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Evaluation of fenugreek collections for growth, yield and yield-attributing traits in Northern Dry Zone of Karnataka

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Abstract
Fenugreek (*Trigonella foenum-graecum* L.), a valuable legume with economic and nutritional importance, holds significant potential for genetic improvement. The present investigation was carried out during two consecutive *rabi* seasons of 2023-24 and 2024-25 in the Department of Plantation, Spices, Medicinal and Aromatic crops, College of Horticulture, Bagalkot, to identify high-yielding collections suitable for the Northern Dry Zone of Karnataka. Based on the pooled data over both seasons, the 55 collections evaluated in the experiment exhibited highly significant variation for growth, yield and yield-attributing traits. Among the collections, the minimum days to germination was recorded in HUB-3 (3.25 days), while the maximum plant height was observed in DFC-5 (65.47 cm). DFC-24 recorded the maximum plant spread (682.73 cm²) and the highest number of branches per plant (12.10). With respect to reproductive traits, the earliest days to first flowering (34.25 days), days to 50 per cent flowering (38.25 days) and days to seed maturity (99.25 days) were recorded in DFC-3. Among the yield attributes, DFC-24 registered the highest number of pods per plant (55.30), longest pod length (12.23 cm), maximum number of seeds per pod (13.86), highest test weight (16.69 g) and superior seed yield (7.54 g/plant, 412.61 g/plot and 18.34 q/ha). The collections DFC-20, DFC-3 and HUB-3 also exhibited superior performance with respect to growth, yield and yield-related traits compared to the check varieties (Bagalkot local, DFC-21 and Afg-1). Consequently, DFC-24, DFC-20, DFC-3 and HUB-3 were identified as promising and economically viable collections for seed yield under the Northern Dry Zone of Karnataka.

Keywords: Fenugreek collections, evaluation, seed yield, Northern Dry zone of Karnataka

Introduction
Fenugreek (*Trigonella foenum-graecum* L.), popularly known as ‘methi’, is a prominent seed spice crop extensively cultivated in India for its seeds, fresh leaves and tender shoots, which possess considerable culinary and medicinal importance. The crop belongs to the family Fabaceae under the subfamily Papilionaceae and has a diploid chromosome number of 2n = 16 (Chaudhary *et al.*, 2018) [3]. The species name *foenum-graecum*, meaning “greek hay,” reflects its historical use as a forage crop in ancient agricultural systems, while the characteristic curved shape of its pods has led to its recognition by alternative names such as “ox horn” or “goat horn” (Lust, 1986) [12]. Fenugreek is predominantly a self-pollinated species and is believed to have originated in the Old World, with domestication traced to the Mediterranean region or parts of Asia (Turrill, 1926) [27]. The Indian subcontinent and the Eastern Mediterranean region are recognized as the primary centres of origin (De Candolle, 1885) [5]. The crop thrives under warm temperate and tropical climatic conditions prevalent across the Mediterranean basin, Europe and Asia, contributing to its wide agro-climatic adaptability and extensive cultivation.
The crop is cultivated in several parts of the world, including India, Egypt, Pakistan, France, China, England and regions of North and East Africa such as Ethiopia and Morocco. In India, its cultivation is predominantly concentrated in Rajasthan, widely referred to as the fenugreek bowl of the country, followed by Gujarat, Madhya Pradesh, Uttar Pradesh, Haryana, Himachal Pradesh, Karnataka, Tamil Nadu and Andhra Pradesh. India is the largest producer of fenugreek globally, contributing more than 68 per cent of the world’s total production (Malhotra, 2011) [14].

Among the major seed spices grown in the country, fenugreek ranks third in terms of area under cultivation and fourth with respect to production. During the agricultural year 202324, the crop was cultivated over an area of 158.203 thousand hectares with a production of 249.523 thousand tonnes (Spice Board, 2025). In Karnataka, fenugreek occupied an area of 118 hectares and recorded a production of 152 tonnes during the same period. Within the state, cultivation is predominantly confined to the northern dry zone, particularly in the districts of Vijayapura, Bagalkot, Dharwad, Gadag, Belagavi, Haveri, Koppal, and Raichur (Anonymous, 2024) [1].

