

Short Communication

NUMERICAL CHROMOSOME POLYMORPHISM IN *Mikania cordifolia* WILLD. (ASTERACEAE)

E.M.D. Maffei<sup>1</sup>, M.A. Marin-Morales<sup>2</sup>, P.M. Ruas<sup>1</sup> and C.F. Ruas<sup>1</sup>

ABSTRACT

Cytogenetical analysis of *Mikania cordifolia*, from south-eastern Brazil, using the conventional Feulgen method, showed a chromosome number of  $2n = 36$ . Previous karyotypic descriptions for this species showed a numerical chromosome variation of  $2n = 34$  to 38. There was a secondary constriction in every metaphase in the first chromosome pair, which constitutes a cytological marker. Small extranumerary chromosomes with numerical variation in the same plant were found in the tenth chromosome pair.

INTRODUCTION

The genus *Mikania*, Tribe Eupatorieae, Family Asteraceae, has about 300 species, with tropical and subtropical distribution. In Brazil, about 200 species can be found (Barroso, 1958). There is not much cytogenetical information about this genus, and most concerns only chromosome number. In *Mikania cordifolia*, chromosome number has been reported as  $2n = 38$  (Gaiser, 1954);  $n = 18$  (Powell and King, 1969),  $n = 19$  (Robinson *et al.*, 1989) and  $2n = 34$  chromosomes (Ruas and Ruas 1987). The objective of the present study was to characterize the chromosome number and morphology of an *M. cordifolia* population from Campinas, São Paulo (south-eastern Brazil).

MATERIAL AND METHODS

Samples of five populations of *Mikania cordifolia* were collected from their natural habitat and maintained in the greenhouse of the General Biology Department of the Universidade Estadual de Londrina (UEL). The voucher specimens were deposited in the Herbarium (FUEL No. 09330). Since these plants can also reproduce vegetatively, we are not sure if these analyzed populations had or not a different ancestry.

Root tips were collected at 22° to 28°C and pre-treated with 8-hydroxyquinoline (0.002 M) for 2 h and

20 min, at 10°C. Fixation was in Carnoy (3 ethanol:1 acetic acid) for 24 h at room temperature. Root tips were stored at -9°C.

After hydrolysis in 1 N HCl at 60°C for 11 min, the root tips were Feulgen stained for 2 h and smeared in 1% acetic carmine solution. Around 100 metaphases were analyzed to determine the chromosome number and five metaphase cells were photographed and used for morphometric analysis. Chromosome measurements included absolute length of individual chromosomes, measured in  $\mu\text{m}$ , and arm ratio for each chromosome (long arm/short arm).

The chromosome types were established according to the Levan *et al.* (1964) nomenclature. Karyotype asymmetry index was determined according to Stebbins (1971). The mean chromosomal length of the five metaphase cells was used for the idiogram construction. The chromosome number of the conventional genome was counted in 100 metaphases and the number of B chromosomes was observed in 20 metaphases.

RESULTS

This population of *M. cordifolia* showed  $2n = 36$  chromosomes (Figure 1a), whose length varied from 3.04 to 0.72  $\mu\text{m}$ . The total length of the haploid complement was 21.15  $\mu\text{m}$ . The karyotype was asymmetric, with a longest/smallest chromosome ratio of 4.22 (Table I).

