Int. J. Adv. Res. Biol. Sci. 2(9): (2015): 81–83

International Journal of Advanced Research in Biological Sciences
ISSN: 2348-8069
www.ijarbs.com

Research Article

Mitotic studies in selected species of *Ipomoea* Linn.

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Abstract

In this present paper an attempt has been made to examine the relationship of cytology with classification. Cytology is supposed to be an important tool for classifying the plants. The morphological characters of the chromosomes such as size, shape and length has significant role in classifying plants based on cytology. For the present investigation 15 species of Ipomoea were selected. Plants used in this study were collected from different localities of Kerala and Tamil Nadu. All the15 members of the genus Ipomoea showed diploid chromosome number (2n=30) except *I. staphylina* which showed 2n=32.

Keywords: cytology, Mitotic studies, Ipomoea Linn, diploid chromosome.

Introduction

The family Convolvulaceae is commonly known as "Morning glory family" Lawrence (1960). This name is derived from the species *Ipomoea purpurea*. The family comprises about 55 genera and 1650 species distributed chiefly in the tropics and sub tropics, which ranges extending from north to south temperate regions, and particularly abundant in tropical America and tropical Asia (Willis 1960, Mathew and Philip 1983). Santapau and Hendry (1973) have listed 170 species of the Convolvulaceae from India.

Cytology has contributed, especially during the past few decades, much to the elucidation of taxonomic problems. Anderson (1947) has dealt in an elaborate manner, the role of cytology in the assessment of systematic affinities among plant taxa. Recent advancement and rethinking in cytological investigations have brought about taxonomic separation, creation of new families and family groups. A number of pioneer investigation on the Cytotaxonomy of several angiospermic plant families (Anderson and Sax 1936, Babcock and Stebbins 1938, Gregary 1941, Babcock 1942) and many others have clearly pointed out that the taxonomic differentiation and speciation among plants are intimately correlated with chromosome number and morphology. Modern taxonomy must made use of as many varied lines of evidence as possible to achieve classification that represent natural relationship.

Cytotaxonomy based on chromosomal characteristics was most popular in plant taxonomy during the period 1930-1960. Among the chromosomal characters used in taxonomic and evolutionary studies, chromosome number and morphology have been the most popular. These characters have been used for years in evaluating relationships and deducing phylogenetic sequences in Angiosperms. During the present investigation chromosome number and average chromosome length of 15 species of *Ipomoea* were studied. Cytological data obtained from the present study is used to analyse the phylogeny, taxonomy and interrelationship of the members of Convolvulaceae based on their basic chromosome number.

Materials and Methods

Root tips for somatic chromosome studies were collected from vine cuttings grown in pots containing sand. Seed can also be used for the same purpose. Roots are produced from nodal region. The roots were collected on the 3rd day after planting between

12 A.M. and 1 P.M. on bright sunny days. Pre treatment with 0.002M. 8- Hydroxyl quinoline gave satisfactory results. The roots were fixed in 3:1 ethanol: acetic acid medium. Addition of a slight ferric acetate on the next day to the fixative was helpful in better staining of the chromosome with acetocarmine. Acetocarmine and acetoorceine has been used as stains. The number of mitotic chromosome, chromosome length and average chromosome length, were also investigated during the present study.

Observation and Discussion

In the present investigation mitotic chromosome characteristic of 15 species of the genus *Ipomoea* were analysed (Plate-1 and Table-1). All the 15 species showed diploid chromosome level. All the observed *Ipomoea* species showed 30 as diploid chromosome number except *I.staphylina* which showed 32. The basic chromosome number in the present study reported as 15 in all species except *I.staphylina* which showed 16 as basic chromosome number. Among the 15 species studied mitotic metaphasic chromosome length varies from 1.60 to 4.0 µm. Highest average chromosome length was reported as 3.07 µm in *I.carnea* and lowest as 2.51µm in *I.digitata.*

Table 1: Mitotic chromosome features of selected species of *Ipomoea* Linn .

Name of Species	Chromosome Number	Chromosome Length (µm)	Basic Chromosome Number	Level of Ploidy	Average Chromosome Length(µm)
I. quamoclit L.	30	2.0 - 3.20	14,15,16	2n	2.83
I. digitata L.	30	2.0 - 3.90	14,15	2n	2.51
I. obscura (L.) Ker-Gawler	30	2.0 - 3.50	15	2n	2.75
I. cairica (L.)Sweet	30	2.10 - 3.50	14,15	2n	3.05
I. indica (Burm.f.)Merr.	30	2.50 - 3.50	15,16	2n	2.57
I. coptica (L.) Roemer and Schultes	30	2.0 - 3.0	15	2n	2.63
I. purpurea (L.) Roth.	30	1.60 - 3.0	15	2n	2.33
I. carnea, Jacq *Ipomoea carnea Jacq.ssp.fistulosa* (Choisy)D.Austin	30	2.80 - 4.0	15	2n	3.07
I. horsfalliae Hook.	30	2.5 - 3.5	15	2n	2.61
I. hederifolia L.	30	2.20 - 4.0	15	2n	3.01
I. staphylina Roemer and Schultes	32	2.0 - 3.50	16	2n	2.1
I. pes-caprae ssp.brasiliensis Sweet	30	2.10 - 3.20	15	2n	2.78
I. hederacea Jacq.	30	1.60 - 3.0	15	2n	2.58
I. alba L.	30	2.0 - 3.50	15	2n	2.78
I.aquatica Forsskal.	30	1.90 - 3.30	15	2n	2.53

