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Performance of various methi (*Trigonella foenum-graceum* L.) genotypes for yield and yield attributing parameters

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Abstract
The experiment was conducted in the vegetable science field unit of Kittur Rani Channamma College of Horticulture, Arabhavi (UHS, Bagalkot), Karnataka during *Rabi* 2018-19 to evaluate the performance of different fenugreek genotypes for yield attributing parameters. Among the 22 genotypes evaluated, the highest herbage yield per plant and per square metre area was recorded in the genotype RMt-303 when recorded at full vegetative growth stage. Maximum number of pods per plant (54.33) and pod width (4.07mm) was recorded in the genotype RMt-351. Pod length was recorded to be maximum in case of genotype HUB-6 (12.02 cm). Maximum number of seeds per pod was recorded in HUB-11 (19.20) while the seed size was found to be maximum in RMt-351 genotype (3.96mm).Significantly highest seed yield per plant and per hectare was recorded for HUB-5 where the genotypes *viz.*, HUB-5, HUB-4, HU-3, HUB-1 and HUB-2 proved their superiority significantly over the check HUB-12.

Keywords: Crop improvement, fenugreek, genotypes, germplasm, seed yield, trigonella foenum-graceum

Introduction
Fenugreek (*Trigonella foenum-graecum* L.), (2n=2x=16), belongs to the sub-family Papilionaceae of the Leguminaceae family is popularly known by it's vernacular name 'methi'. It is a small-seeded, self pollinated, diploid annual legume plant grown as a leafy vegetable, condiment and as a medicinal plant. The fresh tender leaves and stems are consumed as curried vegetables, while seeds are mainly used as spice for flavouring almost all the dishes. Fenugreek is rich in minerals, protein, Vitamin A and C. (Som and Maity, 1986) [15].

Fenugreek is considered to have originated in the Mediterranean region of the "Old World" (Vavilo, 1926) [16] or in parts of Asia (De Candolle, 1964). The species name *foenum-graecum* means "Greek hay" indicating its use as a forage crop in the past. Fenugreek can be grown under wide range of climatic conditions. It is extensively used as fresh leaves (green leafy vegetables), chopped leaves (flavouring agent), sprouts and microgreens (salad). (Aggarwal *et al.* 2013) [1]. Fenugreek leaves being rich in iron, calcium, protein and vitamins and suggested as iron chelator. (Kumar *et al.*, 2010) [7].

It is largely cultivated in India, Argentina, Egypt, Brazil, Southern France, Morocco, Algeria, Ethiopia and Lebanon. India is one of the major producers and exporters of fenugreek. Fenugreek is exported to Saudi Arabia, Japan, Malaysia, USA, UK, Singapore and Sri Lanka. In India, its cultivation is concentrated mainly in Rajasthan, which has a share of 83 per cent of the total fenugreek production in the country. Other states cultivating fenugreek are Gujarat, Tamil Nadu, Uttar Pradesh, Himachal Pradesh, Madhya Pradesh, Andhra Pradesh and Punjab (Anon., 2018) [2].

Domestic marketing centres of fenugreek are Jodhpur, Pratapgarh, Nembhaheda, Bhawanimandi, Jhalarapatan, Ramganjmandi, Sojat, Kota and Jaipur. During 2017-18, production of 118.4 thousand MT was produced in an area of 81.2 thousand hectare with a productivity of 1.5 MT per hectare (Anon., 2018) [3]. Therefore, there is a need for identification or development of fenugreek genotypes with high yield for northern dry zone of Karnataka. This calls for an evaluation of local or related genotypes to know the variability. With limited variability nothing can be achieved and the breeder will have to enrich the germplasm or genotypes or can resort to create greater variability through hybridization, mutation and polyploidy breeding.

The productivity of the crop in India is considered low, mainly due to the paucity of good high yielding varieties to the growers. Keeping all these aspects in view, the present investigation was carried out with the objective to evaluate the performance of fenugreek genotypes for yield and yield attributing parameters.

