

= Cucurbita =

Cucurbita (Latin for gourd) is a genus of herbaceous vines in the gourd family , Cucurbitaceae , also known as cucurbits , native to the Andes and Mesoamerica . Five species are grown worldwide for their edible fruit , variously known as squash , pumpkin , or gourd depending on species , variety , and local parlance , and for their seeds . First cultivated in the Americas before being brought to Europe by returning explorers after their discovery of the New World , plants in the genus Cucurbita are important sources of human food and oil . Other kinds of gourd , also called bottle @-@ gourds , are native to Africa and belong to the genus Lagenaria , which is in the same family and subfamily as Cucurbita but in a different tribe . These other gourds are used as utensils or vessels , and their young fruits are eaten much like those of Cucurbita species .

Most Cucurbita species are herbaceous vines that grow several meters in length and have tendrils , but non @-@ vining " bush " cultivars of *C. pepo* and *C. maxima* have also been developed . The yellow or orange flowers on a Cucurbita plant are of two types : female and male . The female flowers produce the fruit and the male flowers produce pollen . Many North and Central American species are visited by specialist bee pollinators , but other insects with more general feeding habits , such as honey bees , also visit .

The fruits of the genus Cucurbita are good sources of nutrients , such as vitamin A and vitamin C , among other nutrients according to species . The plants contain the toxins , such as cucurbitin , cucurmosin , and cucurbitacin .

There is debate about the taxonomy of the genus , as the number of accepted species varies from 13 to 30 . The five domesticated species are *Cucurbita argyrosperma* , *C. ficifolia* , *C. maxima* , *C. moschata* , and *C. pepo* . All of these can be treated as winter squash because the full @-@ grown fruits can be stored for months ; however , *C. pepo* includes some cultivars that are better used only as summer squash .

Cucurbita fruits have played a role in human culture for at least 2 @,@ 000 years . They are often represented in Moche ceramics from Peru . After Christopher Columbus 's arrival in the New World , paintings of squashes started to appear in Europe early in the sixteenth century . The fruits have many culinary uses including pumpkin pie , biscuits , bread , desserts , puddings , beverages , and soups . Pumpkins and other Cucurbita fruits are celebrated in festivals and in flower and vegetable shows in many countries .

= = Description = =

Cucurbita species fall into two main groups . The first group are annual or short @-@ lived perennial vines and are mesophytic , i.e. they require a more or less continuous water supply . The second group are perennials growing in arid zones and so are xerophytic , tolerating dry conditions . Cultivated Cucurbita species were derived from the first group . Growing 5 to 15 meters (16 to 49 ft) in height or length , the plant stem produces tendrils to help it climb adjacent plants and structures or extend along the ground . Most species do not readily root from the nodes ; a notable exception is *C. ficifolia* , and the four other cultivated mesophytes do this to a lesser extent . The vine of the perennial Cucurbita can become semiwoody if left to grow . There is wide variation in size , shape , and color among Cucurbita fruits , and even within a single species . *C. ficifolia* is an exception , being highly uniform in appearance . The morphological variation in the species *C. pepo* and *C. maxima* is so vast that its various subspecies and cultivars have been misidentified as totally separate species .

The typical cultivated Cucurbita species has five @-@ lobed or palmately divided leaves with long petioles , with the leaves alternately arranged on the stem . The stems in some species are angular . All of the above @-@ ground parts may be hairy with various types of trichomes , which are often hardened and sharp . Spring @-@ like tendrils grow from each node and are branching in some species . *C. argyrosperma* has ovate @-@ cordate (egg @-@ shaped to heart @-@ shaped) leaves . The shape of *C. pepo* leaves varies widely . *C. moschata* plants can have light or dense pubescence . *C. ficifolia* leaves are slightly angular and have light pubescence . The leaves of all

four of these species may or may not have white spots .

