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Original Article

Karyomorphological Study of *Flacourtia Jangomas* (Lour.) Raeusch

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Abstract

From the karyomorphological study of *Flacourtia jangomas* (Lour.)Raeusch, it has been established that the chromosome number of this plant is 2n = 18 and it has been reported for the first time.The chromosomes are classified into four groups: one pair nearly metacentric long chromosome with nearly subterminal secondary constriction; two pairs of nearly metacentric to sub- metacentric long chromosomes; three pairs of very small chromosomes in which no centromere could be detected.Nine bivalents were found during meiotic study by using fluorochrome.

Keywords: Karyotype, Haematoxylin, Hoechst 33258, Metacentric,Centromere.

Introduction

Flacourtia jangomas (Lour.) Raeusch belongs to family Flacourtiaceae. The plant is a medium- sized tree of dioecious habit. It is distributed in Brahmaputra valley and adjoining area in the North Eastern parts of India It is probably migrated from Bangladesh and Upper Myanmer and is cultivate as a rare plant. The plant has pomocultural as well as some medicinal values such as, fruits used in bilious condition and in diarrhoea (Kirtikar and Basu,1935), leaves used for treatment of asthma (Jain,1991).The presence of tannin and a fixed oil in the fruits (Anon,1956) and two limnoids viz. limolin and jangomolide in stem and bark (Ahmad *et al*.,1984).

As it is cultivated as rare plant, propagation by in *vitro* culture of this plant has been standardized (Chandra, 1999; Chandra and Bhanja 2002), but no cytological report of this plant has been found earlier regarding its chromosome number. Only the chromosome number of *F. indica* has been reported i.e., 2n=22 (Tjio ,1948 ;Bhaduri and Kar, 1949; Mukherjee, 1975; Sarkar et.al.,1976). The objective of this investigation is to work out a detailed karyomorphological study regarding the number of its chromosome complement by using conventional staining as well as fluorochrome.

Materials & Methods

For the study of somatic chromosome, young leaf tips (1.5-2.0 cm) of actively growing branches were taken during growing season (March - May). The plants are cultivatrd in Ramna Forest, Burdwan. The leaf tips were pretreated in *para* dichlorobenzene-Aesculine mixture(1:1v/v) for 3hr at 12-14º C .Then they were thoroughly washed and fixed in Carnoy's fluid (6:3:1) at 12º C for 24hrs. and after that they were stored in 70% ethanol.The materials were stained with haematoxylin squash technique (Halder and Bhanja, 1982).

For the study of meiosis, young male flower buds of suitable sizes were collected during May-June; anthers were dissected out at proper stage. The materials were fixed in Carnoy' fluid as the above mentioned method and stored in 70% ethanol. For staining of meiotic chromosomes both Acetic- Carmine as well as fluorochromes were used The PMCs were squashed in 45% acetic acid and stained with Hoechst 33258 (Vosa,1976;Chandra,1999).

Observations

From the squash preparation of leaf tip, the chromosome constitution of this material was studied. The chromosome number was found out to be 2n =18 (Fig.1). The sizes were very small, ranging in length 0.6 µm to 2.1 µm during somatic mid- metaphase. The chromosomes were classified into four groups: $2A^{nm\ \&\ nst} + 4B^{nm\ -nsm} + 6C^{\ nsm} + 6D$. The two A-type chromosome were the longest ones and they had two constrictions in each, one nearly median and the other nearly subterminal the four B-type chromosome were next in order of length and they had nearly median to submedian constrictions, the next group of six chromosomes, the C-type,had nearly submedian constrictions, the remaining six chromosomes of the D-type , were small (being less than 1mm in length) and no constriction could be brought out in spite of repeated trials with various pre-treating agents(Fig.2).

The meiotic chromosomes of this material were studied during diakinesis. Acetic- Carmine and other conventional staining methods were found to be inadequate for this

material . Using the fluorescent dye Hoechst 33258, nine bivalents could be brought out(Fig.3).This corroborates with the 2n=18 chromosome of the somatic component.

