CHROMOSOME COUNTS OF *BIDENS*, *COSMOS* AND *THELESPERMA* SPECIES (ASTERACEAE, COREOPSISIDINAE)

Thomas E. Melchert  
Biological Sciences  
The University of Iowa  
Iowa City, IA  
thomas-melchert@uiowa.edu

ABSTRACT

Chromosome counts are presented for *Bidens*, *Cosmos*, *Thelesperma* species. *Phytologia* 92(3): 312-333 (December 1, 2010).

KEY WORDS: *Bidens*, *Cosmos*, *Thelesperma*, chromosome counts, Coreopsisidinae.

The chromosome counts presented here were made from pollen mother cell squashes of materials collected throughout Mexico, the southwestern U.S. (primarily Arizona and New Mexico), and Central America (primarily Guatemala). Nos. 6006-6240 were collected by T. E. Melchert and P. D. Sørensen in 1965; Nos. 6251-6504 by T. E. Melchert, P. D. Sørensen and D. J. Crawford in 1966; Nos. 67-1 through 67-182 by T. E. Melchert, D. J. Crawford and J. E. Averett in 1967; Nos. 68-1 through 68-46 by N. J. Carman in 1968; Nos. 68-48 through 68-138 by N. J. Carman and D. E. Giannasi in 1968; Nos. 71-1 through 71-21 by C. R. Hart in 1971; Nos. 71-22 through 71-308½ by T. E. Melchert, C. R. Hart and R. E. Ballard in 1971; and those with a (R-) prefix by R. R. Roseman in 1976.

The methods used to obtain and document these counts are those of Melchert (1968). In the following tables counts obtained from individual plants are distinguished by letters (A, B, C, D) appended to the population collection number. Counts obtained from progeny grown from seed in The University of Iowa greenhouses are marked by the symbol (GH). The chromosome numbers presented here for the populations comprising the “*Bidens pilosa* species complex” (B.
odorata, B. alba, B. pilosa and B. clavata) collected in 1971 were determined by Ballard (1975, 1986, 1988).

Voucher specimens are deposited in The University of Texas Herbarium (TEX). These studies were supported by N.S.F. grants GB-3851 and GB-6684.

**LITERATURE CITED**

Ballard, R.E. 1975. A biosystematic and chemotaxonomic study of the *Bidens pilosa* complex in North and Central America. Ph.D. Diss., Univ of Iowa, Iowa City, IA.


<table>
<thead>
<tr>
<th>COUNTRY:</th>
<th>Taxon</th>
<th>Collections</th>
</tr>
</thead>
<tbody>
<tr>
<td>State</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MEXICO:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bidens acrifolia Sherff</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Jalisco:</td>
<td>$n = 10$ 6376, 6385, 68-113</td>
</tr>
<tr>
<td></td>
<td>Bidens aequisquama (Fernald) Sherff</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Jalisco:</td>
<td>$n = 36$ 6407</td>
</tr>
<tr>
<td></td>
<td>Jalisco:</td>
<td>$n = ca 36$ 6389, 68-59</td>
</tr>
<tr>
<td></td>
<td>Michoacán:</td>
<td>$n = 36$ 68-126, 68-128, 247</td>
</tr>
<tr>
<td></td>
<td>Bidens aequisquama var. guanajuatensis Melchert</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Guanajuato:</td>
<td>$n = 36$ 71-94 (Type collection)</td>
</tr>
<tr>
<td></td>
<td>Bidens alba (L.) DC. var. alba</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Veracruz:</td>
<td>$n = 24$ 71-127, 71-130, Cruden 1893</td>
</tr>
<tr>
<td></td>
<td>Bidens alba var. radiata (Sch.-Bip.) Ballard</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Campeche:</td>
<td>$n = 24$ 71-143B, Cruden 1912</td>
</tr>
<tr>
<td></td>
<td>Oaxaca:</td>
<td>$n = 24$ 68-35, 71-137</td>
</tr>
<tr>
<td></td>
<td>Tamaulipas</td>
<td>$n = 24$ King 4058</td>
</tr>
<tr>
<td>TABLE 1. CHROMOSOME COUNTS OF BIDENS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>COUNTRY: State</strong></td>
<td><strong>Taxon</strong></td>
<td><strong>Collections</strong></td>
</tr>
<tr>
<td>Bidens angustissima H. B. K.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MEXICO:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Durango:</td>
<td>$n = 10$</td>
<td>6290, Cruden 1855</td>
</tr>
<tr>
<td>Guanajuato:</td>
<td>$n = 10$</td>
<td>71-100</td>
</tr>
<tr>
<td>Hidalgo:</td>
<td>$n = 10$</td>
<td>*Beaman 2763 (TEX)</td>
</tr>
<tr>
<td>San Luis Potosi:</td>
<td>$n = 10$</td>
<td>71-72</td>
</tr>
<tr>
<td><strong>Bidens anthemoides (DC.) Sherff</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MEXICO:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mexico D. F.:</td>
<td>$n = 11$</td>
<td>67-126</td>
</tr>
<tr>
<td>Mexico:</td>
<td>$n = 11$</td>
<td>71-115 (GH), 71-234</td>
</tr>
<tr>
<td><strong>Bidens aurea (Ait.) Sherff</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MEXICO:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mexico:</td>
<td>$n = 17$ or $18$</td>
<td>67-164</td>
</tr>
<tr>
<td>Chiapas:</td>
<td>$n = 23$</td>
<td>6460A, 6460B, Cruden 1543C, Cruden 1543D, Cruden, 1537, Cruden 1548, Cruden 1549</td>
</tr>
<tr>
<td>Durango</td>
<td>$n = 23$</td>
<td>6291, 68-85</td>
</tr>
<tr>
<td>Guanajuato:</td>
<td>$n = 23$</td>
<td>67-175</td>
</tr>
<tr>
<td>Hidalgo:</td>
<td>$n = 23$</td>
<td>67-41, 67-38</td>
</tr>
</tbody>
</table>
**TABLE 1. CHROMOSOME COUNTS OF *BIDENS***

