

Evaluation of multi-purpose fenugreek variety Pusa Early Bunching (PEB)

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Abstract

Fenugreek (*Trigonella foenum-graecum* L.) is annual leguminous crop which commonly grown as vegetable, medicinal and spice purpose under arid and semi-arid regions of India. High yielding varieties for seed purpose are available in market but not available for leafy vegetable purpose. Local varieties released for seed purpose are grown for leafy vegetable which, gave poor leaves and seed yields after nipping the leaves. As compared to Gujarat Methi 2 (GM 2), Pusa Early Bunching (PEB) plants are dwarf in nature with more number of branches and have late bolting habit resulted in faster regeneration growth. Also, it produced 41.6 per cent higher green bio-mass yield (20.4 t ha⁻¹) than check variety viz. GM 2. PEB found numerically superior for producing higher seed yield (334 kg ha⁻¹) by 19.3 per cent as compared to GM 2 (280 kg ha⁻¹). It contains higher nutritive values viz; Iron (245 ppm), Zinc (220 ppm) and Manganese (710 ppm) than GM 2. The PEB stored upto 05 days in refrigerator condition in polythene bags, which is higher than check GM 2. Thus, adaptation of PEB for cultivation of fenugreek gave an assurance not only for increase the profit at regular interval in short duration but against the failure of crop also.

Key words : GM 2, leafy fenugreek, multi-purpose, Pusa Early Bunching (PEB),

Introduction

Fenugreek (*Trigonella foenum-graecum* L.), an important spices crop is largely grown in northern India during *rabi* season. It also occupies a prime position among various seed spices grown in Gujarat. It is mainly cultivated in the districts of Patan, Banaskantha, Mehsana, Kutch, Sabarkantha, Ahmedabad and Rajkot, for vegetable purpose; also it is grown in all over Gujarat. It is widely grown for both seed as well as vegetable purposes. In Gujarat, it is cultivated for grain purpose on an area of about 9258 hectares of land and produced 6429 tonne with the productivity of 694 kg ha⁻¹ (Anonymous, 2014). Fenugreek seeds and leaves are widely used in pharmaceutical industries due to saponin, diosgenin, trigonella alkaloids etc. which cure the cancer, cardiovascular diseases and diabetes. The seeds, fresh and dried leaves of fenugreek are widely used as a culinary spice and condiment for food preparations and enhance the taste. Sun dried leaves, which having aromatic qualities, are used as spice for seasoning of foods during off-seasons and use in cosmetic and hair conditioning. The leaves and shoots are quite rich in protein, minerals and vitamins A, B as well as C (Arya, 2000). Seeds and leaves are bitter in taste due to the presence of alkaloid

(*trigonelline*). Fenugreek seed contains volatile oil and fixed oil in small quantities (Sowmya and Rajyalakshmi, 1999). The dried leaves of the fenugreek are used as a quality flavour for meat, fish and vegetable dishes. Hence, the demand of fenugreek has increased in recent years. In Gujarat, two varieties of fenugreek viz., Gujarat Methi 1 (GM 1) and Gujarat Methi 2 (GM 2) were released during the year 2001 and 2006, respectively for spice purpose. The later variety GM 2 has occupied more than 70% area of fenugreek in Gujarat, but there is no variety for vegetable purpose. Vegetable growers are mostly using GM 2 for vegetable purpose. Therefore, there is an urgent need to identify the leafy fenugreek variety having higher green leaves in yield along with superior nutritive values.

Materials and methods

More than 25 germplasm lines were collected during 2006 from local areas of North Gujarat were selfed and purified at Seed Spices Research Station, Sardarkrushinagar Dantiwada Agricultural University, Jagudan. Ten high yielding entries viz., JFg-179, JFg-226, JFg-234, JFg-240, JFg-250, JFg-253, JFg-260, JFg-261, JFg-263, JFg-266, and GM 2 and PEB as checks were further evaluated for its performance in small scale varietal trial during 2010-11. Further, it was tested in 6 trials at two different locations

viz., Jagudan and Anand during 2012-13 to 2013-14 in Large Scale Varietal Trial in a randomized block design with three replications. The recommended package of practices was followed as per need of crop during the course of investigation. Data on various morphological and yield attributing characters days to 1st cutting, days to 2nd cutting, days to bolting, dry matter (%) and green leaf yield (t ha⁻¹) were recorded. The bio-chemical parameters and post-harvest studies had also been carried out. The chlorophyll content in the green fenugreek was estimated by method of Witham *et al.* (1971). The data pertaining to various characters were analyzed as per the procedure of Randomized Block Design given by Panse and Sukhatme (1978) for individual environments.

Materials and methods

Green bio-mass yield

At Jagudan, out of five different trials, PEB found significantly superior over GM 2, exhibited 19.97 t ha⁻¹ green leaf against 13.40 t ha⁻¹ of GM 2 as check variety which was 49.1 per cent higher than check GM 2.

At Anand, PEB gave numerically higher green bio-mass yield 21.56 t ha⁻¹ against 17.0 t ha⁻¹ of GM 2 which was 26.8 higher over GM 2.

On an average, the variety Pusa Early Bunching produced 20.4 t ha⁻¹ green leaf against 14.4 t ha⁻¹ of GM 2 as check variety and out yielded by ranking 5/7. Thus, overall increase with PEB was 41.6 per cent than GM 2 (Table 2).

Green bio-mass yield attributing characters

In general, PEB was dwarf and have more number of primary and secondary branches than GM 2. Days required for 1st and 2nd cut, bolting as well as maturity for seeds was higher with PEB than GM 2 (Table 3).

