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Research Paper

Response of fenugreek to fertility levels under different cutting management

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ABSTRACT

An experiment was conducted at Agricultural Research Station, Sardarkrushinagar Dantiwada Agricultural University, Aseda, Gujarat during three consecutive *rabi* season during the year 2020 to 2022. Fenugreek variety PEB (Pusha Early Bunch) was sown at second fort night of November with three fertilizer levels, *viz*. 100% RDF (20-40-00 N-P_2O_5-K_2O kg/ha), 125% RDF (25-50-00 N-P_2O_5-K_2O kg/ha), 150% RDF (30-60-00 N-P_2O_5-K_2O kg/ha) and four cutting management *viz;* no cutting (only seed production), cutting at 50 DAS as leafy vegetable + seed production, cutting at 40 and 70 DAS as leafy vegetable + seed production, cutting at 30, 50 and 70 DAS as leafy vegetable + seed production laid out in randomized block design with factorial concept in three replications. Significantly higher plant height at 40, 50 and 75 DAS, higher number of branch per plant, number of pod per plant, number of seed per pod, green leaf yield, seed yield and seed equivalent yield were recorded under the application of 150% RDF (30-60-00 N-P_2O_5-K_2O kg/ha) fertility levels which remained at par with 125% RDF (25-50-00 N-P_2O_5-K_2O kg/ha)), while in case of cutting management, no cutting treatment recorded significantly higher plant height at 40, 50 and 70 DAS as well as it recorded higher no. of pods per plant, length of pods, test weight and seed yield (741 kg/ha) while, higher no. of branches and no. of seeds per pod were recorded under cutting at 50 DAS as leafy vegetable + seed production. Higher green leaf yield (9,468 kg/ha) and seed equivalent yield (1,755 kg/ha) was recorded with three cutting at 30, 50 and 70 DAS as leafy vegetable followed by seed production.

***Key words*:** Fertilizer, Growth, Leaf yield, Seed yield, Seed equivalent yield

Fenugreek (*Trigonella foenum-graecum* L.) is an annual seed spice crop also used as a leafy vegetable, and reported to have medicinal properties. India is largest consumer, exporter and producer of spices in the world. Fenugreek locally known as *'methi'* belonging to the *Leguminosae* family and used as spice and condiment to add flavour in various to a variety of cuisines. Fenugreek seeds are used to lower the blood glucose and blood cholesterol levels due to presence of large amounts of soluble fiber in them. Fenugreek is grown under marginal and sub-marginal lands. Chemical analysis of fenugreek seed revealed that it contains 13.7 per cent water, 26.2 per cent protein, 5.8 per cent fat, 3 per cent mineral matter, 7.2 per cent fiber, 4.41 per cent carbohydrate, 0.16 per cent calcium, 0.37 per cent phosphorus, 14.1 mg iron, 333 calories and 160 IU carotene per 100 gm (Agrawal, 2002). Fenugreek is mainly grown in India, Pakistan, China, Nepal and Bangladesh. In India, it is commercially grown in Rajasthan, Gujarat, Madhya Pradesh, Haryana, West Bengal, Punjab and Maharashtra. Rajasthan occupies 80% of area and production (Babaleshwar and Shetty, 2017). The major area was occupied by Rajasthan (90.9 Mha) followed by Madhya Pradesh (52.2 Mha) and Gujarat (8.7 Mha.) with production of 110.8, 101.8 and 16.6 M tonnes respectively (Anon.2024) In Gujarat, it being cultivated in 8702 ha area with 16697 kg production during 2021-22. Increased addition of nitrogen usually results in increased yield of crop plant (Korus and Lisiewska, 2009). Productivity of the crop is low but may be increased with supply of optimum amounts of fertilizer and improved agronomic practices. It also helps in production of side shoots or branches thus resulting in increased photosynthetic activity and accumulation of more photo-synthates ultimately resulting in increased seed size and yield (Lakshmi *et al.,* 2015). Cutting of stems significantly effects branching and enhances flowering in most of the crops (Ahmed and Oladiaran, 2012). Apical bud pinching helps in altering the source sink relationship by curbing the vegetative growth and hastening reproductive phase of the plant. Cutting of stems significantly effects branching and enhances flowering in most of the crops. Since in most of the leafy vegetables several cuttings are possible, they require a good amount of fertil-