Out of the 500 species of *Ipomoea*, chromosome number of 93 species is known so far (Federov 1969, Galdblatt 1984 and 1985, Virendrakumar and Subramanian 1986). The data of chromosome number for *Ipomoea* from previous reports showed that there are two basic numbers for this genus x =14, x =15 and x =16. The presence of 2n =28 and 30 chromosome in different individuals of *I.angulata* and *I.versicolor* clearly suggest that the chromosome numbers are derivable one from the other (Sharma and Datta 1958). Since n =15 is the most frequent gametic number, n =14 might have originated from n =15 by aneuploid reduction.

Most of the early cytological work on the genus *Ipomoea* has been done in Japan (Yasui 1928). Nagoa (1928) found out the chromosome number of *Ipomoea nil* (L) Roth as 2n =30. Kano (1929) counted the chromosome number of *I. purpurea* and *I. hederacea* as 2n = 30. Nakajima (1936) reported the same number of chromosome in *I. purpurea*. King and Bamford (1937) made a fairly elaborate study of the chromosome number of 15 species of *Ipomoea*. They concluded that the basic chromosome number of *Ipomoea* is x=15. Waternabe (1939) also reported the same number in *I. batatus*. Sharma and Datta (1958) studied the karyotypes of 20 species of *Ipomoea*. Sampathkumar (1970) also carried out Karyo morphological studies of 18 species of *Ipomoea*.

Conclusion

In the present study the number of mitotic chromosome, chromosome lengths and average chromosome length were investigated. All the15 members of the genus *Ipomoea* showed diploid chromosome number. The data of chromosome number for *Ipomoea* from previous reports showed that there are two basic numbers for this genus x =14, x =15 and x =16. All the observed *Ipomoea* species showed 30 as diploid chromosome number except *I.staphylina* which showed 32. Among the 15 species observed metaphasic chromosome length varies from 1.60 to 4.0 µm.

References

Anderson, A . 1937. A case of asyndesis in *Picea abies*. *Hereditas* **33** 301.

Anderson, E. and Sax, K. 1936. A Cytological monograph of the American species of *Tradescantia Bot Gaz*. **97** 433 – 476

Babcock, E. B., Stebbin, G. L., and Jenkins, J. A. 1937. Chromosomes and phylogeny in some genera of the Crepidinae. *Cytologia*, Fuiii Jubil. 188-210.

Federov, A.N. 1969. Chromosome numbers of flowering plants Academy of science of U.S.S.R Otto koelz Science Publishers . **624** Koenigstein West Germany

Goldblatt, P. 1984. Index to plant Chromosome numbers. *Missouri Bot. Gar* **8.**

Goldblatt, P. 1985. Index to plant chromosome numbers. *Missouri Bot. Gar* **9.**

Gregory, W. C. 1941. Phylogenetic and cytological studies in the Rannunculaceae *Traan Amar Phil Soc* (N.S) **31** 43-521

Kano, T. 1929. Etudes cytologoque sur les Convolvulaceae. Proc. Crop.Sci.Soc. Japan **4** 16-21.

King, J. R. and Bamford, R. 1937. The chromosome number in *Ipomoea* and related genera. *Heredity* **28** 279-282.

Lawrence, H. M. G. 1960. Taxonomy of vascular plants. The Mac Millan Company New York

Mathew, P. M. and Philip, O. 1983, Studies in the pollen morphology of South Indian Rubiaceae. (In:Nair, P.K.K.(ed). Adv. Pollen Spore Res. **10** 1-80 Today and Tomorrow's Printers and Publishers, New Delhi).

Nagoa. M. 1928. The chromosome number of *Pharbitis* chosiy Bot. Mag. Tokyo **42** 501

Nakajima, G. 1963. Karyotype of genus *Ipomoea Cytologia* **28** 351-359

Sampathkumar. R. 1979. Karyomorphological studies in some south Indian convolvulaceae *Cytologia* **44 (2)** 275-286

Santapau, M. and Hendry, A. N. 1973. Dictionary of the flowering plants in India. CSIR, New Delhi

Sharma, A. K and Datta, P. C. 1958. Cytological investigations on the genus *Ipomoea* and its importance in the study of phylogeny *Nucleus* **1** 89-122.

Virendrkumar, and Subramanian, B. 1986, Chromosome Atlas of Flowering plants of the Indian Subcontinent. **I** Dicohyledons. Bot.Sur.India.

Watanabe, K. 1939. *Porc. Crop Sci.Soc*.Japan.**11**

Willis, J. C. 1960. A dictionary of the flowering plants and ferns. 6th edition Cambridge Uni. Press

Yasui, 1928. Studies on *Pharbitis nill* chois. II. Chromosome number. *Bot Mag Tokyo* **42** 480-495.