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## CYTOLOGICAL STUDIES OF TWO SPECIES OF GENUS DELONIX

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### ABSTRACT

**Keywords:**

*Delonix regia*,  
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Many cytological characteristics were studied in two species of Genus *Delonix* i.e., *D. regia* and *D. elata*. *Delonix regia* possessed  $2n = 28$  chromosome number. Both univalent as well as bivalents occurred invariably in this plant species, the former type being predominant over latter type. The chiasma frequency per PMc varied from 8-12 with average being 15.82. The chiasma frequency per chromosome averaged 0.56. The meiosis as well as meiotic indices was quite normal. Whereas *Delonix elata* is concerned for the above said chromosomal characteristics, it differed minutely in the frequency of chromosomal associations and chiasma frequency (per PMc and per chromosome). It does not show any change in comparison to *D. regia* in chromosome number, chromosomal distribution at AI and meiotic index. However rod bivalent occurred more frequently than ring type unlike *D. regia*.

**INTRODUCTION:** Genus *Delonix* belongs to family Leguminosae. Two species viz. *D. regia* and *D. elata* were selected for cytological studies. *D. regia* is an ornamental (beautiful red flowered) perennial, medium-sized; erect unarmed, deciduous magnificent tree with an umbrella shaped crown. While *D. elata* is a white flowered medium sized deciduous tree with lesser wide canopy. The flowers are smaller in comparison to previous species with difference in some floral characteristics.

Both selected species also have many medicinal values because of the presence of bioactive compounds Bark of *D. regia* has medicinal properties. In *D. elata* the leaf extracts are anti-inflammatory; a root decoction is drunk for abdominal pains. A psychosomatic medicinal use relating to scorpion bite treatment is reported from India. Very little attention has been paid towards cytological analysis of these plants.

Details of early prophase could not be worked out mainly because of small size of chromosomes and dark stain ability of cytoplasm. Many cytological characteristics namely chromosome number, chromosomal associations, chiasma frequency, meiotic index (%), type and size of tetrads of microspores, size and viability of pollen grains are studied in two plant species of *Delonix* i.e., *D. regia* and *D. elata*.

**MATERIALS AND METHODS:** Phenological studies of *D. regia* indicate that the flowering starts in the first week of April and September. It extends up to last July and December. *D. elata* have almost same period. Flower buds of different sizes were collected from the selected plants species during their flowering seasons, at the relative temperature and humidity appropriate size of bud was taken. They were fixed in Carnoy's fluid I for 24 hrs, and then transferred to 70% alcohol for storage. Their anthers were put on the slide and stained in 1% acetocarmine solution. A cover slip was placed over the solution.

After pressing and heating different pollen mother cell (PMC's) were seen with different meiotic stages. Microphotography was done from temporary prepared slides at different magnifications (x100-450  $\mu$ m).

**RESULTS AND DISCUSSION:** Observation about cytological characters have been presented in **Table 1**

**TABLE 1: DATA ON CHROMOSOMAL CHARACTERISTICS IN *DELONIX REGIA*, *D. ELATA* AND *CAESALPINIA PULCHERRIMA***

Name of the plant species	Chromosome number	Chromosomal Associations				Chiasma Frequency		Chromosome Distribution at AI	Meiotic Index (%) Average (Range)
		Univalents Average (Range)	Bivalents Average (Range)		PMc Average (Range)	Chromosome Average (Range)			
			Ring	Rod					
<i>Delonix regia</i>	2n = 28	0.85 (0-2)	6.22 (3-9)	4.34 (1-7)	15.82 (8-21)	0.56 (0.28-0.75)	14:14	99.66 (99.0-100)	
<i>D. elata</i>	2n = 28	1.30 (0-2)	4.84 (1-7)	5.49 (2-6)	16.50 (15-18)	0.58 (0.53-0.64)	14:14	99.75 (99.45-100)	
<i>Caesalpinia pulcherrima</i>	2n = 24	2.40 (0-4)	5.03 (3-7)	4.91 (2-9)	13.35 (8-17)	0.55 (0.33-0.70)	12:12	98.53 (97.09-99.50)	