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izer for quick growth. One or two leaf cutting may be done if adequate nutrient is supplied since it is associated with vigorous vegetative growth, leading to higher seed production. Thapa (1999) revealed from his study that leaf plucking of fenugreek seed crop at early stages can provide an extra income to the growers. Therefore, to get good vegetative growth after cutting nitrogen is essential Farmers usually practice leaf cutting in fenugreek only when crop grown for vegetable purpose. There is need to standardize the nitrogen requirement when leaf cutting is practiced at different stages of growth since it may influence leaf and seed yields. The experiment was undertaken to determine the best nutrient levels and appropriate stage of leaf cutting to enhance yield.

MATERIALS AND METHODS

An experiment was conducted at Agricultural Research Station, Sardarkrushinagar Dantiwada Agricultural University, Aseda, Gujarat during three consecutive *rabi* season of years 2020 to 2022. Fenugreek variety PEB (Pusha Early Bunch) was sown at second fort night of November of every season of the consecutive three years with line sowing at 45 cm spacing of different treatments of three fertilizer levels *viz*; 100 % RDF (20-40-00 N-P_2O_5-K_2O kg/ha), 125 % RDF (25-50-00 N-P_2O_5-K_2O kg/ha), 150 % RDF (30-60-00 N-P_2O_5-K_2O kg/ha) and four cutting management *viz;* No cutting (Only seed production) , Cutting at 50 DAS as leafy vegetable + seed production, Cutting at 40 and 70 DAS as leafy vegetable + seed production, Cutting at 30, 50 and 70 DAS as leafy vegetable + seed production laid out in randomized block design with factorial concept in three replications. The experiment field was prepared by applying farm yard manure 5 t/ha followed by ploughing at 15 days before sowing and second times ploughing followed by planking were done for smoothing the plot for sowing. Crop was sown during the month of November in the plot size: Gross plot: 5.0 m × 3.6 m = 18.0 m² (12 rows). Recommended dose of fertilizers: 20:40:00 N-P_2O_5-K_2O kg/ha was used. The half dose of nitrogen and full dose of phosphorus were applied through urea and single super phosphate di ammonium phosphate as basal at the time of sowing and remaining nitrogen was top dressed at 30 days after sowing (DAS). Application of NPK consortium @ 10 mg/kg seed was done as a seed treatment at the time of sowing. Phosphorus was applied as per treatments through SSP.

The crop was irrigated in flood at 10 days interval by the end of January month and further at 7 days interval. Pesticides *i.e.* carbendazim 50% WP @ 2 ml/l and imidacloprid 17.8% SL @ 1.5 ml/l were applied twice after each cutting to keep the crop free of fungal disease and insects, respectively.

The cutting was done at 30, 40, 50 and 70 DAS as per the treatment and observation of plant height at 30, 40, 50 and 70 DAS before each cut. Green leaf yield was counted after each cut and converted on hectare basis. The other bio metric observation like; number of pods per plant, length of pods (cm), number of seed/pods, test weight (g), seed yield (kg/ha) and straw yield (kg/ha) were recorded after harvesting and proper sun drying (4 days after harvesting). The soil samples and plant samples were collected from each net plot area and after prepared for the laboratory studies for different macronutrient content. Data were statistically analyzed using analysis of variance (ANOVA) procedure according to Gomez and Gomez (1984). The mean differences were compared using LSD at 5%.