There are male (staminate) and female (pistillate) flowers (unisexual flowers) on a single plant (monoecious) , and these grow singly , appearing from the leaf axils . Flowers have five fused yellow to orange petals (the corolla) and a green bell @-@ shaped calyx . Male flowers in Cucurbitaceae generally have five stamens , but in Cucurbita there are only three , and their anthers are joined together so that there appears to be one . Female flowers have thick pedicels , and an inferior ovary with 3 ? 5 stigmas that each have two lobes . The female flowers of *C. argyrosperma* and *C. ficifolia* have larger corollas than the male flowers . Female flowers of *C. pepo* have a small calyx , but the calyx of *C. moschata* male flowers is comparatively short .

Cucurbita fruits are large and fleshy . Botanists classify the Cucurbita fruit as a pepo , which is a special type of berry derived from an inferior ovary , with a thick outer wall or rind with hypanthium tissue forming an exocarp around the ovary , and a fleshy interior composed of mesocarp and endocarp . The term " pepo " is used primarily for Cucurbitaceae fruits , where this fruit type is common , but the fruits of Passiflora and Carica are sometimes also pepos . The seeds , which are attached to the ovary wall (parietal placentation) and not to the center , are large and fairly flat with a large embryo that consists almost entirely of two cotyledons . Fruit size varies considerably : wild fruit specimens can be as small as 4 centimeters (1 @.@ 6 in) and some domesticated specimens can weigh well over 300 kilograms (660 lb) . The current world record was set in 2014 by Beni Meier of Switzerland with a 2 @,@ 323 @.@ 7 @-@ pound (1 @,@ 054 @.@ 0 kg) pumpkin .

= = Taxonomy = =

Cucurbita was formally described in a way that meets the requirements of modern botanical nomenclature by Linnaeus in his *Genera Plantarum* , the fifth edition of 1754 in conjunction with the 1753 first edition of *Species Plantarum* . Cucurbita pepo is the type species of the genus . Linnaeus initially included the species *C. pepo* , *C. verrucosa* and *C. melopepo* (both now included in *C. pepo*) , as well as *C. citrullus* (watermelon , now *Citrullus lanatus*) and *C. lagenaria* (now *Lagenaria siceraria*) (both are not Cucurbita but are in the family Cucurbitaceae .

The Cucurbita digitata , *C. foetidissima* , *C. galeotti* , and *C. pedatifolia* species groups are xerophytes , arid zone perennials with storage roots ; the remainder , including the five domesticated species , are all mesophytic annuals or short @-@ life perennials with no storage roots . The five domesticated species are mostly isolated from each other by sterility barriers and have different physiological characteristics . Some cross pollinations can occur : *C. pepo* with *C. argyrosperma* and *C. moschata* ; and *C. maxima* with *C. moschata* . Cross pollination does occur readily within the family Cucurbitaceae . The buffalo gourd (*C. foetidissima*) , which does not taste good , has been used as an intermediary as it can be crossed with all the common Cucurbita .

Various taxonomic treatments have been proposed for Cucurbita , ranging from 13 ? 30 species . In 1990 , Cucurbita expert Michael Nee classified them into the following oft @-@ cited 13 species groups (27 species total) , listed by group and alphabetically , with geographic origin :