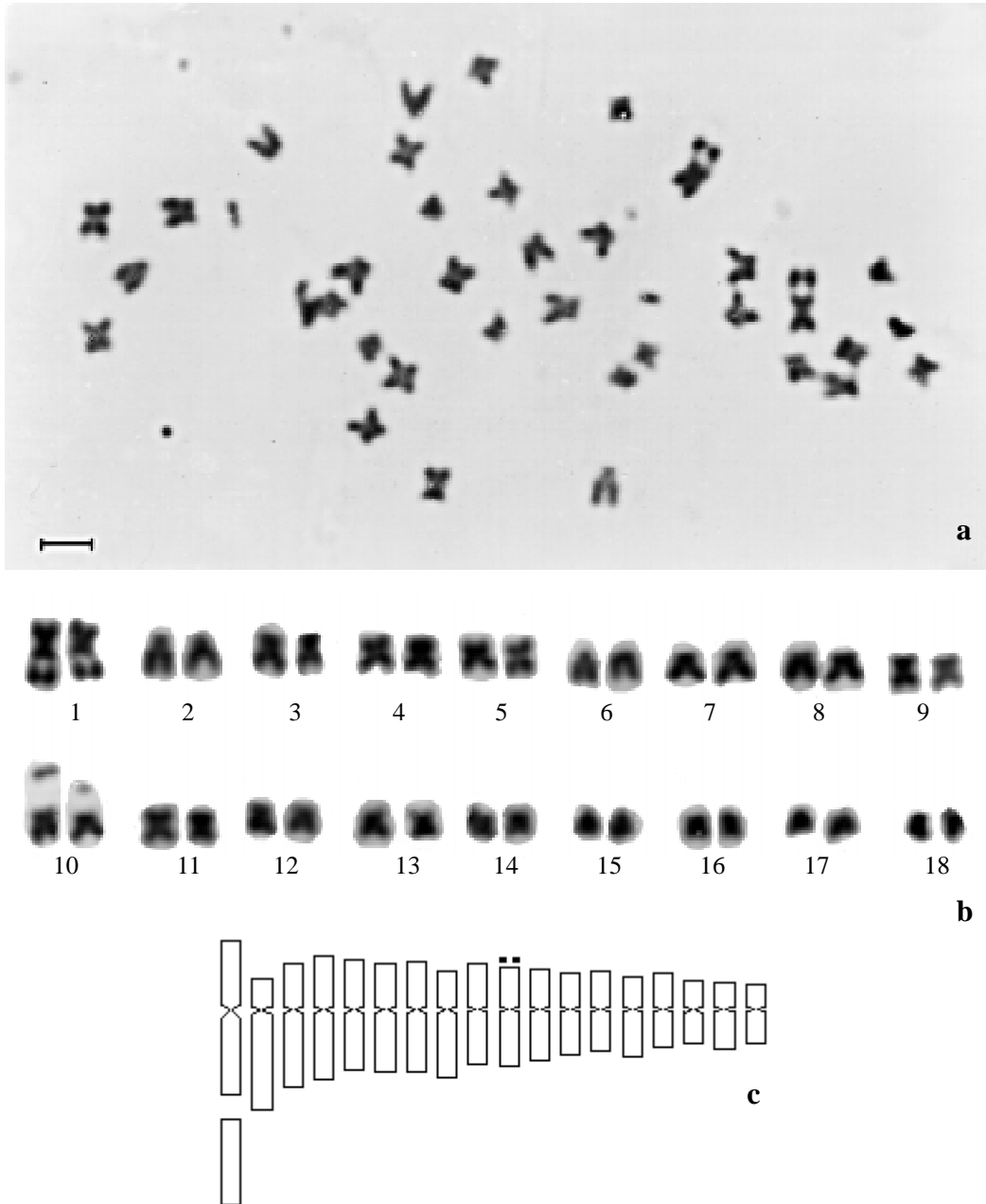
There were 14 pairs of median (m) chromosomes, three of submedian (sm) chromosomes and one pair of subterminal (st) chromosomes (Figure 1 b,c; Table I). A secondary constriction was identified in the first pair, and a satellite in the tenth (Figures 1 and 2). One to seven small B-chromosomes were found, although seven was the most frequent number in metaphase cells (Figures 2 and 3).

DISCUSSION

The chromosome number found in *M. cordifolia* (Campinas population in southern Brazil) was  $2n = 36$ . Previous karyotypic descriptions for this species showed a numerical chromosome variation of  $2n = 34$  to 38 (Gaiser, 1954; Powell and King, 1969; Ruas and Ruas 1987; Robinson *et al.*, 1989). Numerical polymorphism is relatively common for some plant species. In *M. pachyphylla*  $2n = 34$ , 36 and 38 chromosomes was ob-

<sup>1</sup>Departamento de Biologia Geral, Universidade Estadual de Londrina, Londrina, PR, Brasil.