RESULTS AND DISCUSSION

Effect of different fertility levels and cutting management on plant population per metre row length remained non-significant. Plant height at 30 DAS was recorded higher under the treatment 150% RDF in 2020–21 and 2021–22 but non-significantly increased in 2022–23 as well as in in the pooled of two years, while the cutting has non-significant effect on plant height at 30 DAS. Significantly higher plant height (12.39 cm) at 40 DAS was recorded under the treatment receiving 150% RDF (F_3) during the individual as well as pooled basis and remained statistically at par with the treatment F_2: 125% RDF, while C_3 recorded significantly higher plant height (13.56) in individual as well as on pooled results and remained at par with treatment C_1 and C_2 in pooled results of three years. Plant height (18.24 cm) at 50 DAS was recorded significantly higher under the treatment receiving 150% RDF (F_3) during the individual as well as pooled basis and remained statistically at par with the treatment F_2: 125% RDF, while

Table 1. Initial Fertility status of soil

Parameter	2020–21	2021–22	2022–23
$EC_{1:2.5}$ (dS/m)	0.189	0.142	0.152
$pH_{1:2.5}$	8.12	7.89	7.34
Available Nitrogen (kg/ha)	156.8	121.5	202.3
Available Phosphorus (kg/ha)	96.9	126.4	67.3
Available Potash (kg/ha)	182.8	236.5	268.5

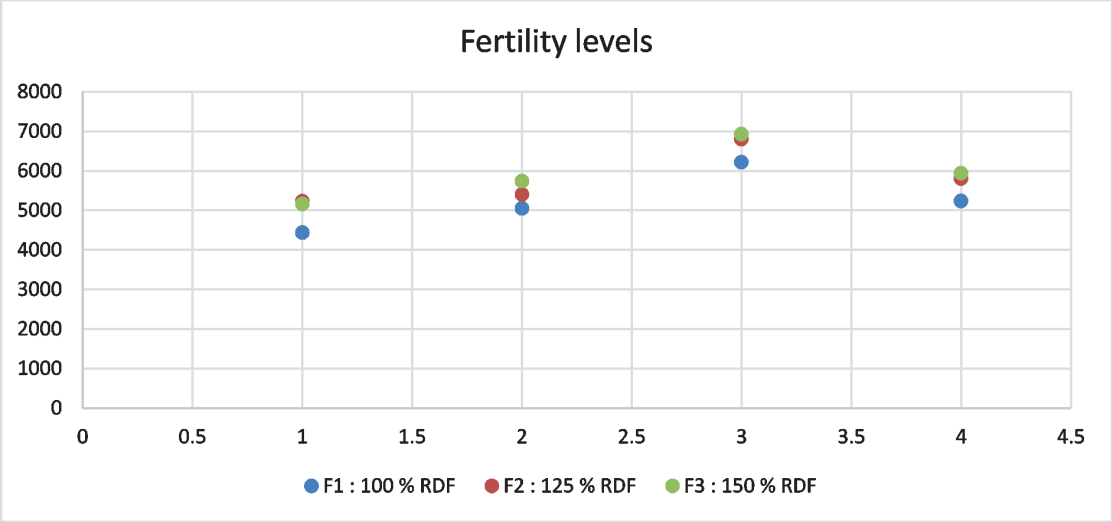

Fig. 1. Effect of fertility levels on green leaf yield of fenugreek

C_1 recorded significantly higher plant height (23.11 cm) at 50 DAS in individual as well as on pooled results and remained at par with treatment C_2 (Cutting at 50 DAS as leafy vegetable + seed production) in pooled results of two years. Interaction effect found significantly higher under treatment F_3C_3 and remained statistically at par with F_3C_2, F_3C_1 and F_3C_2.

