Plant Diversity Website

Cucumis sativus Linnaeus

Common Names: Cucumber, garden cucumber, apple cucumber, gherkin, *concombre* (French), *cornichon* (French), *pepino* (Spanish and Portuguese), *huang gua* (pinyin, China), *khira* (Pakistan) (1,2,6,8).

Family: Cucurbitaceae, the Gourd Family

Etymology: *Cucumis* in Latin means 'cucumber', the word was derived from Greek for cucumber, *kykyon*. The epithet *sativus*, also Latin, means 'that is sown', referring to the common agricultural use of the species (4,5).

Botanical synonyms: *Cucumis esculentus* Salisb., *C. hardwickii* Royle, *C. muricatus* Willd., *C. rumphii* Hassk., *C. setosus* Cogn., *C. sphaerocarpus* Gabaev, *C. vilmorinii* Sprenger (2).

Quick Notable Features (1,9,11):

- ¬ Herbaceous vine with pubescent stems and unbranched tendrils up to 30cm long
- ¬ Leaves are alternate and simple, with 3-7 palmate lobes and serrated margins
- ¬ Yellow 5-merous flowers bearing either female or male organs
- ¬ Hairless cylindrical fruits are warty, yellow to green, and up to 50cm long

Plant Height: Cucumbers grow up to 2m tall and 5m long (7,9).

Subspecies/varieties recognized (2):

C. sativus subsp. *agrestis* Gabaev
C. sativus var. *albus* Ser.
C. sativus var. *anatolicus* Gabaev
C. sativus var. *anglicus* L.H. Bailey
C. sativus var. *arakis* Forssk.
C. sativus var. *battich-djebbal* Forssk.
C. sativus var. *brullos* Forssk.
C. sativus var. *chatte* Forssk.
C. sativus var. *chiar* Forssk.
C. sativus var. *cilicicus* Gabaev
C. sativus var. *ennemis* Forssk.
C. sativus var. *europaeus* Gabaev
C. sativus var. *fakus* Forssk.
C. sativus var. *falcatus* Gabaev
C. sativus var. *fastigiatus* Ser.
C. sativus var. *flavus* Ser.
C. sativus subsp. *gracilior* Gabaev
C. sativus var. *hardwickii* (Royle) Gabaev
C. sativus var. *indo-europeus* Gabaev
C. sativus var. *irano-turanicus* Gabaev
C. sativus var. *izmir* Gabaev
C. sativus var. *pallidus* Gabaev
C. sativus subsp. *rigidus* Gabaev
C. sativus var. *sativus*

C. sativus var. *schemmam* Forssk.
C. sativus var. *sikkimensis* Hook. f.
C. sativus var. *squamosus* Gabaev
C. sativus var. *testudaceus* Gabaev
C. sativus var. *tuberculatus* Gabaev
C. sativus var. *usambarensis* Zimm.
C. sativus var. *variegatus* Ser.
C. sativus var. *viridis* Ser.
C. sativus var. *vulgatus* Gabaev

Most Likely Confused with: *Cucumis melo, Cucurbita foetidissima, Cucurbita maxima, Thladiantha dubia, Echnocystis lobata, Sicyos angulatus, Vitis* ssp.

Habitat Preference: *C. sativus* grows on moist, well-drained (sandy) soils rich in organic matter and slightly alkaline. It prefers full sun exposure in warm and humid climates; it is not frost resistant (1,12).

Geographic Distribution in Michigan: Cucumber has only escaped cultivation in Cheboygan county, at the University of Michigan Biological Station by Douglas Lake (1).

Known Elevational Distribution: *C. sativus* grows up to 2120m above sea level in Antioquia, Colombia (2).

Complete Geographic Distribution: Native to Southern Asia (1), *C. sativus* was introduced to North America and other parts of the world. In the United States it is currently found in AR, FL, GA, HI, IL, KS, KY, LA, MA, MI, MO, MS, NC, NY, OH, PA, SC, UT, VA, and Puerto Rico; in Canada in ON and QC (6). The cucumber is found in over 117 countries throughout the world, its spread is due to cultivation, which started over 3000 years ago in India (2,8,9).

Vegetative Plant Description: *C. sativus* is a morphologically variable annual herbaceous climber. The stems are prostrate, angular, and covered in white pubescence. Stipules are absent, and the plant bears unbranched axillary tendrils up to 30cm long 10-16 (-20) cm long petioles. The pubescent leaves are alternately arranged on 10-16 (-20) cm long petioles, simple, basally cordate, and apically acute with 3-7 palmate lobes. The palmately-veined leaves are nearly orbicular, 7-20cm long and broad (1,9,11,12,16).

Climbing Mechanism: Cucumbers use their simple tendrils to climb over structures or other vegetation (11).

