were in agreement with Sutar *et al*. (2019).

## Conclusion

The package of practices farming module recorded the higher seed yield (884 kg/ha) and natural farming system module found *on par* result for the seed yield. The interaction of package of practices farming system module with a variety AFg-5 recorded significantly highest seed yield (913 kg/ha) and natural farming system module and varieties (KPD-1, AFg-3, AFg-4, AFg-5) interactions recorded *on par* results. Lowest seed yield was recorded with organic farming system module. The natural farming module found to be the next suitable practice for fenugreek seed production in Northern dry zone of Karnataka during *rabi* season.

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