Significantly higher plant height (31.99 cm) at 70 DAS was recorded under the treatment receiving 150% RDF (F_3) on pooled basis. while C_1 recorded significantly highest plant height of 45.73 cm at 70 DAS on pooled results. Interaction effect shows non-significant results. It might be due to easy availability of nutrients though chemical fertilizers application and higher nitrogen fixation by bacteria which in turn helped in better absorption and subsequent utilization of nitrogen for synthesis of chlorophyll, which results in higher photosynthesis and there by producing more dry matter leading to more plant height and in addition to that the plant was not cut at any stage in case of cutting management which ultimately results in higher plant height in C_1. These results are in accordance with the findings of Chaudhary *et.al.* (2011) Jain *et al.* (2003), Bhunia *et al.* (2006), Mehta *et al.* (2012) and Rizvi *et al.* (2013) in fenugreek.

Number of branches significantly affected by different fertility levels and cutting management in individual as well as on pooled results of three years. Significantly the highest value of number of branch (10.94) was recorded

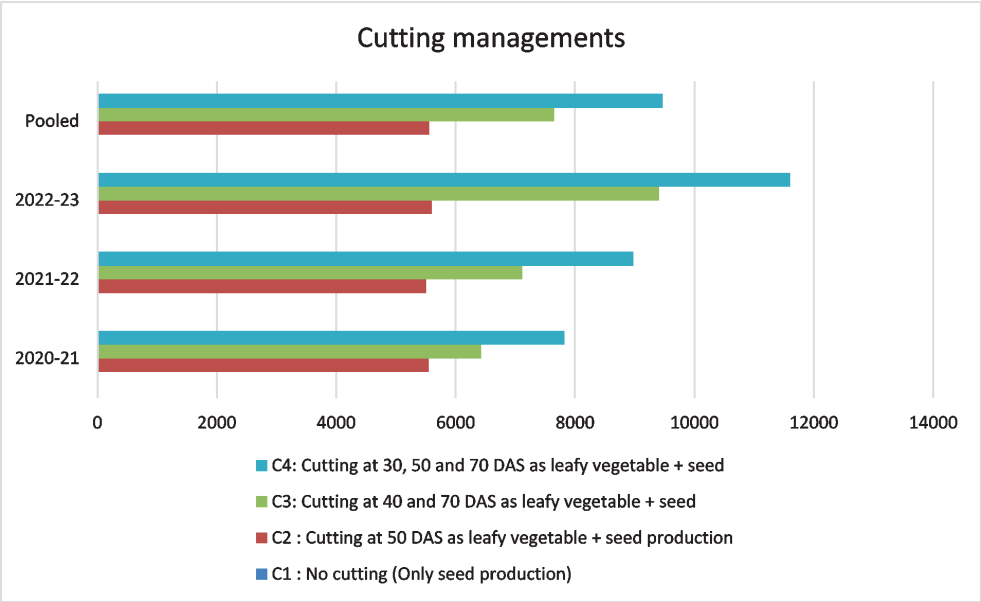

Fig. 2. Effect of cutting managements on green leaf yield of fenugreek

Table 2. Effect of different fertility levels and cutting management on growth and yield attributes of fenugreek (pooled data of 3 years)

