

J. M.

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
NORTHEASTERN REGION
AGRICULTURAL RESEARCH CENTER
BELTSVILLE, MARYLAND 20705

June 21, 1976

Subject: Baccharis megapotamica and the Genus, Baccharis

To: Robert E. Perdue, Jr., Chief
Medicinal Plant Resources Laboratory

Baccharis megapotamica Spreng. includes two varieties - the typical variety and B. megapotamica Spreng. var. weirii stat. nov. in G. M. Barroso, Baccharidinae do Brazil (thesis 1973). According to Jose Cuatrecasas (personal communication), her (Barroso) thesis may have been published.

Both varieties of Baccharis megapotamica have shown antitumor activity, but samples that Dr. Kupchan has been working with are of B. megapotamica var. megapotamica. From reviewing herbarium specimens and Barroso's thesis at the Smithsonian, the following is a summary on the habit and distribution of B. megapotamica.

Baccharis megapotamica var. megapotamica is a shrub 3 to 5 feet high occurring in boggy meadows or open fields and along trails at elevations from 2,700 to near 7,000 feet. Its distribution is limited to southeastern Brazil in the States of Minas Gerais, Rio de Janeiro, Sao Paulo, Parana, Santa Catarina and Rio Grande do Sul. B. megapotamica var. weirii is similar to the distribution of the typical variety but it does not occur in Minas Gerais and extends further south into Uruguay. Figure 1 shows the distribution of B. megapotamica var. megapotamica.

Baccharis megapotamica and three other closely related species, B. spicata, B. caprariaefolia and B. dracunulifolia, are classified by Barroso in the B. spicata group. B. spicata is active in PS from Uruguay, samples of B. dracunulifolia were inactive and B. caprariaefolia has not been screened. All of these species appear to be more widely distributed in Brazil than B. megapotamica.

The genus Baccharis belongs to the tribe Astereae in the family Asteraceae (Compositae). Subtribes defined in the Astereae are: Solidagininae (Gnaphalium, Chrysopsis, Lepidophyllum, Solidago, Haplophragma, Chrysopsis, Phytolacca), Grangeinae (Grangea, Dicrocephala), Bellidinae (Egletes), Asterinae (Calotes, Townsendia, Erigeron, Aster, Melanodendron, Olivaria, Phytolacca), Conyzinae (Microglossa, Haastia, Conyza, Chrysocoma), Hinterhuberinae (Hinterhubera) and Baccharidinae (Baccharis, Baccharis). Phylogenetic relationships of Baccharis to other tribes and genera are shown in Figure 2. In Figure 2, note that we have had significant antitumor activity in Erigeron and Conyza.

The diagnostic characters of the Baccharidinae are plants usually dioecious with corollas that are profoundly lobed. The dioecious occurrence in Baccharis may also be a relevant factor in regards to activity. For example, activity in Cannabis is commonly associated with the female plants.

About 400 species of Baccharis are currently recognized, most of these occur in Brazil. Approximately 18% of the species have been screened for anti-tumor activity and 7.5-8.4% of those tested are active. Species of Baccharis have been screened on 128 occasions and 4.7% of the collections are active. Statistics on samples and extracts tested and active are summarized below:

Species Collections (one or more samples)	128	
Active Collections	6	
Percent Active		4.7
Species Tested	71-80	
Active Species	6	
Percent Active		7.5-8.4
Samples Tested	157	
Active Samples	7	
Percent Active		4.5
Extracts Tested	167	
Active Extracts	7	
Percent Active		4.2

Three of the six species that are listed as active in Baccharis belong to the B. spicata group. These are B. megapotamica, B. weirii (= B. megapotamica var. weirii) and B. spicata. Species active in Baccharis are listed in Table 1.

Antitumor agents isolated and identified in Baccharis are from samples of B. sarothioides Gray; centaureidin (Flavone) and 3,5,7 trihydroxy-3,4; dimethoxyflavone and are listed to be active in only KB Cell Culture.

About 14 species of Baccharis were found to have been reportedly used medicinally or cited as poisonous. Eleven species have been screened and only one is active. These facts are listed in Table 2.

