

**CHROMOSOME COUNTS IN *BIDENS* SECTION,
GREENMANIA (COREOPSIDEAE: ASTERACEAE)**

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ABSTRACT

New chromosome counts are reported for *Bidens* section *Greenmania*. The majority of the counts are hexaploids and octaploids. *Phytologia* 92(2): 233-240 (August 2, 2010).

KEY WORDS: *Bidens*, chromosome counts.

Chromosome numbers were made from mother cell squashes. Fresh mother cells were fixed in a modified Carnoy's solution: chloroform; absolute alcohol; glacial acetic acid (4:3:1 volume/volume). Young anthers were subsequently dissected and squashed in propio-carmin. Chromosome counts were independently confirmed by Dr. Thomas Melchert, Wayne Carlson, and/ or Tau San Chou (Botany Department, Univ. of Iowa, Ames, Iowa). Voucher specimens and drawings are deposited in the University of Texas Herbarium (TEX).

Mitotic counts of root tip material grown in the Univ. of Iowa greenhouse were made to supplement the meiotic data. Tips were pretreated in 8-hydroxy quinoline, fixed, washed and hydrolyzed in leuco-basic fuschin, cleared in acetic acid and squashed according to the methodology of Chen (1969).

Chromosome counts obtained in this study are listed in Table 1. The haploid number is listed in all cases. Counts obtained from root tips are marked with an asterisk (*).

At the start of this study, only two ploidy levels were known for *Bidens* sec. *Greenmania*: three diploid population (1. from Colima, Mexico (*B. reptans* var. *urbanii*, Keil & Stuessy, 1977), and (2. another

two diploid counts of *B. squarrosa* from Chiapas, Mexico (Solbrig, 1972). Three tetraploid populations of the latter had been found as well, one in Oaxaca, Mexico, and two from Guatemala (Robinson et al. 1981). Surprisingly, the great majority of populations examined were high polyploids: hexaploids or octaploids. Tetraploid populations were common in Guatemala, but not in Mexico. Only a small minority of the examined populations were diploid. The single dodecaploid ($n = 72$) population (of *B. boquetiensis*) was obtained in Panama. The cytological and other data (morphological and flavonoids) are discussed in more detail by Roseman (1986).

ACKNOWLEDGEMENTS

Financial assistance was provided by a National Science Foundation Doctoral Dissertation Grant

LITERATURE CITED

- Chen, C.C. 1969. The somatic chromosomes of maize. *Can. J. Genet. Cytol.* 11: 752-754.
- Roseman, R.R. 1986. A systematic study of *Bidens*, section *Greenmania* in Mexico, Central America and Jamaica: chemotaxonomy, cytotaxonomy and phenetics. PhD. Thesis, Botany Dept, Univ. of Iowa, Iowa City, Ia.

Table 1. Chromosome counts of *Bidens* section *Greenmania*.

Country, State	Taxon Locality and collection number	n
<i>Bidens reptans</i>		
JAMAICA:		
St. Thomas	Roseman 553, Union Hill, near Serge Island marble quarry.	12 12*
St. Catherine	Roseman 554, near Luidas Vale.	12 12*
<i>Bidens mexicana</i>		
MEXICO:		
Guerrero	Roseman 515, 23 mi north of Acapulco, Hwy 95.	12
<i>Bidens antiguensis</i> var. <i>antiguensis</i>		
GUATEMALA:		
Huehutenango	Roseman 527, 5 mi northwest of Huehuetenango.	24
El Progreso	Roseman 600, 81 mi north of Santa Cruz Varapas on road to Coban.	24
Alta Verapas	Roseman 602, 20 mi west of Santa Cruz Varapas on Hwy 7W.	24
Quiche	Roseman 592, 4.8 mi north of Chichicastenango on road to Quiche.	24
	Roseman 529, 3.4 mi south of Chichicastenango.	24*
Solola	Roseman 591, 4.1 mi south of Panajachel.	24*
Sacatepequez	Roseman 585, 10.3 mi from Chimaltenango on road to Antigua.	24

Table 1. Chromosome counts of *Bidens* section *Greenmania* (cont'd).

Country, State	Taxon Locality and collection number	n
	<i>Bidens antiguensis</i> var. <i>antiguensis</i> (cont'd.)	
Escuintla	Roseman 571, 10 mi northwest of Escuintla on road to Guatemala City.	24
	<i>B. antiguensis</i> var. <i>procumbens</i>	
GUATEMALA: Zacapa	Roseman 594, 9 mi north of Zacapa- Isabal boundary.	24
	Roseman 597, near Juan de Paz, 3 mi from Zacapa-Isabal boundary.	24
	<i>Bidens antiguensis</i> var. <i>salvadorensi</i>	
GUATEMALA Quetzaltenango	Roseman 573, 12.3 mi southeast of Zunil, between Retalhuleu and Zunil.	24
	<i>Bidens antiguensis</i> x <i>B. squarrosa</i> (hybrid?)	
GUATEMALA: Retalhuleu	Roseman 572, 16.6 mi southeast of Zunil on road from Retalhuleu to Quetzaltenango.	60
	<i>Bidens izabalensis</i>	
GUATEMALA: Izabal	Roseman 598, 1 mi southwest of road to Mariscos from main highway to Puerto Barrios.	36
Zacapa	Roseman 595, near Juan de Paz, 4 mi from Izabal-Zacapa boundary.	36
	<i>Bidens izabalensis</i> x <i>B. squarrosa</i> (hybrid?)	
Alta Verapas	Roseman 601, just west of Santa Cruz Verapaz on road to San Cristobal	36 36*

Table 1. Chromosome counts of *Bidens* section *Greenmania* (cont'd).

