

Notes on the Distribution of the Leguminosae in Indiana

WILLIAM G. GAMBILL, JR., Wabash College

Introduction

In Indiana the Leguminosae represent between four and five percent of the total number of native and naturalized vascular plants. This family with its thirty-two genera and eighty-odd species is fourth in size in the state, being surpassed in the number of species only by the Compositae, Cyperaceae and Gramineae. Here, as elsewhere, the leguminous plants are a conspicuous and often striking element of the vascular flora, and include some of our best known trees, shrubs, and herbs.

The purposes of this paper are (1) to point out the principal patterns of geographical distribution of eighty-seven species of Leguminosae growing spontaneously in Indiana; and (2) to briefly analyze the affinities of the leguminous flora of this state with that of adjacent floristic areas or of other parts of the world.

Data on the distribution in Indiana of the plants discussed herein is based on the treatment of the Leguminosae by Deam (2), and on additional facts contained in the Indiana Plant Distribution Records (3). Works by Braun (1), Fassett (4), Fernald (5), Fox (6), Gambill (7), Jones (8), and Schaffner (9) have been used as sources of reference on distribution of the leguminous species under consideration outside of Indiana. Nomenclature is in most instances that adopted by Deam. When other binomials are considered to be the valid ones, names used by Deam follow in parentheses.

Geographical Distribution and Floristic Affinities

From the standpoint of their patterns of geographical distribution within the state, the Leguminosae fall into roughly six main groups: (1) Species which range generally throughout the state; (2) species found in northern and southern Indiana, but conspicuously lacking in the central part of the state; (3) species occurring only in the northern counties; (4) species found chiefly in both western and northern Indiana; (5) species distributed over the southern third of the state; and (6) species restricted to the extreme southern counties of the state.

A multiplicity of interacting climatic, physiographic and biotic factors express themselves in the creation of many kinds of habitats in the state. The greatly varying combinations of growing conditions provided by these habitats have made it possible for leguminous plants with considerably diversified floristic affinities to become established in Indiana. Therefore, any study of the patterns of geographic distribution of this group of plants leads naturally to a consideration of the floristic affinities of the species comprising the group.

An attempt is made here to indicate the floristic relationships of the species of Leguminosae by grouping them according to the geographical areas in which they are most abundant, or of which they are most characteristic. The following floristic areas are recognized in this study as being represented in the leguminous flora of Indiana. The letters designating each area later in the paper are indicated in parentheses: (1) southeastern woodland plants (SEW), occurring in the wooded areas of eastern and southeastern United States; (2) coastal plain plants (CP), occurring most abundantly in the coastal plain areas of the south Atlantic and Gulf states and the valleys of the Mississippi River and its tributaries; (3) northern plants (N), found most abundantly in northern United States and Canada; (4) prairie plants (P), occurring most commonly in the prairie areas of Illinois, Wisconsin, Minnesota, the Dakotas, Nebraska, Kansas, Iowa, Missouri, Arkansas, Oklahoma and Texas; (5) plants introduced from Eurasia (EUR); (6) plants introduced from the American tropics (TR); and (7) endemic plants (END), or those originally described from Indiana and distributed chiefly within the boundaries of the state.

In the following sections of this paper are listed the plants characterized by the geographical patterns of distribution described above, with the indication of the principal floristic affinity of each.

Species Distributed Generally throughout the State

- Cercis canadensis* L.—SEW
Cassia fasciculata Michx.—SEW, P
Cassia hebecarpa Fern.—SEW
Gleditsia triacanthos L.—SEW
Gymnocladus dioica (L.) K. Koch.—SEW
Baptisia leucantha T. & G.—P
Medicago sativa L.—EUR
Medicago lupulina L.—EUR
Melilotus alba Desr.—EUR
Melilotus officinalis (L.) Lam.—EUR
Trifolium pratense L.—EUR
Trifolium repens L.—EUR
Trifolium hybridum L.—EUR
Trifolium procumbens L.—EUR
Trifolium agrarium L.—EUR
Psoralea onobrychis Nutt.—P
Tephrosia virginiana (L.) Pers.—SEW
Robinia pseudoacacia L.—SEW
Desmodium nudiflorum (L.) DC.—SEW
Desmodium glutinosum (Muhl.) Wood—SEW
 [*D. acuminatum* (Michx.) DC.]
Desmodium canescens (L.) DC.—SEW
Desmodium cuspidatum (Muhl.) Loud.—SEW
 [*D. bracteosum* (Michx.) DC.]
Desmodium canadense (L.) DC.—SEW, P

- Desmodium paniculatum* (L.) DC.—SEW
Desmodium dillenii Darl.—SEW
Vicia villosa Roth—EUR
Vicia caroliniana Walt.—SEW
Amphicarpa bracteata (L.) Fern.—SEW
Apios americana Medic.—SEW
Strophostyles helvola (L.) Britt.—CP

In this group have been included those plants which range from the northern to the southern boundaries, and from east to west within the state. These species are not always found in every county, although some of them are, and are not necessarily abundant in numbers. In fact, some of them are found quite infrequently. Most of these are species which can adapt themselves to a fairly wide range of growing conditions. It will be noted that the majority of these are plants characteristic of the eastern and southeastern woodlands. In Indiana many of these are approaching the northern and western limits of their distribution in the United States. Ten of these are naturalized species, originally introduced from Eurasia. For the most part they are very abundant and widespread, behaving as weeds.