<sup>2</sup>Departamento de Ciências Biológicas, UNESP, Campus de Assis, Av. Dom Antonio, 2100, 19806-173 Assis, SP, Brasil. Send correspondence to M.A.M.-M.



**Figure 1** - a, Metaphase cell with  $2n = 36$  chromosomes; b, karyotype; c, idiogram of *Mikania cordifolia*. Bar represents 2  $\mu\text{m}$ .

served (Nevling, 1969) and in *M. pyramidata*,  $2n = 36$ , 40 + 4-5 fragments (Robinson *et al.*, 1989). Based on our analysis, we suggest that aneuploidy has an important role in the evolution of *M. cordifolia*.

Ruas and Ruas (1987) suggested that the secondary constriction in the biggest arm of chromosome one is a cytological marker for this genus. We confirm the presence of this marker. It was observed in every metaphase. It is described for the first time the occurrence of a satellite in the tenth chromosome pair in this species. Karyotypes with submedian and subterminal chromosomes are considered to be derived and therefore indicate chromo-

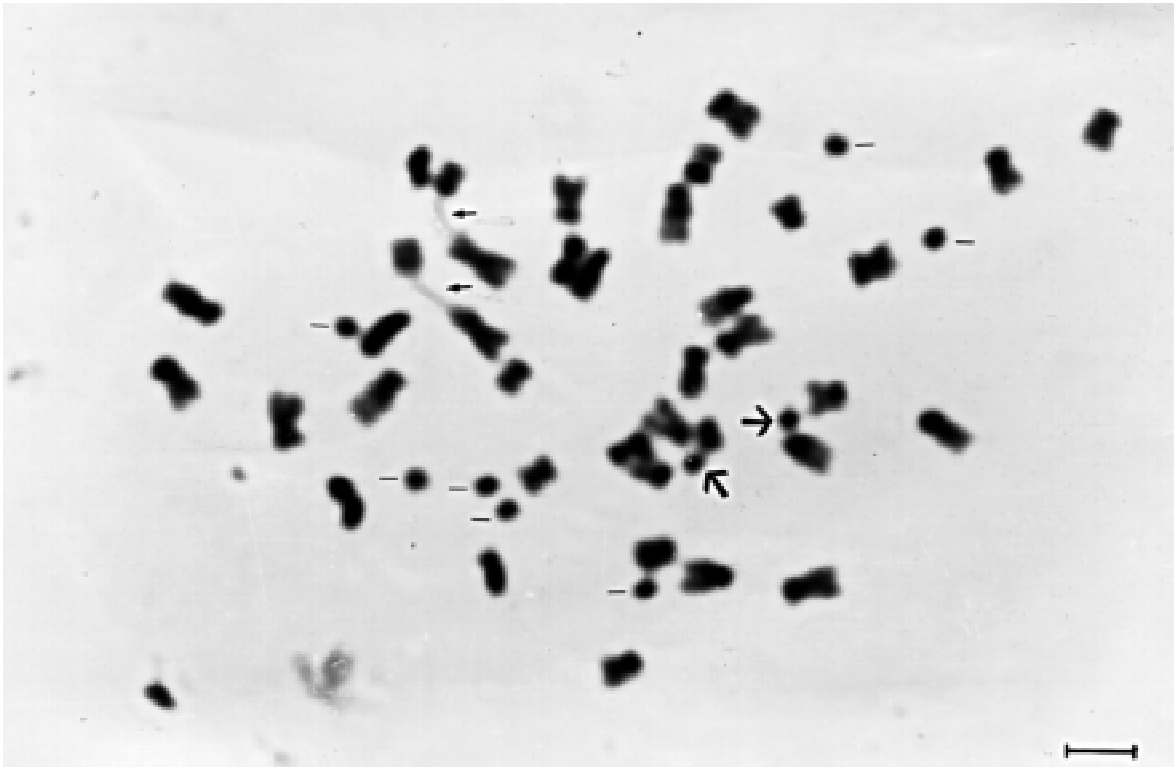
some rearrangements during the evolutionary process (Stebbins, 1971).