Flower Description: *C. sativus* is monoecious (separate male and female flowers on the same plant) and its axillary flowers are actinomorphic and rarely bisexual. Both staminate and pistillate flowers have a pubescent 5-parted calyx composed of 0.5-1cm long white pubescent sepals. The sepals are long, narrow, and acute; on pistillate flowers, the calyx is fused to the ovary and forms a hypanthium. The corolla is approximately 2cm long, yellow, fused less than half of its length, campanulate, 5-parted with oblong to lanceolate lobes. Staminate flowers are solitary or 3-7 on pubescent pedicels (0.5-2cm long), bearing 3 stamens, of which two have 2-celled anthers (0.3-0.4cm long) and one a 1-celled anther. Pistillate flowers are solitary or paired on pedicels shorter than the staminate ($\leq$ 0.5cm long) before fruit development, whereas during

fruit development the pedicels can elongate up to 5cm long. The pistilate flowers have 3 staminodes, a pubescent, ellipsoid, unilocular ovary 2-5cm long, with a short style and 3 stigmas (9,11,12).

Flowering Time: The blooming period of cucumbers is July-September. Staminate flowers open before pistillate flowers (7,12).

Pollinator: *C. sativus* is pollinated by bees that harvest the nectar produced by the flowers; honey bees are more effective than wild bees. The pollen is sticky, which makes wind pollination improbable (10,13).

Fruit Type and Description: The fruit is an indehiscent cylindrical berry with many seeds. Cucumbers are glabrous, and can be smooth or warty, yellow or green, ranging from 5-100cm long and weigh 50g to 4kg. Each plant produces up to 25 fruits (9,11,12).

Seed Description: The white seeds range from 0.5-1.8cm in length, and are emarginate and elliptical with pointed ends. A gram of seed includes 33-40 seeds (9,11,12).

Dispersal Syndrome: Cucumbers occasionally escape from cultivation (15). In wild populations, members of the Cucurbitaceae are mostly dispersed by mammals and birds (14). Since cucumbers are fleshy, indehiscent, and the seeds are nor winged nor plumed, it is probable that animals are the dispersal agents.

Distinguished by: *Cucumis melo,* also known as melon, has leaves that are apically round, and the fruits are smooth to reticulate and ovate to oblong. In comparison, *C. sativus* has apically acute leaves, and the fruits are warty and cylindrical. Species of *Cucurbita* also produce yellow flowers, but at least twice the size (>5cm long x 5cm wide) of *C. sativus,* and *Cucurbita* tendrils are branched. *Cucurbita foetidissima* has triangular leaves that point upwards, and the whole plant smells foul when bruised. *Cucurbita maxima* has unlobed leaves, and the stigmas are bifid, versus 3-7 lobed leaves and simple stigmas in *C. sativus*. *Thladiantha dubia* has tubers the size of small potatoes, the hairs are hooked, the plants are dioecious, the stigmas are bifid, and the fruit is hairy even at maturity. *C. sativus* has pointed hairs, the plants are monoecious, and the fruits only hairy during its early development. *Echinocystis lobata* and *Sicyos angulatus* have branched tendrils, bear whitish small flowers up to 1.5cm long, and the fruits are covered in soft spines. *E. lobata* leaves have elongated acute lobes with very few teeth on the margins; its flowers have 6 sepals and 6 petals. *C. sativus* has short lobes, the leaf margins are coarsely toothed, and the flowers only bear 5 sepals and 5 yellow petals. *S. angulatus* bears clustered, inconspicuous flowers and produce small single seeded fruits, which are not clustered. *Vitis* ssp. are woody vines with bifid tendrils arranged opposite the leaves, the minute flowers are grouped, generally produced in mid spring, inconspicuous, and the fruits are small, dark, round berries (1,11).

Other members of the family in Michigan (number species): *Citrullus* (1), *Cucumis* (1), *Cucurbita* (3), *Echinocystis* (1), *Sicyos* (1), *Thladiantha* (1) (source 1).

Ethnobotanical Uses: Cucumbers are consumed raw or pickled (gherkin). Mature uncooked cucumbers bring relief for individuals suffering from celiac disease, and promote skin health. Edible oil can be extracted from the seeds and used for cooking. Immature cucumbers can be cooked and consumed to treat dysentery. The fruit is also valued in the cosmetic industry, used to soften the skin. A poultice made from fresh cucumbers can be applied to burns and open sores. The seeds can be used to expel parasitic worms. The juice from the leaves induce vomiting and aid digestion. The seedlings are toxic and should not be consumed (7,9).

Phylogenetic Information: The genus *Cucumis* 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), Datiscaceae, 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 pumpkin, squash, melon, watermelon, and gourds (3).

Interesting Quotation or Other Interesting Factoid not inserted above: When a pistillate flower is successfully pollinated and fruit starts developing, other pistillate flowers on the same branch (occasionally on the same vine) will be inhibited from producing fruit. Staminate flowers start to open about 10 days earlier than pistillate, and they number 10-100x more (10). "Cucumber peel when eaten by cockroaches is reported to kill them after several nights" (9). In 2002, over 60% of all cucumbers were produced in China, with a total world production of 36 million tons (9). "Cucumber ranks among the top 10 vegetables in world production" (15).

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