Species Occurring in both Northern and Southern Indiana

- Cassia nictitans* L.—SEW
Trifolium arvense L.—EUR
Psoralea psoralioides var. *eglandulosa* (Ell.) F. L. Freeman—SEW
Astragalus canadensis L.—P, N, SEW
Desmodium rotundifolium DC.—SEW
Desmodium marilandicum (L.) DC.—SEW
Desmodium ciliare (Muhl.) DC.—SEW
Desmodium rigidum (Ell.) DC.—SEW
Lathyrus palustris var. *myrtifolius* (Muhl.) Gray—N

This group includes those species which may be found in both the lake area of northern Indiana and the unglaciated and hilly regions of the southern part of the state. They are conspicuously rare or absent in the fertile soil of the prairie and till plain areas in central Indiana. *L. palustris* var. *myrtifolius* is a more northern plant which is close to its southerly limit in southern Indiana. The species indicated by SEW are at the northern limit of their distribution in northern Indiana.

Species Occurring only in Northern Indiana

- Baptisia tinctoria* var. *crebra* Fern.—SEW
Lupinus perennis L.—SEW, N
Trifolium dubium Sibth.—EUR
Vicia americana Muhl.—N
Lathyrus ochroleucus Hook.—N
Lathyrus maritimus (L.) Bigel.—N
 [*L. japonicus* var. *glaber* Fern.]

Lathyrus venosus var. *intonsus* Butters & St. John—N
Lathyrus palustris var. *linearifolius* Ser.—N

Of the two species listed as southeastern plants in this group, *Baptisia tinctoria* var. *crebra* is near the northern limit of its distribution; the range of *Lupinus perennis* extends farther north from Indiana into Wisconsin and Minnesota, as well as into northern New England. The latter species has, therefore, a distribution which would make possible the inclusion of it as a northern plant. With the exception of *Trifolium dubium*, introduced from Eurasia and having a very limited distribution in Indiana, the others of this group of plants are distinctly northern and western in their distribution. *Vicia americana* occurs not only in the northern states and southern Canada, but is widely distributed through the western and southwestern states. The latter species and *Lathyrus ochroleucus*, *L. maritimus*, and *L. palustris* var. *linearifolius* are wide-ranging, extending from the Atlantic to the Pacific coasts in the northern United States and Canada.

Species Occurring in Northern and Western Indiana

Baptisia leucophaea Nutt.—P
Psoralea tenuiflora Pursh—P
Amorpha canescens Nutt.—P.
Dalea alopecuroides Willd.—P
Petalostemum purpureum (Vent.) Rydb.—P
Petalostemum candidum (Willd.) Michx.—P
Desmodium sessilifolium (Torr.) T. & G.—SEW, P
Desmodium illinoense Gray—P
Lespedeza capitata Michx.—P, SEW

All members of this group can be considered as prairie species, and they occur in the parts of Indiana where there are prairie habitats. With the exception of *Desmodium sessilifolium* and *Lespedeza capitata* they are all more abundant to the west and south of Indiana than they are east of it. *Petalostemum purpureum*, *P. candidum*, and *Desmodium illinoense* reach the eastern limit of their distribution in Indiana.

Species Occurring in the Southern Third of Indiana

Desmanthus illinoensis (Michx.) MacM.—P
Cassia marilandica L.—SEW
Cladrastis lutea (Michx. f.) Koch—SEW
Desmodium pauciflorum (Nutt.) DC.—SEW
Desmodium laevigatum (Nutt.) DC.—SEW
Desmodium viridiflorum (L.) Beck—SEW
Lespedeza striata (Thunb.) H. & A.—EUR
Lespedeza stipulacea Maxim.—EUR
Lespedeza nuttallii Darl.—SEW
Lespedeza repens (L.) Bart.—SEW
Lespedeza procumbens Michx.—SEW

Strophostyles leiosperma (T. & G.) Piper—CP
Strophostyles umbellata (Muhl.) Britt.—CP

Lespedeza striata and *L. stipulacea* have been introduced from eastern Asia as forage crops and have escaped throughout the south-eastern states. *Desmanthus illinoensis*, a prairie plant which may have been introduced into Indiana from the west, approaches the northeastern limit of its distribution in this state. The remaining plants of this group, with the exception of *Strophostyles leiosperma* which follows the Mississippi Valley into Wisconsin, reach the northern limit of their distribution in Indiana.

