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Karyotypic studies in red black seed variety of *Abrus precatorius* L

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Abstract

Abrus precatorius L. (Rosary pea) is wonderful herb. A small climbing tropical vine with seeds known as crab's eye found abundantly in forest. This herb has an importance in a tribal life. In their various festivals they press birds feathers and seeds of this plant on beeswax and tie on their wrist. The seed of this plant are nutritious and has an aphrodisiac property.

The present investigation was carried out on karyotypic studies in Red black seed variety of *Abrus precatorius* L. The chromosome numbers were found to be $2n=22$. The karyotype in Red black seed variety was asymmetrical.

Keywords: Karyotype, Fabaceae, *Abrus precatorius* L. Red black seed variety

Introduction

The concept of Karyotype was developed by Leviteky in 1931 [4]. According to him the karyotype of an individual in contrast to the genotype is the set of chromosomes weather normal or abnormal as seen in the mitotic metaphase. The set is made up of chromosomes weather diploid, anueploied or euploid.

The karyotype is recognized as a definite species characters. The morphology of the chromosome among the individuals of the same species is observed to be recognizably constant but it is different in distantly related species. It has been found that in a species karyotype remains constant as regards to its shape and size. However in some species karyotype is subjected to variation (Swanson, 1957) [5].

Leviteky (1931) [4] suggested that evolution in the form and shape of the Chromosomes has resulted in progressive asymmetry of the karyotype. The most primitive genus in the Ranuaculaceae, judged on the basis of floral characters was found to have a karyotype with large chromosomes of more or less than same size and with medium centromeres regarded as a symmetrical karyotype. In the most advanced genera of the group *Aconitum* and *Delphinium* the more advanced species showed progressive asymmetry in the Karyotype. Therefore it was suggested that two trends can be observed in the progressive evolution from a symmetrical karyotype to an asymmetrical one.

- i. Reduction in length of one arm of the chromosome giving rise to submedian and subterminal centromeres for median ones and,
- ii. Reduction in size of some chromosomes in relation to other of the same set so that the advanced karyotype has chromosomes of progressively unequal sizes (Leviteky, 1931) [4]. Taylor (1926) [6] classified the chromosomes into five types according to their centromeric position and observed two pairs of chromosomes with satellite in *Fritillaria inprei*alls.

Evolution of karyotype has been understood and unraveled to a limited extent. The usefulness of comparative cytological approach should in the future be greatly enhanced by the improved cytological technique with DNA and protein comparisons forming the basis of evolutionary criteria.

The genus *Abrus precatorius* L. belongs to the legume family Fabaceae which is the third largest family of flowering plants with more than 18000 described species. The family includes herbs, shrubs, trees and vines distributed throughout the world especially the tropical rain forest.

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Taxonomic description

A beautiful much branched, slender perennial, deciduous woody climbing herbs. Stem cylindrical wrinkled, bark smooth textured, brown. Leaves stipulate pinnately compound leaf lets 7-24 pairs 0.6-2.5×0.4-1.2cm turgid, oblong obtuse truncate at both end appressed hairy. Flowers in axillary racemes, Shorter than leaves, fascicled on the swollen nodes, pink. Calyx lobes short appressed hairy pods 1.5-5.0×0.8-1.5cm turgid, oblong appressed hairy with a sharp deflexed bark, silky textured 3 to 5 seeded. Seeds elliptic to subglobose, smooth, glossary shining red with black blotch around the hilum. Flowers and fruits:-August – January (Frohne D. and Prander H. S. 1983)^[1].

Abrus precatorius L. is economically important, it has highly medicinal value as well as morphologically very much specialized which makes it ideal for the cytological studies. Therefore karyotypic studies in Red black seed variety was under taken for providing good background for further cytological study of this genus.

Material and methods

The seeds were germinated in petridishes on moist filter paper for mitotic study. The root tips that had attained the length of 6mm were cut down and pretreated with 0.002M 8- hydroxyquinoline solution for two and half to three hours. The root tips were then washed in running water and fixed in cornoy's fluid (3:1) for 18 to 24 hours. After fixation stored in 70% (V/V) ethanol solution and then stored in a refrigerator till required for squash preparations. Squash preparations were made after hydrolyzing root tips in 1N Hcl for 20 minutes at 60^oc. They were stained with 2% alcoholic haematoxylin with 4% iron alum as mordent for 5 minutes and finally squashed in 45% acetic acid. Temporary preparations were made permanent in butyl alcohol (Johnson, 1939)^[2] and mounted in euparal. At least 20 metaphase plates in a polar view were scored for the karyotypic analysis. Drawing of somatic chromosomes were made by using the prism type of camera lucida. The plates were photograph under trinocular microscope. The observations were followed by calculations as suggested by Levan *et al.* (1964)^[3].

Results and discussion

Karyotype analysis

The average length of the chromosome was calculated from fifteen metaphase phases in the polar view (Fig H). The data on chromosome morphology is presented in tables No1 and Idiogram of somatic complement presented in figure no 1. On critical observation the diploid chromosome number was found to be 2n=22. The chromosome pair was numbered starting from the longest pair. The data on cytological

observations is given in table 1. The chromosomes are classified on the basis of position of centromere. The measurement of somatic chromosomes is given in table No 2.

