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RUBUS PARVIFOLIUS (ROSACEAE), NATURALIZED IN ILLINOIS AND IOWA¹

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INTRODUCTION

While travelling to and from work, the senior author noted a vigorous bramble covering about a 20-meter section of hillside along a road bordering the North Central Regional Plant Introduction Station farm, southwest of Ames, Iowa. Upon closer examination, the bramble seemed to be significantly different from those species described in floras of surrounding states (Great Plains Flora Association 1986, Mohlenbrock 1986, Steyermark 1963). This plant was identified as *Rubus parvifolius* L. (= *R. triphyllus* Thunb., non *R. parvifolius* Walter), the trailing raspberry, using Rehder's (1940) key.

The senior author initially suspected that this species had merely been persisting near the Plant Introduction Station after cultivation, but then he noticed the same bramble in other locations around Ames, where the plant was naturally reproducing and clearly not under cultivation. This species' vigorous growth (at one site it covers over 1000 square meters of thin woodland understory) and its production of fruits attractive to birds suggest that the plant is now well established and should be considered a member of the local flora.

The discovery of *R. parvifolius* in Iowa, along with its absence from nearly all North American floristic manuals, prompted this work.

HISTORICAL ACCOUNT

Previous reports of *R. parvifolius* escaping from cultivation in North America are limited to a few records from the Boston, Massachusetts area. Rich (1908) reported the phenomenon first, finding *R. parvifolius* on "Back Bay lands" in 1907 (*W. P. Rich s.n.*, 26 Jun 1907, A²) and taking it to Alfred

¹Journal Paper No. J-14243 of the Iowa Agriculture and Home Economics Experiment Station, Ames, Iowa. Project No. 1018.

²The abbreviations for herbarium names follow Holmgren et al. (1990).

Rehder of the Arnold Arboretum for identification. In a later report of the same collection, Knowlton and Deane (1918) provided a clue to the source of the plant: "a native of Japan, escaped from Fenway." Fernald (1950) mentioned the synonymous *R. triphyllus* in his *Rubus* treatment, noting that it "has appeared in vacant lots in Boston, Mass.," but did not include it in his key.

Specimens at BH indicate that *R. parvifolius* has been cultivated at the Arnold Arboretum since at least 1915 (*L.V. Schmidt s.n.*, 3 Nov 1915, BH). In at least one instance, this bramble escaped cultivation there, for E.J. Palmer commented that the plant was "escaped and well established" on a slope in 1948 (*Palmer 48417*, BH).

Commercial interest in this species in the U.S. began in 1929 with the collection of seed in Japan by P.H. Dorsett and W.J. Morse of the Division of Plant Exploration and Introduction of the U.S. Department of Agriculture (USDA) and with subsequent horticultural studies by Williams and Darrow (1940) in Maryland and North Carolina. These researchers noted that the species was both resistant to a number of common diseases infecting the related bramble *Rubus idaeus* L., red raspberry, and that it had a large berry of "fair quality." Attempts were then made to use this species as a means of improving the disease resistance of cultivated red raspberries in breeding programs (Darrow 1937) and, more directly, as a parent in new hybrid fruit cultivars (Williams & Darrow 1940). *Rubus parvifolius* has since been used sporadically to breed red raspberries for warm climates (Jennings 1988).

In 1938, the Soil Conservation Service (SCS) of the USDA established a cooperative research program with a number of state agricultural experiment stations, including Iowa's, to improve the management of agricultural production on sloping lands (Bennett 1938). In the late 1930s, a Hill Culture Research Station was established southwest of Ames, Iowa by the SCS, in cooperation with the Iowa Agriculture and Home Economics Experiment Station. It was used until 1947 by the SCS to study plants that control soil erosion and to develop new cropping systems. The site was then transferred to the newly-formed North Central Regional Plant Introduction Station.

To date, there is no direct evidence that the Hill Culture Research Station in Iowa cultivated *R. parvifolius*. However, the 1946 Annual Reports of the Department of Agriculture (Bennett 1946) noted that research was under way by the Hillculture Research Division on the cultivation of cane fruits, which probably included *Rubus*, on eroded lands in Iowa. Williams and Darrow (1940) noted that *R. parvifolius* has a growth habit making it especially well-suited to covering eroded banks, and it is plausible that the Hill Culture Research Station was working with this species. A search of all accession records of the North Central Regional Plant Introduction Station provided no evidence that *R. parvifolius* had ever been cultivated at the Station, so its presence in the area most likely dates to before 1947.

Another potential source for the introduction of *R. parvifolius* to Ames was the *Rubus* breeding program of T.J. Maney at Iowa State College (now University). Maney (1945) reported growing hybrids between *R. parvifolius*

and red raspberry, but it is not known whether he ever grew *R. parvifolius* in the field.