<table>
<thead>
<tr>
<th>COUNTRY:</th>
<th>Taxon</th>
<th>Collections</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>State</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MEXICO (cont’d):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mexico:</td>
<td>( n = 23 )</td>
<td>6115, 67-138, 67-147, 67-166, 67-150, 6230, 71-109</td>
</tr>
<tr>
<td>Oaxaca:</td>
<td>( n = 23 )</td>
<td>6191, 67-107, 68-32, 68-32B, 68-37</td>
</tr>
<tr>
<td>Puebla:</td>
<td>( n = 23 )</td>
<td>6150</td>
</tr>
<tr>
<td>San Luis Potosí:</td>
<td>( n = 23 )</td>
<td>67-16</td>
</tr>
<tr>
<td>Tlaxcala:</td>
<td>( n = 23 )</td>
<td>67-46</td>
</tr>
<tr>
<td>Veracruz:</td>
<td>( n = 23 )</td>
<td>67-114</td>
</tr>
<tr>
<td>Michoacán:</td>
<td>( n = 34 ) or ( 35 )</td>
<td>6098, 71-244</td>
</tr>
<tr>
<td>(Mirador:</td>
<td>( n = \text{ca} 35 ) ( (34-36) )</td>
<td>67-170</td>
</tr>
<tr>
<td>Mil Cumbres:)</td>
<td>( n = \text{ca} 35 ) ( (or \ 36) )</td>
<td>71-244</td>
</tr>
</tbody>
</table>

*Bidens aurea* (Ait.) Sherff (cont’d)