Materials and Methods

The experiment was conducted in the vegetable science field unit of Kittur Rani Channamma College of Horticulture, Arabhavi (UHS, Bagalkot), Karnataka during *Rabi* 2018-19. The experiment site is located in the agro climatic zone-III(Northern Dry Zone) of Karnataka state. Geographically, Arbhavi is located at 16°15' North latitude, 74°45' East longitude and at an altitude of 612.03 meters above the mean sea level.

Twenty two genotypes including check HUB-12 obtained from different research stations and local collections were evaluated in randomized block design with two replications. Observations were recorded from five plants from the middle rows of the plot excluding the border plants, regarding various characters, namely herbage yield per plant and per square meter area, number of pods per plant, pod width, pod length, number of seeds per pod, seed size and seed yield per plant and per hectare. The data was analysed stastistically as per the methods suggested by Panse and Shukthame (1978) [9].

Results and Discussion

The data on the different yield and yield attributing characters of different fenugreek germplasm have been presented in Table 1.

Genotypes differed significantly with respect to herbage yield obtained per plant and per square meter area where, the genotype RMt-303 recorded the highest herbage yield which was statistically on par with local check HUB-12, HUB-2, RMt-1 and RMt-305 genotypes. The highest herbage yield recorded in the genotypes might be attributed to the increased height of that plant with higher number of primary and secondary branches borne which resulted in increased leaf /herb yield. These results are in consonance with the findings of Datta and Chatterjee (2004) [4]. (Fig. 1).

RMt-351 produced the highest number of pods per plant (54.33) which was statistically on par with HUB-13 (52.20), HUB-9 (50.26) and HUB-8 (48.73) which were significantly superior to check HUB-12 (46.04). Such increase in the number of pods might be due to the higher growth parameters like plant height and number of branches, contribution of increased plant height towards increased seed yield might be mainly through the production of more number of primary and secondary branches which in turn, resulted in more number of pods, as bearing area available on the plant was more (Jain *et al.,* 2014., Verma and Korla, 2003) [6, 17].

Significant differences in pod length and pod width was also noticed among the genotypes evaluated and the pod length ranged from 9.19 cm to 12.02 cm. Among all the genotypes HUB-6 registered the highest pod length (12.02 cm) and was found to be significantly superior over the check HUB-12 (10.41cm). Significantly the highest pod width was recorded with RMt-351 (4.07 mm) which was statistically on par with the local check HUB-12 (4.03 mm). The results are in conformity with the findings of Malik and Tehlan (2009) [8].

Table 1: Per se performance of fenugreek genotypes for yield and yield attributes