If the Hill Culture Research Station in Iowa was cultivating *R. parvifolius*, it is also possible that other SCS programs were working with this plant in the 1940s. One region that received a great deal of attention by the SCS at that time was an area of highly erodible, sandy soils along the Illinois River (Keith Van De Velde, pers. comm.). Mason County, Illinois, which includes large expanses of such soils, is the only other midwestern county where *R. parvifolius* has been collected away from cultivation.

KNOWN COLLECTIONS IN ILLINOIS AND IOWA AND CURRENT STATUS

Illinois

Naturalized populations of *R. parvifolius* were first collected in the midwestern U.S. by R.T. Rexroat on 31 May 1959, in Mason County, Illinois, southwest of the village of Bath along the edge of a woods (*Rexroat 5755*, BH and *5756*, ISM). Later in 1959, he located a second population growing on sandy soil on the edge of a woods west of the village of Saidora, also in Mason County. He made many collections at this site between 1959 and 1969 (representatives include *Rexroat 9375*, BH and *5891*, ISM). In 1961, a third population was discovered northeast of Saidora, where collections were made between 1961 and 1969 (representatives include *Rexroat 7503* and *10750*, ISM).

In June, 1990, the senior author spent two days in Mason County in an unsuccessful attempt to relocate these populations. Personnel from the Mason County Soil and Water Conservation District, the SCS, and the Illinois Natural History Survey are continuing the search.

Rexroat's widow donated his field collection notes to the herbarium at Western Illinois University (MWI) (R.D. Henry, pers. comm.). The senior author contacted R.D. Henry, curator of MWI, after the unsuccessful search, to see if Rexroat's original notes might be helpful in pinpointing the collection sites.

Henry was acquainted with Rexroat and accompanied him into the field before his death in 1979. (An obituary of Rexroat describes many aspects of this amateur naturalist's interesting life [Henry 1979]). Henry has searched Rexroat's field notes and interviewed some of his field companions at our request, but has not yet uncovered useful information to pinpoint *R. parvifolius* collection sites.

Henry was aware, however, that Rexroat had discovered an unusual bramble. Rexroat transplanted *R. parvifolius* from Mason County to his home in Virginia, Illinois, and he gave Henry a cutting from the planting at his home along with an explanation of this plant's rarity. Although we have not been able to relocate this species in Mason County, plants originating from one of Rexroat's populations are thriving on the campus of Western Illinois University in Macomb (*Henry & Scott 6036*, MWI).

Iowa

On 1 June 1988, *R. parvifolius* was collected from populations growing in Story County, Iowa. Three populations in the vicinity of Ames were sampled during the summer of 1988.

STORY CO.: An east-facing bank along State Avenue S of Mortensen Road, NE1/4 of SE1/4 of SE1/4 of Sec. 8, T83N, R24W, *Widrechner 169* (ISC) and *181* (BH, ISC, MICH); along the S edge of the Chicago & Northwestern Railway right-of-way, N of 4109 and 4115 Toronto Street, W edge of SE1/4 of SW1/4 of Sec. 32, T84N, R24W, *Widrechner 170*, (ISC) and *182* (ISC, MICH); and an open, mixed deciduous forest on a north-facing slope in Reactor Woods, SE1/4 of NE1/4 of Sec. 32, T84N, R24W, *Widrechner 171* (ISC, MICH) and *183* (BH, ISC).

A fourth population was found in 1989 in a disturbed woodland on the edge of the Iowa State University campus.

STORY CO.: 25 meters E of the intersection of Pammel Drive and Hyland Avenue, SE1/4 of NW1/4 of Sec. 4, T83N, R24W, *Widrechner 273* (ISC).

Additional collections from Story County are deposited at CM, MIL, and MO.

DIAGNOSTIC FEATURES AND KEY

Features of the flowers and fruits clearly place *R. parvifolius* (Fig. 1) in the subgenus *Idaeobatus*. In leaf, flower, and fruit characteristics, it is so unlike any of the native, trailing members of subgenus *Eubatus* that this treatment will compare *R. parvifolius* only to other species of the subgenus *Idaeobatus* found native or naturalized in the midwestern U.S. and to *R. odoratus* L.

Table 1 lists important morphological features that can be used to distinguish *R. parvifolius* from the native raspberries, *R. occidentalis* L. and *R. strigosus* Michaux, and from the introduced species found in the region, *R. idaeus* and *R. phoenicolasius* Maxim. Data for this table were collected from living material and from herbarium collections at ISC.

In any season, the most obvious characteristic that can be used to distinguish *R. parvifolius* is its habit. It grows in a mounding tangle unlike any of the other *Idaeobati*. The rose-pink petals and glossy, bright red fruits are readily obvious characteristics at certain times. In Iowa, flowering occurs from late May to early June, and fruits ripen from late June into July.