Country, State	Taxon Locality and collection number	n
<i>Bidens squarrosa</i> var. <i>squarrosa</i>		
COSTA RICA:		
Heredia	Roseman 566 north of Herredia on Hwy 9 near sawmill.	36
PANAMA:		
Cocle	Roseman 540, hills south of El Valle.	36
Veraguas	Roseman 537, above San Francisco, on road from Santiago to Santa Fe, about 12 mi south of Santa Fe.	36
<i>Bidens squarrosa</i> var. <i>atrostriata</i>		
MEXICO:		
Oaxaca	Roseman 519, 46-47 mi south of Oaxaca just north of Totolapan.	36*
	Roseman 518, Monte Alban	36 36*
Michoacan	Roseman 514, 20 mi south of Arteaga.	36
<i>Bidens squarrosa</i> var. <i>chiapensis</i>		
MEXICO:		
Chiapas	Roseman 525, 4 mi northwest of Comitán on Pan American Hwy.	36
<i>Bidens squarrosa</i> var. <i>tereticaulis</i>		
MEXICO:		
Veracruz	Roseman 613, 8-9 mi west of Minatitlán, Hwy. 180.	36
	Roseman 637, near Tampico, on highway from Temporal.	36

Table 1. Chromosome counts of *Bidens* section *Greenmania* (cont'd).

Country, State	Taxon Locality and collection number	n
<i>Bidens squarrosa</i> var. <i>chapensis</i>		
St, Louis Potosi	Roseman 638, just south of Ciudad Valles on Hwy 85, near Rio Tempaon,	36
	Roseman 639 3-4 mi north of Tamazunchale	36*
Oaxaca	Roseman 616, 8 mi north of Chiltepec on Hwy 175 to Oaxaca.	36
	Roseman 621, 8 mi north of Valle, Nacional, Hwy 175.	36**
	Roseman 619, 7.8 mi north of Chiltepec on Hwy 175 to Oaxaca.	36
Hidalgo	Roseman 634, ca 12 mi south of Huehutla	36*
Yucatan	Roseman 609, 8-9 mi southwest of Izamal	36
	Roseman 611, Hwy 180 near turnoff to Chitzen-Itza.	36*
	Roseman 612, ruins at Uxmal	36 36*
<i>Bidens squarrosa</i> var. <i>speciosa</i>		
GUATEMALA: Quetzalenango	Roseman 583, 1 mi from Zunil on road to Fuentes Georgina.	36
	Roseman 574, near Santa Maria de Jesus on road to San Lucas.	36
	Roseman 588, 8-9 mi from Panajachel on road to San Lucas.	36

Table 1. Chromosome counts of *Bidens* section *Greenmania* (cont'd).

Country, State	Taxon Locality and collection number	n
<i>Bidens squarrosa</i> var. <i>speciosa</i>		
MEXICO: Vera Cruz	Roseman 639, 10 mi south of Huatusco, road to Fortin de las Flores.	36*
	Roseman 631, trail to upper falls, Cascades de Naolinca.	36*
<i>Bidens squarrosa</i> var. <i>hondurensis</i>		
COSTA RICA: Puntarenas	Roseman 570, 6 mi south of Santa Elena, road from Monteverde.	36
	Roseman 569, 5 mi south of Santa Elena road from Monteverde.	36
<i>B. squarrosa</i> var <i>hondurensis</i> x <i>B. boquetiensis</i> (hybrid?)		
COSTA RICA: Punarenas	Roseman 568, 3 mi south of Santa Elena road from Monteverde.	36**
<i>Bidens boquentiensis</i>		
PANAMA: Chiriqui	Roseman 556, 23 mi north of church at Boquet, road to Altos de Boquete.	48*
	Roseman 555, ca 3 mi north of Boquete, near bridge.	72 72*
COSTA RICA: San Jose	Roseman 532, Cerro de la Muerte, ca 65 mi north of San Isidro.	48

Table 1. Chromosome counts of *Bidens* section *Greenmania* (cont'd).

Country, State	Taxon Locality and collection number	n
<i>Bidens boquentiensis</i> (cont'd)		
	Roseman 536, Panamerican Hwy, ca 6 mi north of San Isidro.	48
	Roseman 561, Cerro de la Muerte, ca 60 mi north of San Isidro.	48*
Cartago	Durkee 573-22, Tapanti	48*
Puntarenas	Roseman 567, 1.5 mi of cheese factory, Monteverde.	48*
Heredia	Roseman 563, Vara Blanca	36
<i>Bidens holwayi</i>		
GUATEMALA:		
Quetzaltenango	Roseman 576, western slopes of Volcan Zunil, on road from Zunil to Fuentes Georgina.	48
Quiche	Roseman 605, 5 mi south of Nebaj on road to Sacapulas.	48
	Roseman 606, 7 mi south of Nebaj on road to Sacapulas.	48
	Roseman 608, between km 10 and km 11, south of Nabaj on road to Sacapulas.	48

* Haploid chromosome numbers are listed. Numbers with an asterisk are one-half of the mitotic chromosome number obtained from root tips; all other numbers are meiotic counts.

** Abnormal meiosis, circle of chain of four chromosomes.