

Plant Diversity Website

Apios americana Medik.

Common Names: Groundnut, Wild Bean, Potato-bean, American Potato Bean, Indian-potato (1, 4, 7).

Etymology: *Apios* is Greek for “pear”; the plant was named such because of its pear-shaped tubers. *Americana* means “American” (3, 7, 17).

Botanical synonyms: *Apios tuberosa* (4), *Glycine apios* (14).

FAMILY: Fabaceae (the Pea family).
Fabaceae is also known as Leguminosae

Quick Notable Features:

- Purple-brown flowers in axillary racemes
- Papilionaceous (butterfly-like) corolla
- Stem and leaves are unarmed
- Pinnately compound leaves with 5-7 ovate to lanceolate leaflets per leaf, each leaflet with a round (not C-shaped) petiolule



Plant Height: Climbing individuals grow up to 5m long (4).

Subspecies/varieties recognized (11):

Apios americana f. *cleistogama* Fernald
Apios americana f. *keihneri* Oswald
Apios americana f. *mcculloughii* Oswald

Apios americana f. *pilosa* Steyerl.
Apios americana var. *turrigera* Fernald

Most Likely Confused with: *Apios priceana*, *Wisteria frutescens* and *Wisteria sinensis*, *Amphicarpaea bracteata*, *Desmodium rotundifolium*, *Strophostyles helvola*, as well as the species in the genera *Lathyrus*, *Rubus*, and *Coronilla*.

Habitat Preference: *A. americana* can grow in partial or no shade (5). It prefers low and moist woods, thickets, stream and riverbanks, ponds, marshes, meadows, and wet ravines (1, 4).

Geographic Distribution in Michigan: Located in 32 counties of the Lower Peninsula, nearly all in the southern half, and in Mackinac, Delta, and Menominee counties of the Upper Peninsula (1).

Known Elevational Distribution: Groundnut can be found cultivated up to elevations of 1000m (16).

Complete Geographic Distribution: Native to the eastern United and Canada. *A. americana* is found in every state east of and including Colorado, and in Quebec and Ontario in Canada (14).

Vegetative Plant Description: An herbaceous, perennial vine. Stems range from glabrous to lightly pubescent and bear glabrous to pubescent petioles, up to 1.8 cm long. *A. americana* can climb high, as well as grow over shrubs and herbs on the ground. Rhizomes are slim and have 2 or more tubers “in a series” (2). Tubers can be up to 6cm in diameter. The leaves bear deciduous stipules that are 4-7mm long. The leaves are alternate, pinnately compound, and bear 5-7 leaflets per leaf. The leaflets can be glabrous or pubescent and are ovate to lanceolate, with a rounded base and an acute tip. They range from 2-10cm in length, but are typically 4-6cm long and 1.5-4cm wide (1, 2, 4, 7, 8).

Climbing Mechanism: *A. americana* is an apical stem twiner (pers. obs., Robyn J. Burnham).

Flower Description: Flowers are borne in axillary racemes on peduncles. The racemes are dense and compact in the northern states and more elongated in the southern states. The peduncle is 2-5 cm long and bears pedicels that are 2-5 mm long. Flowers are perfect. They are 10-13mm long with a hemispheric calyx tube, 3-5mm in length. The 4 upper calyx lobes are short or non-existent, and the single lower lobe is usually half as long as the calyx tube. The corolla is papilionaceous, or “butterfly shaped”, with retuse petals (bearing a notch at the top). The banner petal has a whitish back and a reddish-brown front. Wings are purplish-brown, keel is “strongly curved” (1) and sometimes coiled. There are 10 diadelphous (1+9) stamens. The pistil is stipitate with a disk that surrounds the stipe. The ovary is 5.5-7 mm long and glabrous to tomentose with 7-16 ovules. The style is coiled and glabrous to bearded. The capitate stigma has a stigmatic membrane (1, 2, 4, 5, 7, 8, 18).

Flowering Time: The species flowers from July to September in the Great Plains (4).

Pollinator: In Colorado, honeybees were observed crawling between the banner and keel (12). Leafcutter bees were observed tripping the flower in Connecticut (19).

Fruit Type and Description: A straight or slightly curved legume, 5-11.5cm long and 4-6 mm wide (4,21). The tip is shortly-aristate to acuminate. The legume is glabrous to tomentose when young and can be glabrous or bear striga (sharp-pointed appressed bristles) when mature. The endocarp is silver to “off-white” (18). The dehiscent pods may have up to 12 seeds per pod (19).