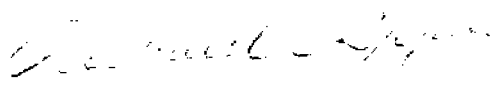
Table 3 lists all species of Baccharis that have been screened for antitumor activity. The nomenclature for all species was checked in the available references as cited. Considering the high percentage of species that have been screened in this genus, it was surprising to find that two species of rather widespread distribution have not been screened: B. latifolia (Ruiz & Pav.) Pers. and B. douglasii DC.

Some nomenclatural or spelling corrections to be made for the computer records are listed in Table 4.

For more specific information on the abundance of Baccharis megapotamica, Dr. Jose Cuatrecasas suggested that we write to:

1. Graziela Maciel Barrosa
Jardin Botanico do Rio de Janeiro
Rio de Janeiro
Brazil (South America)
2. P. Raulino Reitz
Herbaris "Barbosa Rodrigues"
88300 ITAJAI, S.C.
Brazil (South America)

The amount of my time devoted to this project was about 22 hours. However, it should be noted that Sandra Saufferer obtained the necessary information on the distribution of Baccharis megapotamica about two years ago. Sandy's time involved was two hours.


Richard W. Spjut, Botanist
Medicinal Plant Resources Laboratory

Enclosures

cc: A. S. Barclay
G. M. Christenson
S. Saufferer
POSI File

TABLE 1. List of Active Species in the Genus, Baccharis

<u>Baccharis coridifolia</u> DC.	st-1f (KB) (B-614363)	Brazil (Parana)
<u>Baccharis megapotamica</u> Spreng. var. <u>megapotamica</u>	rt; tw-1f-fl (KB, PS) (PR-27152) (PR-27153)	Brazil (Parana)
<u>Baccharis megapotamica</u> Spreng. var. <u>weirii</u> (Bak.) Stat. Nova (= <u>B. weirii</u> Baker)	rt-tw-1f-fl (KB) (PR-33100)	Brazil
<u>Baccharis pedunculata</u> (Miller) Cabrera	rt-tw (PS) (PR-32831)	Panama
<u>Baccharis sarothroides</u> Gray	st-1f (KB) (B-614034)	California
<u>Baccharis spicata</u> Hiern,	wd (PS) (B-649646)	Uruguay

TABLE 2. List of Medicinal and Poisonous Species
in the Genus, Baccharis

<u>Species</u>	<u>Reference</u>
* <u>Baccharis artemisioides</u> Hook & Arn.	1
<u>B. calliprinos</u> Griseb.	4
* <u>B. conferta</u> H.B.K.	7
* <u>B. coridifolia</u> DC.	1,5
<u>B. crispa</u> Spreng.	5
* <u>B. genistilloides</u> Pers.	4,6
* <u>B. glomerulifolia</u> Pers.	2
* <u>B. glutinosa</u> Pers. = <u>B. salicifolia</u> (Ruiz. & Pav.) Pers.	4,8
* <u>B. halimifolia</u> L.	3
<u>B. microcephala</u> (Less.) DC.	6
* <u>B. notoserquilla</u> Griseb.	8
* <u>B. pteronioides</u> DC.	2
* <u>B. tridentata</u> Vahl.	4
* <u>B. trimera</u> (Less.) DC.	5

* Species that have been screened for antitumor activity.

Baccharis coridifolia DC. is the only species active in the above list

1. Ragonese, A. E. Plantas toxicas para el garodo en la region central Argentina. La Planta V. Nacional, Facultad de Agronomia, Revista 31: 133-336, December 1955.
2. Kingsbury, J. M. Poisonous Plants of the United States and Canada. Englewood Cliffs, N.J., Prentice-Hall, 626 pp., 1964.
3. Hurst, E. The Poisonous Plants of New South Wales. Sydney, 498 pp., 1942.
4. Uphof, J. C. Ta. Dictionary of Economic Plants. Verlag Von J. Cramer, Lehre, Germany, 591 pp., 1963 (second edition).
5. Cabrera, A. L. Flora Pantagonia (VII) Compositae. Buenos Aires, 5-96.
6. Lindley, J. and T. Moore. The Treasury of Botany. Longmans, Green and Co., London, Vol. 1: 114-115, 1899.
7. Martinez, M. Las Plantas Medicinales de Mexico. Ediciones Botas-Mexico, 656 pp., Quinta edicion, 1969.
8. Hartwell, J. L. Plants Used Against Cancer. A Survey. Lloydia 30(4): 379-436, 1967 and ten additional installments ending with 34(4): 386-437, 1971.