Fig.1

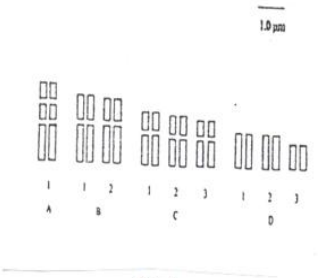

Fig.2

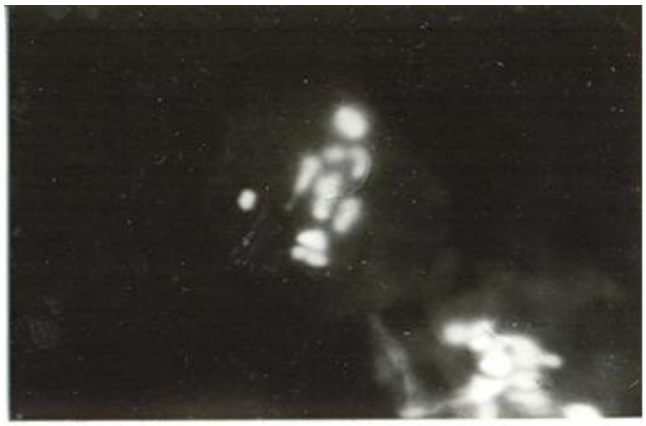

Fig.3

Fig.1. A mitotic metaphase of *Flacourtia jangomas* stained with heamatoxylin showing 2n=18

Fig.2. Karyotype of *Flacourtia jangomas* showing four groups of chromosome.

Fig.3. A meiotic metaphase of *Flacourtia jangomas* stained with Hoechst 33258 showing nine bivalents.

Discussion

The chromosome number of *F. jangomas* 2n =18 appears to have been found for the first time. The report of 2n =22 chromosome in another species in *F. indica* causes some confusion unless one accedes to both the basic numbers of X =9 and X =11 as plausible within the same genus of *Flacourtia* it appears that a taxonomic revision in order to re-establish their phylogenetic relationship is necessary.It may be noted in this context that although *F.indica* is at best a medium-sized scraggly shrub, *F.jangomas* can surely be considered a small tree on attaining adulthood.

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REFERENCES

1. Ahmad,J.,Wizarat,K.,Shamsuddin,K.M.,Zaman,A.and Connlly, J.D.1984 Jangomolide, a novel limnoid from *Flacourtia jangomas*. *Phytochemistry*.**23(6):**1269-1270
2. Annonymous 1956 *Flacourtia* comm. (Flacourtiaceae). In The Wealth of India: Raw Materials, **4:42**-44 CSIR, New Delhi.
3. Bhaduri,P.N.1949.Preliminary investigation on the cytogenetics of *Trewia nudiflora* Linn., *Chrozophora plicata* Neck, *Flacourtia ramontchi* L.Herit and *F. sepia* Roxb.Proc.36th Indian Sci. Congr.**Part 3:**140
4. Chandra, I .1999. Tissue Culture and Cytology of *Coccinia grandis* (L.)Voigt & *Flacourtia jangomas*(Lour.) Raeusch. Ph.D Thesis,The University of Burdwan, Burdwan :39
5. Chandra, I. and Bhanja, P.2002 Study of organogenesis *in vitro* from callus tissue of *Flacourtia jangomas* (Lour.) Raeusch through scanning electron microscopy. *Curr. Sci.* **83:**476-479
6. Haldar,M. and Bhanja, P 1982 A rapid Iron haematoxylin method for difficult to- stain plant chromosomes. *Cell and Chromosome Research* **.5(2):**73-74
7. Jain, S.K.1991. Dictionary of Indian Folk Medicine and Ethnobotany: 91, Deep Publication, New Delhi.
8. Kirtikar,K.R. and Basu,B.D.1935 Indian Medicinal Plants (2nd edn.),**1:**220,Publ. By Lalit Mohan Basu, Allahabad
9. Mukherjee, P.1975. Cytochemical studies on *Bixa* and *Flacourtia*.Bull. Bot. Soc. Bengal **29:**25-27
10. Mitra, R.L.1993 Flacourtiaceae.In Sharma, B.D.(ed.) Botanical Survey of India, Kolkata,**2:**403
11. Sarkar,A.K., Dutta,N., Mallick, R. and Chatterjee,U. (1976).In IOPB chromosome number reports LIV.*Taxon*.**25:**631-649
12. Tjio, J.H.1948. The somatic chromosomes of some tropical plants. *Hereditas*.**34:**135-146
13. Vosa, C.G.1976 Heteromorphic patterns in *Allium* I. The relationship between the species of *cepa*
14. Group and its allies.Heredity.**36:**383-392

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