**Bidens balsana** Melchert

**MEXICO:**

**Guerrero:** | \( n = 11 \) | 67-154, 71-206 |

**Bidens bicolor** Greenm.

**MEXICO:**

**Chiapas:** | \( n = 12 \) | 6455, 71-150, 71-154 |
<table>
<thead>
<tr>
<th>TABLE 1. CHROMOSOME COUNTS OF <em>BIDENS</em></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>COUNTRY:</strong></td>
</tr>
<tr>
<td><strong>State</strong></td>
</tr>
<tr>
<td><strong>Bidens bicolor</strong> Greenm. (cont’d)</td>
</tr>
<tr>
<td>MEXICO (cont’d):</td>
</tr>
<tr>
<td>Oaxaca:</td>
</tr>
<tr>
<td>GUATEMALA:</td>
</tr>
<tr>
<td><strong>Bidens bigelovii</strong> A. Gray</td>
</tr>
<tr>
<td>MEXICO:</td>
</tr>
<tr>
<td>Chiapas:</td>
</tr>
<tr>
<td>Durango:</td>
</tr>
<tr>
<td>Guanajuato:</td>
</tr>
<tr>
<td>Jalisco:</td>
</tr>
<tr>
<td>Querétaro:</td>
</tr>
<tr>
<td>San Luis Potosi:</td>
</tr>
<tr>
<td><strong>UNITED STATES:</strong></td>
</tr>
<tr>
<td>Arizona:</td>
</tr>
<tr>
<td>New Mexico:</td>
</tr>
<tr>
<td><strong>Bidens carpodonta</strong> Sherff</td>
</tr>
<tr>
<td>MEXICO:</td>
</tr>
<tr>
<td>Nuevo Leon:</td>
</tr>
<tr>
<td><strong>Bidens chiapensis</strong> Brandegee</td>
</tr>
<tr>
<td>MEXICO:</td>
</tr>
<tr>
<td>Chiapas:</td>
</tr>
<tr>
<td>COUNTRY:</td>
</tr>
<tr>
<td>---------</td>
</tr>
<tr>
<td>State</td>
</tr>
<tr>
<td><strong>GUATEMALA:</strong></td>
</tr>
<tr>
<td>Bidens chiapensis Brandegee (cont’d)</td>
</tr>
<tr>
<td><strong>MEXICO:</strong></td>
</tr>
<tr>
<td>Chiapas:</td>
</tr>
<tr>
<td>GUATEMALA:</td>
</tr>
<tr>
<td>Bidens chrysanthemifolia (H. B. K.) Sherff</td>
</tr>
<tr>
<td><strong>MEXICO:</strong></td>
</tr>
<tr>
<td>San Luis Potosi:</td>
</tr>
<tr>
<td>Bidens clavata Ballard</td>
</tr>
<tr>
<td><strong>MEXICO:</strong></td>
</tr>
<tr>
<td>Guerrero:</td>
</tr>
<tr>
<td>Bidens cronquistii (Sherff) Melchert</td>
</tr>
<tr>
<td><strong>MEXICO:</strong></td>
</tr>
<tr>
<td>Guerrero:</td>
</tr>
<tr>
<td>Bidens ferulaefolia (Jaq.) DC.</td>
</tr>
<tr>
<td><strong>MEXICO:</strong></td>
</tr>
<tr>
<td>8 states:</td>
</tr>
<tr>
<td>Bidens laevis (L.) B. S. P. Presl.</td>
</tr>
<tr>
<td><strong>MEXICO:</strong></td>
</tr>
<tr>
<td>Jalisco:</td>
</tr>
<tr>
<td>Bidens lemmornii A. Gray</td>
</tr>
<tr>
<td><strong>MEXICO:</strong></td>
</tr>
<tr>
<td>Chihuahua:</td>
</tr>
</tbody>
</table>
**TABLE 1. CHROMOSOME COUNTS OF BIDENS**

<table>
<thead>
<tr>
<th>COUNTRY: State</th>
<th>Taxon</th>
<th>Collections</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bidens leptocephala</strong> Sherff</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MEXICO:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chihuahua:</td>
<td>$n = 11$</td>
<td>6254A, 6254B</td>
</tr>
<tr>
<td>UNITED STATES:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arizona:</td>
<td>$n = 11$</td>
<td>71-9, 71-14, 71-16</td>
</tr>
<tr>
<td><strong>Bidens longistyla</strong> Hart</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MEXICO:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coahuila:</td>
<td>$n = 12$</td>
<td>5 counts, Hart 1979</td>
</tr>
<tr>
<td><strong>Bidens mollifolia</strong> Sherff</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MEXICO:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Durango:</td>
<td>$n = ca 24$</td>
<td>6310</td>
</tr>
<tr>
<td>Jalisco:</td>
<td>$n = 24$</td>
<td>71-266</td>
</tr>
<tr>
<td>Mexico:</td>
<td>$n = 36$</td>
<td>71-232</td>
</tr>
<tr>
<td>Michoacán:</td>
<td>$n = 24$</td>
<td>68-27, 68-29, 71-245</td>
</tr>
<tr>
<td></td>
<td>$n = 36$</td>
<td>71-173</td>
</tr>
<tr>
<td><strong>Bidens oaxacana</strong> Melchert</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MEXICO:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oaxaca:</td>
<td>$n = 12$</td>
<td>67-87</td>
</tr>
<tr>
<td><strong>Bidens ocellatus</strong> (Greenm.) Melchert</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MEXICO:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mexico D. F.:</td>
<td>$n = 12$</td>
<td>6485, 6485A, 67-131, 71-222</td>
</tr>
</tbody>
</table>
### TABLE 1. CHROMOSOME COUNTS OF *BIDENS*