This was the first time that B-chromosomes were reported for this species. The B-chromosomes varied in cells of the same plant, which suggests nondisjunction in the mitotic anaphase. Variation in chromosome number in the same plant is a rule used to discriminate B-chromosomes from the normal chromosome complement (Jones and Rees 1982). An extranumeric chromosome in some Asteraceae species has been reported in *Crepis capillaris* (Rutishauser, 1960; Whitehouse *et al.*, 1981) and *Calycademia paniciflora* (Carr, 1975; Carr and Carr, 1982).

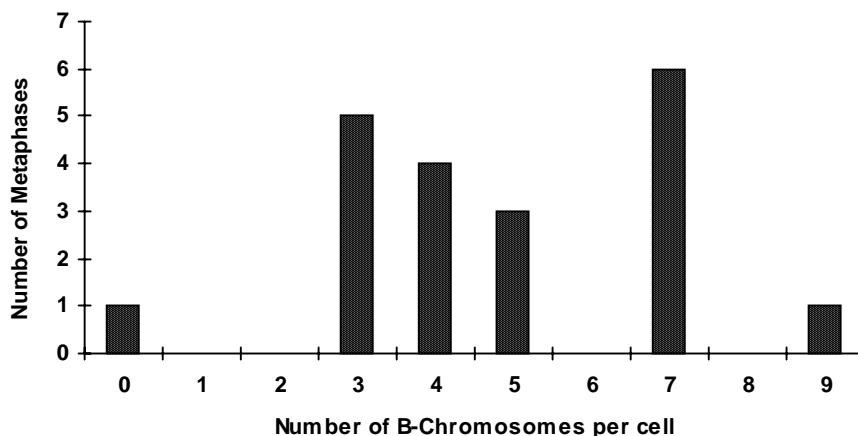
**Table I** - Mean chromosome length ( $\mu\text{m}$ ) and arm ratio of five metaphases of *Mikania cordifolia*, and chromosome type.

Chromosome pair	Chromosome length ( $\mu\text{m}$ )	Standard error	L/S*	Standard error	Chromosome type
1	3.04	0.25	2.86	0.09	sm
2	1.50	0.15	3.44	0.31	st
3	1.42	0.16	1.73	0.06	sm
4	1.39	0.18	1.37	0.21	m
5	1.30	0.12	1.27	0.09	m
6	1.26	0.14	1.30	0.21	m
7	1.24	0.14	1.37	0.16	m
8	1.21	0.14	1.87	0.19	sm
9	1.15	0.14	1.30	0.17	m
10**	1.12	0.15	1.40	0.17	m
11	1.05	0.15	1.40	0.18	m
12	0.93	0.01	1.35	0.18	m
13	0.89	0.08	1.28	0.18	m
14	0.82	0.13	1.44	0.18	m
15	0.82	0.13	1.13	0.07	m
16	0.75	0.05	1.50	0.20	m
17	0.74	0.12	1.26	0.08	m
18	0.72	0.12	1.66	0.08	m

Haploid chromosome length = 21.15. \*Longest/shortest chromosome length ratio (L/S) asymmetry index = 4.20. \*\*Chromosome with satellite. sm, Submedian; st, subterminal; m, median.



**Figure 2** - Metaphase cell of *Mikania cordifolia*. Larger arrows indicate the positions of satellites in the tenth pair; smaller arrows indicate secondary constrictions and lines indicate B-chromosomes (in this case there are seven B-chromosomes). Bar represents 2  $\mu\text{m}$ .



**Figure 3** - Distribution of B-chromosome numbers in four metaphase cells from each of five plants of *Mikania cordifolia*.

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## RESUMO

As análises citogenéticas mitóticas realizadas através de coloração convencional (Feulgen) em *Mikania cordifolia*, nativa da região de Campinas (SP), revelaram um número cromossômico de  $2n = 36$  cromossomos. Descrições cariotípicas anteriores para essa espécie mostraram um número cromossômico variando de  $2n = 34$  a  $2n = 38$ . Em todas as metáfases foi encontrada uma constricção secundária no primeiro par cromossômico (já descrito anteriormente como um marcador citológico). Foi descrito, pela primeira vez nesta espécie, um satélite no 10º par cromossômico. Foram encontrados também cromossomos extranumerários pequenos com variação numérica na mesma planta.

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