

Cytogenetical Study of some Wild Plants from Taif, Saudi Arabia

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Abstract: Saudi Arabia is the largest country of the Arabian Peninsula which has a diverse higher plant flora in its varied landscapes with more than 2243 plant species which has a valuable economic importance due to its usage as pharmaceuticals, nutritional, fire wood suppliers as well as its use in popular remedy. Due to the scant of wild plant species studies of Arabian in literatures, the present study aim to report the chromosome numbers of 8 taxa belonging to 4 families of angiosperms collected from Taif province, Saudi Arabia flora. These taxa are: *Solanum villosum* Mill., *Datura stramonium* L., *Aerva javanica* (Burm.f.) Juss. Ex Shult, *Calotropus procera* (Aiton) W.T. Aiton, *Acacia tortilis* subspecies *tortilis* (Forssk.) Hayne, *Acacia oerfota* (Forssk.) Schweinf, and *Acacia gerrardii* Benth.

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Key words: Chromosome number, *Solanum*, *Datura*, *Aerva*, *Calotropus*, *Acacia*.

1. Introduction

Saudi Arabia, the largest country of the Arabian Peninsula, has a diversified higher plant flora in its varied landscapes, with about 2243 species in 837 genera and 142 families, Collenette (1998 & 1999). Taif, as a town situated on eastern slope of Makka region in Saudi Arabia above Sarawat mountains by 1700-2500m altitude and attitude of 20-22° horizontal and 40-42° longitudinal.

Aspects of the plant diversity of Saudi Arabia have been documented by Mandaville (1990), Chaudhary (1999) and Chaudhary & Al-Jowaid (1999).

Although chromosome numbers of some species found in Saudi Arabia are known from other parts of their distribution area, there are many which have never been reported previously.

Only few species growing in Saudi Arabia were cytologically investigated so far (Al-Turki 1992, Badr & Gassim 1992 and Al-Turki *et al.* 2000). The present study therefore aims at a completion of our knowledge of the cytology of the flowering plants in the Kingdom, providing a basis for nature conservation and other applied programs as well as for taxonomic and genetic studies.

In this study, chromosome numbers of 7 taxa belonging to 4 families of flowering plants are provided. These taxa are: *Solanum villosum* Mill. (Family: Solanaceae), *Datura stramonium* L. (Family: Solanaceae), *Aerva javanica* (Burm.f.) Juss. Ex Shult. (Family: Amaranthaceae), *Calotropus procera* (Aiton) W.T. Aiton (Family: Asclepiadaceae), *Acacia tortilis* subspecies *tortilis* (Forssk.) Hayne (Family:

Leguminosae), *Acacia oerfota* (Forssk.) Schweinf. (Family: Leguminosae), and *Acacia gerrardii* Benth. (Family: Leguminosae).

2. Material and methods

Plants and seeds of the taxa investigated were collected from Taif province of the Kingdom of Saudi Arabia.

The plants were identified by staff members of the Herbarium of Taif University, Taif, using the works of Migahid (1978), Miller & Cope (1996), Collenette (1999) and Chaudhary (1999). Voucher specimens of the studied taxa were deposited in the Scientific Research Center, Taif University, Saudi Arabia.

Chromosome counts were made from metaphase plates of mitotic division in squashed root tips of seedling germinated in 9.0 cm plastic Petri-dishes on two layers of Whatman No.1 filter paper moistened with distilled water. They were incubated at 25°C. The cytological preparations were made according to the technique described by Darlington & La-Cour (1976); root-tips were excised, pretreated with 0.05% Colchicine for 4 h in iced-water, fixed in freshly prepared acetic- alcohol solution (3:1) and after a brief wash, hydrolysed in 1N HCl for 10-12 min at 60°C, root tips were stained by Feulgen's reagent for 60 mins. An average of 10 cells for each taxa has been used for chromosome counting. Best observations, were photographed using the 100× oil immersion objective photomicroscope.