The productivity and quality of fenugreek is influenced by several factors such as varietal selection, planting season, cultural practices, environmental conditions, and pest and disease incidence, among which varietal selection plays a crucial role in determining yield and quality. Although numerous fenugreek varieties have been developed, their performance varies widely across regions due to differences in agro-climatic conditions. The relatively low productivity of fenugreek in India has been largely attributed to the lack of region-specific high-yielding varieties and suboptimal crop husbandry practices (Kurubetta *et al.*, 2018) [11]. Moreover, fenugreek cultivars often exhibit differential yield performance even under similar environments due to complex genotype × environment interactions affecting yield and quality traits. Therefore, prior to recommending any variety for a particular region, it is essential to evaluate the fenugreek collections with emphasis on adaptability, genotypic suitability and yield performance. In view of these considerations, the present investigation was undertaken to identify high-yielding fenugreek collections suitable for the Northern Dry Zone of Karnataka.

Materials and Methods

The present investigation was conducted at the experimental research field of the Department of Plantation, Spices, Medicinal and Aromatic Crops, College of Horticulture and University of Horticultural Sciences, Bagalkot, Karnataka, which is situated in the Northern Dry Zone of Karnataka (Zone III, Region II) at 16°18′ N latitude and 75°69′ E longitude, with an average elevation of 542 m above mean sea level (MSL). During the *rabi* seasons of 2023-24 and 2024-25, a total of 55 fenugreek collections were evaluated for growth, yield and yield-related traits, with the experimental material comprising accessions sourced from various research institutes across India as well as different agro-climatic regions of Karnataka. The experiment was laid out in a Randomized Complete Block Design (RCBD) with 55 collections evaluated in two replications and three varieties, namely Bagalkot Local, DFC-21 and Afg-1 served as standard checks.

The experimental site was prepared to a fine tilth through repeated ploughing and harrowing with a tractor-drawn cultivator. The land was subsequently levelled, furrowed and systematically divided into plots of 1.8 m × 1.8 m, with well-defined bunds and irrigation channels separating the replications and treatments. To enrich soil fertility and nutrient status, well-decomposed farmyard manure (FYM) was incorporated at 10 t/ha during land preparation, along with the recommended dose of fertilizers (50:25:40 kg NPK/ha) by broadcasting uniformly in rows to individual plots and mixed thoroughly in to the soil. Good quality seeds were sown at a depth of about 1.5 cm, maintaining a spacing of 30 cm between rows and 10 cm between plants. A light irrigation was provided immediately after sowing, followed by subsequent irrigations at 5-7 days interval. The experimental plots were kept weed-free through periodic hand weeding. Thinning was performed 30 days after sowing, retaining only the healthy and uniform seedlings to ensure optimum plant population. The crop was harvested at full maturity, dried, threshed and the cleaned seeds were obtained by winnowing and stored in labelled bags.

Growth and yield attributes were recorded on five randomly selected plants from each plot, excluding the border rows, for all fenugreek collections. Observations on growth parameters included days to germination, which was defined as the number of days from sowing to complete seed germination. Plant height (cm), plant spread (cm²) and number of branches per plant were measured at harvest. Phenological traits such as days to first flowering and days to 50 per cent flowering were recorded as the number of days from sowing to the appearance of the first flower and to the stage when 50 per cent of plants in a plot flowered, respectively, while days to seed maturity were calculated as the number of days from sowing to pod maturity. Yield-related traits such as number of pods per plant, pod length (cm), number of seeds per pod and seed yield per plant (g) were recorded at harvest. Seed yield per plot (g) was computed by summing the total yield obtained from each collection and seed yield per hectare (q) was calculated on the basis of seed yield per plot. Test weight (g) was determined by counting one thousand seeds from each collection and weighing them using an electronic balance. The analysis of variance was conducted following the methodology outlined by Panse and Sukhatme (1967) [19], using the mean values of randomly selected plants from each replication across all the collections.