Sl. No	Genotypes	Herbage yield (g/plant)	Herbage yield (Kg/m^2)	Number of pods per plant	Pod length(cm)	Pod width (mm)	Number of seeds per pod	Seed size (mm)	Seed yield(g/plant)	Seed yield (kg/ha)
1	RMt-1	3.40	1.36	41.30	10.09	3.77	16.75	3.62	5.61	17.61
2	RMt-143	2.19	0.87	47.25	10.46	3.79	17.60	3.40	4.52	13.29
3	RMt-303	3.98	1.59	34.15	10.26	3.77	14.23	3.56	5.64	16.70
4	RMt-305	3.36	1.34	45.55	9.87	3.56	18.75	3.32	5.35	15.18
5	RMt-351	2.61	1.16	54.33	10.01	4.07	17.15	3.96	5.18	14.82
6	RMt-354	2.51	1.00	47.46	9.79	3.97	16.19	3.82	4.62	14.10
7	RMt-361	2.77	1.11	39.40	10.22	3.80	16.85	3.68	5.16	14.92
8	LS-1	2.02	0.81	39.73	10.28	3.97	14.43	3.85	4.67	13.01
9	LS-2	2.65	1.06	43.30	10.69	3.67	17.10	3.51	5.73	17.27
10	HUB-1	2.82	1.12	37.89	9.19	3.90	18.95	3.70	5.87	18.71
11	HUB-2	3.61	1.44	45.25	9.60	3.70	14.60	3.59	5.86	18.66
12	HUB-3	3.01	1.20	45.79	9.41	3.78	16.30	3.62	5.88	18.87
13	HUB-4	3.09	1.23	42.15	9.77	4.00	18.85	3.92	6.06	19.05
14	HUB-5	3.34	1.33	35.45	10.30	3.76	16.10	3.66	6.62	21.61
15	HUB-6	3.23	1.29	44.49	12.02	3.69	16.90	3.50	5.82	13.23
16	HUB-7	3.34	1.33	46.24	10.30	3.76	15.90	3.70	5.24	15.92
17	HUB-8	3.20	1.28	48.73	10.04	3.34	17.50	3.25	5.38	15.77
18	HUB-9	3.04	1.21	50.26	10.01	4.01	19.09	3.89	4.84	15.47
19	HUB-10	2.69	1.07	35.65	10.03	3.76	15.00	3.62	5.06	15.91
20	HUB-11	3.01	1.20	38.04	10.10	3.70	19.20	3.55	5.76	17.56
21	HUB-12	3.70	1.48	46.04	10.41	4.03	15.90	3.91	5.79	18.31
22	HUB-13	2.76	1.10	52.20	10.40	3.36	17.30	3.25	5.77	17.54
	Mean	3.03	1.21	43.66	10.15	3.80	16.84	3.63	5.47	16.52
	S.Em±	0.36	0.12	1.86	0.36	0.12	0.89	0.22	0.30	1.09
	CD (0.05)	0.98	0.35	5.48	1.08	0.34	2.63	0.65	0.89	3.20
	CV (%)	14.27	14.24	1.63	6.03	4.34	7.51	7.76	7.86	9.33