<table>
<thead>
<tr>
<th>COUNTRY: State</th>
<th>Taxon</th>
<th>Collections</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bidens odorata Cav. var. chilpancingensis</strong>&lt;br&gt;MEXICO: Guerrero:</td>
<td>$n = 12$</td>
<td>71-217</td>
</tr>
<tr>
<td></td>
<td>$n = 12, 13$</td>
<td>71-207</td>
</tr>
<tr>
<td><strong>Bidens odorata Cav. var. odorata</strong>&lt;br&gt;MEXICO: Aguascalientes:</td>
<td>$n = 12$</td>
<td>68-97, 71-85</td>
</tr>
<tr>
<td>Chiapas:</td>
<td>$n = 12$</td>
<td>6461A, 6461C, 71-152, 71-158</td>
</tr>
<tr>
<td>Chihuahua</td>
<td>$n = 12$</td>
<td>6253A, 6253B, 6257, 6262A, 6262B, 68-72, 68-73, 68-74, 68-75</td>
</tr>
<tr>
<td>Coahuila:</td>
<td>$n = 12$</td>
<td>71-23, 71-25, 71-32</td>
</tr>
<tr>
<td>Guanajuato:</td>
<td>$n = 12$</td>
<td>67-22, 67-24</td>
</tr>
<tr>
<td>Guerrero:</td>
<td>$n = 12$</td>
<td>67-153</td>
</tr>
<tr>
<td>Hidalgo:</td>
<td>$n = 12$</td>
<td>67-33, 67-36</td>
</tr>
<tr>
<td>Michoacán:</td>
<td>$n = 12$</td>
<td>6420, 71-242</td>
</tr>
</tbody>
</table>
### TABLE 1. CHROMOSOME COUNTS OF *BIDENS*

<table>
<thead>
<tr>
<th>COUNTRY: State</th>
<th>Taxon</th>
<th>Collections</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bidens odorata Cav. var. odorata (cont’d)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MEXICO (cont’d):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Morelos:</td>
<td>$n = 12$</td>
<td>67-30</td>
</tr>
<tr>
<td>Nuevo Leon:</td>
<td>$n = 12$</td>
<td>71-35, 71-40, 71-47</td>
</tr>
<tr>
<td>Puebla:</td>
<td>$n = 12$</td>
<td>71-118, 71-120, 71-204</td>
</tr>
<tr>
<td>San Luis Potosi:</td>
<td>$n = 12$</td>
<td>68-103, 71-48, 71-49, 71-70</td>
</tr>
<tr>
<td>Tlaxcala</td>
<td>$n = 12$</td>
<td>67-47</td>
</tr>
<tr>
<td>Zacatecas:</td>
<td>$n = 12$</td>
<td>71-26, 71-77, 71-281, 71-283</td>
</tr>
<tr>
<td><strong>GUATEMALA:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Huehuetenango:</td>
<td>$n = 12$</td>
<td>6450</td>
</tr>
<tr>
<td>Quezaltenango:</td>
<td>$n = 12$</td>
<td>6448</td>
</tr>
<tr>
<td><strong>UNITED STATES:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>New Mexico:</td>
<td>$n = 12$</td>
<td>71-3</td>
</tr>
</tbody>
</table>

**Bidens odorata var. rosea** Melchert

* = *B. o. var. calcicola* (Greenm.) Ballard

| MEXICO: |       |             |
| Chiapass: | $n = 12$ | 71-139, 71-141 |
| Colima: | $n = 12$ | 71-258 |
### TABLE 1. CHROMOSOME COUNTS OF *BIDENS*