TABLE 3. Review of Nomenclature in Species of Baccharis
Screened for Antitumor Activity

<u>Species</u>	<u>Reference No.</u>
<u>Baccharis angustifolia</u> Michx	5,8
<u>B. anomala</u> DC.	6,8
<u>B. artemisioides</u> Hook. & Arn.	3
<u>B. articulata</u> (Lam.) Pers.	6,8
<u>B. axillaris</u> DC.	6,8
<u>B. braunii</u> (Polak) Standley = <u>B. pedunculata</u> (Miller) Cabrera	1
<u>B. calvescens</u> DC.	6,8
<u>B. cassinefolia</u> DC.	8
<u>B. concava</u> Pers.	8
<u>B. confertifolia</u> DC.	8
<u>B. curitybensis</u> Heering ex Malme	6,8
<u>B. discolor</u> Bak.	8
<u>B. dracunulifolia</u> DC.	4,6,8
<u>B. elaeagnoides</u> Steud. ex Sch.Bip.	6
<u>B. emoryi</u> Gray	7,8
<u>B. genistilloides</u> (Lam.) Pers.	3
<u>B. gibertii</u> Baker	8
<u>B. glomeruliflora</u> Pers.	5,8
<u>B. glutinosa</u> Pers. = <u>B. salicifolia</u> (Ruiz & Pav.) Pers.	1
<u>B. gnaphalioides</u> Spreng.	8
<u>B. halimifolia</u> L.	2,3,5,8
<u>B. halimimorpha</u> DC.	8
<u>B. helichrysoides</u> DC.	6,8
<u>B. heterophylla</u> H.B.K.	8
<u>B. linearis</u> (Ruiz. & Pav.) Pers.	3
<u>B. magellanica</u> (Lam.) Pers. = <u>B. truncuneata</u> (L.f.) Pers. var. <u>magellanica</u> (Lam.) Cuatr.	1
<u>B. megapotamica</u> Spreng. var. <u>megapotamica</u>	4,6
<u>B. medulosa</u> DC.	8
(<u>B. melastomefolia</u> Hook. & Arn.) = <u>B. punctulata</u> DC.	8
<u>B. myricaefolia</u> DC.	6,8
<u>B. nivalis</u> (Wedd.) Sch.Bip. ex Philippi	3
<u>B. notoserquilla</u> Griseb.	8
<u>B. ochracea</u> Spreng.	8
<u>B. paniculata</u> DC.	8
<u>B. patagonica</u> Hook. & Arn.	3
<u>B. pedicillata</u> DC.	8
<u>B. pedunculata</u> (Miller) Cabrera	2
<u>B. pilularis</u> DC.	7
<u>B. pilularis</u> DC. ssp. <u>consanguinea</u> (DC.) C.B.Wolf	7
<u>B. pinnatigra</u> ?	none