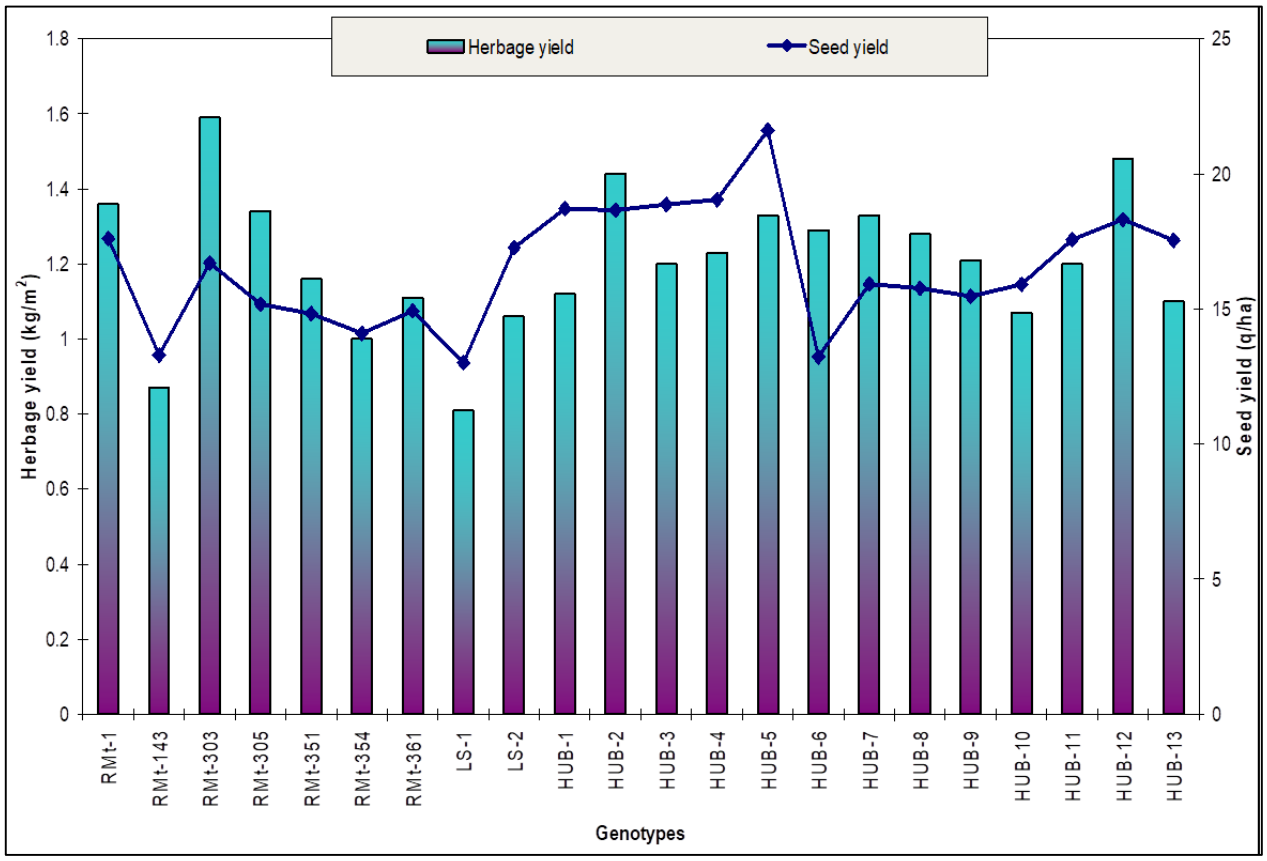

Fig 1: Herbage seed yield of fenugreek genotypes at 30 days after showing

Genotypes differed significantly with respect to number of seeds per pod and seed size. HUB-11(19.09) recorded the highest number of seeds per pod which was statistically on par with HUB-9 (19.09), HUB-1 (18.95), HUB-4 (18.85), RMt-305 (18.75) and RMt-143 (17.60) and there were significantly highest number of seeds per pod than HUB-12, regarded as local check. The highest number of seeds per pod may be due to higher pod length which results in higher seed yield. The highest seed size of 3.96 mm was recorded in RMt-351 which was statistically on par with HUB-4 and were on par with the check HUB-12. The characters like number of pods per plant, pod length and width, number of seeds per pod and seed size were regarded as important factors to be considered for selection of high yielding lines as they exhibited direct and positive effect on seed yield per plant. (Sharma and Sastry, 2008., Pushpa *et al.*, 2012., Singh *et al.*,2013., Jain *et al.*, 2014) [12, 11, 13, 6].

Significantly highest seed yield recorded per plant and per hectare was found to be maximum in HUB-5 which was statistically on par with HUB-4, HUB-3, HUB-1 and HUB-2 and showed their significant superiority over the check HUB-12 genotype for both seed yield per plant and per hectare. (Fig. 1).

The ability of a genotype to respond positively to a growing situation coupled with efficient conversion of source to sink during flowering to maturity period solely depends on the genotype architecture and inherent genetic potential. The higher yield is reflected by better growth and environmental conditions under which the crop is raised. Singh *et al.*, (2015) [14] observed that pods per plant, number of seeds per pod, seed size and pod length are the most important traits which can respond well to selection. Malik and Tehlan (2009) [8] evaluated diverse fenugreek genotypes under irrigated-alluvial farming situation and opined that the selection of superior types improves the production of fenugreek in the country. Pathak *et al.*, (2014) [10] reported that yield traits in fenugreek differed significantly and offers a good scope for selection of better genotypes.

From this study it can be concluded that the cultivation of genotypes RMt-303, HUB-2, RMt-1, RMt-305 and HUB-7 for herbage yield and the genotypes HUB-5, HUB-4, HUB-3, HUB-1 and HUB-2 for seed yield may be suitable and more economical under Arabhavi region of northern dry zone of Karnataka. These high yielding varieties can be proposed for multi-location trials for checking their yield stability and further exploited in various breeding programmes for their yield potential or can be released as such after their thorough testing at various locations.

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