<table>
<thead>
<tr>
<th>COUNTRY: State</th>
<th>Taxon</th>
<th>Collections</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><em>Bidens odorata var. rosea</em> Melchert (cont’d) = <em>B. o. var. calcicola</em> (Greenm.) Ballard (cont’d)</td>
<td></td>
</tr>
<tr>
<td>MEXICO (cont’d):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Durango:</td>
<td>$n = 12$</td>
<td>6278, 71-295, 71-296</td>
</tr>
<tr>
<td>Guanajuato:</td>
<td>$n = 12$</td>
<td>67-176A</td>
</tr>
<tr>
<td>Jalisco:</td>
<td>$n = 12$</td>
<td>6361, 6366A, 71-88, 71-264, 71-268, 71-280</td>
</tr>
<tr>
<td></td>
<td>$n = 12 + n = \text{ca } 13$</td>
<td>6061, 6392</td>
</tr>
<tr>
<td></td>
<td>$n = 12, 13 + (13 + 1)$</td>
<td>71-278</td>
</tr>
<tr>
<td>Mexico:</td>
<td>$n = 12$</td>
<td>67-151, 71-226</td>
</tr>
<tr>
<td>Morelos</td>
<td>$n = 12$</td>
<td>71-221</td>
</tr>
<tr>
<td>Nayarit</td>
<td>$n = 12$</td>
<td>6334, 6334A</td>
</tr>
<tr>
<td>Oaxaca:</td>
<td>$n = 12$</td>
<td>71-138, 71-164, 71-170</td>
</tr>
<tr>
<td>San Luis Potosi:</td>
<td>$n = 12$</td>
<td>71-638</td>
</tr>
<tr>
<td></td>
<td>$n = 12 + 14$</td>
<td>71-63B</td>
</tr>
<tr>
<td><em>Bidens odorata var. oaxacensis</em> Ballard</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MEXICO:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Guerrero:</td>
<td>$n = 12$</td>
<td>71-211, 71-218, 71-220</td>
</tr>
<tr>
<td>COUNTRY: State</td>
<td>Taxon</td>
<td>Collections</td>
</tr>
<tr>
<td>---------------</td>
<td>-------</td>
<td>-------------</td>
</tr>
<tr>
<td><strong>Bidens odorata var. oaxacensis</strong> Ballard (cont’d)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MEXICO (cont’d):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mexico:</td>
<td>(n = 12)</td>
<td>71-225, 71-237</td>
</tr>
<tr>
<td>Puebla:</td>
<td>(n = 12)</td>
<td>67-51, 67-51B, 71-205</td>
</tr>
<tr>
<td><strong>Bidens ostruthiodes</strong> (DC.) Sch.-Bip.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MEXICO:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chiapas:</td>
<td>(n = 23)</td>
<td>6465</td>
</tr>
<tr>
<td>Mexico:</td>
<td>(n = 23)</td>
<td>6222, 67-135, 68-31</td>
</tr>
<tr>
<td>Michoacán:</td>
<td>(n = 23)</td>
<td>6429, 68-28</td>
</tr>
<tr>
<td>Oaxaca:</td>
<td>(n = 23)</td>
<td>67-100</td>
</tr>
<tr>
<td>GUATEMALA:</td>
<td>(n = 23)</td>
<td>6435, Cruden 1556, Cruden 1576</td>
</tr>
<tr>
<td><strong>Bidens pilosa</strong> L.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MEXICO:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chiapas:</td>
<td>(n = 36)</td>
<td>Cruden 1932, R-521 (‘‘var..’’ minor)</td>
</tr>
<tr>
<td>Durango:</td>
<td>(n = 36)</td>
<td>6315, 6317, Cruden 1866</td>
</tr>
<tr>
<td>COUNTRY: State</td>
<td>Taxon</td>
<td>Collections</td>
</tr>
<tr>
<td>---------------</td>
<td>-------</td>
<td>-------------</td>
</tr>
<tr>
<td><strong>Bidens pilosa L. (cont’d)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MEXICO (cont’d):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jalisco:</td>
<td>$n = 36$</td>
<td>63-66</td>
</tr>
<tr>
<td>Michoacán:</td>
<td>$n = 36$</td>
<td>6082, 6087, 6094, 6416</td>
</tr>
<tr>
<td>Oaxaca:</td>
<td>$n = 36$</td>
<td>68-38, 71-175, 71-180A</td>
</tr>
<tr>
<td>Querétaro:</td>
<td>$n = 36$</td>
<td>68-106</td>
</tr>
<tr>
<td><strong>COSTA RICA:</strong></td>
<td>$n = 36$</td>
<td>R-533 (“var..” minor)</td>
</tr>
</tbody>
</table>

**Bidens pringlei Greenm.**

| MEXICO: |       |             |
| Michoacán: | $n = 12$ | 6418, 67-173 |

**Bidens pueblensis (Sherff) Melchert**

| MEXICO: |       |             |
| Mexico: | $n = 12$ | 71-228 |
| Oaxaca: | $n = 12$ | 71-185 |

