



Original Research Article

CYTOTAXONOMY OF *TRIGONELLA FOENUM-GRAECUM* L. COLLECTED FROM JHARKHAND AND UTTAR PRADESH

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Abstract: Karyotypic studies on four species of *Trigonella* L. were performed in the present study. All the varieties were recorded with a diploid number of chromosome i.e. $2n=16$, ($n=8$). The study also includes measurement of total chromatin length as well as the comparison of chromosome morphology between species. Idiograms have been prepared on the basis of arm ratio.

Key words: Arm Ratio, Centromere, Chromatin Length, Cytotaxonomy, Idiogram, *Trigonella*

INTRODUCTION

Trigonella belongs to the family Fabaceae. It is an aromatic, erect, hairy annual plant of the bean family and is a rabi crop. Sowing is done in the month of October and November. 4-6 irrigations at 12 days interval and proper phosphorus contents are essential for its growth [1]. India is one of the center of origin of *Trigonella* and it has been reported from the Harappa civilization [2].

Trigonella has many medicinal properties and is used as a traditional food. It is consumed by the diabetic patients. It also produces complex carbohydrates, steroidal sapogenesis and amino acids [3]. The seed powder have hypoglycemic and hypocholesterolemic action [4].

The present study was carried out on *T. foenum-graecum* L. var. yellow large seed, var. dark brown seed, var. light brown seed and var. kasturi methi, to determine the chromosome numbers, types and arm length according to centromere position.

MATERIALS AND METHODS

The seeds were collected from the following states

S. no.	VARIETIES	STATE
1.	<i>T. foenum-graecum</i> var. yellow large seed	Jharkhand
2.	<i>T. foenum-graecum</i> var. dark brown seed	Uttar Pradesh
3.	<i>T. foenum-graecum</i> var. light brown seed	Uttar Pradesh
4.	<i>T. foenum-graecum</i> var. kasturi methi	Jharkhand

The seeds were firstly treated with sunlight and were allowed to grow in water containing petridish under normal conditions. Root apices of 1-2 cm in length were excised between 7:30-8:00 am and were treated with 1, 4-paradichlorobenzene, aceto alcohol and was preserved in 70 % ethanol.

The preserved material was taken, stained in 2% aceto carmine and ten well separated metaphase plates

were taken for the measurement of long arm and short arm. Slides were prepared by the squash technique. Photographs were taken with the help of digital SLR camera.

Arm ratio was calculated as $\frac{\text{Length of long arm}}{\text{Length of short arm}}$

Classification of chromosomes was made on the basis of table given by Abraham and Prasad 1983 [5].

RESULTS AND DISCUSSIONS

The study of karyotype is of great importance in modern taxonomy. The concept of taxonomy has been reviewed [6-12] and commented with karyotype and their evolution.

All the four varieties of *Trigonella* has been reported with chromosome number $2n=2x=16$. These reports have been earlier confirmed [13-14], [6-12]. This indicates that all the varieties were stable.

The total chromatin length observed in the var. yellow large seed was 38.75μ , var. dark brown seed was 42.72μ , var. light brown seed was 39.51μ and var. kasturi methi was 35.01μ . On the basis of TCL *T. foenum-graecum* var. dark brown seed considered as most primitive whereas var. kasturi methi was the most advanced one. *T. foenum-graecum* var. yellow large seed were recorded with 4 NSM and 4 NM chromosome, var. dark brown seed has 8 NM chromosomes whereas var. light brown seed and var. kasturi methi consists of 1 NSM and 7 NM chromosomes. The variety with dark brown seed was considered most primitive as there were only nearly metacentric chromosomes. According to idiograms var. Kasturi methi was the most advanced one because of its asymmetrical nature.

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Table 1: Karyomorphological data of four varieties of *Trigonella foenum-graecum* L.