<u>Species</u>	<u>Reference No.</u>
<u>B. plummerae</u> Gray	7
<u>B. pteronioides</u> DC.	9
<u>B. racemosa</u> (Ruiz. & Pav.) DC.	3
<u>B. reticularia</u> DC.	8
<u>B. retusa</u> DC.	8
<u>B. rhomboidalis</u> Remy	3
<u>B. rufescens</u> Spreng.	3
<u>B. sagittalis</u> (Less.) DC.	3
<u>B. salicifolia</u> (Ruiz. & Pav.) Pers.	1,2,3
<u>B. salacina</u> T. & G.	10
<u>B. salzmannii</u> DC.	8
<u>B. sarothroides</u> Gray	7,9
<u>B. schultzii</u> Bak.	8
<u>B. semiserrata</u> DC.	8
<u>B. sergiloides</u> Gray	7,9
<u>B. sphaerocephala</u> Hook. & Arn.	8
<u>B. spicata</u> Hieron	4,6,8
<u>B. stenocephala</u> Bak.	6,8
<u>B. subopposita</u> DC.	6,8
<u>B. subspathulata</u> Gardn.	8
<u>B. teleaguinoides</u> ?	none
<u>B. thesioides</u> H.B.K.	8,9
<u>B. tricuneata</u> (L.f.) Pers.	2
<u>B. tridentata</u> Vahl	8
<u>B. trimera</u> (Less.) DC.	3,6
<u>B. trinerva</u> ?	none
<u>B. trinervis</u> Pers.	8
<u>B. umbelliformis</u> DC.	
= <u>B. obovata</u> Hook. & Arn.	3
<u>B. uncinella</u> DC.	6,8
<u>B. vaccinoides</u> H.B.K.	8
<u>B. vauthieri</u> DC.	8
<u>B. vernonioides</u> DC.	8
<u>B. viminea</u> DC.	7,9
* <u>B. weirii</u> Bak.	4,6

* Status likely to be changed: B. megapotamica Spreng. var. weirii

Addendum

<u>B. coridifolia</u> DC.	6,8
---------------------------	-----

1. Cuatrecasas, J. 1968. Notas Adicionales, Taxonomicas Y Corologicas, Sobre Baccharis. Revista de la Acad. Colombiana De Ciencias Exactas Fisicas Y Naturales. Vol. 13(50): 201-226.
2. _____. 1969. Prima Flora Colombiana (Compositae - Asterae). Webbia, Vol. 24(1): 2-299.
3. Cabrera, A. L. 1971. Flora Patagonica (VII) Compositae, pp. 5-96. Buenos Aires.
4. Barrosa, G. M. 1973 (Thesis - unpublished) Baccharidinae do Brazil. (Copy at Smithsonian - Jose Cuatrecasas).
5. Long, R. W. and O. Lakela. 1971. A Flora of Tropical Florida. University of Miami Press, pp. 850-51.
6. Angely, Joa. 1965. Flora Analitica Do Parana. Impresso nos Estudos Unidos do Brazil, pp. 675-680.
7. Munz, P. A. 1965. California Flora. University of California Press, Berkeley and Los Angeles, pp. 1225-1227.
8. Index Kewensis
9. Kearney, T. H. and R. H. Peebles. 1969. Arizona Flora. University of California Press, Berkeley and Los Angeles, pp. 882-884.
10. Correll, D. S. and H. B. Correll. 1975. Aquatic and Wetland Plants of Southwestern United States. Stanford University Press. Vol. 2, p. 1607.

TABLE 4. List of Corrections for some Species
in the Genus Baccharis

<u>Previous Listing</u>		<u>Correction</u>
<u>Baccharis braunii</u>	B-603831 B-603832	<u>B. pedunculata</u> (Miller) Cabrera
<u>B. cordifolia</u> L.	B-614363	<u>B. coridifolia</u> DC.
<u>B. cordifolia</u> DC.	PR-7963; B-613839	<u>B. coridifolia</u> DC.
<u>B. glutinosa</u> Pers.	B-624822 B-070271 B-601173 PR-2825; B-655411	<u>B. salicifolia</u> (Ruiz. & Pav.) Per
<u>B. umbelliformis</u> DC.	B-673440	<u>B. obovata</u> Hook. & Arn.
<u>B. magellanica</u> (Lam.) Pers.	B-668335	<u>B. tricuneata</u> (L.f.) Pers. var. <u>magellanica</u> (Lam.) Cuatr.:
<u>Baccharis vaccinoides</u> H.B.K.	B-641837	<u>Baccharis vaccinoides</u> H.B.K.
<u>Baccharis nivalis</u> SCH. BIP.	B-673436	<u>Baccharis nivalis</u> Sch. Bip.