



## RESEARCH ARTICLE

### KARYOTYPIC STUDIES IN WHITE SEED VARIETY OF *Abrus precatorius* L.

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#### ABSTRACT

The genus *Abrus precatorius* L. belongs to the legume family Fabaceae. It has highly medicinal value. Roots are used as substitute for liquorices. Leaves and seeds are used in Ayurvedic medicine. The seeds are used as weights by goldsmiths. The present investigation was carried out on karyotypic studies in white seed variety of *Abrus precatorius* L. The chromosome numbers were found to be  $2n=22$ . The Karyotype in white seed variety of *Abrus precatorius* L. was asymmetrical.

## INTRODUCTION

The genus *Abrus precatorius* L. belongs to the legume family Fabaceae. It is the third largest family of flowering plants with more than 18,000 described species. It is surpassed in size only by the orchid family (Orchidaceae) with about 20,000 species and the sunflower family (Asteraceae) with about 24,000 species. The family includes herbs, shrubs, trees and vines distributed throughout the world, especially in the tropical rain forest. The pioneering work of Russian School of cytologists, headed by S. Navaschin developed the fundamentals of the Karyotype concept from their observations that most species of living organisms shows a distinct and constant individuality of their somatic chromosomes and that closely related species have more similar chromosomes than those of more distinctly related ones. The regular diploid complement of chromosome is kept constant through the successive nuclear divisions involved in growth and development by the process of mitosis (Stebbins, 1950). A considerable advancement has been made in this regard to the association of karyotype with the evolution of the species (Stebbins, 1950). The results of this investigation have enabled the workers of generalized certain principles regarding Karyotype, evolution and phylogeny. The Karyotype is recognized as a definite species character. 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). In comparing the Karyotype of different species Levitky 1931, Heitz (1928 & 1932) and Drington (1937) described the principle ways in which Karyotype differ from each other these are:

1. Basic chromosome number.
2. form and relative size of different chromosomes of the same set.
3. Number and size of the satellites and secondary constrictions.
4. Absolute size of all chromosome.
5. Distribution of material with different staining properties that is euchromatin and heterochromatin.

The Karyotype of a species is determined from the study of a number of individuals because each individual varies the Karyotype as determined in the present condition is the elimination of past evolutionary changes of various types (Levitkey, 1931). During the evolution of Karyotype chromosome of the set undergoes changes. Variation in the size and shape of the chromosome has been observed to a greater or a lesser degree between species of the same genus and between genera belong to the same family having the same chromosome numbers. In the large numbers of cases such changes showed positive trends which could be corrected with trends observed in phenotypic changes. Levitky (1931) suggested that evolution in the form and shape of the chromosome has resulted in progressive asymmetry of the Karyotype. *Abrus precatorius* L. is economically important it has highly medicinal value as well as morphologically very much

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



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Figure 1.

Table 1. Measurement and Position of Centromere of Somatic chromosome in *Abrus precatorius* L. (White seed variety)

Chromosome Pair number	Length of long arm (l)in $\mu$	Length of Short arm(s)in $\mu$	Total Length of Chromosome (C)in $\mu$	Arm Ratio(r)	'd' value	Centromeric index (i)	Relative Length of Chromosome	Position of Centromere	% of distribution of Chromatin in chromosome
I.	0.5	0.5	1	1	0	50.00	100	Median point M	13.00
II	0.56	0.4	0.96	1.4	0.16	41.57	96	Median region m	12.53
III.	0.64	0.26	0.9	2.46	0.38	28.89	90	Sub Median Sm	11.75
IV	0.4	0.4	0.8	1	0	50.00	80	Median region m	10.44
V	0.46	0.2	0.66	2.3	0.26	30.30	66	Sub Median Sm	08.62
VI	0.5	0.2	0.7	2.5	0.30	28.57	70	Sub Median Sm	9.14
VII	0.4	0.2	0.6	2.0	0.20	33.33	60	Sub Median Sm	7.83
VIII	0.38	0.2	0.58	1.9	0.18	34.48	58	Sub Median Sm	07.57
IX	0.36	0.2	0.56	1.8	0.15	35.71	56	Sub Median Sm	07.31
X	0.26	0.24	0.50	1.08	0.02	48.86	50	Median region m	06.53
XI	0.2	0.2	0.4	1	0	50.00	40	Median point M	05.22

Table 2. Measurement of Somatic chromosome in white seed variety of *Abrus precatorius* L.

Name of plant variety	Chromosome number 2n=22	Range of chromosome length in $\mu$	Mean length of chromosome	Arm ratio r	'd' value	'I' value	Range of chromatin per chromosome	Karyotype fomula
White Seed Variety	22	0.4 to 1	0.70	1 to 2.5	0 to .38	30.30 to 50.00	5.22 to 13.00	$3A^M+ 2B^m+6C^{Sm}$

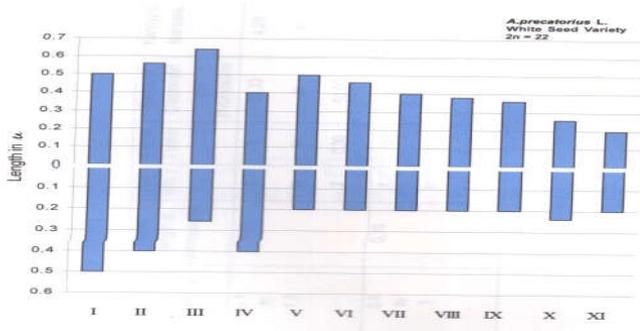


Figure 2.

specialized which makes it ideal for the cytological studies. Therefore Karyotypic studies in white seed variety was undertaken 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 refrigerator till required for squash preparations. Squash preparations were made after hydrolyzing root tips in 1N HCL for 20 minutes at 60°C. They were stained with 2% alcoholic haematoxylin with 4% iron alum as mordant for 5 minutes and finally squashed in 45% acetic acid. Temporary preparations were made permanent in butyl alcohol (Johnson 1939) and mounted in euparal. At least 20 metaphase plates in a polar view were scored for the Karyotype analysis. Drawing of somatic chromosomes were made by using the prism type of camera lucida. The plates were photographed under trinocular microscope. The observations were followed by calculations as suggested by Levan, et al (1964)

## RESULT AND DISCUSSION

The diploid number of chromosome in the white variety of *Abrus precatorius* L. was found to be  $2n=22$  (fig H). The total length of chromosome measured from 0.4μ to 1μ.

The chromosome pair were numbered in the order of decreasing length. The detailed morphological data is presented in the table 2. The ideogram of somatic chromosome is represented in fig No 2. Measurement of somatic chromosome is shown in table No.3. The chromosomes are classified on the basis of position of centromere in the following groups.

**Group A:** Chromosome with position of centromere at median point.

**Group B:** Chromosome with position of centromere at median region.

**Group C:** Chromosome with position of centromere at submedian region.

## Conclusion

Thus in this variety three chromosomes were with median point centromere. Two chromosomes with median region centromere and six chromosomes with centromere at submedian region. The Karyotype in while seed variety was asymmetrical. The Karyotype formula is as under:

$$3A^M + 2B^m + 6C^{Sm}$$

It can be conclude that white seed variety of *Abrus precatorius* L. shows diversity in their morphological characters.

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