C. argyrosperma (synonym *C. mixta*) ? cushaw pumpkin ; origin : Panama , Mexico

C. kellyana , origin : Pacific coast of western Mexico

C. palmeri , origin : Pacific coast of northwestern Mexico

C. sororia , origin : Pacific coast Mexico to Nicaragua , northeastern Mexico

C. digitata ? fingerleaf gourd ; origin : southwestern United States (USA) , northwestern Mexico

C. californica

C. cordata

C. cylindrata

C. palmata

C. ecuadorensis , origin : Ecuador 's Pacific coast

C. ficifolia ? figleaf gourd , chilacayote ; origin : Mexico , Panama , northern Chile and Argentina

C. foetidissima ? stinking gourd , buffalo gourd ; origin : Mexico

C. scabridifolia , likely a natural hybrid of *C. foetidissima* and *C. pedatifolia*

C. galeottii is little known ; origin : Oaxaca , Mexico

C. lundelliana , origin : Mexico , Guatemala , Belize
C. maxima ? winter squash , pumpkin ; origin : Argentina , Bolivia , Ecuador
C. andreana , origin ? Argentina
C. moschata ? butternut squash , ' Dickinson ' pumpkin , golden cushaw ; origin : Bolivia , Colombia , Ecuador , Mexico , Panama , Puerto Rico , Venezuela
C. okeechobeensis , origin : Florida
C. martinezii , origin : Mexican Gulf Coast and foothills
C. pedatifolia , origin : Querétaro , Mexico
C. moorei
C. pepo ? field pumpkin , summer squash , zucchini , vegetable marrow , courgette , acorn squash ; origin : Mexico , USA
C. fraterna , origin : Tamaulipas and Nuevo León , Mexico
C. texana , origin : Texas , USA
C. radicans ? calabacilla , calabaza de coyote ; origin : Central Mexico
C. gracilior

The taxonomy by Nee closely matches the species groupings reported in a pair of studies by a botanical team led by Rhodes and Bemis in 1968 and 1970 based on statistical groupings of several phenotypic traits of 21 species . Seeds for studying additional species members were not available . Sixteen of the 21 species were grouped into five clusters with the remaining five being classified separately :

C. digitata , *C. palmata* , *C. californica* , *C. cylindrata* , *C. cordata*
C. martinezii , *C. okeechobeensis* , *C. lundelliana*
C. sororia , *C. gracilior* , *C. palmeri* ; *C. argyrosperma* (reported as *C. mixta*) was considered close to the three previous species
C. maxima , *C. andreana*
C. pepo , *C. texana*
C. moschata , *C. ficifolia* , *C. pedatifolia* , *C. foetidissima* , and *C. ecuadorensis* were placed in their own separate species groups as they were not considered significantly close to any of the other species studied .

== Phylogeny ==

The full phylogeny of this genus is unknown , and research was ongoing in 2014 . The following cladogram of *Cucurbita* phylogeny is based upon a 2002 study of mitochondrial DNA by Sanjur and colleagues .

== Reproductive biology ==

All species of *Cucurbita* have 20 pairs of chromosomes . Many North and Central American species are visited by specialist pollinators in the apid tribe Eucerini , especially the genera *Peponapis* and *Xenoglossa* , and these squash bees can be crucial to the flowers producing fruit after pollination .

When there is more pollen applied to the stigma , more seeds are produced in the fruits and the fruits are larger with greater likelihood of maturation , an effect called xenia . Competitively grown specimens are therefore often hand @-@ pollinated to maximize the number of seeds in the fruit , which increases the fruit size ; this pollination requires skilled technique . Seedlessness is known to occur in certain cultivars of *C. pepo* .

The most critical factors in flowering and fruit set are physiological , having to do with the age of the plant and whether it already has developing fruit . The plant hormones ethylene and auxin are key in fruit set and development . Ethylene promotes the production of female flowers . When a plant already has a fruit developing , subsequent female flowers on the plant are less likely to mature , a phenomenon called " first @-@ fruit dominance " , and male flowers are more frequent , an effect that appears due to reduced natural ethylene production within the plant stem . Ethephon , a plant growth regulator product that is converted to ethylene after metabolism by the plant , can be used to

increase fruit and seed production .

The plant hormone gibberellin , produced in the stamens , is essential for the development of all parts of the male flowers . The development of female flowers is not yet understood . Gibberellin is also involved in other developmental processes of plants such as seed and stem growth .

= = = Germination and seedling growth = = =

Seeds with maximum germination potential develop (in *C. moschata*) by 45 days after anthesis , and seed weight reaches its maximum 70 days after anthesis . Some varieties of *C. pepo* germinate best with eight hours of sunlight daily and a planting depth of 1 @. @ 2 centimeters (0 @. @ 47 in) . Seeds planted deeper than 12 @. @ 5 centimeters (4 @. @ 9 in) are not likely to germinate . In *C. foetidissima* , a weedy species , plants younger than 19 days old are not able to sprout from the roots after removing the shoots . In a seed batch with 90 percent germination rate , over 90 percent of the plants had sprouted after 29 days from planting .

