

- Empetrum purpureum* L. July 31, 1896. Round Lake.  
*Solidago*, one species. August 6, 1896. Cedar Lake.  
*Euthamia graminifolia* (L.). Nutt. August 1, 1896. Cedar Lake.  
*Aster macrophyllus* L. August 6, 1896. Round Lake.  
*Inula Helenium* L. August 6, 1896. Round Lake.  
*Silphium trifoliatum* L. July 31, 1896. Round Lake.  
*Rudbeckia laciniata* L. September 2, 1897. Cedar Lake.  
*Bidens Beckii* Torr. August 6, 1896. Round Lake.  
*Bidens trichosperma* (Michx.). Britt. August 6, 1896. Round Lake.  
*Erechtites hieracifolia* (L.). Raf. September 2, 1897. Cedar Lake.  
*Carduus nuticus* (Michx.). Pers. September 2, 1897. Cedar Lake.

## SOME UNRECOGNIZED FORMS OF NATIVE TREES.

BY STANLEY COULTER.

In the case of certain of our familiar forests there is a popular or commercial recognition of certain well-marked forms which have either escaped the attention of botanists or have been considered of such slight importance as to receive no mention in descriptive works. Some of these forms are so distinct and so persistent as to raise the question as to whether they may not be entitled to varietal rank. Certainly in a study of our forest flora they must be taken into account. I desire in this paper to call attention to some of these botanically unrecognized forms, hoping by this means to receive added information upon this point.

### ASIMINA TRILOBA DUNAL.

The papaw has two easily distinguishable forms, which may be characterized as—

1. A large-fruited form, becoming a rich yellow upon ripening.
2. A small-fruited form, remaining white upon ripening.

Among the evident fruit differences the following are to be noted. In the large-fruited form the pulp is much softer and more yielding than in the small-fruited form; it possesses a much stronger flavor and odor; the

seeds are less numerous, although somewhat larger. The color of the outer skin changes to black under the action of frost, while in the small-fruited type it remains green. Form 1 furnishes the really edible fruit. The larger form is also in cross section, almost circular, while the small-fruited form is elliptical, being compressed dorso-ventrally.

In habit, form 1 is the taller plant, the branches are more appressed, and the bark is a decided brown. In form 2, the branches are spreading and the bark much lighter in color, being gray rather than brown.

The inner bark of form 1, after maceration in water, is used in making rough ropes and withes; that of number 2 can not be so used, being much more brittle, or rather of much less tensile strength.

As compared with form 2, the leaves of form 1 are larger, more acute, a deeper green and much more highly odorous. The leaves of the papaw are popularly supposed to possess preservative properties and are used to cover meat, dressed poultry and fish, butter, etc. For this purpose only the leaves of form 1 are used. Large areas of the other forms will be passed over in the search for the highly odorous leaves of the large-fruited form. In histological features, the leaves of the two forms differ chiefly in the palisade layer and the relative thickness of the outer walls of the epidermis. This later, in form 2, being from two to four times thicker than in its larger leaved relative.

The date of flowering differs slightly, form 2 opening its smaller, less deeply colored flowers from a week to ten days later than form 1.

In our area form 2 has much the wider soil range. While always associated with form 1, it also thrives in a much thinner, lighter soil and in drier situations. When growing together, the two forms are easily separable, never by any chance becoming confluent.

While not of the opinion that these differences are sufficient to create a new species, I am inclined to think that in our area form 2 should have recognition as a distinct form, and suggest that it be known as *alba*.

#### JUGLANS NIGRA L.—Black Walnut.

Of this familiar tree there exists in Indiana two if not three easily separable forms:

1. Fruit spherical, nut following shape of hull; hull thick, bright green in immature state, turning black upon ripening; pulp becoming

black and very soft under the action of frost; kernel very oily, of somewhat rank flavor.

2. Fruit ovoid, much smaller than in number 1. Nut following shape of hull; hull relatively thin, bright green in immature state, turning yellow upon ripening or under the influence of frost; pulp drying up and hardening at maturation; kernel dry (not markedly oily), and of an agreeable flavor. This is the form which the wood-wise boy gathers for his winter supply.

*The leaf* of form 2 is much smaller than that of form 1, the leaflets being smaller, more sharply acute and finely serrate; they are also much less vividly green than those of form 1, a difference in color that seems due to the thicker epidermis.

Form number 2 grows in drier situations than form 1, though occasionally extending into the regions of the latter. In these cases there seems to be no blending of forms. The two forms are sharply distinct wherever associated.

