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New basic chromosome number in *Chlorophytum borivilianum* Santapau and Fernandes

K A Geetha & Satyabrata Maiti

National Research Centre for Medicinal and Aromatic Plants
Boriavi, Anand - 387 310, Gujarat, India
E-mail: nrcmap@wilnetonline.net

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Abstract

Cytological studies of *Chlorophytum borivilianum* revealed a new chromosome number, 2n=4x=28 and also the presence of polyploids (tetraploid and octoploid levels) in the population with a basic number of x=7.

Key words: *Chlorophytum borivilianum*, chromosome number, polyploidy.

Chlorophytum borivilianum Santapau and Fernandes (Liliaceae), commonly known as *safed musli* is widely distributed in the forests of Gujarat, Rajasthan and Madhya Pradesh (Fig. 1a). Although organized commercial cultivation of the crop has gained momentum in recent years in India, collection from forests is the major source of raw material for the industry. Superior genotypes in terms of quality and productivity are hence needed considering its ever-increasing demand as raw material and threatened status in the natural habitat (Nayar & Sastry 1988). A research programme was initiated for the development of superior varieties of the crop at National Research Centre for Medicinal and Aromatic Plants (NRCMAP) at Anand (Gujarat). Large number of collections was made from different hotspot areas of its natural habitat and considerable phenotypic variability was observed within the species (Geetha & Maiti 2002). The present study was initiated to examine whether the variability observed was due to changes at chromosomal level.

The plants were collected from the forests of Gujarat, Rajasthan and Madhya Pradesh and maintained in the Research Farm of NRCMAP. Meiotic study was conducted by collecting flower buds at about 9.00 am and fixing in Carnoy's fluid (absolute alcohol and glacial acetic acid in 3:1 ratio) without any pre-treatment. Acetocarmine 2% was used for meiotic chromosome staining. For somatic chromosome study, young root tips were collected between 1.00 pm and 2.00 pm and pre-treated with 0.002 M aqueous solution of 8-hydroxyquinoline for 3 h at about 4ºC. Thereafter, pre-treated roots were washed in tap water and fixed in Carnoy's fluid. Simple smear and squash lacto-propionic orcein technique was followed (Dyer 1963). About 50 plant samples were analysed in the present study.

Considerable variability in terms of morphol-

ogy was observed in the collections. Two distinct morphotypes such as prostrate/spreading and erect types were present in the collections. Leaf length (12.1 cm to 41.0 cm) and breadth (1.5 cm to 4.0 cm) also varied greatly in the collections. However, maximum degree of variability was observed in the shape and size of fasciculated roots, which is the economically useful part of the plant. Variation in root colour was noticed, varying from dark brown to light yellow. Root diameter varied from 0.4 cm to 1.0 cm and root tip from blunt to tapering types.

All the genotypes examined showed chromosome number of 2n=28 (Fig. 1b). Meiotic study revealed the presence of 14 bivalents (Fig. 1c). However, an octaploid having 56 chromosomes was also noticed in the root samples (Fig. 1d).

Chromosome number reported in *C. borivilianum* was 2n=16 with a basic number of x=8 and the species as a diploid (Kumar & Subramaniam 1986). Cytological studies conducted in other species by several workers (Baldwin & Speese 1951; Kumar & Rao 1958; Boraiah 1966; Pahuja & Kumar 1969; Sheriff & Chennaveeraiah 1972; Naik 1974) revealed two basic numbers with x=7 and x=8. The species with x=8 are mostly diploids whereas species with x=7 are either diploids or at various levels of polyploidy (Naik & Nirgude 1981). Our mitotic study revealed that in our collection chromosome number was found to be 2n=4x=28 indicating that it is a tetraploid with basic number of chromosome as x=7. Meiosis also showed 14 bivalents. Octaploid (2n=8x=56) observed in root samples also suggests the basic chromosome number as x=7.

In the light of present finding, karyo-morphological study in relation to geographical distribution of the species would be very important. Work is in progress to correlate karyotype analysis with phenotypic and chemical variability present within the germplasm collections with an ultimate aim to select superior genotypes in terms of chemical quality and yield.

Fig 1a

Fig 1b

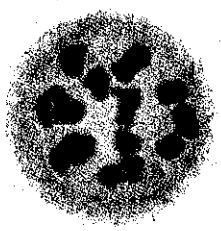

Fig 1c

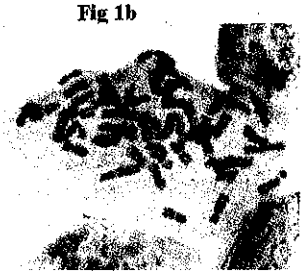

Fig 1d

Fig. 1a. Habit of *Chlorophytum borivilianum*
Fig. 1b. Mitotic metaphase (2n=4x=28)
Fig. 1c. Diakinesis stage (n=14)
Fig. 1d. Mitotic metaphase (2n=8x=56)

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