Results and Discussion

The *per se* performance of growth parameters recorded in the pooled data of both *rabi* seasons (2023-24 and 2024-25) exhibited highly significant variation among the collections (Table 1). In pooled mean over both the seasons, the minimum days for germination was observed in HUB-3 (3.25), which was on par with DFC-3 (3.50), DFC-24 (3.75) and lower than the check varieties Afg-1 (4.75), DFC-21 (4.25) and HUB-8 (4.00). Maximum days for germination was taken by Rmt-305 (6.00). This difference in germination is due to the genetic makeup of the fenugreek collections as well as their interaction with the environment. Faster germination in certain fenugreek collections was mainly attributed to rapid imbibition of water by their seed tissues, while delayed germination in others occurred due to comparatively slower or inadequate water uptake. These observations are in agreement with the findings of Guzel and Ozyazici (2021) [8,] and Verma *et al.* (2024) [28].

At harvest, DFC-5 maintained the highest plant height (65.47 cm), remaining statistically on par with Rmt-305 (62.37 cm), DFC-7 (60.62 cm), DFC-10 (63.75 cm) and DFC-13 (60.73 cm), whereas DFC-24 recorded the lowest plant height (46.15 cm).The top-performing fenugreek collections for plant height demonstrated superiority over the check varieties (Afg-1, DFC-21 and HUB-8) in the pooled data. The difference in plant height among fenugreek collections were primarily influenced by genetic variations and their interaction with prevailing agroclimatic and soil conditions. Comparable findings on variation in plant height across different genotypes have also been documented by Selvarajan *et al.* (2002) [24], Datta and Choudhuri (2005) [4,], Pushpa *et al.* (2012) [21], Giridhar *et al.* (2016) [7], Mamatha *et al.* (2017) [16], Narolia *et al.* (2017) [18], Kurubetta *et al.* (2018) [11] and Shakthi *et al.* (2020) [25]. DFC-24 maintained the maximum spread (682.73 cm²), which was statistically similar to the check variety DFC-21 (630.63 cm²) and other varieties such as DFC-3 (650.70 cm²), HUB-3 (637.27

cm²), DFC-20 (635.77 cm²), while the minimum was observed in Rmt-303 (380.55 cm²). With respect to the number of branches per plant, DFC-24 maintained the maximum branches (12.10), statistically similar to the check variety DFC-21 (11.75) and other varieties such as Lam sel-2 (11.05), Lam sel-3 (11.50), GM-1 (11.20), Rmt-351 (11.65), Rmt-354 (11.20), Rmt-361 (11.35), Pusa Early Bunching (11.20), HUB-2 (11.70), HUB-3 (11.80), HUB-7 (11.50), DFC-1 (11.30), DFC-3 (11.85), DFC-8 (11.40), DFC-12 (11.50), DFC-17 (11.50), DFC-18 (11.45), and DFC-20 (11.95), while the minimum number of branches was recorded in Rmt-303 (9.05). The greater plant spread may be attributed to their prostrate growth habit, which facilitates wider canopy development, coupled with efficient nutrient utilization. Varieties/genotypes with broader and more numerous leaves capture more light, which accelerates assimilate production and promotes vigorous lateral growth, thereby enhancing canopy spread as well the number of branches. Similar results have been reported by Selvarajan *et al.* (2002) [24], Malik and Tehlan, (2009) [15], Pushpa *et al.* (2012) [21], Mamatha *et al.* (2017) [16], Madhuri *et al.* (2021) [13] and Desai *et al.* (2022) [6].

