CYTOLOGICAL STUDIES IN SALVADORACEAE

SURAYYA SIDDIQI

Department of Botany, University of Karachi.

Introduction

Salvadoraceae is a small family that includes only three genera and nine species. This family has had a doubtful phyletic relationship owing to the fact that the genera may be polypetalous (*Azima* and *Dobera*) or gamopetalous (*Salvadora*). For this reason Bentham and Hooker (1862-83) and Bessey (1915) placed the Salvadoraceae in the order Gentianales and Rendle (1925) in the order Oleales. Engler (1897) and Hutchinson (1960), however, include this family within the order Sapindales and Celastrales respectively, while Hallier (1912) includes it in Polygalales.

Since cytological information about the family Salvadoraceae is altogether missing, and the phyletic position of this group is based entirely on morphology, the cytological information of various members of this group is expected to be of immense value. With this point in view the locally available species *Salvadora oleoides* Decne and *S. persica* L. were studied cytologically.

Material and Methods

The material for meiotic studies of *S. oleoides* and *S. persica* was collected from Manghopir (Karachi) between 7-8 A.M. in December and November respectively and was fixed in Farmer's fluid (Sass, 1958).

For mitosis the root-tips were fixed between 10 A.M. to 12.30 P.M. from the seedlings that were grown in the green house of Botany Department, Karachi University.

Acetocarmine squash preparation of root tips and microsporocytes were made following Darlington and LaCour (1950).

Results

In *S. oleoides* the counts were made at diakinesis of pollen mother cells, because the chromosomes in this species are unusually small and it is difficult to make a correct count at any other stage. The chromosomes in *S. oleoides* form regular pairs at diakinesis. Bridges, fragments or lagging chromosomes are absent and plant produces approximately 100% fertile pollen. This species has a set of twelve haploid chromosomes in the microsporocytes (Fig. 1) and twenty four in the somatic tissue of root tips (Fig. 2).