Treatment	Plant population /meter row length	Plant height (cm)				Branches/ plant	Pods/ plant	Length of pods (cm)	Seeds/ pod	Test weight (g)
		30 DAS	40 DAS	50 DAS	70 DAS					
Fertility levels (F)										
F_1: 100% RDF	9.68	5.04	10.86	16.37	29.23	8.53	22.65	7.28	10.27	8.91
F_2: 125% RDF	9.65	5.56	11.79	17.45	31.46	9.60	27.40	8.19	11.12	10.59
F_3: 150% RDF	9.62	6.12	12.39	18.24	31.99	10.94	27.54	9.12	11.64	10.83
SEm±	0.123	0.308	0.188	0.316	0.60	0.18	0.397	0.216	0.186	0.115
CD (P=0.05)	NS	NS	0.531	0.893	1.70	0.49	1.120	0.846	0.540	0.325
Cutting management (C)										
C_1: No cutting (Only seed production)	9.67	5.64	13.54	23.29	45.73	10.29	31.96	9.76	13.03	11.41
C_2: Cutting at 50 DAS as leafy vegetable + seed production	9.72	5.67	13.28	23.11	22.68	12.91	27.73	8.27	10.94	10.54
C_3: Cutting at 40 and 70 DAS as leafy vegetable + seed production	9.71	5.51	13.56	7.79	32.76	8.78	24.42	7.79	10.57	9.65
C_4: Cutting at 30, 50 and 70 DAS as leafy vegetable + seed production	9.50	5.48	6.33	15.22	22.39	6.79	19.35	6.96	9.51	8.83
SEm±	0.142	0.099	0.217	0.56	2.50	0.20	0.458	0.242	0.166	0.245
CD (P=0.05)	NS	NS	0.613	1.96	8.67	0.57	1.293	0.838	0.468	0.848
Interaction F × C										
SEm±	0.246	0.171	0.376	0.633	1.20	0.349	0.793	0.228	0.287	0.230
CD (P=0.05)	NS	NS	NS	NS	NS	NS	2.240	NS	NS	0.649
(Y × F) (Y × C) (Y × F × C)	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
CV%	7.66	9.19	9.65	11.300	12.13	10.82	9.20	8.35	7.82	6.82

under the treatment of F_3, 150% RDF of fertility levels and C_2 (cutting at 50 DAS as leafy vegetable + seed production) under cutting management (12.91), while result of interaction found non-significant. Cutting improves vertical growth of plant resulting in translocation of photosynthates and encouraging auxiliary branches. The results agreed with Krishnaveni *et al.* (2014). Increasing number of cuttings suppress shoot and root growth and considerably improve branching of plant (Datta *et al.* (2005).

Significantly higher number of pods per plant (27.54) was recorded under the fertility levels treatment F_3, 150% RDF on pooled basis and remained statistically at par with the treatment F_2, 125% RDF, while under different cutting management, treatment C_1, No cutting recorded the highest number of pods per plant (31.96) in all season as well as on pooled results. The results of interaction found significant and higher number of pods per plant were obtained under the treatment F_3C_1 and remained statistically at par with the treatment F_3C_2. It might be due to increasing number of cutting drastically reduced the pods per plant, seeds per pod and 1000-seed weight. This might be due to reduction of l vegetative growth under a greater number of cuttings. Data *et al.* (2005) also reported the similar trend in fenugreek.

The effect of various fertility levels on length of pods per plant recorded significantly highest in the treatment receiving 125% RDF (9.12 cm) and no cutting management (9.76 cm) in individual as well as on pooled results, while interaction effect remained non-significant. Number of seeds/pod significantly affected by different fertility levels and cutting management in individual as well as on pooled results of three years. Significantly the higher value of number of seeds/pod (11.64) was recorded under the treatment of F_3: 150% RDF of fertility levels and remained statistically at par with F_2, while in case of different cutting managements C_2 (Cutting at 50 DAS as leafy vegetable + seed production) recorded significantly highest value (13.03) of number of pods in individual as well as on pooled of three years. The result of interaction remained non-significant. It might be due to higher length of pods which makes more space for development and growth of more seed in pod. Similar results were reported by Khiriya

Table 3. Effect of different fertility levels and cutting management on seed yield and seed equivalent yield of fenugreek (pooled data of 3 years)

