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Chromosome Counts and Morphological Studies in the Tribe Cercideae from Northern Nigeria

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Abstract **– Chromosome counts and morphological studies of some leguminous taxa of tribe Cercideae from wild populations in Northern Nigeria were carried out to determine their chromosome numbers, phenology their relationships with the soils on which they were found growing. Results from chromosome counts confirm the previous reports of n=14 for *Bauhinia monandra, B. rufescens* and n= 13 for *Piliostigma thonningii*.The chromosome number of n= 13+1B and n=12+1B was recorded for the first time *in Bauhinia tomentosa* and *Piliostigma reticulatum* respectively. The distribution maps of the investigated taxa and their phenological data are presented for the first time.**

Keywords **– Chromosome, Morphological, Cercideae, Phenology.**

I. INTRODUCTION

The family Fabaceae is more or less equivalent to Gramineae in economic importance due to its known as potential food plants and a multitude of other uses. With about 700 genera and nearly 20,000 species, they constitute the third largest family of flowering plants after Compositae and Orchidaceae (Lewis et al. 2005).The tribe Cercideae is an important group in this family. They are predominantly trees or shrubs with or without interstipular spines, rarely lianas. The group is composed of five genera (Wunderlin, 1976) [10] and are mainly found in the tropics with the exception of Cercis, which is restricted to temperate regions.

There is paucity of information on the Cytology of the tribe Cercideae from Northern Nigeria. The only notable contribution was by (Sharma and Raju, 1968) [8] who reported the basic number of x=7 in all four species of Cercis, x=4 in Griffonia, Adenolobus and Bauhinia and further suggested a basic number of x=7 for the tribe. Although aneuploid numbers like 2n = 24 have been recorded in some genera. Taken this into consideration, a systematic cytological investigation of five species in the tribe from Northern Nigeria was investigated.

II. MATERIALS AND METHODS

Young flower buds of *Bauhinia monandria, B. rufescens, B. tomentosa, Piliostigma reticulatum and P. thonningii* from the wild as well as cultivated populations were collected and fixed in either 1:3 glacial acetic and alcohol for 24 hours and subsequently squashed in 2% aceto-carmine stain. Staining of the chromosomes was improved by saturating the acetic acid in the fixative with ferric acetate. Chromosome number was confirmed from at least 20 well spread cells.

Photomicrographs were taken under a Nikon L-50automat microscope with an automatic Rico XR-X3000 camera attachment with oil immersion, contrast objective of X100 and compensating ocular of X10. Panchromatic high contrast films with speed of 120-135mm were used. The exact source of material, accession number and chromosome numbers along with their flowering periods are presented in table 1. The numerals indicate months of the year. Distribution maps were prepared on the basis of information extracted after critical examination of the herbarium sheets at Forest Research Institute (F.R.I.N) Ibadan, literature records and field observations. Voucher specimens are deposited in the Herbarium of Department of Biological Sciences, Ahmadu Bello University Zaria with the following references / accession numbers: *Buahinia monandria*, MAA O34, *B. rufescens*, MAA 084, *B. tomentosa*, MAA 054, *Piliostigma reticulatum*, MAA030 and *P. thonningii,* MAA 056.

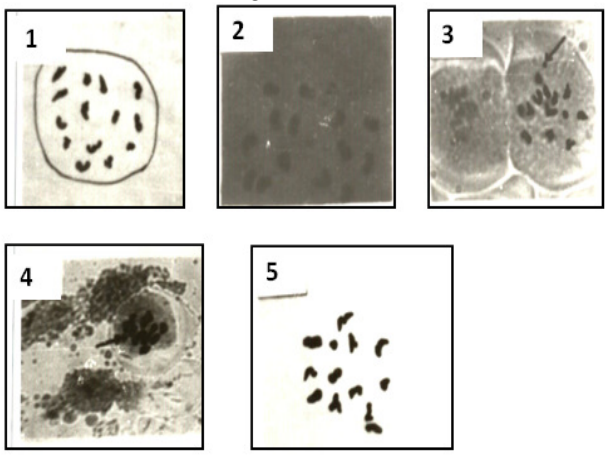

Plate 1: Photomicrographs showing chromosomes and their numbers in the family *Fabaceae* from Northern Nigeria

1. *Bauhinia monandra* (M) (n = 14)
2. *Bauhinia rufescens* (M) (n = 14)
3. *B. tomentosa* (M) (n = 13 + 1B)
4. *Piliostigma thonningii* (M) (n = 13)
5. *P. reticulatum* (M) (n = 12 + 1B)