CamScanner

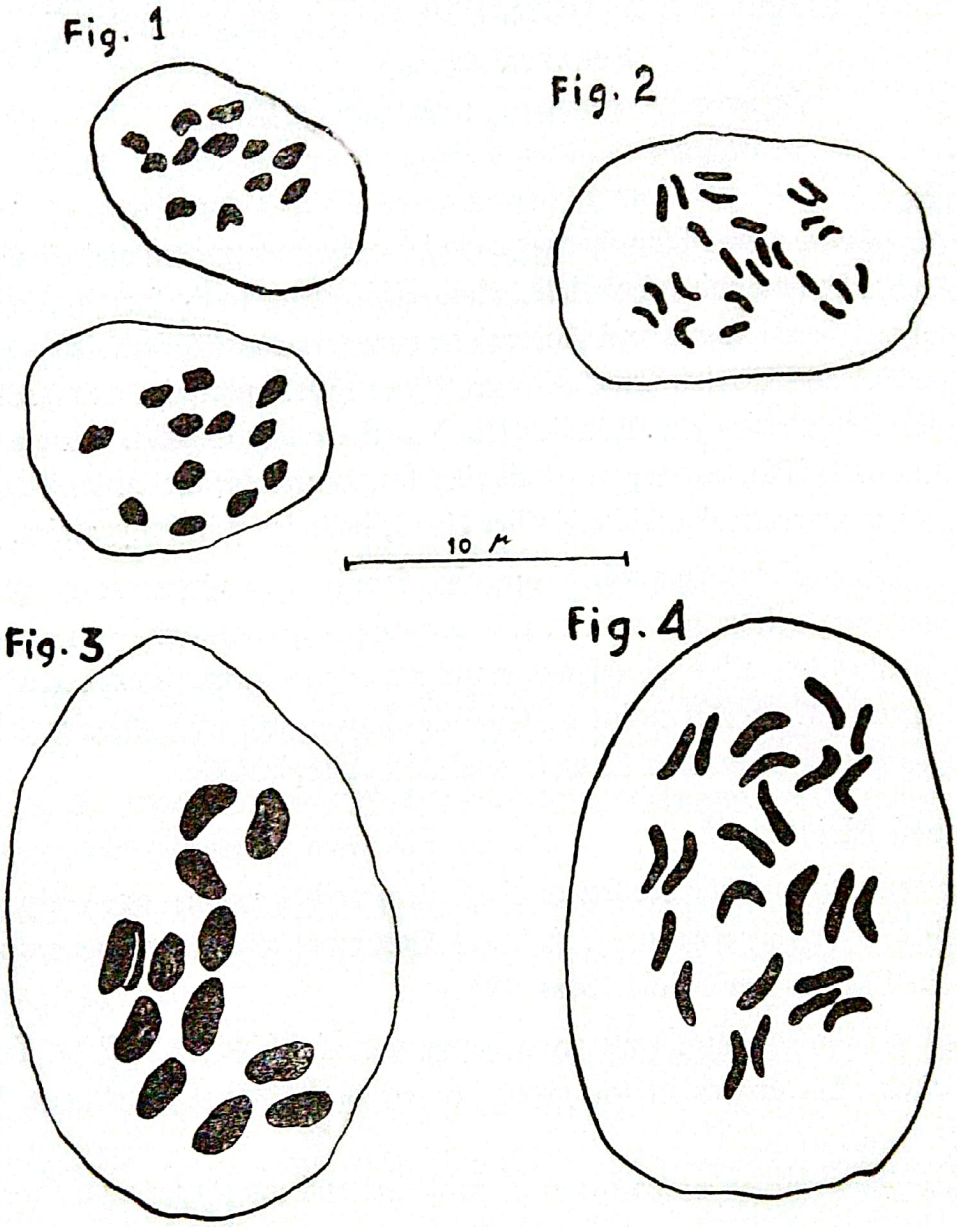


Fig. 1. Polar view of M1 in 2 p.m. cs. of *S. oleoides*, each showing 12 haploid chromosomes. Fig. 2. A root-tip cell in *S. oleoides* showing 24 somatic chromosomes. Fig. 3. Polar view of M1 in a p.m.c. of *S. persica* showing 12 haploid chromosomes. Fig. 4. A root-tip cell in *S. persica* showing 24 somatia chromosomes. Note that the chromosomes in *S. persica* are larger in size compared to those in *S. oleoides*.

CamScanner

Cytological behaviour and chromosome number of *S. persica* (Figs. 3 & 4) is same as in *S. oleoides* except that *S. persica* has larger chromosomes (Fig. 4) in comparison to *S. oleoides* (Fig. 2).

Discussion

With respect to size the chromosomes of *S. oleoides* are distinctly smaller than those of *S. persica*. This difference in karyotype in the two species along with morphology, anatomy and biochemical studies (to be published elsewhere) suggests that *S. oleoides* is probably more highly evolved.

At this stage when in the family Salvadoraceae only two species are known with respect to chromosome number it is difficult to conclude whether n=12 chromosomes also represents the basic number for the family Salvadoraceae, or the genus *Salvadora* is polyploid with n=6 chromosomes. The regularity of chromosomal pairing in both the species does indicate, however, that it has been long since this number was established in the genus *Salvadora*. Further investigations in the genus *Azima* and *Dobera* will be important for the better understanding of chromosome number in the family Salvadoraceae.

The chromosome number in *Salvadora* indicates similarity of family Salvadoraceae with Oleaceae (Gentianales, Bentham and Hooker, 1862-83 and Oleales of Rendle, 1925), where n=24 chromosomes are recorded (Darlington and Wylie, 1955). Similarly, Apocynaceae shows n=12 as well as 23, chromosomes (Darlington and Wylie 1955). The families included in the orders Sapindales, Celastrales and Polygalales do not show similarities to the family Salvadoraceae with respect to its chromosome number.

On the basis of gross morphology (to be published elsewhere) and cytology it may be fair to conclude that the family Salvadoraceae may eventually find its place with sympetalous families, *i.e.* near Oleaceae and Apocynaceae.

Summary

The chromosome number of *Salvadora oleoides* and *S. persica* are reported. Phylogenetic relationship of the family Salvadoraceae with Apocynaceae and Oleaceae is discussed in the light of cytology.

Acknowledgment

I am thankful to the authorities of University of Karachi for the grant of Research Fellowship. I am greatly indebted to Dr. S. I. Ali for his kind guidance and encouragement. I am thankful to Dr. S. A. Faruqi for helpful suggestions and constructive criticism.

CamScanner

References

Bentham, G. and Hooker, J.D. (1862-83). Genera Plantarum. 3 Vols. London.

Bessey G. E. 1915. The phylogenetic taxonomy of flowering plants, Ann. Mo. Bot. Gard. **2**: 109-164.

Darlington, C.D. and LaCour, L.F. 1950. The handling of chromosomes. George Allen and Unwin Ltd. London.

Darlington, C. D. and Wylie, A. P. 1955. Chromosome Atlas of flowering plants. George Allen and Unwin Ltd. London.

Engler A. 1897. Ubersicht uber die Unterabteilungen, Klassen, Reihen, Unterreihen and Familien der Embryophyta siphonogama. Naturliche Pflanzenfamielien, Nachtr. II-IV.

Hallier, H. 1912. L' origine et le systeme phyletique des angiosperms. Arch. Neerl, Sci. Exact. Nat. Ser. III. B, **1**: 146-234.

Hutchinson, J. 1960. The families of flowering plants. Vol. I. Clarendon Press, Oxford.

Rendle, A.B. 1925. The classification of flowering plants. Vol. II. Dicotyledon. Univ. Press Cambridge. England.

Sass, J. E. 1958. Botanical Microtechnique. The Iowa State College Press, Ames, Iowa.

CamScanner