Seed yield

The dry seeds are extensively used in form of powder as well as used in grain. Seed yield obtained after two cuts found significant, but differences between PEB and GM 2 was found non-significant. PEB found numerically superior for producing higher seed yield (334 kg ha⁻¹) by 19.3 per cent as compared to GM 2 (280 kg ha⁻¹) (Table 1).

Table 1. Comparative seed yield (kg ha⁻¹) performance (after two cuttings)

Location	Name of experiment	Seed yield (kg ha ⁻¹)		% increase over PEB	C.D. 5 %	C.V. %
		PEB	GM-2 (ch)			
Jagudan	SSVT2010-11	334	291	14.8	243	33.7
	LSVT2011-12	379	296	28.0	184	30.4
	LSVT2012-13	232	243	-	103	20.2
	LSVT2013-14	389	288	35.1	191	23.7
	LSVT2014-15	368	262	40.5	205	22.4
	Pooled Mean	334	280	19.3	167	23.1

Table 2. Comparative marketable green leaf yield (t ha⁻¹) performance at individual location and mean over the locations (two-cuts)

Location	Name of experiment	Green bio-mass yield (t ha ⁻¹)			% IOC GM 2 (ch)	C.D. 5%	C.V. %
		PEB	GM 2 (ch)	Rank of (PEB)			
Jagudan	SSVT2010-11	26.17*	14.09	1/12	85.7	4.19	18.2
	LSVT2011-12	22.47*	12.52	1/12	79.5	3.62	13.6
	LSVT2012-13	19.50	14.51	1/12	34.4	NS	18.9
	LSVT2013-14	17.44	15.60	1/12	11.8	2.92	11.6
	LSVT2014-15	14.27*	10.27	1/12	38.9	3.43	18.4
	Pooled Mean	19.97*	13.40	5/5	49.1	2.54	16.1
Anand	LSVT2012-13	15.00	16.22	11/12	-7.5	6.55	18.5
	LSVT2013-14	28.11*	17.78	3/12	58.1	1.96	4.6
	Pooled Mean	21.56	17.00		26.8	NS	12.4
Over all Mean (7 trials)		20.4	14.4	5/7	41.6		
Significantly superiority over check		4/7					

Post - harvest study and dehydrated leaf

Post-harvest study was carried out in a refrigerator condition at low temperature in lower density polythene bags (300 LDPE gauge). The PEB stored in refrigerator up to 5 days without losing its quality. The dry matter of PEB is 20.1 per cent, which is higher than check GM 2 (17.2%). PEB recorded higher dehydrated leaves than check GM 2 (Table 4). The nutritive values of Iron (245 ppm), Zinc (220 ppm) and Manganese (710 ppm) were

found higher in PEB than GM 2 (Table 5 and 6).

Conclusion

Considering higher leaf yield, late bolting habit, superior in nutritive quality and less prone to diseases and pests, PEB is endorsed for vegetable purpose in the vegetable growing areas of Gujarat state. This variety was also more suitable for commercial cultivation and in kitchen gardening.

Table 3. Plant height (cm), branches plant⁻¹ and days to cutting and bolting

Genotype	Plant height	1 st cutting*		Days to cutting	Plant height	2 nd cutting*		Days to cutting	Days to bolting
		Primary	Secondary			Primary	Secondary		
PEB	17.4	4.5	4.7	54.3	12.9	3.8	5.0	67.0	58
GM 2(ch)	29.9	3.7	3.0	45.3	18.9	2.9	1.8	58.0	47

*Mean of Jagudan (5 years) and Anand (2 years)

Table 4. Mean of green leaf yield attributing characters

S. No.	Characters	PEB	GM 2 (ch)
1	Days to 1 st cutting	54.3	45.3
2	Days to 2 nd cutting	67.0	58.0
3	No. of leaflets	3.0	3.0
4	Petiole length(cm)	2.5	3.3
5	Leaf length(cm)	3.5	3.6
6	Leaf width (cm)	2.1	3.2
7	Days to bolting	58.0	47.0
8	Green leaf yield (t/ha)	20.4	14.4
9	Dry matter (%)	20.1	17.2

Table 5. Post-harvest study and quality parameters of PEB and GM 2

Genotype	Moisture (%)	Dry matter (%)	Dehydrated leaves / kg green bio-mass	Foaming Index*	Total Chlorophyll (mg g ⁻¹)	Aroma (after five days) **
PEB	79.9	20.1	201 g	<1 (0.7 to 0.8 cm)	1.57	Very light off-odour
GM 2 (ch)	82.8	17.2	172 g	<1 (0.3 to 0.4 cm)	1.64	Light off-odour

* indicates foaming index indicates saponin content, higher the index indicates more saponin content

** indicates the aroma assessment after five days storage under refrigerator condition

Table 6. Mineral contents (ppm) of fenugreek dry leaves

Sr. No.	Name of minerals	PEB	GM 2
1.	Iron (Fe)	245	197
2.	Zinc (Zn)	220	150
3.	Potassium (K)	1.2	1.0
4.	Copper (Cu)	110	100
5.	Manganese (Mn)	710	640

References

- Anonymous, 2014. District-wise area and production of Horticultural crops in Gujarat State, Directorate of Horticulture, Gujarat State, Gandhinagar.
- Arya, P. S. 2000. Spices Crop of India. *Kalyani Publishers*, New Delhi, 271-275.
- Panse, V.G. and Sukhatme, P.V. 1978. Statistical methods for agricultural workers (III Edn.). I.C.A.R. Publication, New Delhi.
- Sowmya, P. and Rajyalakshmi, P. 1999. Hypocholesterolemic effect of germinated fenugreek seeds in human subjects. *Plant Foods Hum. Nutr.*, 53: 359-365.
- Witham, F.H., Blaydes, D.F. and Devlin, R. M. 1971. Experiments in Plant Physiology. Van Nostrand Reinhold Co., New York. pp55-5.

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