The pooled analysis over both seasons revealed significant variability among the collections for days to first flowering, days to 50 per cent flowering and days to seed maturity (Table 1). The longest duration to first flowering was observed in Rmt-303 (41.75) and DFC-10 (41.75). In contrast, the earliest flowering was noted in DFC-3 (34.25), which was statistically on par with HUB-3 (35.00), DFC-18 (35.00), DFC-20 (34.75) and DFC-24 (34.50). The minimum days to 50 per cent flowering was recorded in DFC-3 (38.25), which was statistically on par with DFC-20 (39.25), DFC-24 (39.50) and earlier than the check varieties Afg-1 (43.00), DFC-21 (40.00) and HUB-8 (42.00). The longest duration to 50 per cent flowering was seen in Rmt-303 (46.50). The earliest seed maturity was reported in DFC-3 (99.25), which was statistically on par with DFC-20 (99.50), GM-3 (100.25), DFC-8 (100.25), DFC-24 (100.25) HUB-3 (100.75), DFC-7 (100.75) and the check variety DFC-21 (100.75), while the longest duration for seed maturity was observed in Rmt-305 (120.25). Such differences in flowering and maturity can be explained by the inherent genetic makeup and the varying life cycle lengths of the genotypes/varieties, along with their interaction with prevailing environmental factors such as temperature, day length and humidity. Faster growth and greater carbohydrate accumulation may have promoted early flowering, which in turn led to early maturity. Moreover, the interplay of these factors with endogenous phytohormones likely accelerated the process of maturity following early flowering. The present observations on reproductive parameters in fenugreek are in close agreement with the earlier findings of Selvarajan *et al.* (2002) [24], Naik and Akhtar (2012) [17], Singh and Kaur (2007) [26], Giridhar *et al.* (2016) [7], Kurubetta *et al.* (2018) [11], Camlyca and Yaldiz (2019) [2], Desai *et al.* (2022) [6] and Verma *et al.* (2024) [28].

Significant differences were noticed with respect to yield and its related traits among the fenugreek collections evaluated. The pooled analysis over both seasons indicated that, DFC-24 recorded the highest number of pods per plant (55.30), which was on par with DFC-3 (52.10) and DFC-20 (51.10), whereas the lowest was observed in Rmt-303 (26.50). The number of pods per plant remained consistently higher in the top-performing collections compared to the check varieties (Afg-1, DFC-21, and HUB-8) in the pooled analysis. DFC-24 produced the longest pod (12.23 cm) which was longer than the check varieties (Afg-1, DFC-21 and HUB-8) and statistically similar to CO-2 (11.41 cm), Afg-5 (11.46 cm), HUB-3 (11.97 cm), DFC-3 (12.15 cm), DFC-7 (11.55 cm), DFC-18 (11.38 cm), and DFC-20 (12.08 cm). Conversely, the lowest pod length was found in Rmt-303 (6.85 cm). The maximum seeds per pod was recorded in DFC-24 (13.86)**,** which was statistically similar to HUB-3 (12.95), DFC-3 (13.46) and DFC-20 (13.22), whereas the minimum was recorded in Rmt-303 (7.56). Consistently higher seeds per pod were observed in the superior collections compared to the check varieties (Afg-1, DFC-21, and HUB-8) in the pooled analysis. The highest seed yield per plant was obtained in DFC-24 (7.54 g), which was on par with HUB-3 (6.84 g), DFC-3 (7.27 g) and DFC-20 (7.06 g), while the lowest yield was noted in Rmt-303 (4.05 g). Seed yield per plant remained consistently higher in the superior collections compared to the check varieties (Afg-1, DFC-21, and HUB-8). The highest seed yield per plot was obtained in DFC-24 (412.61 g), which was higher than the check varieties (Afg-1, DFC-21 and HUB-8) and on par with HUB-3 (373.81 g), DFC-3 (407.04 g) and DFC-20 (391.37 g), while the lowest yield was noted in Rmt-303 (175.49 g). The pooled analysis over both seasons revealed that DFC-24 produced the highest seed yield per hectare (18.34 q/ha), which was higher than the check varieties (Afg-1, DFC-21 and HUB-8) and statistically on par with HUB-3 (16.61 q/ha), DFC-3 (18.09 q/ha), and DFC-20 (17.39 q/ha), whereas the lowest seed yield per hectare was recorded in Rmt-303 (7.80 q/ha). The highest test weight was recorded in DFC-24 (16.69 g), which was followed by DFC-3 (16.38 g) and DFC-20 (16.29 g), while the lowest test weight was observed in Rmt-303 (10.53 g). The superior performing collections consistently exhibited higher test weight when compared with the check varieties (Afg-1, DFC-21 and HUB-8) in the pooled data over both the seasons. With respect to yield traits, DFC-24 consistently outperformed the other fenugreek collections, registering highest values for pods per plant, pod length, seeds per pod, seed yield at different levels (per plant, per plot and per hectare) and test weight. In contrast, the lowest performance for most of these traits was recorded in Rmt-303. The variation in pods per plant is primarily governed by the genetic makeup of genotype/variety and their interaction with environmental conditions. Higher pod production is often linked to vigorous vegetative growth, including greater plant spread, enhanced branching and efficient dry matter accumulation, which collectively contribute to increased productivity. Among yield components, seeds per pod and test weight play a decisive role, with seed set largely influenced by effective pollination, successful fertilization and retention of zygotes. Efficient partitioning and storage of photosynthates further strengthen the yield potential. The boldness of seeds contributed significantly to the higher test weight in fenugreek. These results on yield related parameters were supported by Selvarajan *et al.* (2002) [24], Datta and Choudhuri (2005) [4], Naik and Akhtar (2012) [17], Pushpa *et al.* (2012) [21], Santhosha (2012) [23], Phom *et al.* (2014) [20], Santhosha *et al.* (2014) [22], Giridhar *et al.* (2016) [7], Mamatha *et al.* (2017) [16], Jyothi and Hegde (2018) [10], Camlyca and Yaldiz (2019) [2], Madhuri *et al.* (2021) [13] and Desai *et al.* (2022) [6].