**Bidens purpusorum Biter & Peters**

| MEXICO: |       |             |
| Puebla: | $n = 11$ (GH) | 67-115, 71-121, 71-122 |
|         | $n = 11$ | Powell & Edmundson 641 (originally reported as B. f. reptans) |

**Bidens riparia H. B. K.**

| MEXICO: |       |             |
| Jalisco: | $n = 12$ | 71-261, 263 |
| PANAMA: | $n = 12$ | R-59 |
### TABLE 1. CHROMOSOME COUNTS OF *BIDENS*

<table>
<thead>
<tr>
<th>COUNTRY:</th>
<th>Taxon</th>
<th>Collections</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>State</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>MEXICO:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jalisco:</td>
<td>$n = 12$</td>
<td>71-273</td>
</tr>
<tr>
<td>Michoacán:</td>
<td>$n = 12$</td>
<td>R-508</td>
</tr>
</tbody>
</table>

*Bidens rostrata* Melchert

| **MEXICO:** |       |             |
| Aguascalientes: | $n = 11$ | 71-86 |
| Jalisco: | $n = 11$ | 6356, 71-80, 71-90 |
| Mexico: | $n = 11$ | 67-158 |
| San Luis Potosi: | $n = 11$ | 71-86, 71-75A, 71-75B |

*Bidens schaffneri* (A. Gray) Sherff

| **MEXICO:** |       |             |
| Chihuahua | $n = 11$ | 6270A, 6270B, 6261 |

*Bidens schaffneri* var. *wrightii* (Sherff) Melchert

| **Artificial Hybrid** | $n = 11$ | 67-158 ♂ x 6261 ♀ (GH) |
| (meiotic pairing normal) |       | (meiotic pairing normal) |

*Bidens serrulata* (Poir.) Desf.

<p>| <strong>MEXICO:</strong> |       |             |
| Morelos: | $n = 12$ | 71-223 |</p>
<table>
<thead>
<tr>
<th>COUNTRY:</th>
<th>Taxon</th>
<th>Collections</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>State</strong></td>
<td><strong>Bidens serrulata (Poir.) Desf. (cont’d)</strong></td>
<td></td>
</tr>
<tr>
<td>Puebla:</td>
<td>(n = 12)</td>
<td>71-117</td>
</tr>
</tbody>
</table>

| **Bidens sharpii (Sherff) Melchert** | |
| | \(n = 11\) | King 2517 (TEX) (reported as \(B. serrulata\) var. \(sharpii\)) |

| **Bidens subspiralis McVaugh** | |
| Michoacán: | \(n = 12\) | R-509 |

| **Bidens tenuisecta A. Gray** | |
| UNITED STATES: | | |
| Arizona: | \(n = 12\) | H-71-1 |
| New Mexico: | \(n = 12\) | H-71-18 |

<p>| <strong>Bidens triplinervia H. B. K.</strong> | |
| MEXICO: | | |
| Chiapas: | (n = 24) | 71-151 |
| | (n = \text{ca} 24) | King 2990 |
| Durango: | (n = 24) | 6300 |
| Guerrero: | (n = 12) | Cruden 1631 (Cal) |
| Hidalgo: | (n = 24) | 67-37, 67-42, 68-56 |</p>
<table>
<thead>
<tr>
<th>TABLE 1. CHROMOSOME COUNTS OF <em>BIDENS</em></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>COUNTRY:</strong></td>
</tr>
<tr>
<td><strong>State</strong></td>
</tr>
<tr>
<td>Bidens triplinervia H. B. K. (cont’d):</td>
</tr>
<tr>
<td>Mexico (cont’d):</td>
</tr>
<tr>
<td>Mexico:</td>
</tr>
<tr>
<td>Michoacán:</td>
</tr>
<tr>
<td>Nuevo Leon:</td>
</tr>
<tr>
<td>San Luis Potosi:</td>
</tr>
<tr>
<td>Oaxaca:</td>
</tr>
<tr>
<td>Veracruz:</td>
</tr>
<tr>
<td>GUATEMALA:</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
TABLE 2. CHROMOSOME COUNTS OF *COSMOS*