Species Restricted to Extreme Southern Indiana

Cassia occidentalis L.—TR
Gleditsia aquatica Marsh.—CP
 X *Gleditsia texana* Sarg.—CP
Baptisia australis (L.) R. Br.—SEW
Crotalaria sagittalis L.—SEW, CP
Trifolium reflexum var. *glabrum* Lojaccono—SEW, P
Psoralea stipulata T. & G.—END
Amorpha fruticosa L.—SEW, CP
Wisteria macrostachya Nutt.—CP
Stylosanthes biflora (L.) BSP.—SEW, CP
Lespedeza stuevei Nutt.—SEW
Clitoria mariana L.—CP, SEW
Galactia volubilis (L.) Britt.—CP
Phaseolus polystachyus (L.) BSP.—CP

This group consists of species which, for the most part, are more abundant in the warmer portions of south central and southeastern United States. They have advanced northward chiefly along the eastern coastal plain and in rich river valleys in the interior. Only the southern counties of Indiana afford the climatic and physiographic conditions required by these species. *Trifolium reflexum* var. *glabrum*, the single native *Trifolium* in this state, offers the only exception in this group to the above statements. This variety seems to be the western form of the species, and is quite at home in prairie habitats in Illinois, Iowa, South Dakota, and south to Oklahoma.

Those species indicated by the letters CP have almost certainly migrated into Indiana along the Mississippi, Ohio, and Wabash Rivers. The type specimen of *Psoralea stipulata* comes from Clark County, Indiana (collected in 1839). The validity of this species is questionable, and the plant now seems to be extinct. *P. stipulata* appears to be the only truly endemic leguminous species reported from Indiana. *Cassia occidentalis*, reported only from Floyd County, occurs most abundantly in the tropics of both the Old and New Worlds.

Summary and Conclusions

1. The following patterns of geographical distribution are exhibited by the Leguminosae in Indiana:
 - a. Occurring throughout the state; 34 species.
 - b. Occurring in both the northern and southern parts, but absent in the central area; 9 species.
 - c. Occurring in the north only; 8 species.
 - d. Occurring in both the northern and western parts of the state; 9 species.
 - e. Occurring in the southern one-third of the state; 13 species.
 - f. Occurring in the extreme south; 14 species.
2. The largest number of leguminous species is found in southern Indiana, the number diminishing progressively northward.
3. On the basis of their floristic affinities the leguminous plants of Indiana can be divided into the following categories:
 - a. Southeastern and eastern woodland plants; 44 species, comprising 50.5% of the leguminous flora.
 - b. Coastal plain and Mississippi Valley plants; 10 species, comprising 11.5%.
 - c. Northern plants; 6 species, comprising 6.8%.
 - d. Prairie plants; 12 species, comprising 13.7%.
 - e. Plants naturalized from Europe, Asia, or tropical America; 15 species, comprising 17.1%.
 - f. Endemic plants; 1 species, comprising 1.1% of the leguminous flora of the state.
4. The most widespread species in the state are certain of the southeastern woodland plants and naturalized weed-like species from Eurasia.
5. A majority of the species limited to northern Indiana are of northern floristic affinity and are close to the southern limit of their distribution in the United States.
6. Most of the species limited in distribution to both northern and western Indiana are prairie species which are, for the most part, more abundant west and south of Indiana than they are east of it.
7. Species occurring throughout the southern third of Indiana are southeastern woodland or coastal plain plants which are near the northern limit of their U. S. distribution in Indiana.
8. The majority of species restricted to extreme southern Indiana are plants of the coastal plain and lower Mississippi Valley which are also near the northern limit of their distribution in the United States.
9. The state of Indiana is so located geographically that species from several floristic areas converge within its boundaries, a

condition which is partly responsible for the surprising richness of its vascular flora.

Literature Cited

1. BRAUN, E. LUCY. 1943. An annotated catalog of Spermatophytes of Kentucky. Publ. by the author, Cincinnati, Ohio.
2. DEAM, C. C. 1940. Flora of Indiana. 1236 pp. Department of Conservation, Division of Forestry. Indianapolis, Indiana.
3. ———, T. G. YUNCKER, R. C. FRIESNER, et al. 1941-1951. Indiana Plant Distribution Records I-XI. Proc. Ind. Acad. Sci. 50-60.
4. FASSETT, N. C. 1939. The leguminous plants of Wisconsin. 157 pp. The University of Wisconsin Press. Madison, Wisconsin.
5. FERNALD, M. L. 1950. Gray's manual of botany (8th Ed.). 1632 pp. American Book Company. New York, N. Y.
6. FOX, W. B. 1945. The Leguminosae in Iowa. Am. Midl. Nat. 34:207-230.
7. GAMBILL, W. G. 1947. Leguminosae of Illinois. Doctoral thesis (in publication). University of Illinois.
8. JONES, G. N. 1950. Flora of Illinois. Am. Midl. Nat. Monogr. 5:1-368. The University of Notre Dame Press. Notre Dame, Indiana.
9. SCHAFFNER, J. H. 1928. Field manual of the flora of Ohio and adjacent territory. R. G. Adams & Co. Columbus, Ohio.