

THE GOLDENRODS OF SOUTH DAKOTA

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Solidagos, or goldenrods, furnish a basis for much discussion in botanical circles, owing to their innate complexity and the difficulty experienced in laying lines of differentiation for the various species.

The sixteen species of goldenrod found in South Dakota may be divided into three distinct classes using leaf veining as the superior taxonomic character, and leaf-surface, leaf-shape, and flower-head-arrangement as secondary factors.

The first division includes the species *S. flexicaulis*, which has very broad leaves with coarse, uneven teeth, but they are not 3-ribbed. The leaf petioles are margined and the heads are in axillary clusters. This species is scattered throughout the entire eastern part of South Dakota and is found to remain constant and true to type, whether growing in a mesophytic or a xerophytic environment. No natural conditions appear to change the shape of the broadly ovate leaves, with their characteristically ragged, uneven teeth. Neither are the small, axillary clusters of the inflorescence altered to such a degree that identification is difficult.

The second, or distinctly 3-ribbed leaf classification, has a broader scope and includes eight species grouped according to the inferior taxonomic factors of surface and shape of leaves, together with the arrangement of the flower-heads on the branches of the panicle. *S. glaberrima*, *S. elongata*, *S. missouriensis*, and *S. Serotina* rest within the glabrous, or smooth-leaved division. Both *S. glaberrima* and *S. elongata* have long, linear, lance-shaped leaves, with margined petioles, but the flower-heads of the former have a second, or one-sided arrangement on the branches of the panicle, while *S. elongata* has the flower-heads loosely clustered on long, erect, axillary branches of the panicle. *S. glaberrima* is scattered generously over the entire state, while *S. elongata* flourishes in the semi-xerophytic western portion of the state. In spite of the similarity of the leaves the two species are found to

remain constant owing to the distinctive type of the inflorescence in each case. However remotely removed the plants may be from their native habitat, the second arrangement of the heads on the delicately slender panicle-branches of *S. glaberrima* are never found to approach the coarse, stiffly-erect flat-topped inflorescence of *S. elongata*. *S. missouriensis* is distinguished by linear, lance-shaped leaves, which become very narrow and acute, or pointed, on the upper stems, while the flower-heads are, for the most part, secund on the panicle branches. This species, with its slender, reddish stems, is found to remain true to type, no matter how variable the degree of nutriment and moisture. The semi-folded upper leaves, together with the characteristic flower-cluster — partly secund and partly plummy — are unailing distinguishing factors. These plants are indigenous to the entire state. *S. serotina* is distinguished by its oblong, lance-shaped leaves with coarse ragged teeth. The large heads of this species are arranged on long, loose, nodding branches of the panicle. This species, which is scattered quite generously over the entire state, is found to remain constant under any and all conditions, although its leaves are very similar in shape to those of *S. canadensis*, which has grown in moist, nutritious soil. Under no conditions are the leaves of *S. serotina* found to become puberulent, or hairy. Neither are the leaves of *S. canadensis* found to become glabrous, or smooth. *S. serotina* has a loose, fluffy panicle of large heads, whereas *S. canadensis* is characterized by a densely secund arrangement of the small heads on the branches of the panicle. *S. canadensis* and *S. gilvocanescens* fall within the classification characterized by leaves covered with minute hairs throughout. *S. canadensis* has broadly linear, lance-shaped leaves with teeth of varying size, while the flower-heads are definitely not secund, but cluster closely about the branches of the panicle. This species is scattered throughout the state, thriving especially well along creek and ditch banks. *S. gilvocanescens* has narrowly linear, lance-shaped leaves with small, depressed teeth, which are very inconspicuous, and the flower-heads are very small and hug the panicle-branches closely. *S. gilvocanescens* resembles *S. canadensis*

so closely that Coulter and Nelson, Asa Gray, and Ivar Tidestrom have determined it as a variety of *S. canadensis*. Under normal growing conditions, size is the chief determining factor. However, *S. canadensis*, grown on hot, dry hillsides or sandbars, and *S. gilvocanescens*, grown in the nutritious, moist soil of ditch banks, are difficult to classify, because *S. canadensis* becomes so small and *S. gilvocanescens* becomes so large, that they resemble each other in size. *S. altissima* and *S. mollis* both belong to the classification having leaves covered with fine hairs on one side only, or very sparingly hairy on the upper surface and densely hairy below. *S. altissima* has broadly lance-shaped to oval leaves, which are rather small, while the flower-heads are distinctly secund, or one-sided, on the branches of the panicle. A close examination of the leaves of *S. altissima* and of *S. gilvocanescens* reveal the fact that the upper surface of those of *S. altissima* is very sparingly pubescent; whereas that of *S. gilvocanescens* is densely puberulent. Otherwise the plants are so similar that there is difficulty in determining the proper classification. There is never a shadow of a doubt concerning the species, *S. mollis*, whatever the growing conditions may be. Its characteristically ovate to spatulate leaves, with their rounded tips and inconspicuous teeth, are found to remain true to type, no matter how diminutive or how large the plants become in varying environments.

The third, or feather-veined leaf classification, includes seven species. In this division the secondary veins of the leaves arise from a midrib. *S. pulcherrima* and *S. nemoralis* both have leaves covered with fine hairs. The one outstanding difference between these two species is the size of the heads *S. pulcherrima* having the larger heads. Some authors accord *S. pudcherrima* a distinct species based on minor differences found in the vegetative parts of the plants, while others treat the two species synonymously. *S. erecta*, *S. rigidiuscula*, *S. pallida*, and *S. speciosa* have smooth leaves throughout, with a definitely spike-like inflorescence. *S. erecta* has narrowly spatulate leaves without hairy margins, while *S. rigidiuscula* has leaves with hairy margins. The flower-cluster of *S. rigidiuscula* occupies a third more stem space than does that of

S. erecta and is more definitely pyramidal in shape. The leaves of *S. erecta* are larger than those of *S. rigidiuscula* and taper sharply toward the apex. *S. pallida* has broadly spatulate leaves, which are entire, or without teeth. *S. speciosa* has leaves with fine, depressed teeth. *S. pallida* and *S. speciosa* present an altogether different phase of the spike-shaped flower-cluster classification. The most outstanding difference between these two species is the paleness of *S. pallida*. *S. pallida* has a very leafy flower-cluster, whereas that of *S. speciosa* is practically devoid of leaves. *S. rigida* has leaves, which are densely hairy through with coarse hairs. Extremely large flower-heads make up the stiff, loosely assembled inflorescence, which is definitely flat-topped. The entire plant is characterized by extreme rigidity and coarseness and is definitely bristly in every respect.

Empirical data concerning minor taxonomic characters furnish ample material for the botanist, in case fine lines become necessary in order to limit a plant to its proper classification. However, these minor differences have no place in this general survey of the goldenrods of South Dakota.