<table>
<thead>
<tr>
<th>COUNTRY: State</th>
<th>Taxon</th>
<th>Collections</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Cosmos</em> section <em>Cosmos</em>:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MEXICO:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hidalgo:</td>
<td>$n = 12$ II</td>
<td>67-39</td>
</tr>
<tr>
<td>Querétaro:</td>
<td>$n = 12$ II</td>
<td>67-31</td>
</tr>
<tr>
<td>Tlaxcala:</td>
<td>$n = 12$ II</td>
<td>67-48</td>
</tr>
<tr>
<td><em>Cosmos caudatus</em> H. B. K.:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MEXICO:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Veracruz:</td>
<td>$n = 24$ II</td>
<td>71-126, 71-132</td>
</tr>
<tr>
<td>PANAMA:</td>
<td>$n = 24$ II</td>
<td>R-538</td>
</tr>
<tr>
<td><em>Cosmos pacificus</em> Melchert</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MEXICO:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Colima:</td>
<td>$n = 12$ II</td>
<td>71-259</td>
</tr>
<tr>
<td>Michoacán:</td>
<td>$n = 12$ II</td>
<td>71-124, 71-248, 71-251A, 71-251B</td>
</tr>
<tr>
<td>Mexico:</td>
<td>$n = 12$ II</td>
<td>71-236</td>
</tr>
<tr>
<td><em>Cosmos pacificus var. chiapensis</em> Melchert</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MEXICO:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chiapas:</td>
<td>$n = 12$ II</td>
<td>71-161</td>
</tr>
<tr>
<td><em>Cosmos parviflorus</em> (Jacq.) Pers.:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MEXICO:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hidalgo:</td>
<td>$n = 12$ II</td>
<td>67-49</td>
</tr>
<tr>
<td>Mexico:</td>
<td>$n = 12$ II</td>
<td>67-161 ½</td>
</tr>
<tr>
<td>Country: State</td>
<td>Taxon</td>
<td>Collections</td>
</tr>
<tr>
<td>---------------</td>
<td>-------</td>
<td>-------------</td>
</tr>
<tr>
<td><strong>Cosmos parviflorus</strong> (Jacq.) Pers. (cont’d)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MEXICO (cont’d):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>San Luis Potosi: &amp; $n = 12$ II &amp; 67-20</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Cosmos sulphureus</strong> Cav.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MEXICO:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chiapas: &amp; $n = 12$ II &amp; 71-162A, 71-162B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Colima: &amp; $n = 12$ II &amp; 71-257</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mexico: &amp; $n = ca 12$ II &amp; 71-238</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Michoacán: &amp; $n = 12$ II &amp; 71-249A, 71-249B, 71-252</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oaxaca: &amp; $n = 12$ II &amp; 67-83</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Cosmos sulphureus x C. pacificus</strong> F$_1$ Hybrids</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MEXICO:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chiapas: &amp; $n = ca 12$ (8II, 1IV, 1III, 1I) &amp; 71-160</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Colima: &amp; $n = 12$ II <em>(very irregular)</em> &amp; 71-260</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Michoacán: &amp; $n = 12$ II <em>(very irregular)</em> &amp; 71-250</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Cosmos section Discopoda:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Cosmos deficiens</strong> (Sherff) Melchert</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MEXICO:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jalisco: &amp; $n = 12$ &amp; 68-114</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**TABLE 2. CHROMOSOME COUNTS OF COSMOS**