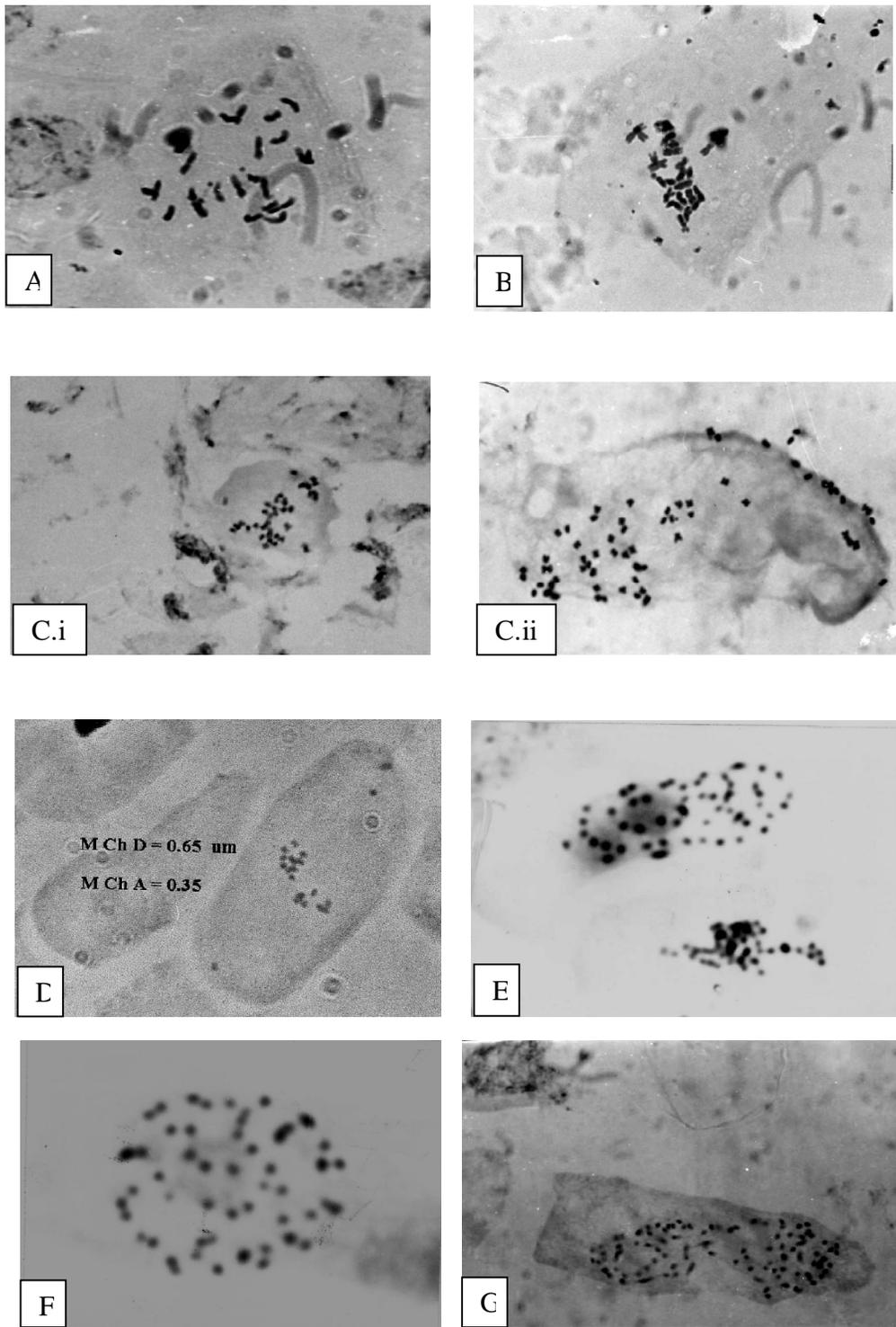


Figure (1): Mitotic cell division of *Solanum villosum* (A), *Datura stramonium* (B), *Aerva javanica* (C), *Calotropus procera* (D), *Acacia tortilis* (E), *Acacia oerfota* (F) and *Acacia gerrardii* (G).

3. Results and Evaluations

The chromosome numbers determined for 7 taxa belonging to 4 families are the first reports from Saudi Arabian populations.

Solanum villosum Mill. (Family: Solanaceae) was found to have $2n=24$ chromosomes, Fig. (1-A). The same chromosome number has been recorded for *Solanum nigrum* by Sultana and Alam (2007).

The population of *Datura stramonium* L. (Family: Solanaceae), Fig. (1-B) with a diploid set of chromosomes ($2n = 24$); there were no chromosomes with satellites and there were 1-2 micro-chromosomes in the metaphases. Spurnà et al (1981), has the same result of chromosome number. He mentioned that *D. stramonium* L. included biotypes with a chromosome number of 21-25; in the metaphases, there were chromosomes with satellites and the metaphases contained 1-3 micro-chromosomes.

Two chromosomal cellular counts of *Aerva javanica* (Burm.f.) Juss. Ex Shult. (Family: Amaranthaceae) chromosomal numbers has been counted, Fig. (1-C-i & C-ii). These are $2n= 32$ and $2n= 64$. Greizerstein and Poggio (1992) proposed that the species with $2n= 32$ are polyploids (basic chromosome number $x=8$) and that $x= 16$ is a derived basic number.

Calotropus procera (Aiton) W.T. Aiton (Family: Asclepiadaceae) have the chromosome number $2n=22$, (Fig. 1-D). The present result confirms that recorded by Raghavan (1957), where *Calotropus procera* and *Calotropus gigantean* had $2n= 22$ chromosomes, while Bramwell et. al. (1972) mention that *Calotropus* R. Br. have $2n=26$.

The chromosomal cellular counts of *Acacia tortilis* subspecies *tortilis* (Forssk.) Hayne (Family: Leguminosae), Fig. (1-E), was found in populations of *A. tortilis* subspecies *tortilis*, $2n = 52$. Ouarda et al. (2009) has the same result. The same chromosome number was found in *Acacia oerfota* (Forssk.) Schweinf. (Family: Leguminosae), (Fig. 1. F), while *Acacia gerrardii* Benth. (Family: Leguminosae) has $2n= 104$.

The previous chromosome numbers in *Acacia* species showed the same chromosome number for populations of *A. tortilis* (Forssk.) Hyne across their wide geographical range have one cytotype with a chromosome number $2n=52$ (Oballa and Olng'otie 1993).

More chromosomal detailed analysis for the Arabian Peninsula wild plant flora is needed especially in case of great number of plant flora species and scant cytogenetically analysis.

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