Table 1: *Per se* performance of fenugreek collections for growth and reproductive parameters

Variety/Genotype	Days to germination	Plant height (cm)	Plant spread (cm^2)	Number of branches per plant	Days to first flowering	Days to 50 per cent flowering	Days to seed maturity
Lam sel-1	4.25	53.95	555.18	10.70	37.75	42.50	104.75
Lam sel-2	4.50	57.82	480.42	11.05	38.00	42.25	108.00
Lam sel-3	4.25	53.65	529.57	11.50	36.75	41.25	111.25
GM-1	4.00	53.88	455.06	11.20	36.25	41.75	117.25
GM-2	5.25	55.42	501.39	10.05	36.50	42.00	107.75
GM-3	4.25	54.60	582.17	10.60	36.50	42.00	100.25
CO-1	4.00	58.61	528.98	9.80	37.75	42.00	110.75
CO-2	4.50	59.10	487.25	10.00	36.75	41.50	107.25
Rmt-1	5.00	56.90	544.07	9.50	38.00	42.00	114.50
Rmt-143	5.00	56.00	512.81	11.00	37.25	42.50	119.00
Rmt-303	5.50	58.38	380.55	9.05	41.75	46.50	119.25
Rmt-305	6.00	62.37	434.85	9.20	41.25	45.00	120.25
Rmt-351	4.00	51.90	553.49	11.65	35.25	40.75	106.25
Rmt-354	5.25	54.28	568.94	11.20	37.00	41.75	104.25
Rmt-361	4.25	54.60	564.20	11.35	38.25	43.50	106.25
Afg-1	4.75	55.67	500.67	10.65	37.25	43.00	114.50
Afg-2	4.25	53.95	575.21	10.95	36.00	40.25	107.75
Afg-3	4.25	54.61	549.04	10.55	38.00	42.50	119.00
Afg-4	4.00	54.61	556.44	10.65	38.25	43.50	115.75
Afg-5	4.75	57.25	459.64	10.10	36.25	41.75	117.50
Pusa Early Bunching	5.00	54.81	522.26	11.20	39.25	44.50	107.25
HM-57	4.00	55.91	495.45	10.70	39.25	43.25	112.75
DFC-21	4.25	53.65	630.63	11.75	36.00	40.00	100.75
HUB-1	4.25	55.45	555.45	10.70	37.00	42.00	107.00
HUB-2	4.50	52.44	594.17	11.70	37.25	41.25	102.25
HUB-3	3.25	49.14	637.27	11.80	35.00	40.25	100.75
HUB-4	4.25	55.04	530.77	9.75	35.50	40.00	118.75
HUB-5	5.00	57.22	524.13	9.90	37.25	42.00	116.00
HUB-6	4.00	54.85	572.30	10.50	38.00	43.75	109.50
HUB-7	4.75	53.27	601.02	11.50	36.75	40.25	117.25
HUB-8	4.00	56.15	483.69	10.25	36.75	42.00	111.25
HUB-9	5.25	54.77	560.03	10.40	36.50	41.50	114.25
DFC-1	4.00	53.33	585.23	11.30	39.25	41.75	107.50
DFC-2	4.25	56.45	491.11	10.35	35.75	41.50	104.25
DFC-3	3.50	46.82	650.70	11.85	34.25	38.25	99.25
DFC-4	4.00	57.79	594.67	9.90	38.00	41.75	105.75
DFC-5	5.00	65.47	457.99	9.20	40.50	45.50	119.75
DFC-6	4.00	55.59	560.81	10.55	39.50	43.75	113.50
DFC-7	4.00	60.62	456.80	10.25	40.00	43.50	100.75
DFC-8	5.25	51.47	576.63	11.40	35.25	40.50	100.25
DFC-9	5.75	56.82	505.87	9.40	39.75	44.75	116.00
DFC-10	5.50	63.75	398.10	9.10	41.75	45.00	119.50
DFC-11	5.00	54.49	553.43	9.65	38.00	42.00	118.00
DFC-12	4.00	54.61	542.29	11.50	38.50	43.50	107.75
DFC-13	5.25	60.73	576.08	10.40	38.00	42.25	116.50
DFC-14	5.00	54.37	528.09	10.65	37.75	45.25	113.50
DFC-15	4.00	53.72	578.70	9.60	37.00	43.00	118.00
DFC-16	4.50	56.75	569.08	10.80	37.25	42.00	118.25
DFC-17	4.00	56.17	604.57	11.50	36.75	41.50	106.50
DFC-18	5.00	52.79	590.97	11.45	35.00	40.50	103.25
DFC-19	4.75	57.42	497.70	9.85	37.00	41.50	118.25
DFC-20	4.00	48.83	635.77	11.95	34.75	39.25	99.50
DFC-22	4.25	55.11	499.30	10.70	35.75	40.00	106.00
DFC-23	4.50	56.59	539.10	9.95	40.00	43.75	109.00
DFC-24	3.75	46.15	682.73	12.10	34.50	39.50	100.25
S. Em ±	0.20	1.73	19.00	0.37	0.35	0.56	0.81
C.D. (5%)	0.56	4.91	53.88	1.05	0.99	1.59	2.29

