



Short communications

Mitotic Studies in *Naravelia zeylanica* (L.) DC.

T. Praveen Dhar*

Research Department of Botany, St. Stephen's College, University of Kerala,
Pathnanapuram, Kerala, India

*Corresponding author

ABSTRACT

Keywords

Mitosis,
Naravelia
zeylanica

Naravelia zeylanica is a highly medicinal plant belonging to the family Rannunculaceae. The Rannunculaceae consist of 35 genera and perhaps 1500 species, chiefly distributed in the cooler temperate regions of the earth and especially of the Northern hemisphere (Lawrence, 1966). In this present paper an attempt has been made to examine the mitotic chromosome number of *N. zeylanica*. For the present mitotic study root tips from newly cultivated plants were used. The mitotic chromosome number of the present study is reported as 16.

Introduction

Naravelia zeylanica (L.) DC. (Ranunculaceae) is a climbing shrub with tuberous roots; wiry stem strong tendrils, leaves 3- foliate, opposite, terminal leaf let modified into 3 branched tendrils, leaf lets ovate, lanceolate, serrate. Prominently nerved, flowers yellow, fragrant, in axillary and terminal panicles, sepals downy, petals aspects. linear- clavate, elongate; fruit aggregate of achiness, ending in twisted feathery tales. This plant useful on vitiated conditions of pitta, helminthiasis, dermatopathy, leprosy, rheumatalgia, odontalgia, colic inflammation, wounds and ulcers. The roots and stems have a strong penetrating smell (Warrier *et al.*, 1995). In Kerala, *N. zeylanica* is used as a source of the drug for intestinal worms, skin disease, leprosy, toothache and headache (Sivarajan and Balachandran, 1958).

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 investigations on the cytotaxonomy of several angiospermic plant families (Anderson and Sax, 1936; Babcock and Stebbins, 1938; Gregory, 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.

Roy and Sharma (1971) have cytologically studied 15 species of *Anemone*, *Aquilegia*, *Caltha*, *Clematis* and *Ranunculus* from Western and Eastern Himalayas. In South India, the taxa of Ranunculaceae are thriving only at higher altitudes of Western Ghats, particularly during the rainy seasons. There are 5 wild genera, namely *Naravelia*, *Clematis*, *Ranunculus*, *Thalictrum* and *Anemone*, consisting of 16 species in South India (Gamble 1956). Besides, the species of *Delphinium*, *Anemone*, *Nigella*, *Aconitum*, *Aquilegia* and rarely *Ranunculus* and *Eranthis* are ornamentally grown in Ooty, Kodaikanal and Yercaud of Western Ghats. Most of the wild species of South Indian Ranunculaceae have not been cytologically investigated so far. In the present study an attempt is made to analyse the mitotic chromosome number of *N. zeylanica* (L.) DC.

Materials and Methods

For the present mitotic study root tips were used. For this plant were collected from different parts of Western Ghats, collected plants were cultivated in pots containing sand and are kept in the Botanical garden of ST. Stephen's College, Pathanapuram. Young and healthy root tips were used for mitotic studies. Roots are produced from nodal region. The roots were collected on the 10th day after planting between 12 A.M. and 1 P.M. on bright sunny days. Pre treatment with 0.002M. 8- Hydroxyl quinoline gave good results. The roots were fixed in 3:1 ethanol : acetic acid medium. Addition of 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, were

investigated by counting five to ten metaphases to determine the chromosome number during the present study.

Results and Discussion

In the present investigation mitotic chromosome of *N. Zeylanica* were analysed. The exact number of species is unknown due the absence of a comprehensive world taxonomic treatment. Mitotic chromosome analysis revealed the presence of $2n = 16$ chromosome number (Plate 1). The present report of $2n = 16$ chromosomes in *N. zeylanica* confirms the earlier observations of chromosome number in this species (Raghavan and Arora, 1958). The chromosomes of this species are larger in size and both in the same diploid chromosome number and larger size of chromosomes. Beskaravaynaja *et al.* (1979), Bir *et al.* (1987), Pastor *et al.* (1988) and Serov (1989) conducted chromosomal studies in the genus *Clematis* and reported $2n = 16$ and 32 for *Clematis orientalis* and $2n = 16$ for *C. flammula* and *C. ispanhanica* therefore a tetraploid chromosome number is new for two species of *C. ispanhanica* and *C. flammula*. Subramanian (1999) conducted a chromosome study in eight genera of Ranunculaceae mostly collected from different regions of Ooty and Kodaikanal of Western Ghats. First record of chromosome numbers has been made in *Ranunculus wallichianus*, *R. subpinnatus*, *R. reniformis*, *Clematis wightianus*, *Thalictrum dalzellii* and *T. saniculaeforme*. On the basis of previous and present cytological data, there are $n=7$ and $n=8$ series in *Ranunculus*. All the species of *Ranunculus* studied here are higher polyploids and both aneuploidy and euploidy play important role in speciation. The previous karyological analyses of *Anemone* reveal two distinct series, one with $n=8$ and the other $n=7$. Both *A. rivalaris* and *A. japonica* have $2n=24$ chromosomes and they should have derived