**TABLE 2: DATA ON THE CHARACTERISTICS OF TETRADES AND POLLEN GRAINS IN *DELONIX REGIA*, *D. ELATA* AND *CAESALPINIA PULCHERRIMA***

Name of the plant species	Tetrad type (%)		Size of tetrad ( $\mu$ m)		Pollen size ( $\mu$ m)		Pollen Fertility (%)
	Tetrahedral	Isobilateral	Tetrahedral	Isobilateral	Viable	Non-viable	
<i>Delonix regia</i>	66.72 $\pm$ 6.21	33.28 $\pm$ 3.19	62.68 $\pm$ 6.03 $\times$ 60.72 $\pm$ 2.18	58.61 $\pm$ 7.21 $\times$ 54.12 $\pm$ 0.17	36.97 $\pm$ 1.10 $\times$ 35.66 $\pm$ 1.25	22.10 $\pm$ 0.17 $\times$ 19.11 $\pm$ 10.17	95.10 $\pm$ 7.19
<i>D. elata</i>	80.54 $\pm$ 1.07	19.45 $\pm$ 2.12	60.19 $\pm$ 8.85 $\times$ 58.16 $\pm$ 1.51	56.92 $\pm$ 2.99 $\times$ 50.11 $\pm$ 2.26	27.11 $\pm$ 17.11 $\times$ 25.27 $\pm$ 1.17	20.97 $\pm$ 5.52 $\times$ 18.22 $\pm$ 2.92	92.78 $\pm$ 6.96
<i>Caesalpinia pulcherrima</i>	62.68 $\pm$ 2.77	37.32 $\pm$ 1.97	55.53 $\pm$ 2.80 $\times$ 43.78 $\pm$ 1.44	46.62 $\pm$ 9.02 $\times$ 39.29 $\pm$ 1.71	46.12 $\pm$ 1.10 $\times$ 44.25 $\pm$ 12.93	18.81 $\pm$ 3.25 $\times$ 17.14 $\pm$ 1.05	88.65 $\pm$ 11.17

The chromosome number in both of *Delonix* species were 2n = 28 (Fig. 3c). The chromosome associations were concerned, In *Delonix regia*, both univalent as well as bivalents occurred invariably in this plant species, the former type being predominant over latter type. The chiasma frequency per PMc varied from 8-12 with average being 15.82.

The chiasma frequency per chromosome averaged 0.56. The meiosis as well as meiotic index was quite normal. Whereas *D. elata* is concerned for the above said chromosomal characteristics, it differed minutely in the frequency of chromosomal associations and chiasma frequency (per PMc and per chromosome). It does not show any change in comparison to *D. regia* in chromosome number, chromosomal distribution at AI and meiotic index.

However, rod bivalent occurred more frequently than ring type unlike *D. regia*. (Table 1, Fig. 3) Chromosome distribution was quite normal at AI in them. Similarly values of their meiotic indices remain quite similar

and 2; Fig. 1, 2 and 3. Normal meiotic division was observed in all the selected species. The plant species were studied for their chromosome number, chromosomal association, chiasma frequency, tetrads of microspores and pollen grains.

around 99%. But both these cytotypes differed minutely in the percentage of pollen viability, which was quite normal in them.

Our findings on chromosome number of both species of *Delonix* confirm the earlier similar reports (Senn, 1938; Jacob, 1940; Pentulu, 1942; Atchison, 1951; Mehra and Sareen, 1973; Goldblatt and Davidse, 1977; Sanjappa, 1978; Gill and Husaini, 1982; Jarolimova, 1994). Singhal *et al.* (1990) carried out cytological exploration of 47 Indian woody leguminous species from the forest of Northern, Central and Southern India. They reported much cytomorphological variability, structural heterozygosis for translocation/inversion and cytomixis in some of them. They also reported B chromosome in *Erythrina caffra* (n = 21 + 0-3B), *Millettia brandisiana* (n = 11 + 0-2B), *Pongamia pinnata* (n = 11 + 0-7B) and *Tamrindus indica* (n = 13 + 0 - 4B). In my cytological studies on the two species of *Delonix* and one species of *Caesalpinia*. We have not observed any B chromosome in them.