Table 2: *Per se* performance of fenugreek collections for yield parameters

Variety/Genotype	Number of pods per plant	Pod length (cm)	Number of seeds per pod	Seed yield per plant (g)	Seed yield per plot (g)	Seed yield per hectare (q)	Test weight (g)
Lam sel-1	38.20	10.34	10.23	5.43	280.66	12.47	12.90
Lam sel-2	36.10	11.21	10.22	5.35	271.79	12.08	14.96
Lam sel-3	39.85	10.25	10.72	5.62	281.61	12.52	14.20
GM-1	36.55	9.96	10.34	5.46	284.57	12.65	14.81
GM-2	38.10	10.18	10.68	5.19	249.14	11.07	11.99
GM-3	36.00	9.41	10.83	5.36	273.52	12.16	14.88
CO-1	38.55	9.58	10.83	5.65	293.90	13.06	13.87
CO-2	38.10	11.41	10.86	5.27	281.31	12.50	12.99
Rmt-1	36.30	10.28	9.51	5.21	253.89	11.28	14.92
Rmt-143	36.00	9.89	10.40	5.39	260.02	11.56	15.61
Rmt-303	26.50	6.85	7.56	4.05	175.49	7.80	10.53
Rmt-305	28.95	7.38	8.05	4.24	191.18	8.50	11.36
Rmt-351	39.70	8.96	10.63	5.45	276.77	12.30	15.34
Rmt-354	39.75	10.04	11.02	5.54	279.94	12.44	13.97
Rmt-361	36.70	9.37	10.64	5.71	292.68	13.01	14.30
Afg-1	37.25	9.99	11.81	5.72	302.46	13.44	13.45
Afg-2	37.60	10.18	10.32	5.42	263.18	11.70	13.29
Afg-3	38.20	8.91	10.45	5.20	255.89	11.37	12.91
Afg-4	37.80	9.75	10.31	5.89	310.01	13.78	13.69
Afg-5	40.55	11.46	10.50	5.11	240.60	10.69	13.35
Pusa Early Bunching	38.20	9.59	10.13	5.41	270.74	12.03	13.23
HM-57	38.70	9.77	10.60	5.32	266.04	11.82	12.70
DFC-21	42.00	11.10	11.44	6.38	335.72	14.92	15.78
HUB-1	34.85	10.90	10.21	6.00	302.42	13.44	15.24
HUB-2	49.75	10.95	12.67	6.24	321.04	14.27	15.27
HUB-3	49.90	11.97	12.95	6.84	373.81	16.61	16.23
HUB-4	40.35	8.84	10.75	5.29	251.82	11.19	13.86
HUB-5	41.45	11.10	10.40	5.44	266.71	11.85	14.31
HUB-6	36.85	8.82	10.74	5.30	261.17	11.61	14.90
HUB-7	30.95	8.44	9.06	4.73	223.28	9.92	11.52
HUB-8	35.60	10.81	10.72	5.25	258.12	11.47	15.00
HUB-9	38.15	9.80	10.37	5.61	307.17	13.65	13.87
DFC-1	40.65	9.16	9.74	5.16	254.61	11.32	14.98
DFC-2	35.50	9.94	9.93	5.32	263.25	11.70	12.35
DFC-3	52.10	12.15	13.46	7.27	407.04	18.09	16.38
DFC-4	39.00	8.71	10.89	5.94	304.06	13.51	14.45
DFC-5	30.00	8.13	8.28	4.33	198.02	8.80	11.46
DFC-6	44.45	9.90	10.50	5.50	280.48	12.47	12.51
DFC-7	50.15	11.55	11.45	6.31	318.43	14.15	12.61
DFC-8	32.10	9.29	9.36	4.90	241.75	10.74	13.75
DFC-9	33.85	9.35	9.19	4.44	231.64	10.30	13.15
DFC-10	28.00	6.94	8.21	4.18	195.46	8.69	10.76
DFC-11	36.70	9.89	9.80	5.25	258.47	11.49	12.27
DFC-12	37.30	10.49	9.39	5.49	280.69	12.48	14.62
DFC-13	40.20	10.21	10.11	5.44	268.57	11.94	14.47
DFC-14	39.90	9.85	11.00	5.35	252.89	11.24	15.44
DFC-15	37.90	9.53	10.61	5.29	249.41	11.09	12.77
DFC-16	34.80	10.40	10.74	5.58	292.03	12.98	14.34
DFC-17	38.95	9.84	10.56	5.26	259.54	11.53	14.53
DFC-18	36.45	11.38	11.04	4.94	240.52	10.69	14.25
DFC-19	38.05	10.46	10.47	5.14	266.70	11.85	14.36
DFC-20	51.10	12.08	13.22	7.06	391.37	17.39	16.29
DFC-22	40.30	10.64	9.89	5.27	269.60	11.98	13.38
DFC-23	40.00	9.61	10.26	5.13	269.82	11.99	13.90
DFC-24	55.30	12.23	13.86	7.54	412.61	18.34	16.69
S. Em ±	1.49	0.34	0.42	0.26	17.67	0.79	0.01
C.D. (5%)	4.21	0.97	1.18	0.75	50.09	2.23	0.03