Seed Description: The glaucous seeds are green when fresh and dark brown when dry. They are 4-5 mm long with a wrinkled surface and an irregular shape (4,18).

Dispersal Syndrome: *A. americana* can be diploid or triploid. Both types have similar morphologies and can reproduce asexually via tubers. Apparently only the diploid plants can reproduce sexually and bear seeds (19). Triploid plants may flower, but are without seeds. Anderson and Spackman hypothesized that, in

Colorado, the tubers are dispersed by flooding and human activity (12). No mechanism for dispersal by seed has been found.

Distinguished by: The flower of *Apios americana* is purplish-brown and retuse, while *Apios priceana* (a species of the southern Midwest USA) has a whitish-green flower with a “spongy appendage” (8) protruding from the top of each flower. *A. americana* produces multiple tubers compared to only one in *A. priceana*. *A. americana* has 5-7 leaflets per leaf and is herbaceous while *Wisteria* species differ in their purple-blue flowers, woody stems, and 7-15 foliate leaves that are pubescent on both the top and bottom. *Amphicarpaea bracteata*, *Desmodium rotundifolium* and *Strophostyles helvola* are all trifoliate. *A. bracteata* has underground, 1-seeded legumes and cleistogamous flowers that can grow near or under the soil. It does not have the excurrent midvein that *A. americana* does. *S. helvola* bears whitish-purple flowers, as well as leaflets with 2-3 lobes. *D. rotundifolium* has round to ovate leaflets whereas *A. americana* has ovate to lanceolate leaflets. The terminal leaflet of *Lathyrus* species has been replaced with a tendril. This is not seen in *A. americana*. *Rubus* species can be distinguished by their armed branches and leaves. *Coronilla* can be distinguished by its umbellate inflorescence and many-foliate leaves.

Other members of the family in Michigan (number species): *Cercis* (1), *Crotalaria* (1), *Melilotus* (3), *Trifolium* (10), *Medicago* (3), *Cytisus* (1), *Baptisia* (3), *Amphicarpaea* (1), *Phaseolus* (2), *Strophostyles* (1), *Desmodium* (12), *Psoralea* (1), *Lespedeza* (8), *Glycine* (1), *Caragana* (1), *Gymnocladus* (1), *Gleditsia* (1), *Wisteria* (2), *Amorpha* (2), *Robinia* (3), *Schrankia* (1), *Lupinus* (3), *Cassia* (4), *Pisum* (1), *Lathyrus* (10), *Vicia* (9), *Dalea* (2), *Anthyllis* (1), *Lotus* (1), *Coronilla* (1), *Apios* (1), *Tephrosia* (1), *Astragalus* (3), *Hedysarum* (1) Source (1).

Ethnobotanical Uses: The tubers of *A. americana* are 17% protein by mass, edible, and prepared much like potatoes. Native Americans and early explorers ate them roasted or fried. The tubers can be harvested during the winter and possibly could have saved the settlers at Plymouth Rock from starvation during their first winter. Some studies have indicated that the tubers contain isoflavines, chemicals that are linked to a lesser occurrence of prostate and breast cancer. However, in some instances people have become ill after eating the tubers. The shoots, flowers and seeds are also edible (1, 4, 12, 20). Extensive research on variability within the tubers and directed selection suggests that this may be a viable food crop (22).

Phylogenetic Information: The genus *Apios* is a member of the subfamily Faboideae, also known as Papilionoideae, in the family Fabaceae. Faboideae is distinguished from the other subfamilies because of its bilaterally symmetrical flower, with the uppermost petal largest as

well as outermost, and the two “basal petals” fused together (6). This looks similar to the wings of a butterfly. Fabaceae makes up the majority of the order Fabales, which is a member of the Rosid subclass. The Rosids are eudicots (9, 10).

Interesting Quotation or Other Interesting Factoid not inserted above:

- Apios americana* shares a symbiotic relationship with *Rhizobium* soil bacteria (9). This bacteria fixes nitrogen that the plant can then use.
- This plant shows considerable variation in the amount of pubescence, raceme density, and leaflet size among individuals (4,5).
- A. americana* can thrive in temperate as well as subtropical climates (4,5).
- Horses and other livestock also graze its leaves (4, 5).
- This species experiences low fruit and seed production in certain populations. This might be attributed to the many triploid individuals seen in the northern part of the geographic range of this plant. A study done in Connecticut showed that triploid plants did not produce fruit in the field (19).
- One form of the species, “f. cleistogama” has flowers that do not open at all, instead forming progeny by self-pollination (7)

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