There is another species of *Rubus* with rose-pink petals and red fruits that is native to the midwestern U.S. It is *R. odoratus*, a member of the subgenus *Anaplobatus*. This bramble has upright, unarmed canes, simple leaves, and large, showy flowers and in these respects is quite different from *R. parvifolius*.

The following key may be used to distinguish *R. parvifolius* from *R. odoratus* and from species of subgenus *Idaeobatus* described in Table 1.

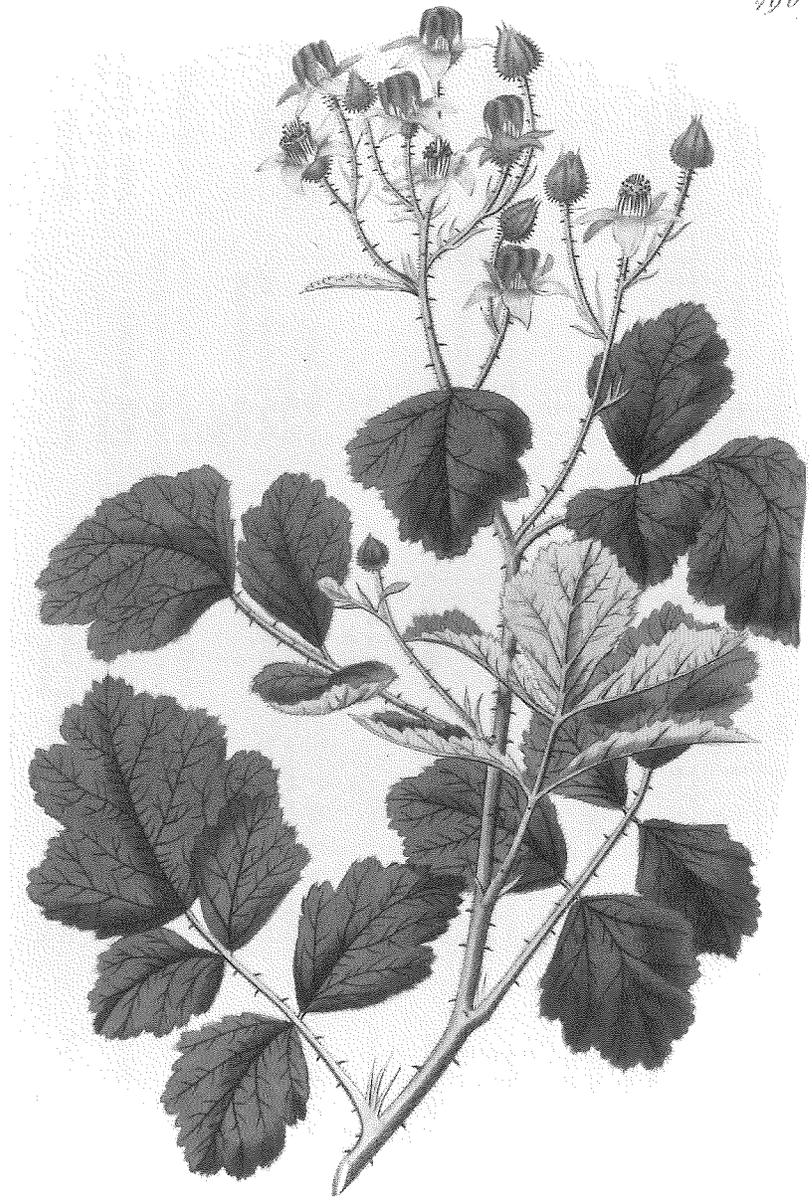


FIGURE 1. *Rubus parvifolius* from Plate 496 in Ker-Gawler (1820).

Table 1. Comparison of key characteristics of *Rubus parvifolius* and other members of Subgenus *Idaeobatus*.

