



Evaluation of Fenugreek (*Trigonella foenum-graecum*) Germplasm Under Arid Condition of Rajasthan

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Spices have been primarily grown in the Mediterranean and South Asian regions since ancient times. Indian spices are always regarded high quality products and popular worldwide due to richness in flavour, aroma, phytochemicals and possesses potential medicinal action like anti-inflammatory, antimutagenic/anticancer, antimicrobial activity etc. Traders from abroad used to visit India due above mentioned importance. Currently, India is the world's largest producer of seed spices, with 22.1 million hectares and 22.06 million tones production.. About 63 spices out of the 109 spices specified by the International Organization for Standardization (ISO) are grown in our country as india blessed with diverse agro-climatic conditions. India exports 0.48 mt (23% of total seed spice production) of raw and value-added products of seed spices to more than 70 countries earned export revenue to the extent of INR 5,665 crore in 2020-21.(NRCSS,2021). These crops are primarily grown in arid and semi-arid part of the country particularly Rajasthan and Gujarat states which are known as "bowl of seed spices and occupy about 72 per cent of total area and 86 per cent of total production. There has been a gradual rise in area and production of these crops in recent days, of crops like cumin, coriander, fennel and fenugreek which is a clear sign clear sign of their potential to have higher income from per capita area.Since there is a large scope of seed spices by introducing the germplasm for obtaining the higher yield and identifying donor source for biotic and abiotic stress tolerance. Hence a large no of the spices germplasm recently indented for import in India. There is a strong need to research for evaluating the germplasm including wild species for searching the new genes to develop higher yield variety with tolerance to major stresses . ICAR-NBPGR, New Delhi regularly conduct exploration to based on gap analysis to cater maximum diversity of such crop for widening the gene pool. The exploration and conservation of spices germplasm is the prime need of hour for searching the gene for the crop improvement programme. The landmark achievements in spices research spices has been achieved after the establishment of two important institutes by ICAR for R& D purpose i.e. ICAR-Indian Institute of Spices Research Calicut (estb. 1986) and National Research Centre on Seed Spices Ajmer, Rajasthan (estb.2000) beside AICRP on Spices with 12 center across the country.

Table1 : Total fenugreek germplasm maintained by ICAR institutes in India.

Crop	NRCSS ,Ajmer (Raj)	NBPGR New Delhi
Cumin	107	247
Coriander	176	1194
Fenugreek	135	1468
Others	305	979
Total	745	3641

Table2: Important seed spices grown under Rajasthan area and production

Name of Crops	Scientific Name	Family	Variety	Area (000, Ha)	Production (000, Tonnes)	Yield (Kg/Ha)
Fenugreek	<i>Trigonella foenumgraecum</i> L., <i>T.carniculata</i>	Fabaceae	Ajmer Fenugreek 1, Afg 2, Afg3, Afg 4, Afg 5, RMt – 1, RMt – 143, RMt – 305, RMt-361, GM – 1, CO – 1, RajandraKranti, , Lam Selection– 1, ,HisarSonali,HisarSuvarna,HisarMukta,HisarMadhavi, PusaEarlyBunching, PusaKasuri	133.2	203.6	1526
Cumin	<i>Cuminum cyminum</i> L.	Apiaceae	RZ-19,RZ -209,RZ -223, RZ-345, GC-1, GC-2, GC-3,GC -4	1241.2	856.5	690
Coriander	<i>Coriandrum sativum</i> L.	Apiaceae	AjmerCoriander-1(ACr1),AjmerCoriander-2(ACr-2), RajendraSwathi,RajendraSonia,Sadhana,	628.6	822.2	1308
Fennel	<i>Foeniculum vulgare</i> Mill.	Apiaceae	AjmerFennel-1(AF1),AjmerFennel-2(AF-2),RF-101,RF-125,RF-143,RF-205,PF-35,GF-1(Gujarat Fennel-1),GF-2,GF-11,Guj.F.-12,HisarSwarup	79.20	128.4	1609
Dill	<i>Anethumgraveolens</i> L.A.sowa	Apiaceae	AjmerDill1(AD-1),AjmerDill2(AD-2),GD-1,GD-2,RSP-11	30.8	30.0	974
Celery	<i>Apiumgraveolens</i> L.	Apiaceae	AjmerCelery-1,RRL-85-1,			
Nigella	<i>Nigellasativa</i> L.	Ranunculaceae	AjmerNigella1(AN-1),AjmerNigella20,AzadKalaungi(1998)			
Ajwain	<i>Trachyspermumami</i>	Apiaceae	AjmerAjwain1(AA-1),AjmerAjwain2(AA-2),AjmerAjwain-93(AA-93),PratapAjwain1,GA-1,LamSelelction-1, Lam Selection-2	36.0	23.3	647
Aniseed	<i>Pimpinellaanisum</i> L.	Apiaceae	AjmerAnise1(AAni-1)			

