**Glycine max (L.) Merr.** (soybean)

*Phaseolus max* L.

Pl. 396 k, l; Map 1752

Plants annual, with taproots. Stems 20–60 cm long, stout, erect or ascending, sometimes reclining with age, branched, appearing bushy, unarmed, densely pubescent with fine, more or less spreading to somewhat matted, yellowish brown hairs. Leaves alternate, pinnately trifoliate, the petiole 5–15 cm long. Stipules 3–7 mm long, lanceolate, tapered abruptly from a broad base to a slender, elongate, sharply pointed tip; stipels 1–3 mm long, linear. Leaflets 4–10 cm long, 2–8 cm wide, broadly ovate to ovate or elliptic, the lateral leaflets sometimes broadly lanceolate, rounded to nearly truncate at the base, angled or slightly tapered to a bluntly or sharply pointed tip, the margins entire, finely hairy, the upper surface sparsely to moderately, finely hairy, the undersurface moderately to densely, finely hairy, the venation pinnate. Terminal leaflet with the stalk 4–19 mm long, symmetric at the base; lateral leaflets with the stalk 1.5–4.0 mm long, usually somewhat asymmetric at the base. Inflorescences axillary, short racemes or loose clusters of (1–)3–5(–8) flowers, the stalk 1–4 mm long, often obscured by dense hairs, the bracts 2–4 mm long, lanceolate, sometimes shed early, each flower with a stalk 2–4 mm long, the bractlets 2–3 mm long, narrowly lanceolate to hairlike. Calyces densely hairy, the tube 1.5–2.5 mm long, conic to bell-shaped, the lobes 1.5–4.5 mm long, lanceolate to narrowly lanceolate-triangular, sharply pointed at their tips, the 2 upper lobes fused to above the midpoint, the lowermost lobes somewhat longer than the others. Corollas papilionaceous, white to lavender or pale purple (rarely pale pink or bluish-tinged), sometimes with darker purple nerves, the banner 5–6 mm long, 3.0–3.5 mm wide, the expanded portion curved or bent backward, broadly obovate, shallowly notched at the tip, the wings 4–5 mm long, 1–2 mm wide, narrowly oblong, the keel 3–4 mm long, 1.0–1.5 mm wide, narrowly boat-shaped, fused to above the midpoint, curved upward toward the bluntly pointed tip. Stamens 10, all of similar length, 9 of the filaments fused and 1 free, the fused portion 2.5–3.0 mm long, the free portion 0.5–0.8 mm long, the anthers small, attached near the base, yellow. Ovary 2–3 mm long, densely hairy, the style 1.0–1.5 mm long, somewhat curved toward the tip, glabrous, the stigma small and terminal. Fruits legumes, 3–7 cm long, 7–13 mm wide, oblong, not beaked, turgid, but slightly flattened, usually somewhat constricted between the seeds, drooping, but usually somewhat arched upward, often dehiscing tardily by 2 valves from the tip, the valves becoming somewhat spirally twisted, brownish green to yellowish brown at maturity, bristly-hairy, mostly 2- or 3-seeded. Seeds 6–9 mm long, 5–7 mm wide, ovoid to nearly globose, the surface paletan to olive green, sometimes tinged, mottled, or streaked with purple, gray, or black, smooth, somewhat shiny. 2n=40. July–August.

Introduced, uncommon and widely scattered (cultigen of Asian origin; introduced widely but sporadically in the eastern U.S. west to Nebraska and Texas, Canada). Edges of bottomland prairies and banks of streams; also fallow fields, margins of cropfields, roadsides, and open disturbed areas.

The soybean is believed to have been domesticated in China, where a wild viney relative (*G. soja* Siebold & Zucc.) is still found. Soybeans were cultivated widely by 100 A.D. and became one of the major food sources supporting the large populations of Asia (Hymowitz, 1970). They are mostly self-pollinated and hundreds of genetically pure land-races have been developed. Soybeans are now probably the most important legume in the world, and have a multitude of uses. In Asian cuisines, soybeans are an important source of proteins and are consumed in the form of soymilk, tofu, miso, soy sauce, and tempeh. The raw seeds are poisonous...
and the trypsine inhibitors they contain must be neutralized by boiling water. Soybeans were a minor crop in the United States until World War II, when the shortage of butter created a demand for soybean oil for margarine. Production of soybeans in the U.S. has now surpassed that of Asia, and they are the most important cash crop in the country. The major use of soybeans in the United States is the oil, which is used for salad oil, cooking oil, and industrial applications. The residual cake is fed to livestock. Miscellaneous applications include soaps, cosmetics, resins, plastics, packaging materials, inks, crayons, solvents, and clothing. Soybeans also are an important source of biofuels.