Lumbermen assert that the wood of form 2 is much lighter in color and of much less commercial value than that of form 1. Whether or not there is difference in the period of flowering and maturation of fruit I am unable to state. Form 1 is that of ordinary descriptive botanists, form 2 not being noted or indicated. In our area it is of general occurrence and is known by the boys as the "little black walnut."

Form 3, so far as I know, is found only in a few localities near Lafayette. The fruit closely resembles the English walnut in some particulars, while in others it resembles the butternut. The hull is thin and without appreciable pulp at any season. The shell is very thin, the nut cracking as easily as the English walnut. The kernel is not at all oily and is very sweet. Some few trees are found upon the west bank of the Wabash River near Lafayette, and a few others near the Purdue campus. This form I described before the Academy of Science in 1890 under the title of "*An Aberrant Form of Juglans nigra.*" In that paper I suggested the fruit peculiarity was due to an early defoliation of the trees which occurred that year. Observations continued from that time until the present convince me that the opinion there expressed is not borne out by facts. The form has maintained itself in the stations indicated through these years from 1890 to 1900, its fruit always presenting the features given above. Dr. Schneck suggests that it is a hybrid of *J. cinerea*  $\times$  *J. regia* in which he follows J. Robinson in "Our Trees" (published by the Essex

Institute), in which a similar form is recorded. I am inclined to doubt the fact of the hybrid nature of the form for reasons that need not be considered in this connection. Whatever the origin of the form, it is definitely established in the two stations indicated. I hope during the coming season, in the case of both the papaw and walnuts, to discover whether or not these variations show a tendency to a "place mode."

LIRIODENDRON TULIPIFERA L.—Tulip Tree. Yellow Poplar.  
White Poplar.

Lumbermen distinguish between "yellow poplar" and "white poplar," a difference based upon the color of the wood. So far as I am able to judge, this difference is dependent upon the age of the tree and the soil conditions, being associated with no structural differences. In my opinion, it will be found that trees of this species, growing in tenacious clay soils, have the denser structure and darker color characterizing the yellow poplar, while in light, dry soils and loam, the white poplar is found. In both conditions the wood of the older trees is of a darker color, in some cases approaching brown. I hope that a series of observations now in progress will make it possible to determine the relation between the soil character and these alleged commercial varieties. If there is any method by which the two forms are to be distinguished by flower, fruit, leaf or bark characters, it has escaped my attention.

DIOSPYROS VIRGINIANA L.—Persimmon.

This tree shows at least two, perhaps three, sharply distinct forms existing in the same area without becoming confluent. A discussion of these differences is unnecessary since in "*The American Persimmon*," Bulletin No. 60, Vol. VII, of the Agricultural Experiment Station of Purdue University, Messrs. Troop and Hadley discuss these variations fully. I quote a few sentences from this bulletin:

"They differ in quality as much as our cultivated apples. Some are very astringent, others are insipid and worthless, still others are sweet and delicious.

"The fruit differs in size from that of a small wild plum to an inch and one-half or two inches in diameter. They also vary greatly in form;

some are globular, others either conical or oblong, those of the globular form predominating."

The wide soil range of the persimmon indicates that these differences may be dependent upon soil character, at least in large measure. A warm soil well exposed to the sun is best adapted to the persimmon, but it is found on almost any kind of soil from rich bottom land to the thin soil of hill tops. In Lawrence and Orange counties, according to Messrs. Troop and Hadley, it is found in great luxuriance in red clay soil areas, in lands exhausted by persistent cropping and which had been abandoned as worthless.

In this wide range of soil conditions it would seem possible to determine with some accuracy the effect of soil character upon this species.

I have called attention to these variations chiefly as an intimation that our forest flora is much less perfectly known than its importance merits, and in the hope that it will direct attention to the range of variation in these and other species.

---

## SEEDLINGS OF CERTAIN NATIVE HERBACEOUS PLANTS.

BY STANLEY COULTER AND HERMAN B. DORNER.

---

## THE RESIN DUCTS AND STRENGTHENING CELLS OF ABIES AND PICEA.

BY HERMAN B. DORNER.

Of recent years great strides have been made in systematic botany, especially in the line of adding new determinative features to classification. At the present time not only external features, but also internal structures are used for the determination of genera and species. This system of classification, according to internal structure, has best been carried out in the genus *Pinus*.

The first work done upon the pines with the internal structure in view,