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Carl C. Blickenstaff
Iowa State College

Charles L. Gilly
Iowa State College

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A Preliminary Report on Biosystematic Studies of Iowa Smartweeds (*Polygonum* Spp.)

CARL C. BLICKENSTAFF AND CHARLES L. GILLY

The senior author first developed an interest in the smartweeds (*Polygonum* spp.) in connection with studies and survey work on the European corn borer (*Pyrausta nubilalis* Hubn.) and related borers. These are *Pyrausta ainsliei* Hein, the smartweed borer, and *P. penitalis* Grote, the lotus borer; both are native to North America, while *P. nubilalis* was introduced into this country from Europe and has become a serious pest of corn. This insect was first noticed in the United States in 1917 in the New England states. It gradually spread westward and was first reported in Iowa in 1943 from Clinton County. By last year (1947) it had spread throughout the state and into eastern Nebraska.

Since the European corn borer is a serious pest of corn, all aspects of control are being studied. Field studies have given some indication that the natural insect parasites—certain small flies and wasps—of the smartweed borer might transfer their attack to the corn borer. For this reason studies of the distribution of the smartweed borer and the host plants which it infests are of interest. It should be noted that although the preferred host of the corn borer is *Zea Mays*, it has been found attacking many different plants and in Ohio under natural field conditions the host list includes two smartweeds, *P. pennsylvanicum* and *P. lapathifolium*. As the common name would indicate, the preferred host plants of the smartweed borer are species of *Polygonum*, particularly *P. pennsylvanicum*. The American lotus, *Nelumbo lutea*, is the preferred host plant of the lotus borer, although in Ohio this borer has been found feeding on several species of smartweed. It is of some interest to note that on at least one occasion all three borers were found naturally in one corn plant, and on another occasion all three were found in a single plant of *Polygonum pennsylvanicum*.

During the summer of 1947 three-hundred-forty-seven specimens of *Polygonum* were collected from all parts of the state. Particular attention was paid to the smartweeds growing in corn fields, and it is of interest to note that *Polygonum pennsylvanicum*, the preferred host of the smartweed borer, was the most common smartweed in such fields. It should be mentioned here that the smartweed borer causes little if any damage to corn.

While identifying the specimens collected during the past summer, all of the specimens of *Polygonum* in the herbaria of Iowa State College, the State University of Iowa, Grinnell College and Parsons College were examined. Thanks are here expressed to those in charge of these herbaria for permission to study the specimens. A total of 1506 specimens of *Polygonum* were available to the authors.

On the basis of these specimens it was determined that twenty species, one well-marked variety and several minor forms of the

genus are known from Iowa. G. L. Wittrock in 1923 reported twenty species and two varieties and R. I. Cratty in 1933 reported twenty-two species and one variety for the state. Specimens representing several of the species reported by these authors do not seem to be distinct from other species, and may be assigned as follows:

- P. camporum* (Wittrock) *P. ramossissimum*
- P. dumetorum* (Wittrock and Cratty) *P. scandens*
- P. exsertum* (Wittrock and Cratty) *P. ramossissimum*
- P. iowense* (Cratty) probably *P. natans* f. *hartwrightii*
- P. longistylum* (Cratty) *P. pennsylvanicum*
- P. neglectum* (Cratty) *P. aviculare*

An additional species and a variety—*P. opelousanum* and *P. coccineum* var. *rigidulum*—recognized in this study but not listed by either Wittrock or Cratty, were first reported for Iowa by Dr. Hayden in 1940. At the same time she also noted the changes of name from *P. muhlenbergii* to *P. coccineum* and from *P. amphibium* to *P. natans*. It might also be noted that the species formerly known as *P. acre* should now be called *P. punctatum*. Another species, *P. tomentosum* Schrank, is apparently reported here for the first time in Iowa; this species, which seems to be most closely related to *P. lapathifolium*, has been collected in Adams, Buchanan, Emmet, Iowa and Story Counties.

In the course of this study it became apparent that several of the species groups in the genus *Polygonum* are in need of detailed attention. Among these are the knotweeds and the false buckwheats. The somewhat confusing amphibious *Persicarias*—*P. coccineum* and *P. natans*—have been clarified by Stanford, and the remaining segments of the genus as represented in Iowa cause comparatively little trouble in identification.

Fourteen entities in the knotweed group have been reported for Iowa; these are referable to only four species: *P. aviculare*, *P. erectum*, *P. ramosissimum* and *P. tenue*. Of these four, *P. aviculare* is the most variable so far as habit of growth and size and shape of leaf is concerned. Such variations, which have been the basis for the description of varieties, and even species, do not seem to be correlated with differences in flower and fruit. The same is apparently true, to a somewhat lesser degree, of *P. ramossissimum*. *P. erectum* and *P. tenue*, at least so far as Iowa material is concerned, are relatively stable.

In the false buckwheat group two species—*P. scandens* and *P. dumetorum*—are usually differentiated on basis of size of achenes and mature calyx. These two entities do not seem to be really distinct. We have referred all Iowa material to *P. scandens*, because of the occurrence of intergradient forms.

In view of the difficulties encountered in the two groups just mentioned, it is apparent that more than a consideration of herbarium specimens will be necessary to clarify specific limits. Moreover, the preparation of an identification key based on seedling characteristics

is particularly desirable for use in connection with distributional studies, for it is frequently impossible to determine specimens not in flower or fruit by the use of currently available keys. Two methods of assembling data for this phase of the problem are being used. Seedlings have been collected from marked colonies which were then visited later in the season when flowering and fruiting specimens could be collected. Also, seeds from determined specimens have been planted; thus far considerable difficulty has been encountered in germinating the seeds. This work, however, is being continued.

Transplant studies, particularly of the knotweed group, are to be started this year. Seedlings from a single colony will be transplanted to sites with different soil composition, soil texture, light intensity, and available moisture. Such a study, obviously, cannot be completed in a single year.

In conclusion, we should like to receive for study seeds and specimens of smartweeds from anywhere in Iowa.

DEPARTMENT OF BOTANY,
IOWA STATE COLLEGE.