Experiments have shown that when more pollen is applied to the stigma , as well as the fruit containing more seeds and being larger (the xenia effect mentioned above) , the germination of the seeds is also faster and more likely , and the seedlings are larger . Various combinations of mineral nutrients and light have a significant effect during the various stages of plant growth . These effects vary significantly between the different species of *Cucurbita* . A type of stored phosphorus called phytate forms in seed tissues as spherical crystalline intrusions in protein bodies called globoids . Along with other nutrients , phytate is used completely during seedling growth . Heavy metal contamination , including cadmium , has a significant negative impact on plant growth . *Cucurbita* plants grown in the spring tend to grow larger than those grown in the autumn .

= = Distribution and habitat = =

Archaeological investigations have found evidence of domestication of *Cucurbita* going back over 8 @, @ 000 years from the very southern parts of Canada down to Argentina and Chile . Centers of domestication stretch from the Mississippi River watershed and Texas down through Mexico and Central America to northern and western South America . Of the 27 species that Nee delineates , five are domesticated . Four of them , *C. argyrosperma* , *C. ficifolia* , *C. moschata* , and *C. pepo* , originated and were domesticated in Mesoamerica ; for the fifth , *C. maxima* , these events occurred in South America .

Within *C. pepo* , the pumpkins , the scallops , and possibly the crooknecks are ancient and were domesticated at different times and places . The domesticated forms of *C. pepo* have larger fruits than non @- @ domesticated forms and seeds that are bigger but fewer in number . In a 1989 study on the origins and development of *C. pepo* , botanist Harry Paris suggested that the original wild specimen had a small round fruit and that the modern pumpkin is its direct descendant . He suggested that the crookneck , ornamental gourd , and scallop are early variants and that the acorn is a cross between the scallop and the pumpkin .

C. argyrosperma is not as widespread as the other species . The wild form *C. a. subsp. sororia* is found from Mexico to Nicaragua , and cultivated forms are used in a somewhat wider area stretching from Panama to the southeastern United States . It was probably bred for its seeds , which are large and high in oil and protein , but its flesh is of poorer quality than that of *C. moschata* and *C. pepo* . It is grown in a wide altitudinal range : from sea level to as high as 1 @, @ 800 meters (5 @, @ 900 ft) in dry areas , usually with the use of irrigation , or in areas with a defined rainy season , where seeds are sown in May and June .

C. ficifolia and *C. moschata* were originally thought to be Asiatic in origin , but this has been disproven . The origin of *C. ficifolia* is Latin America , most likely southern Mexico , Central America , or the Andes . It grows at altitudes ranging from 1 @, @ 000 meters (3 @, @ 300 ft) to 3 @, @ 000 meters (9 @, @ 800 ft) in areas with heavy rainfall . It does not hybridize well with the other cultivated species as it has significantly different enzymes and chromosomes .

C. maxima originated in South America over 4 @, @ 000 years ago , probably in Argentina and

Uruguay . The plants are sensitive to frost , and they prefer both bright sunlight and soil with a pH of 6 @. @ 0 to 7 @. @ 0 . *C. maxima* did not start to spread into North America until after the arrival of Columbus . Varieties were in use by native peoples of the United States by the 16th century . Types of *C. maxima* include *triloba* , *zapallito* , *zipinka* , *Banana* , *Delicious* , *Hubbard* , *Marrow* (*C. maxima* *Marrow*) , *Show* , and *Turban* .

C. moschata is native to Latin America , but the precise location of origin is uncertain . It has been present in Mexico , Belize , Guatemala , and Peru for 4 @, @ 000 ? 6 @, @ 000 years and has spread to Bolivia , Ecuador , Panama , Puerto Rico , and Venezuela . This species is closely related to *C. argyrosperma* . A variety known as the Seminole Pumpkin has been cultivated in Florida since before the arrival of Columbus . Its leaves are 20 to 30 centimeters (8 to 12 in) wide . It generally grows at low altitudes in hot climates with heavy rainfall , but some varieties have been found above 2 @, @ 200 meters (7 @, @ 200 ft) . Groups of *C. moschata* include *Cheese* , *Crookneck* (*C. moschata*) , and *Bell* .

