

Plant Diversity Website

Cucurbita maxima Duch.

Common Names: Autumn squash, marrow, pumpkin, squash, winter squash, turban gourd, buttercup squash, Hubbard squash (1,2).

Etymology: *Cucurbita*, in Latin, means “gourd” and *maxima* means “greatest, largest” (7).

Botanical synonyms: *Cucurbita andreana* Naudin, *C. pepo* var. *maxima* (Duch.) Delile (1).

FAMILY: Cucurbitaceae, the Gourd Family

Quick Notable Features:

- Creeping pubescent herb with alternate leaves and coiled, branched tendrils
- Simple round leaves with cordate base and obtuse apex
- Large, unisexual yellow flowers

Plant Height: 0.2 - 0.6 m tall, with individuals up to 10 m in length (6,8).

Subspecies/varieties recognized (1):

- C. maxima* var. *maxima*
- C. maxima* var. *zapallito* (Carrière) Millán
- C. maxima* subsp. *andreana* Filov
- C. maxima* subsp. *maxima*
- C. maxima* subsp. *turbaniformis* Vassilcz.

Most Likely Confused with: *Cucurbita pepo*, *Cucurbita foetidissima*, *Cucumis* ssp., *Citrullus lanatus*, *Vitis* ssp., *Menispermum canadense*.

Habitat Preference: The species prefers moist, well-drained sandy soils and little or no shade. *C. maxima* is heat and drought tolerant (2,6,15).

Geographic Distribution in Michigan: *C. maxima* has been collected outside of cultivation only in Cheboygan County (2).

Known Elevational Distribution: In Punata, Bolivia, *C. maxima* grows at elevations up to 3823 m (1).

Complete Geographic Distribution: Native to South America, the species is cultivated worldwide for its fruits (5). In the United States, *C. maxima* has escaped from cultivation in AR, MA, ME, MI, NC, NY, OH, PA, SC, UT, VA, VT, WI, and Puerto Rico (3).



Vegetative Plant Description: *C. maxima* is an annual herb with thick climbing or creeping stems. The root system is well developed and roots are up to 40 cm deep and 5 m long. The stems are branching, covered in soft white pubescence, up to 10 m long, and often produce adventitious roots at nodes. The petioles are densely pubescent, 5-20 cm long, and estipulate. The plant bears tendrils at 90 degrees to the leaf axil; these are lightly pubescent, coiled, and 2-5-branched. The thin leaves are alternate, simple, palmately veined, round to reniform, basally cordate, apically obtuse, unlobed to shallowly 5-7 lobed, 7-30 cm across, broader than long, stiff to soft pubescent, and finely dentate (2,5,8,12,15,16).



Climbing Mechanism: *C. maxima* uses its 2-5-branched tendrils to climb (5,12,15).

Flower Description: *C. maxima* is monoecious (unisexual flowers, with male and female on the same plant), bearing solitary actinomorphic flowers (10-20 cm across) that are open for a single day. The flowers produce nectar and are aromatic. Staminate flowers are 20-25 times more numerous than pistillate flowers, but produce less nectar. The campanulate calyx is covered in white pubescence and bears, 5 free sepals; each sepal is linear-lanceolate and 0.5-2 cm long. The yellow to orange corolla is tubular, at least 5 cm long and broad, 5-parted with reflexed petals that are ovate, apically obtuse, and marginally rugose. Staminate flowers are borne on 10-23 cm long, lightly pubescent pedicels, and have 3 connivent stamens with basally pubescent filaments (0.5-0.7 cm long). Pistillate flowers are borne on shorter pedicels, only up to 5.5 cm long, and have an inferior 1-locular ovoid ovary with a short thick style with 3-5 bilobed stigmas. The peduncle of the developing fruit is spongy, and does not expand at the junction of the fruit (2,5,10,12,14,15,16).



Flowering Time: July to August (8).

Pollinator: Both male and female flowers produce nectar and aroma to attract wild bees, including the squash bee (*Peponapis pruinosa*), honey bees, bumble bees, and other insects (10,14,15). The pollen is sticky (12) thus unlikely to be dispersed by wind.

Fruit Type and Description: *C. maxima* fruits are technically classified as berries; they are highly variable in shape, color, and size. The shape can be an elongated cylinder, oval, flattened, globular, heart-shaped, and/or tapering to a curved neck on one or both ends. The length is from 5.8 to 71.6 cm and width from 11.2 to 48.6 cm. The skin can be smooth, warty, wrinkled, or/and have shallow to deep longitudinal ridges. Often there is more than one color on the soft to hard skin: red, white, gray, black, green, cream, and/or orange. The flesh is also variable in color and thickness. It can be white, yellow, or orange, and usually from 1 to 6.4 cm

thick. Some pumpkins and squashes are over 90 kg (~200 pounds), but they usually range from 0.3 to 50 kg. Each fruit bears few to numerous seeds (5,8,11,13,15).