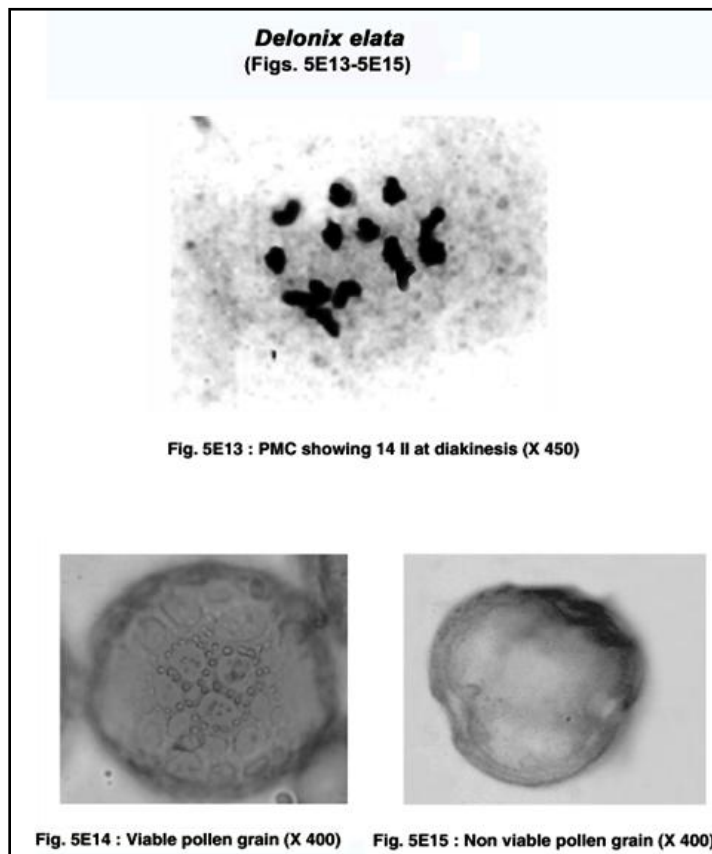
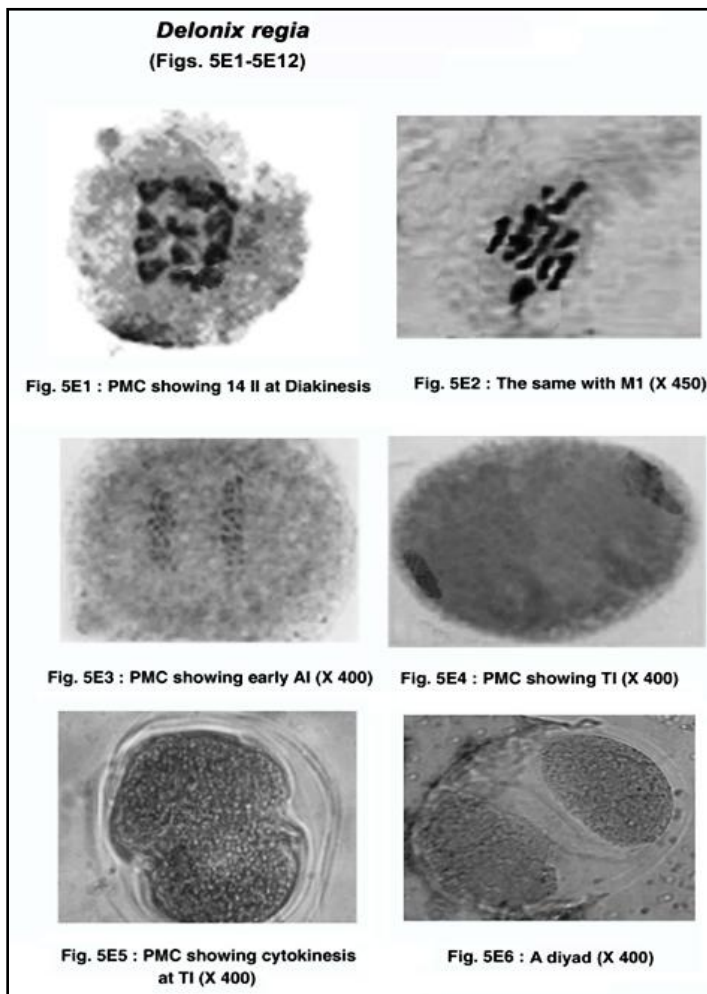
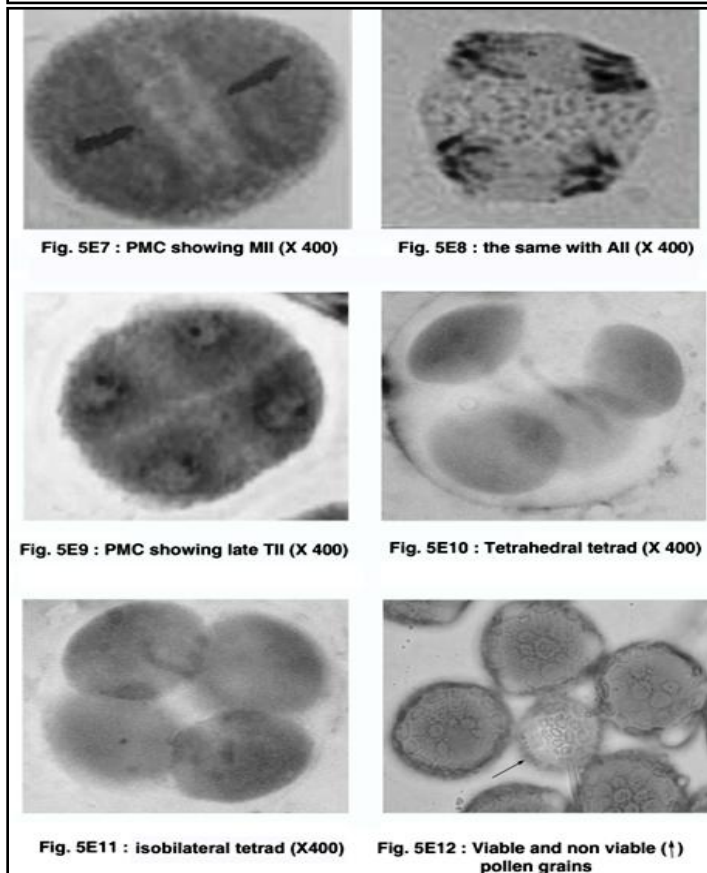