C. pepo is one of the oldest , if not the oldest , domesticated species with the oldest known locations being Oaxaca , Mexico , 8 @, @ 000 ? 10 @, @ 000 years ago , and Ocampo , Tamaulipas , Mexico , about 7 @, @ 000 years ago . It is known to have appeared in Missouri , United States , at least 4 @, @ 000 years ago . Debates about the origin of *C. pepo* have been on @-@ going since at least 1857 . There have traditionally been two opposing theories about its origin : 1) that it is a direct descendant of *C. texana* and 2) that *C. texana* is merely feral *C. pepo* . A more recent theory by botanist Thomas Andres in 1987 is that descendants of *C. fraterna* hybridized with *C. texana* , resulting in two distinct domestication events in two different areas : one in Mexico and one in the eastern United States , with *C. fraterna* and *C. texana* , respectively , as the ancestral species . *C. pepo* may have appeared in the Old World before moving from Mexico into South America . It is found from sea level to slightly above 2 @, @ 000 meters (6 @, @ 600 ft) . Leaves have 3 ? 5 lobes and are 20 ? 35 centimeters (8 ? 14 in) wide . All the subspecies , varieties , and cultivars are interfertile . In 1986 Paris proposed a revised taxonomy of the edible cultivated *C. pepo* based primarily on the shape of the fruit , with eight groups . All but a few *C. pepo* cultivars can be included in these groups . There is one non @-@ edible cultivated variety : *C. pepo* var. *ovifera* .

= = History and domestication = =

The ancestral species of the genus *Cucurbita* were present in the Americas before the arrival of humans , and are native to the New World . The likely center of origin is southern Mexico , spreading south through what is now known as Mesoamerica , on into South America , and north to what is now the southwestern United States . Evolutionarily speaking , the genus is relatively recent in origin , dating back only to the Holocene , whereas the family Cucurbitaceae , in the shape of seeds similar to *Bryonia* , dates to the Paleocene . No species within the genus is entirely genetically isolated . *C. moschata* can intercross with all the others , though the hybrid offspring may not themselves be fertile unless they become polyploid . The genus was part of the culture of almost every native peoples group from southern South America to southern Canada . Modern @-@ day cultivated *Cucurbita* are not found in the wild . Genetic studies of the mitochondrial gene *nad1* show there were at least six independent domestication events of *Cucurbita* separating domestic species from their wild ancestors . Species native to North America include *C. digitata* (*calabazilla*) , and *C. foetidissima* (*buffalo gourd*) , *C. palmata* (*coyote melon*) , and *C. pepo* . Some species , such as *C. digitata* and *C. ficifolia* , are referred to as gourds . Gourds , also called bottle @-@ gourds , which are used as utensils or vessels , belong to the genus *Lagenaria* and are native to Africa . *Lagenaria* are in the same family and subfamily as *Cucurbita* but in a different tribe .

The earliest known evidence of the domestication of *Cucurbita* dates back at least 8 @, @ 000 years ago , predating the domestication of other crops such as maize and beans in the region by about 4 @, @ 000 years . This evidence was found in the Guilá Naquitz cave in Oaxaca , Mexico , during a series of excavations in the 1960s and 1970s , possibly beginning in 1959 . Solid evidence of domesticated *C. pepo* was found in the Guilá Naquitz cave in the form of increasing rind thickness and larger peduncles in the newer stratification layers of the cave . By c . 8 @, @ 000 years BP the

C. pepo peduncles found are consistently more than 10 millimeters (0 @. @ 39 in) thick . Wild Cucurbita peduncles are always below this 10 mm barrier . Changes in fruit shape and color indicate that intentional breeding of C. pepo had occurred by no later than 8 @, @ 000 years BP . During the same time frame , average rind thickness increased from 0 @. @ 84 millimeters (0 @. @ 033 in) to 1 @. @ 15 millimeters (0 @. @ 045 in) .