<table>
<thead>
<tr>
<th>COUNTRY:</th>
<th>Taxon</th>
<th>Collections</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>State</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>MEXICO:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hidalgo:</td>
<td>$n = 24$</td>
<td>67-43</td>
</tr>
<tr>
<td>Oaxaca:</td>
<td>$n = 12$</td>
<td>67-93, 68-44</td>
</tr>
<tr>
<td><strong>Cosmos diversifolius Otto</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>MEXICO:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jalisco:</td>
<td>$n = 24$</td>
<td>68-16</td>
</tr>
<tr>
<td><strong>Cosmos jaliscensis Sherff</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>MEXICO:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mexico:</td>
<td>$n = 12$</td>
<td>67-139A, 67-139B, 67-140</td>
</tr>
<tr>
<td><strong>Cosmos modestus Sherff</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>MEXICO:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jalisco:</td>
<td>$n = 24$ (GH)</td>
<td>68-119</td>
</tr>
<tr>
<td><strong>Cosmos montanus Sherff var. pinnatus Sherff</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>MEXICO:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Durango:</td>
<td>$n = 24$</td>
<td>68-19, 68-67, 6293 (GH)</td>
</tr>
<tr>
<td><strong>Cosmos palmeri B. L. Robinson</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>MEXICO:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chihuahua:</td>
<td>$n = 43-46$</td>
<td>6265 (GH)</td>
</tr>
<tr>
<td>Durango:</td>
<td>$n = ca 48$</td>
<td>68-68</td>
</tr>
<tr>
<td><strong>Cosmos pringlei B. L. Robinson</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>MEXICO:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mexico:</td>
<td>$n = 24$</td>
<td>67-149A, 67-149B</td>
</tr>
<tr>
<td><strong>Cosmos purpureus (DC.) Hemsl.</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>COUNTRY: State</td>
<td>Taxon</td>
<td>Collections</td>
</tr>
<tr>
<td>---------------</td>
<td>-------</td>
<td>-------------</td>
</tr>
<tr>
<td>MEXICO (cont’d):</td>
<td>Cosmos purpureus (DC.) Hemsl. (cont’d)</td>
<td>n = ca 24 (23 + 2 fragments)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MEXICO:</th>
<th>Cosmos scabiosoides H. B. K.</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Morelos:</td>
<td>n = 12</td>
<td>67-129</td>
</tr>
<tr>
<td>Veracruz:</td>
<td>n = 12</td>
<td>67-113</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MEXICO:</th>
<th>Cosmos sessilis Sherff var. stellatus (Sherff) Melchert</th>
</tr>
</thead>
<tbody>
<tr>
<td>Michoacán:</td>
<td>n = 12</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MEXICO:</th>
<th>Cosmos section Mesinenia:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sinaloa:</td>
<td>Cosmos carvifolius Benth.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MEXICO:</th>
<th>Cosmos carvifolius x C. linearifolius F₁ Hybrid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sinaloa:</td>
<td>n = 11</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MEXICO:</th>
<th>Cosmos crithmifolius H. B. K.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oaxaca:</td>
<td>n = 33</td>
</tr>
<tr>
<td>n = ca 33</td>
<td>67-70, 67-85</td>
</tr>
<tr>
<td>n = 33 + 13 dots</td>
<td>67-112</td>
</tr>
<tr>
<td>COUNTRY:</td>
<td>Taxon</td>
</tr>
<tr>
<td>---------</td>
<td>-------</td>
</tr>
<tr>
<td><strong>MEXICO:</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Jalisco:</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Cosmos intercedens</strong> Sherff</td>
<td>$n = 11$</td>
</tr>
<tr>
<td><strong>Cosmos landii var. achalconensis</strong> Melchert</td>
<td>$n = 22$</td>
</tr>
<tr>
<td><strong>Cosmos landii var. landii</strong> Sherff</td>
<td>$n = 22$</td>
</tr>
<tr>
<td><strong>Cosmos linearifolius</strong> (Sch.-Bip.) Hemsl.</td>
<td>$n = 11$ (meiosis irregular)</td>
</tr>
<tr>
<td><strong>Cosmos ochroleucoflorus</strong> Melchert</td>
<td>$n = 22$</td>
</tr>
</tbody>
</table>
### TABLE 3. CHROMOSOME COUNTS OF *THELESPERMA*

<table>
<thead>
<tr>
<th>COUNTRY: State</th>
<th>Taxon</th>
<th>Collections</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MEXICO:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nuevo Leon:</td>
<td>$n = 20$</td>
<td>67-5, 67-9, 71-36</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Thelesperma megapotamicum (Spreng.) Kuntze</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MEXICO:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chihuahua:</td>
<td>$n = 22$</td>
<td>6251</td>
</tr>
<tr>
<td>Coahuila:</td>
<td>$n = \text{ca} 22$</td>
<td>71-34</td>
</tr>
<tr>
<td></td>
<td>$2n = 44$</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>UNITED STATES:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>New Mexico:</td>
<td>$n = 11$</td>
<td>68-14</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Thelesperma simplicifolium var. macrocarpum Melchert</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MEXICO:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coahuila</td>
<td>$n = 30$</td>
<td>71-33</td>
</tr>
<tr>
<td>Nuevo Leon:</td>
<td>$n = 30$</td>
<td>67-1A, 67-1B-, 67-1C, 67-1D, 67-3, 67-12, Cruden 1521</td>
</tr>
<tr>
<td></td>
<td>$n = \text{ca} 30$</td>
<td>67-10</td>
</tr>
</tbody>
</table>