Treatment	Seed yield (kg/ha)				Seed equivalent yield (kg/ha)			
	2020–21	2021–22	2022–23	Pooled	2020–21	2021–22	2022–23	Pooled
Fertility levels (F)								
F_1: 100% RDF	500	367	499	456	1212	1176	1507	1298
F_2: 125% RDF	571	445	598	539	1409	1310	1687	1469
F_3: 150% RDF	600	489	618	569	1427	1407	1727	1520
SEm±	24.07	19.69	23.12	12.91	34.36	29.12	37.94	19.63
CD (P=0.05)	70.61	57.75	67.81	36.48	100.78	85.39	111.28	55.42
Cutting management (C)								
C_1: No cutting (Only seed production)	808	631	588	741	807	632	784	741
C_2: Cutting at 50 DAS as leafy vegetable + seed production	683	484	498	611	1571	1365	1566	1501
C_3: Cutting at 40 and 70 DAS as leafy vegetable + seed production	547	389	409	494	1575	1527	2055	1719
C_4: Cutting at 30, 50 and 70 DAS as leafy vegetable + seed production	193	230	220	239	1444	1666	2155	1755
SEm±	27.80	22.73	26.70	31.61	39.68	33.62	43.81	107.50
CD (P=0.05)	81.54	66.69	78.30	109.39	116.37	98.60	128.49	372.02
Interaction F × C								
SEm±	48.15	39.38	46.47	25.83	68.72	58.23	75.88	39.26
CD (P=0.05)	NS	NS	NS	NS	NS	NS	NS	NS
(Y × F) (Y × C) (Y × F × C)				NS				NS
CV %	14.95	15.74	14.00	15.64	8.86	7.89	8.01	9.56

et al. (2003), Choudhary *et al.* (2011) and Bhutia (2017) in fenugreek

Among the different fertility levels managements, significantly higher value of test weight (10.83) was recorded under treatment F_3: 150% RDF and remained statistically at par with F_2: 125% RDF. Among different cutting management C_1, no cutting recorded significantly the highest test weight (11.41) in all individual as well as on pooled results. The results of interaction found significant and highest test weight was obtained under the treatment F_3C_1. Balanced supply of primary nutrients throughout the life cycle of the crop improves flowering fruiting and bold seed formation resulted in to higher test weight. The results corroborate with those of Khiriya *et al.* (2003). Higher test weight due to the fact that crop got sufficient time for its growth under favorable condition. This result is in close conformity to that of Bhutia and Sharangi (2016) and Sultana *et al*., (2016)

The effect of different levels of fertility and cutting management on total green leaf yield of fenugreek remained significant in all season as well as on pooled basis. Among the different fertility levels, on pooled basis treatment F_3: 150% RDF recorded significantly higher total green leaf yield (5,946 kg/ha) and remained at par with treatment F_2: 125% RDF (5,813 kg/ha). In case of different cutting management treatment C_4: Cutting at 30, 50 and 70 DAS as leafy vegetable + seed production, recorded significantly highest total green leaf yield in individual as well as on pooled results (9,468 kg/ha). It might be due to the results are in confirmatory to findings of Datta *et al.* (2005), Gill *et al.* (2001) and Dahiya *et al.* (2009) that green leaf yield increases with increase in fertilizers levels by balanced supply of nutrients to plant which promotes synthesis of more carbohydrates resulted in more photosynthesis and dry matter accumulations.

Seed yield affected significantly by the different fertility levels and cutting management. The treatment F_3: 150% RDF recorded significantly higher seed yield on pooled (569 kg/ha) results and remained statistically at par with the treatment F_2: 125% RDF (539 kg/ha). In case of different cutting management, significantly the highest value of seed yield (741 kg/ha) was recorded under the treatment C_1: No cutting. It might be due to cumulative effect of more number of pods per plant, more number of seeds per pod and maximum weight of seed which ultimately results in higher seed yield of plant. Similar results were reported by Bhutia (2017), Nehra *et al.* (2002), Mehta *et al.* (2011) and Patel *et al.* (2022), Meena (2013), Chaudhary (2016), Somdutt *et al.* (2019), Talaviya and Patel (2025).

The effect of different levels of fertility and cutting management on seed equivalent yield of fenugreek remained significant in all season as well as on pooled basis.