from n=8 series. Both in the larger size and the same number of chromosomes, *N. zeylanica* and *Clematis wightianus* are related together. The presence of fewer numbers of chromosomes and larger size of them indicates that *Nigella damascena* is a primitive species. All the three species of *Thalictrum*, namely *T. javanicum*, *T. dalzellii* and *T. saniculaeforme* possess 2n=16 chromosomes and perhaps, these taxa are diploids derived from n=8 series. The chromosomes are comparatively smaller in size in all these species. The chromosomes of Ranunculaceae show considerable variations in size from the largest to shorter but they are mostly large, medium and short. It is of particular interest to note that the shorter chromosomes measured more than a millimicron, while the longest chromosome measures more than 10 millimicrons. Based on the length, the chromosomes have been grouped into shorter, short, medium sized long, longer and the longest chromosomes (Subramanian, 1999). Winge (1925), Gregory (1941), Linnert (1961) and Lewis *et al.* (1962) have reported 2n= 14 chromosomes in *Aquilegia canadensis*. Besides, Roy and Sharma (1971) have also reported 2n=14 chromosomes in this species

References

- Anderson, A. 1937. A case of asyndesis in *Picea abies*. *Hereditas*, 33: 301.
- Anderson, E., Sax, K. 1936. A Cytological monograph of the American species of *Tradescantia* *Bot Gaz.*, 97: 433-476
- Babcock, E.B., Stebbins, G.L. 1938. Chromosomes and phylogeny in some genera of the Crepidinae. *Cytologia*, Fuiii Jubil. Pp. 188-210.
- Beskaravaynaja, M.A., Djakova, M.I., Sakharova, T.P. 1979. Cytological research of *Clematis* L (In Russian). *Bjulleten Glavnogo Botanicheskogo Sada*, 113: 81-84.
- Bir, S.S., Thakur, H.K., Chatha, G.S. 1987. Chromosomal studies in certain members of Ranunculaceae and Menispermaceae. *Proc. Indian Sci. Cong. Assoc.*, 74: 184-185.
- Gamble, J.S. 1956. Flora of Presidency of Madras, Vol. I. B.S.I. Publication, Calcutta.
- Gregory, W.C. 1941. Phylogenetic and cytological studies in the Ranunculaceae *Traan Amar Phil Soc (N.S)*, 31: 43-521.
- Lawrence, G.H.M. 1966. Taxonomy of vascular plants. The Macmillan Co., New York.
- Lewis, W.H., Stripling, H.C., Ross, R.G. 1962. Chromosome numbers for some angiosperms of the Southern United States and Mexico. *Rhodora*, 64(758): 147-161.
- Linnert, G. 1961. Cytologische Untersuchungen an Arten und Artbastarden von *Aquilegia*. I. Struktur und Polymorphismus der Nucleolenchromosomen, Quadrivalente und B-Chromosomen. *Chromosoma*, 12: 449-459.
- Pastor, J., Fernandez, I., Diez, M. 1988. Números cromosómicos para la flora Española. *Lagascalía*, 15: 124-129.
- Raghavan, R.S., Arora, C.M. 1958. Chromosome numbers in Indian medicinal plants II. *Proc. Indian. Acad. Sci. Sec. B*. 47(6): 352-358.
- Roy, S.C., Sharma, A.K. 1971. Cytotaxonomic studies on Indian Ranunculaceae. *Nucleus*, 14(2): 132-143.
- Serov, V.P. 1989. The study of karyotypes in representatives of the genera *Clematis* and *Atragene* (Ranunculaceae). *Botanicheski Zhurnal Moscow*, 74: 967-972.
- Subramanian, D. 1999. Cytotaxonomical studies in south Indian Ranunculaceae *Cytologia*, 50(4): 759-768.
- Winge, O. 1925. Contributions to the knowledge of chromosome numbers in plants. *Cellule*, 35: 303-324.