Variety	Chrom. No.	Arm length (μ)		T.L. (μ)	LA/SA arm ratio	Classification
		Long arm	Short arm			
<i>Trigonella foenum-graecum</i> L. var. yellow large seed 2n=16	1	3.26 ± 0.06	1.95 ± 0.40	5.02 ± 0.45	1.92 ± 0.44	nsm
	2	3.22 ± 0.06	2.85 ± 0.07	6.07 ± 0.12	1.13 ± 0.02	nm
	3	3.22 ± 0.06	2.85 ± 0.16	6.07 ± 0.22	1.14 ± 0.04	nm
	4	3.15 ± 0.12	2.4 ± 0.51	5.55 ± 0.57	2.05 ± 0.85	nsm
	5	3.00 ± 0.10	1.87 ± 0.37	4.87 ± 0.38	1.91 ± 0.43	nsm
	6	2.77 ± 0.65	2.1 ± 0.60	4.87 ± 1.26	1.44 ± 0.10	nm
	7	1.72 ± 0.32	1.57 ± 0.42	3.75 ± 0.72	1.56 ± 0.24	nm
	8	3.22 ± 0.38	0.82 ± 0.126	2.55 ± 0.44	2.14 ± 0.41	nsm
TCL (μ)				38.75 ± 4.16		
<i>Trigonella foenum-graecum</i> L. var. dark brown seed 2n=16	1	3.15 ± 0.07	2.47 ± 0.28	5.62 ± 0.32	1.36 ± 0.19	nm
	2	3.15 ± 0.07	2.47 ± 0.28	5.47 ± 0.46	1.25 ± 0.10	nm
	3	3.15 ± 0.07	2.7 ± 0.18	5.85 ± 0.22	1.18 ± 0.07	nm
	4	3.07 ± 0.06	2.55 ± 0.30	5.62 ± 0.34	1.3 ± 0.20	nm
	5	3.00 ± 0.15	2.17 ± 0.28	5.17 ± 0.37	1.46 ± 0.17	nm
	6	3.00 ± 0.10	2.55 ± 0.30	5.55 ± 0.40	1.25 ± 0.16	nm
	7	2.77 ± 0.19	2.4 ± 0.43	5.17 ± 0.63	1.35 ± 0.28	nm
	8	2.47 ± 0.32	1.8 ± 0.33	4.27 ± 0.65	1.44 ± 0.09	nm
TCL (μ)				42.27 ± 3.39		
<i>Trigonella foenum-graecum</i> L. var. light brown seed 2n=16	1	3.00 ± 0	2.77 ± 0.06	5.77 ± 0.06	1.08 ± 0.02	nm
	2	3.00 ± 0	2.47 ± 0.28	5.32 ± 0.28	1.38 ± 0.19	nm
	3	2.85 ± 0.12	2.25 ± 0.37	5.1 ± 0.46	1.4 ± 0.21	nm
	4	2.85 ± 0.07	2.1 ± 0.10	4.95 ± 0.16	1.36 ± 0.05	nm
	5	2.62 ± 0.32	2.17 ± 0.46	4.8 ± 0.78	1.46 ± 0.30	nm
	6	2.62 ± 0.12	2.17 ± 0.16	4.8 ± 0.28	1.21 ± 0.04	nm
	7	2.47 ± 0.30	2.17 ± 0.40	4.65 ± 0.70	1.43 ± 0.30	nm
	8	2.4 ± 0.23	1.72 ± 0.38	4.12 ± 0.62	1.69 ± 0.37	nsm
TCL (μ)				39.51 ± 3.34		
<i>Trigonella foenum-graecum</i> L. var. kasturi methi 2n=16	1	2.92 ± 0.06	2.47 ± 0.22	5.4 ± 0.28	1.18 ± 0.09	nm
	2	2.77 ± 0.12	2.3 ± 0.26	5.1 ± 0.38	1.23 ± 0.09	nm
	3	2.62 ± 0.16	1.8 ± 0.31	4.42 ± 0.34	1.73 ± 0.45	nsm
	4	2.55 ± 0.12	1.95 ± 0.12	4.5 ± 0.25	1.31 ± 0.02	nm
	5	2.47 ± 0.28	1.57 ± 0.26	4.05 ± 0.53	1.63 ± 0.11	nm
	6	2.4 ± 0.28	2.02 ± 0.16	4.42 ± 0.44	1.13 ± 0.04	nm
	7	2.17 ± 0.22	1.42 ± 0.16	3.6 ± 0.36	1.55 ± 0.09	nm
	8	2.02 ± 0.30	1.5 ± 0.10	3.52 ± 0.40	1.33 ± 0.12	nm
TCL (μ)				35.01 ± 2.98		

nm: nearly median
nsm: nearly sub median

Karyotype formula:

- 1) *T. foenum-graecum* L. var. yellow large seed.
Karyotype formula – 4 nsm + 4 nm.
- 2) *T. foenum-graecum* L. var. dark brown seed.
Karyotype formula – 8 nm.
- 3) *T. foenum-graecum* L. var. light brown seed.
Karyotype formula – 1 nsm + 7 nm.
- 4) *T. foenum-graecum* L. var. kasturi methi.
Karyotype formula – 1nsm + 7 nm.

Figure 1: Idiograms of four varieties of *Trigonella foenum-graecum* L.

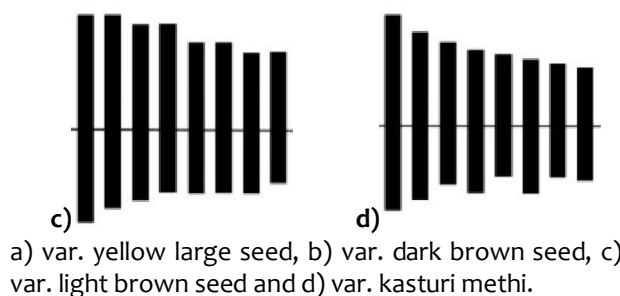
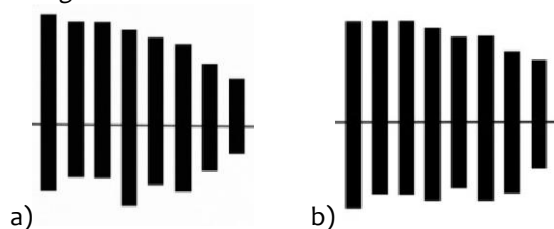


Figure 2: Comparative histograms of *Trigonella foenum-graecum* L. of four varieties showing their total chromatin length.

CONCLUSION

Karyotypic studies on the above stated varieties of *Trigonella* collected from Jharkhand and Uttar Pradesh were done for the first time. According to the observation, var. dark brown seed is most primitive and var. kasturi methi is the advanced one.

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