Among the fertility levels, the treatment of fertility F_3: 150% RDF recorded significantly higher seed equivalent yield of fenugreek in on pooled basis and remained statistically at par with the treatment F_2: 125% RDF. In cutting management, in year 2020–21 treatment C_2 (Cutting at 50 DAS as leafy vegetable + seed production) recorded higher seed equivalent yield and remained statistically at par with C_3. In year 2021–22 and 2022–23 treatment C_4: Cutting at 30, 50 and 70 DAS as leafy vegetable + seed production recorded significantly higher seed equivalent yield and remained statistically at par with the treatment C_3 while in pooled results treatment C_3, Cutting at 40 and 70 DAS as leafy vegetable + seed production, recorded higher seed equivalent yield and remained statistically at par with C_2 and C_4. It might be due to increased green leaf and seed yield, which resulted in the maximum harvest index. The findings are supported by Rana *et al.* (2015). Sowmya *et al.* (2017), Mehta *et. al.* (2011) and Patel (2011), Meena (2013), Chaudhary (2016) and Talaviya *et al.* (2022)

From the above study it can be concluded that to achieve higher fenugreek seed equivalent yield, apply 125% RDF (25-50 N-P_2O_5 kg/ha) in which whole dose of phosphorus (50 P_2O_5 kg/ha in the form of SSP) along with half dose of nitrogen (12.5 kg. N/ha) as basal and remaining half dose of nitrogen (12.5 kg. N/ha) after cutting at 50 days after sowing and left for seed production.

REFERENCE

Agrawal, S, Divakara, S.E.V. and Sharma, R.K. 2002. Production, Development, Quality and

Ahmed, M., Oladiaran, J.A. 2012. Effect of stem cutting and variety on shoot development and seed yield of jute mallow (*Corchorus olitorious* L.). Experimental Agriculture and Horticulture **12**(3): 21–29.

Anonymous. 2024. https://agriexchange.apeda.gov.in

Bhunia, S.R, Chauha, R.P.S., Yadav, B.S. and Bhati, A.S. 2006. Effect of phosphorous, irrigation and rhizobium on productivity, water use and nutrient uptake in fenugreek (*Trigonella foenum-graecum* L.). *Indian Journal of Agronomy* **51**: 239–241.

Bhutia, K.C. 2017. Growth, Phenology and Yield of Fenugreek (*Trigonella foenum-graecum* L.) as Influenced by Date of Sowing. *International Journal of Current Microbiology and Applied Science* **6**(10): 1,810–1,817.

Bhutia, P.H. and Sharangi, A.B. 2016. Effect of dates of sowing and soil moisture level in different growth stages and yield dynamics of fenugreek (*Trigonella foenum-graecum* L.). *National Acadamic Science Letter* **39**(2): 77–80.

Choudhary, B.R., Gupta, A.K, Parihar, C.M., Jat, S.L. and Singh, D.K. 2011. Effect of integrated nutrient management on fenugreek (*Trigonella foenumgraecum*) and its residual effect on fodder pearlmillet (*Pennisetum glaucum*). *Indian Journal of Agronomy* **56**(3): 189–195.

Dahiya, M.S., Nandal, J.K. and Phor, S.K. 2009. Effect of nitrogen and green leaf cutting on seed yield of fenugreek. *Haryana Journal of Horticultural Sciences* **38**(1/2): 110–111.

Datta, S.K. and Alam, R.2005. Effect of different levels of nitrogen and leaf cutting on growth, leaf and seed yield of fenugreek (*Trigonella foenum-graecum*). *Indian Journal of Agricultural Sciences* **75**(9): 580–581.

Export of Seed Spices, Pointer Publication, Jaipur, p. 1–315.

Gill, B.S., Randhawa, G.S., Saini, S.S. 2001. Effect of sowing dates and herb-cutting management on growth and yield of fenugreek (*Trigonella foenum-graecum*). *Indian Journal of Agronomy* **46**(2): 364–367.