Squash was domesticated first , followed by maize and then beans , becoming part of the Three Sisters agricultural system of companion planting . The English word " squash " derives from askutasquash (a green thing eaten raw) , a word from the Narragansett language , which was documented by Roger Williams , the founder of Rhode Island , in his 1643 publication A Key Into the Language of America . Similar words for squash exist in related languages of the Algonquian family .

== Production ==

The family Cucurbitaceae has many species used as human food . Cucurbita is one of the most important of those , with the various species being prepared and eaten in many ways . Although the stems and skins tend to be more bitter than the flesh , the fruits and seeds of cultivated varieties are quite edible and need little or no preparation . The flowers and young leaves and shoot tips can also be consumed . The seeds and fruits of most varieties can be stored for long periods of time , particularly the sweet @-@ tasting winter varieties with their thick , inedible skins . Summer squash have a thin , edible skin . The seeds of both types can be roasted , eaten raw , made into pumpkin seed oil , ground into a flour or meal , or otherwise prepared .

Squashes are primarily grown for the fresh food market . The Food and Agriculture Organization of the United Nations (FAO) reported that the ranking of the top five squash @-@ producing countries was stable between 2005 and 2009 . Those countries are : China , India , Russia , the United States , and Egypt . By 2012 , Iran had moved into the 5th slot , with Egypt falling to 6th . The top 10 countries in terms of metric tons of squashes produced are :

The only additional countries that rank in the top 20 where squashes are native are Cuba , which ranks 14th with 347 @, @ 082 metric tons , and Argentina , which ranks 17th , with 326 @, @ 900 metric tons . In addition to being the 4th largest producer of squashes in the world , the United States is the world 's largest importer of squashes , importing 271 @, @ 614 metric tons in 2011 , 95 percent of that from Mexico . Within the United States , the states producing the largest amounts are Florida , New York , California , and North Carolina .

This is how Cucurbita compares to several other major Cucurbitaceae crops in terms of crop tonnage harvested :

== Nutrients ==

As an example of Curcubita , raw summer squash is 94 % water , 3 % carbohydrates , and 1 % protein , with negligible fat content (table) . In 100 grams , raw squash supplies 16 calories and is rich in vitamin C (20 % of the Daily Value , DV) , moderate in vitamin B6 and riboflavin (12 @-@ 17 % DV) , but otherwise devoid of appreciable nutrient content (table) , although the nutrient content of different Curcubita species may vary somewhat .

Pumpkin seeds contain vitamin E , crude protein , B vitamins and several dietary minerals (see nutrition table at pepita) . Also present in pumpkin seeds are unsaturated and saturated oils , palmitic , oleic and linoleic fatty acids , as well as carotenoids .

== Toxins ==

Cucurbitin is an amino acid and a carboxypyrrolidine that is found in raw Cucurbita seeds . It retards the development of parasitic flukes when administered to infected host mice , although the effect is only seen if administration begins immediately after infection .

Cucurmosin is a ribosome inactivating protein found in the flesh and seed of Cucurbita , notably

Cucurbita moschata . Cucurmosin is more toxic to cancer cells than healthy cells .

Cucurbitacin is a plant steroid present in wild *Cucurbita* and in each member of the family Cucurbitaceae . Poisonous to mammals , it is found in quantities sufficient to discourage herbivores . It makes wild *Cucurbita* and most ornamental gourds , with the exception of an occasional *C. fraterna* and *C. sororia* , bitter to taste . Ingesting too much cucurbitacin can cause stomach cramps , diarrhea and even collapse . This bitterness is especially prevalent in wild *Cucurbita* ; in parts of Mexico the flesh of the fruits is rubbed on a woman 's breast to wean children . While the process of domestication has largely removed the bitterness from cultivated varieties , there are occasional reports of cucurbitacin causing illness in humans . Cucurbitacin is also used as a lure in insect traps .