Source : Area & Production from , DASD, Calicut June 2021



Fig1. Pictorial view of fenugreek varieties

Evaluation of fenugreek germplasm

Fenugreek (*Trigonella foenum-graecum* Linn.) is one of the important minor spices in the country grown in an area of Madhya Pradesh, Haryana, Rajasthan, Gujarat, Maharashtra, Uttar Pradesh, Punjab, Bihar and Andhra Pradesh. Rajasthan contributes about 80 % area of

the country. It is mainly cultivated for its seed & leaves which has important medicinal and health value. The seed is primarily used as condiments, beside that it is also used as constituents of ayurvedic medicines. It contain Protein, iron, calcium and zinc even more than the regular food items. Leaves also contain good amount of mineral and protein content. It is known for its medicinal qualities such as antidiabetic, anticarcinogenic, hypocholesterolemic, antioxidant, and immunological activities. Beside its medicinal value, it is also used as a part of various food product developments as food stabilizer, adhesive, and emulsifying agent. Fenugreek is an autogamous crop and genetic variability is very less Hence, ICAR-NBPGR, New delhi which is the apex institute of ICAR for enriching the of plant germplasm has recently augmented large no of Fenugreek germplasm from abroad. The available germplasm of fenugreek at NBPGR,RS, Jodhpur was evaluated for agro- morphological and biochemical traits during 2021-23. A wide range of variation was observed in agro morphological traits. IC-0624520 identified extra early maturity *i.e* 93 days only compare 120 to 130 days of improved variety. Accession EC510664 identified promising for higher number of pods per plant and early days to 50 % flowering, EC510658 identified for dense foliage dense foliage, EC 510685 for green- copper colour leaf with high antioxidants value,



Fig2: Field view of fenugreek germplasm evaluation

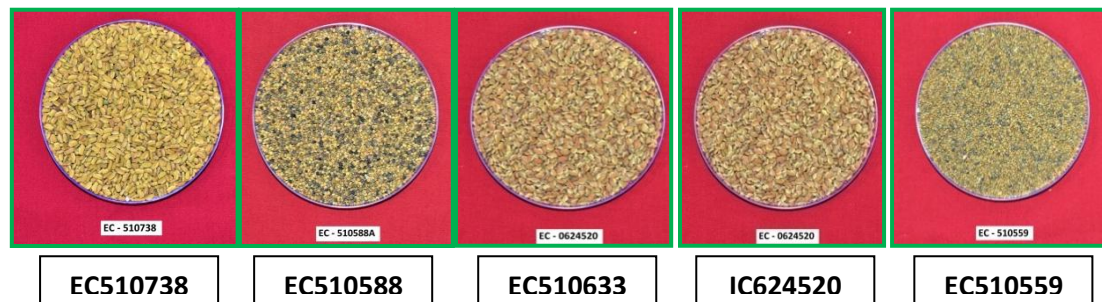


Fig. 3. Variability in seed colour and size



Fig.4 Variation in flower colour



IC0624520
Early maturing (93 days)

EC 510685
Green-copper leaf

Table.3 Range of variation in fenugreek germplasm for morphological traits.

Character	Range		Promising accession	Value of best checks
	Min	Max		
Green-copper leaf			EC510685	Green
Days to 50% flowering	39	61	IC0624520 (39 days), EC510678 (40 days), EC510664 (43 days)	48 days
Early 80 % maturity	93	128	IC0624520 (93 days)	120 days
Plant height (Cm)	27.68	68.92	EC510725 (68.26 cm), EC510559 (87.4), EC510724 (67.66 cm), EC510588A (66.8), EC510609 (66 cm)	62.7 cm
No of branches per plant (Nos)	3.7	9.8	EC510559 (10),EC510633 (8), EC510588 (8), EC510593 (9),	6.12 cm

Future prospects

Fenugreek, a multipurpose spice crop, possesses medicinal properties. Its cultivation is gaining importance these days due higher profitability return and potential to grow under harsh climatic conditions. Therefore, more emphasis should be given for widening the genetic pool by introduction of germplasm for increasing productivity and donor source for resistance against major biotic and abiotic stresses under crop improvement programmes.