Gomez, K.A. and Gomez, A.A. 1984. Statistical Procedures for Agricultural Research. 2nd edn. Second Edition. An International Rice Research Institute Book. A Wiley-Interscience Publication, John Wiley and Sons, New York

Jain, L.K., Singh, P. and Singh, P.2003. Growth and nutrient uptake of chickpea (*Cicer arriatinum L.*) as influenced by biofertilizer and phosphorous nutrition. *Crop Research* **25**: 410–413.

Khiriya, K.D., Singh, B.P. and Taneja, K.D. 2003. Effect of farm yard manure and phosphorus levels on yield, quality and nutrient uptake by fenugreek (*Trigonella foenum-graecum* L.). *Forage Research* **28**(4): 210–214.

Korus, A.A., Lisiewska, Z. 2009. Effect of cultivar and harvest date of kale (*Brassica oleracea* L. var. *acephala*). Polish Journal of Environmental Studies **18**(2): 235–241.

Krishnaveni, V. Padmalatha, T., Padma, S.S. and Prasad, A.L.N. 2014. Effect of pinching and plant growth regulators on growth and flowering in fenugreek (*Trigonella foenum graecum* L.). *Plant Archives* **14**(2): 901–907.

Lakshmi, J., Gowda, R., Parashivamurthy, Narayanaswamy, S., Shivanandan, V.N. 2015. Influence of pre–flowering pinching and Maleic hydrazide spray on plant growth, seed yield and quality attributes in fenugreek. *Legume Research* **38**(3): 353–357.

Mehta, R.S., Anwer, M.M. and Malhotra, S.K. 2012. Influence of sheep manure, vermicompost and biofertilizer on growth, yield and profitibility of cumin. (*Cuminum cyminum* L.) production. *Journal of Spices Aromatic Crops* **21**(1): 16–19.

Patel, P.M., Ardeshna, R.B., Katara., A.R. and Sumanth, G.V. 2022. Effect of integrated nutrient management on nutrient content and uptake of fenugreek in fenugreek-fodder sorghum cropping sequence. *The Pharma Innovation Journal* **11**(12): 1,179–1,182.

Rana, S.C., Pandita, VK. and Sirohi, S. 2015. Influence of spacing and number of leaf cuttings on seed yield in fenugreek. *Legume Research* **38**(6): 858–860.

Rizvi, R, Mahmood, I., Tiyagi, S.A. 2013. Potential role of organic matters and phosphate molubilizing bacteria (PSB) on the growth and productivity of fenugreek. *Journal of Agricultural Science and Technology* **15**: 639–647.

Sowmya, P.T., Naruka, I.S., Shaktawat, R.P.S., Kushwah, S.S. 2017. Effect of sowing dates and stage of pinching on growth, yield and quality of fenugreek (*Trigonella foenum-graecum* L.). *International Journal of Bio-resource and Stress Management* **8**(1): 091–095.

Sultana, S., Das, G., Das, B. and Sarkar, S. 2016. Influence of dates of sowing on growth and yield dynamics of fenugreek (*Trigonella foenum-graecum* L.) *International Journal of Green Pharma* **10**(4): 233–236.

Talaviya, P.L., Patel, K.M, Vora, J.R., Nisarata, N.V. and Faldu, M.R. 2022. Fenugreek: Green leaf, seed yield and FEY affected by phosphorus and cutting management. *The Pharma Innovation Journal* **11**(4): 302–306.

Talaviya, P.L., Patel, K.M. 2025. Effect of phosphorous level and cutting management on growth and yield of fenugreek (*Trigonella foenum-graecum*). *Indian Journal of Agronomy* **70**(1): 120–124.

Thapa U. 1999. Nutrient management of some leafy vegetables. PhD thesis submitted to Bidhan Chandra Krishi Viswavidyaliya, Mohanpur, Nadia, West Bengal.