= = Pests and diseases = =

Cucurbita species are used as food plants by the larvae of some Lepidoptera species , including the Cabbage Moth (*Mamestra brassicae*) , Hypercompe indecisa , and the Turnip Moth (*Agrotis segetum*) . *Cucurbita* can be susceptible to the pest *Bemisia argentifolii* (silverleaf whitefly) as well as aphids (*Aphididae*) , cucumber beetles (*Acalymma vittatum* and *Diabrotica undecimpunctata howardi*) , squash bug (*Anasa tristis*) , the squash vine borer (*Melittia cucurbitae*) , and the twospotted spidermite (*Tetranychus urticae*) . The squash bug causes major damage to plants because of its very toxic saliva . The red pumpkin beetle (*Raphidopalpa foveicollis*) is a serious pest of cucurbits , especially the pumpkin , which it can defoliate . Cucurbits are susceptible to diseases such as bacterial wilt (*Erwinia tracheiphila*) , anthracnose (*Colletotrichum* spp .) , fusarium wilt (*Fusarium* spp .) , phytophthora blight (*Phytophthora* spp. water molds) , and powdery mildew (*Erysiphe* spp .) . Defensive responses to viral , fungal , and bacterial leaf pathogens do not involve cucurbitacin .

Species in the genus *Cucurbita* are susceptible to some types of mosaic virus including : Cucumber mosaic virus (CMV) , Papaya ringspot virus @-@ cucurbit strain (PRSV) , Squash mosaic virus (SqMV) , Tobacco ringspot virus (TRSV) , Watermelon mosaic virus (WMV) , and Zucchini yellow mosaic virus (ZYMV) . PRSV is the only one of these viruses that does not affect all cucurbits . SqMV and CMV are the most common viruses among cucurbits . Symptoms of these viruses show a high degree of similarity , which often results in laboratory investigation being needed to differentiate which one is affecting plants .

= = Human culture = =

= = = Art , music , and literature = = =

Along with maize and beans , squash has been depicted in the art work of the native peoples of the Americas for at least 2 @,@ 000 years . For example , cucurbits are often represented in Moche ceramics .

Though native to the western hemisphere , *Cucurbita* began to spread to other parts of the world after Christopher Columbus 's arrival in the New World in 1492 . Until recently , the earliest known depictions of this genus in Europe was of *Cucurbita pepo* in *De Historia Stirpium Commentarii Insignes* in 1542 by the German botanist Leonhart Fuchs , but in 1992 , two paintings , one of *C. pepo* and one of *C. maxima* , painted between 1515 and 1518 , were identified in festoons at Villa Farnesina in Rome . Also , in 2001 depictions of this genus were identified in *Grandes Heures of Anne of Brittany* (*Les Grandes Heures d 'Anne de Bretagne*) , a French devotional book , an illuminated manuscript created between 1503 and 1508 . This book contains an illustration known as *Quegourdes de turquie* , which was identified by cucurbit specialists as *C. pepo* subsp. *texana* in 2006 .

In 1952 , Stanley Smith Master , using the pen name Edrich Siebert , wrote " The Marrow Song (Oh what a beauty !) " to a tune in 6 / 8 time . It became a popular hit in Australia in 1973 , and was

revived by the Wurzels in Britain on their 2003 album *Cutler of the West* . John Greenleaf Whittier wrote a poem entitled *The Pumpkin* in 1850 . " *The Great Pumpkin* " is a fictional holiday figure in the comic strip *Peanuts* by Charles M. Schulz .

== = Soap == =

The fruit pulp of some species , such as *C. foetidissima* , can be used as a soap or detergent .

== = Folk remedies == =

Cucurbita have been used in various cultures as folk remedies . Pumpkins have been used by Native Americans to treat intestinal worms and urinary ailments . This Native American remedy was adopted by American doctors in the early nineteenth century as an anthelmintic for the expulsion of worms . In southeastern Europe , seeds of *C. pepo* were used to treat irritable bladder and benign prostatic hyperplasia . In Germany , pumpkin seed is approved for use by the Commission E , which assesses folk and herbal medicine , for irritated bladder conditions and micturition problems of prostatic hyperplasia stages 1 and 2 , although the monograph published in 1985 noted a lack of pharmacological studies that could substantiate empirically found clinical activity . The FDA in the United States , on the other hand , banned the sale of all such non @-@ prescription drugs for the treatment of prostate enlargement in 1990 .