Thus in this variety three chromosomes were with median point centromere, six chromosomes with median region centromere and two chromosomes with centromere at submedian region. The karyotype in red black seed variety of *Abrus precatorius* L was asymmetrical. The karyotype formula is as under:-

$$3A^M+m6B^m+2C^{Sm}$$

Conclusion

The present investigation was carried out on karyotypic studies in red black seed variety of *Abrus precatorius* L. The chromosome number was found to be 2n=22. The total length of chromosome varied between 0.40μ to .1.20μ. The karyotype was found to be asymmetrical.

It can be said that it shows diversity in their morphological characters.



Fig.H : Polar View of Metaphase from a root tip cell of *A.precatorius*.L (Red Black Seed Variety) Showing 22 Chromosomes

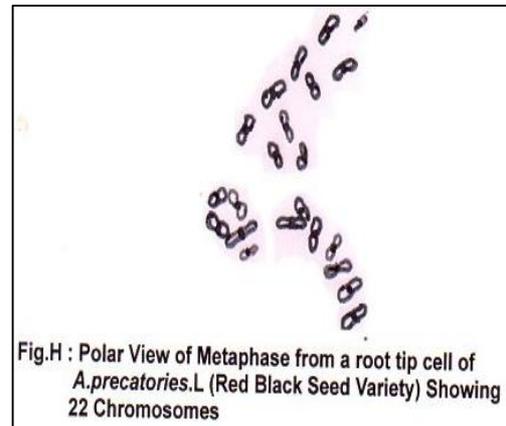


Fig.H : Polar View of Metaphase from a root tip cell of *A.precatorius*.L (Red Black Seed Variety) Showing 22 Chromosomes

Table 1: Measurement and Position of Centromere of Somatic chromosome in *Abrus precatorius* L. (Red Black Seed Variety)

Chromosome Pair number	Length of long arm (l)in μ	Length of Short arm(s)in μ	Total Length of Chromosome (C) in μ	Arm Ratio (r)	'd' value	Centromeric index (i)	Relative Length of Chromosome	Position of Centromere	% of distribution of Chromatin in chromosome
I.	0.6	0.6	1.20	1.0	0.00	50	100.00	Median point M	13
II	0.6	0.56	1.16	1.07	0.04	48.26	97.00	Median region m	12.45
III.	0.6	0.50	1.10	1.20	0.10	45.45	91.67	Median region m	11.80
IV	0.6	0.40	1.00	1.50	0.20	40.00	83.33	Median region m	10.73
V	0.6	0.36	0.96	1.87	0.24	37.60	80.00	Median region m	10.30
VI	0.6	0.32	0.92	1.88	0.28	34.78	70.67	Median region m	9.87
VII	0.6	0.30	0.90	2.00	0.30	33.33	75.00	Sub median Sm	9.66
VIII	0.4	0.28	0.68	1.43	0.17	41.18	56.67	Median region m	7.30
IX	0.4	0.20	0.60	2.00	0.20	33.33	50.00	Sub Median Sm	6.44
X	0.2	0.20	0.40	1.00	0.00	50.00	33.33	Median point M	4.29
XI	0.2	0.20	0.40	1.00	0.00	50.00	33.33	Median point M	4.29

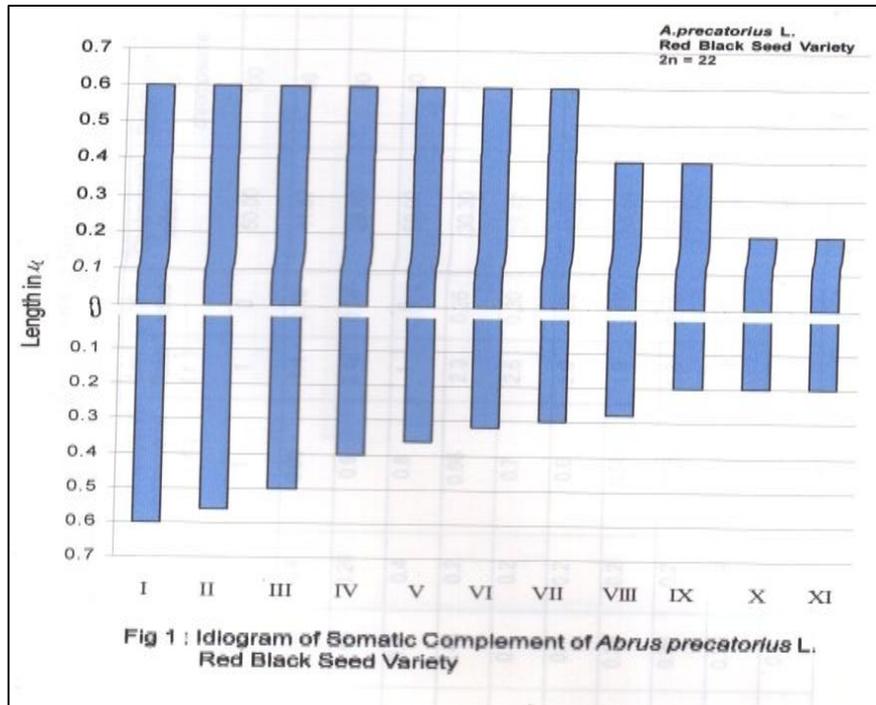


Table 2: Measurement of Somatic chromosome in red black seed variety of *Abrus precatorius* L.

Name of plant variety	Chromosome number 2n=22	Range of chromosome length in μ	Mean length of chromosome	Arm ratio r	'd' value	'I' value	Range of chromatin per chromosome	Karyotype fomula
Red Black Seed Variety	22	0.4 to 1.2	0.85	1 to 2	0 to .30	33.33 to 50.00	4.29 to 13.00	$3A^M+m6B^m+2C_{Sm}$

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