Seed Description: The oval seeds can be white, cream, orange, or brown, and are composed of 34-54% oil. The size (length, width, thickness) and weight of the seeds increase as the fruit size increases, ranging between 1.6 to 2.9 cm long, 0.7 to 1.6 cm wide, 0.28 to 0.69 cm thick, and 14 to 60 g per 100 seeds. The seeds reportedly remain viable for 6-8 years (6,13,15), but bear no endosperm, and the embryo consists of “leaflike cotyledons and a short radicle” (5).



Dispersal Syndrome: The fruits are buoyant and can be dispersed by water, or internally by large mammals (11).

Distinguished by: *Cucurbita pepo* has round-triangular leaves with 5-7 irregular lobes on 6-9 cm long petioles. The peduncle of the developing fruit is hard and thickened at the junction of the fruit. In contrast, *C. maxima* has round to reniform leaves that are only shallowly lobed, if at all, borne on 5-20 cm long petioles. The peduncle of developing fruits in *C. maxima* is spongy and not thickened at the apex. *Cucurbita foetidissima* has triangular leaves that are longer than wide and leathery, producing a foul smell when bruised. *C. maxima* leaves are thin and wider than long and the plant does not smell unpleasant. *Cucumis* ssp. have unbranched tendrils, the corolla is rotate and only up to 3 cm broad and long. *C. maxima* tendrils are 2-5-branched, the corolla is tubular, longer and broader than 5 cm. *Citrullus lanatus* has deeply pinnately lobed leaves, the pedicels of staminate flowers are a lot shorter (3-4 cm long), the corolla is campanulate or rotate and 2.5-3 cm broad, and the stamens are nearly free. *C. maxima* staminate flowers are borne on 10-23 cm long pedicels, and the stamens are connivent. *Vitis* ssp. stems are woody and shredding, tendrils are opposite the leaves, inflorescences are many-flowered thyrses of inconspicuous, minute flowers that later produce small blue-black berries (grapes). *C. maxima* is herbaceous, the tendrils are 90° to the leaves, the inflorescence is solitary with conspicuous flowers that develop into large berries of varied shape, size, and color. *Menispermum canadense* climbs by twining with its apex (no tendrils), the leaves are shallowly peltate, the staminate and pistillate flowers are on different plants (dioecious), the minute flowers have 5-8 sepals and 4-12 petals and later develop into small bluish-black drupes. *C. maxima* bears tendrils, does not have peltate leaves, the large, 5-merous staminate and pistillate flowers are on the same plant (monoecious) (2,5).



Other members of the family in Michigan (number species): *Citrullus* (1), *Cucumis* (2), *Cucurbita* (2), *Echinocystis* (1), *Sicyos* (1), *Thladiantha* (1) (source 2).



Ethnobotanical Uses: The fruits can be cooked, baked, or dried and made into flour. The seeds can be consumed raw, roasted, or powdered, and are rich in oil. The flowers can be eaten raw, cooked, or breaded and fried in oil. Young leaves and stems can also be consumed when cooked. Seedlings are toxic however and should not be consumed. The powdered seed mixed with water can be ingested to expel parasitic worms, as a tonic, and a diuretic. The oil of the seeds is tonic and used for lightening the skin. The pulp of the fruits can be applied as a poultice on burns and skin sores for a soothing effect, and be made into a nourishing facial mask for dry skin. *C. maxima* is also used as animal fodder, and its fruits in varied shapes are also used in decoration (6, 13, and personal observations by the authors).

Phylogenetic Information: The genus *Cucurbita* is included in the Cucurbitaceae family, which is in the Cucurbitales order, part of the Rosid I clade of Core Eudicots. Six other families are part of the order Cucurbitales: Anisophylleaceae, Corynocarpaceae, Coriariaceae, Tetramelaceae (which closest to Cucurbitaceae), Datisceae, and Begoniaceae. Members of the Cucurbitaceae are found in tropical, subtropical, and warm temperate climates throughout the world and are very important economically. The family also includes cucumber, melon, watermelon, and other gourds (4).

Interesting Quotation or Other Interesting Factoid not inserted above: Japan is the largest consumer of one of the *C. maxima* varieties in the world. The species, commonly called “*kabocha*” in Japan (winter squash in the U.S.), was introduced by the Portuguese in the 1500’s and it is used in soups, sushi, and tempura (9). Some believe that *Cucurbita* ssp. co-evolved with the late Pleistocene megafauna, their original seed dispersers. The world record holding heaviest squash is 1810.5 lbs (821.23 kg) (11). The different varieties of *C. maxima* are usually classified into 8 morphotypes of squash: banana, turban, flattened with orange flesh, flattened to globular with light flesh, globular with orange flesh, cylindrical to oval, heart-shaped, and Hubbard (13). Beetles in the genera *Diabrotica* and *Acalymma* are attracted to the odor released by *C. maxima* flowers and feed on the plant (14). Staminate flowers of members of the Cucurbitaceae have 5 true stamens, “but often apparently 3 or sometimes 1 due to various modifications (cohesion, connation, and/or convolution)” (16).

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