In China , *C. moschata* seeds were also used in traditional Chinese medicine for the treatment of the parasitic disease schistosomiasis and for the expulsion of tape worms .

In Mexico , herbalists use *C. ficifolia* in the belief that it reduces blood sugar levels .

== = Culinary uses == =

Long before European contact , *Cucurbita* had been a major food source for the native peoples of the Americas , and the species became an important food for European settlers , including the Pilgrims , even featuring at the first Thanksgiving . Commercially made pumpkin pie mix is most often made from varieties of *C. moschata* ; ' Libby 's Select ' uses the Select Dickinson Pumpkin variety of *C. moschata* for its canned pumpkin . Other foods that can be made using members of this genus include biscuits , bread , cheesecake , desserts , donuts , granola , ice cream , lasagna dishes , pancakes , pudding , pumpkin butter , salads , soups , and stuffing . The xerophytic species are proving useful in the search for nutritious foods that grow well in arid regions . *C. ficifolia* is used to make soft and mildly alcoholic drinks .

In India , squashes (ghia) are cooked with seafood such as prawns . In France , marrows (courge) are traditionally served as a gratin , sieved and cooked with butter , milk , and egg , and flavored with salt , pepper , and nutmeg , and as soups . In Italy , zucchini and larger squashes are served in a variety of regional dishes , such as cocuzze alla puviredda cooked with olive oil , salt and herbs from Puglia ; as torta di zucca from Liguria , or torta di zucca e riso from Emilia @-@ Romagna , the squashes being made into a pie filling with butter , ricotta , parmesan , egg , and milk ; and as a sauce for pasta in dishes like spaghetti alle zucchini from Sicily . In Japan , squashes such as small *C. moschata* pumpkins (kabocha) are eaten boiled with sesame sauce , fried as a tempura dish , or made into balls with sweet potato and Japanese mountain yam .

== = Festivals == =

Cucurbita fruits including pumpkins and marrows are celebrated in festivals in countries such as Argentina , Bolivia , Britain , Canada , Croatia , France , Germany , Italy , Japan , Peru , Portugal , Spain , Switzerland , and the United States . Argentina holds an annual nationwide pumpkin festival Fiesta Nacional del Zapallo (" Squashes and Pumpkins National Festival ") , in Ceres , Santa Fe , on the last day of which a Reina Nacional del Zapallo (" National Queen of the Pumpkin ") is chosen . In Portugal the Festival da Abóbora de Lourinhã e Atalaia (" Squashes and Pumpkins

Festival in Lourinhã and Atalaia ") is held in Lourinhã city , called the Capital Nacional da Abóbora (the " National Capital of Squashes and Pumpkins ") . Ludwigsburg , Germany annually hosts the world 's largest pumpkin festival . In Britain a giant marrow (zucchini) weighing 54 @. @ 3177 kilograms (119 @. @ 750 lb) was displayed in the Harrogate Autumn Flower Show in 2012 . In the USA , pumpkin chucking is practiced competitively , with machines such as trebuchets and air cannons designed to throw intact pumpkins as far as possible . The Keene Pumpkin Fest is held annually in New Hampshire ; in 2013 it held the world record for the most jack @- @ o @- @ lanterns lit in one place , 30 @, @ 581 on October 19 , 2013 .

Halloween is widely celebrated with jack @- @ o @- @ lanterns made of large orange pumpkins carved with ghoulish faces and illuminated from inside with candles . The pumpkins used for jack @- @ o @- @ lanterns are C. pepo , not to be confused with the ones typically used for pumpkin pie in the United States , which are C. moschata . Kew Gardens marked Halloween in 2013 with a display of pumpkins , including a towering pyramid made of many varieties of squash , in the Waterlily House during its " IncrEdibles " festival .