Characteristic	<i>R. parvifolius</i>	<i>R. idaeus</i>	<i>R. occidentalis</i>	<i>R. phoenicolasius</i>	<i>R. strigosus</i>
1. Habit	decumbent, tip-rooting and occasionally rooting at other nodes	erect, not tip-rooting	arching, tip-rooting	long-arching, tip-rooting	erect to arching, not tip-rooting
2. Primocane color	green to purple-green, reddish-brown in winter	light green, tawny or light purple	green to purple, purple in winter, often glaucous	dark purple	light green, tawny or light purple
3. Primocane armature	slender prickles	none, or with slender to broad-based prickles	broad-based prickles	densely covered with purple stipitate glands and occasional prickles	stiff bristles and stipitate glands
4. Leaf persistence	may persist until mid-winter	deciduous	deciduous	deciduous	deciduous
5. Primocane leaf type	ternate or quinate, pinnate	ternate or quinate, pinnate	ternate or quinate, digitate	ternate	ternate or quinate, pinnate
6. Primocane central leaflet shape	obovate to broadly subrhombic, obtuse tip, cuneate base	ovate to elliptic, sometimes three-lobed, acuminate tip, cordate base	ovate to elliptic, acuminate tip, cordate to truncate base	broadly ovate, abruptly short-acuminate tip, cordate to rounded base	ovate to elliptic, sometimes three-lobed, acuminate tip, cordate base
7. Pedicel armature	slender prickles	slender prickles	slender to broad-based prickles	densely covered with purple stipitate glands	stipitate glands
8. Petal color and shape	rose-pink, spatulate	white to green-white, spatulate to obovate	white, narrowly obovate	white, narrowly obovate	white to green-white, spatulate to obovate
9. Mature fruit color	bright, glossy red	purple-red, rarely yellow	purple-black, rarely amber	cherry red	purple-red

FIELD KEY TO *RUBUS ODORATUS* AND SPECIES OF *RUBUS*
SUBG. *IDAEOBATUS* NATIVE OR INTRODUCED TO THE
MIDWESTERN UNITED STATES

1. Leaves simple; canes unarmed with exfoliating bark *R. odoratus*
1. Leaves compound; canes usually armed (except in some forms of *R. idaeus*) without exfoliating bark
 2. Canes erect or arching, not rooting at tips
 3. Primocanes with stiff bristles and stipitate glands . . *R. strigosus*
 3. Primocanes lacking stipitate glands *R. idaeus*
 2. Canes arching to decumbent, rooting at tips
 4. Primocanes densely covered with purple stipitate glands
. . . . *R. phoenicolasius*
 4. Primocanes lacking stipitate glands
 5. Primocanes purple in winter, often glaucous; primocane central leaflet ovate to elliptic, with an acuminate tip and a cordate to truncate base *R. occidentalis*
 5. Primocane reddish-brown in winter, not glaucous; primocane central leaflet obovate to broadly subrhombic with an obtuse tip and a cuneate base *R. parvifolius*

SUMMARY

Rubus parvifolius is a previously unremarked member of the flora of the midwestern U.S. It may have been introduced to the region by the SCS. It is possible that it occurs more widely in the region and might be expected to occur in areas of high erosion or near old SCS research sites. This report presents a table of characteristics and a key that can be used to distinguish this species from related brambles in the field.

The authors would be interested to learn of other occurrences of this species in the midwestern flora.

ACKNOWLEDGMENTS

Many individuals have assisted us in the search for information about *Rubus parvifolius*. We are especially grateful for help given by Douglas Helms, Bob Henry, Kim Hummer, Deborah Lewis, and the staff of the SCS office in Mason County, Illinois. We also wish to thank the curators of A, BH, and ISM for providing loans of *R. parvifolius*; the curators of BH, BUT, COLO, IND, MO, NA, WIS, and WTU for hospitality during visits; the curators of F, GH, ILLS, MO, NCSC, NY, SMU, UBC, UC, and US for searching their collections; and to Neil Harriman, Deborah Lewis, Gail Nonnecke, Richard Pohl, Ken Robertson, and an anonymous reviewer for their useful critiques of this report.

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REVIEW

BOTANY FOR GARDENERS. By Brian Capon. Timber Press, Inc., 9999 S.W. Wilshire, Portland, OR 97225. 1990. 220 pp. \$29.95.

The title of this attractively produced, compact volume implies that its content differs from that of an introductory botany textbook, which is the alternative source for a gardener interested in learning basic botanical science. One would expect such a book to relate sound gardening practice directly to its underlying botanical theory, i.e. botany should provide the "why" for the "how" of gardening. However, this is not the case. For example, seed germination requirements are discussed in some detail but not in the context of methods a skilled gardener uses to get seed of uncommon plants to germinate. The discussion of mineral nutrition does not relate to practical matters of choosing, quantifying, and applying fertilizers; there is no mention of the biology of composting. Nor does the section on plant classification deal more specifically with problems the gardener may face in identifying plants in his collection. Rather, *Botany for Gardeners* is essentially an introductory botany text which crams the subject matter ordinarily requiring 300 to 400 pages into 220 pages. This is not to say that the book is poorly written or the content uninteresting. The challenge for the reader is to assimilate the mass of facts and concepts densely packed on each page. One would hope that the interested gardener will be sufficiently motivated to expend the effort that will be required.

The organization of subject matter in this presentation does not seem entirely logical. The topic of adaptation would be more appropriately discussed following the sections on function, flowers and fruits, and reproduction. Genetics, which today is central to all biology, is deferred until the last