A haploid chromosome count of n = 14 was observed in *Bauhinia monandra* and *Bauhinia rufescens* while a haploid count of n = 13 + 1B chromosome was observed in *Bauhinia tomentosa.*

The chromosome count of n = 14 confirms the previous report by Sharma and Raju (1968) [8], 2n = 28 by Gill and Husaini (1986) [4], 2n = 28 for *Bauhinia monandra.* Atchison (1951) [2] 2n = 28 for *Bauhinia rufescens* and Atchison (1951) [2] 2n=28, Gill and Husaini *(*1986*)* 2n=28+ 1, Gill and Husaini (1982) [3] for *Bauhinia*

tomentosa. In the present study, B- chromosome was observed in *Bauhinia tomentosa* indicating that this species is an aneuploid. Meiosis in the three species under investigation was normal with average pollen size of 27.2µm. All the species thrive best in acidic to slightly neutral soils with pH range of 5.5 to 6.3.

Two populations of *Piliostigma reticulatum* were studied and both proved to have haploid chromosome number of n = 13. However, in one population it was 1-B chromosome that made up the thirteen and this was observed in 30% of the cells. The current observation differs from earlier report of 2n = 28, by Miege (1960) [7]. The occurrence of extra chromosome may be as a result of increased aneuploidy. Pollen grain size was 26.5µm and pollen stainability was 84%. It grows best on slightly acidic soils with pH of 5.9. It flowers in Northern Nigeria around April to June.

In *Piliostigma thonningii* a haploid chromosome number of n=13 was recorded at metaphase 1.This confirms the reports of 2n=26 by Turner and Fearing (1959) [9], but differs from the report of 2n=24 by Mangenot and Mangenot (1962) [6]. Meiosis was normal with 82% pollen formation and average pollen size of 28.0µm. It grows best in slightly alkaline soils with pH of 6.2.

III. Discussion

The five species from the tribe Cercideae presently investigated from Northern Nigeria are diploids with chromosome number n=14. This is in line with earlier chromosome numbers report given by authors as indicated in Table 1.The presence of B- chromosome in *Bauhinia tomentosa and Piliostigma reticulatum* is being reported in the studied area for the first time. B- Chromosomes were earlier reported in *Indigofera hirsuta* and *I. tinctora* from Northern Nigeria (Adelanwa *et al*. 2004) [1]. They were considered to be genetically inert but now, they are known to increase variability and have been a key factor in plant evolution and speciation and the origin of novel adaptation (Levin, 2002) [5]. With n=7 found in all species of *Cercis* and n=4 clearly basic in *Griffonia, Adenolobus and Bauhinia* (Sharma and Raju, 1968) [8], the basic number of n=7 is generally accepted for the tribe, although aneuploid numbers like n=24 have been recorded in some genera. From the distribution map it is quite evident that the Tribe Cercideae is widely distributed within the South western and south eastern part while few populations are scattered over the North central parts of Nigeria. Meiosis was normal in the three species of *Bauhinia* studied with an average pollen grain size of 27µm .Pollen stainability is also high ranging between 82-84% making the tribe more successful in the areas where they were found growing. They thrive best in slightly acidic to slightly neutral soils with ph of 5.5 and 6.3 respectively. Phenological results indicate that all investigated species flowers and fruit within the month of May and October. This will serve as a marker to plant collectors as to when these plants will be available for collection.

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Table 1: Summary of Cytological data in Tribe Cercideae from Northern Nigeria

S/N	*Tribe: Cercideae*	Acces N0.	Locality	Chrom No	Poll Fert %	Poll Size μm	Base No.	Soil Ph	Ploidy Level	Previous Reports
1.	*Bauhinia monandra* Kurz (syn) *Pauletia*	034	ABU Main Campus, Zaria	14	84	28.3	7	5.7	Diploid	Sharma & Raju (1968) 2n=28 Gill & Husaini (1986) 2n=28
2.	*B. rufescens* Lam	084	Zaria road, Jos.	14	82	25.5	7	6.2	Dipliod	Atchison (1951) 2n=28
3.	*B. tomentosa* Linn	054	Giwa, Zaria	13+1B	88	27.8	7	5.5	Dipliod	Atchison (1951) 2n = 28 Gill & Husaini (1982) 2n =28+1
4.	*Piliostigma reticulatum* DC) Hochst.	030	Jengre, Jos.	12+ 1B	84	26.5	13	5.9	Diploid	Miege (1960) 2n= 28
5.	*P. thonningii schum.*	056	Giwa, Zaria	13	82	28	13	6.2	Diploid	Mangenot & Mangenot, (1962) 2n= 24, Turner & Fearing (1959) 2n=26