FIG. 1-3: CYTOLOGICAL CHARACTERS

Both tetrahedral and isobilateral types of microspore tetrads occurred invariably in them. Gill and Husaini (1982) had carried out cytological investigation on some arborescent numbers of Leguminosae including *Delonix regia* and *Caesalpinia pulcherrima*. They have observed pollen viability as well as pollen grain size in them. The pollen viability was 98.3% in *D. regia*. The size of viable pollen grain was 38.7  $\mu\text{m}$  in *D. regia*. In our investigation *D. regia* had slightly less percentage pollen viability.

In selected species, both tetrahedral as well as isobilateral types of microspores tetrads were observed, the former type predominantly occurred in them. Similarly tetrahedrals were somewhat larger than isobilateral type. Pollen viability ranged from 92.78% to 95.10% in them. Viable pollen grains were also larger than non-viable.

**CONCLUSIONS:** All the two plant types are diploid in natural conditions. Meiosis was quite normal in them. Both plant species have same number of chromosome. Univalent as well as bivalents are commonly distributed in both species. Chiasma frequency and



meiotic indices do not show any significant changes in them. Both univalent as well as bivalents occurred invariably in this plant species, the former type being predominant over latter type. Both tetrahedral as well as isobilateral types of microspores tetrads were observed, the former type predominantly occurred in them.

We have concluded the similar result of present study carried out shows that there was no change by different authors in above said cytological characters while they were growing in different habitats.

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