Plate 1: General view of the experimental plot

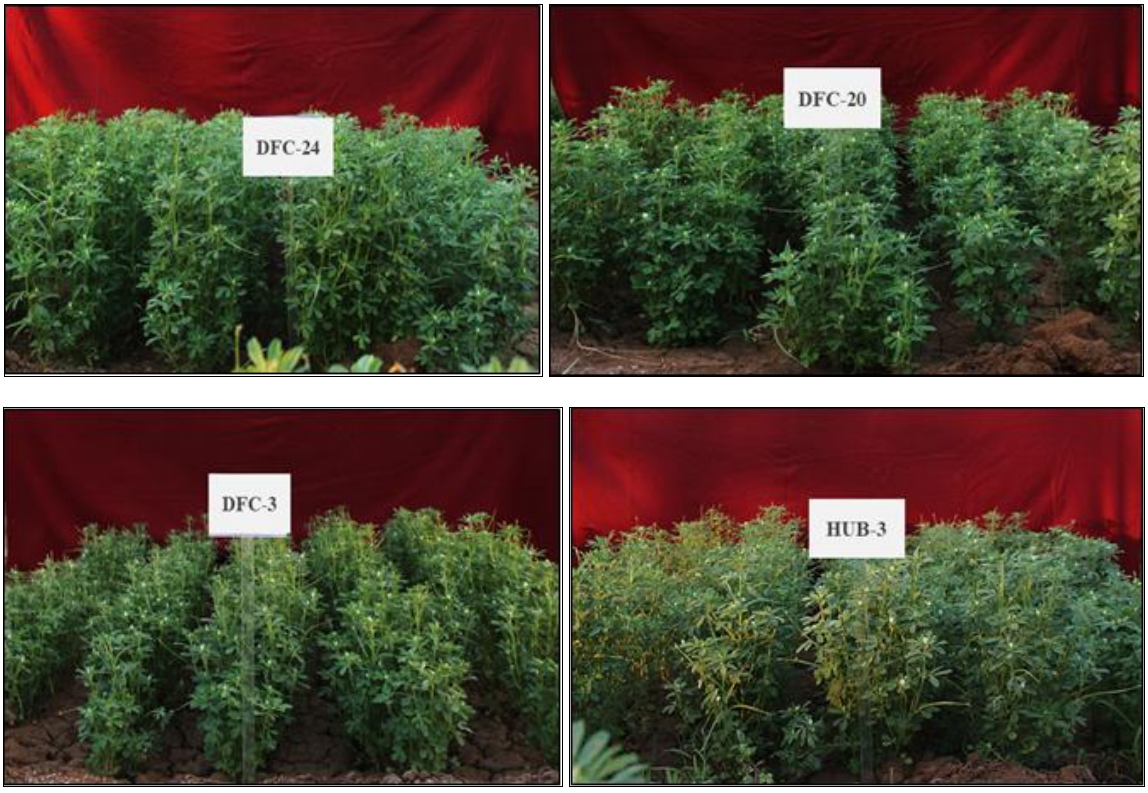

Plate 2: Best performed fenugreek collections

Conclusion

From the current investigation, it can be concluded that the cultivation of fenugreek collections DFC-24, DFC-20, DFC-3 and HUB-3 may be suitable and more economical for Northern dry zone of Karnataka. These high-yielding collections could be recommended for further evaluation through multi-location trials to assess their yield stability. Additionally, they can be effectively utilized in breeding programmes aimed at enhancing yield potential and developing improved fenugreek varieties adapted to dry zone conditions.

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