

Chayote Production Guidelines for Hawaii

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Chayote, Sechium edule, is a delicious and versatile vegetable member of the cucurbit family which is fast becoming one of the top specialty vegetables in the United States. Also known as vegetable pear, mirliton pear, pimpinella, cho-cho (japanese), and güisquil (Spanish), this prolific climbing plant originated in Mexico and Guatemala and is now an important food in tropical and subtropical regions of the world. Its popularity as a tasty addition in the dinner table has spread to Brazil, the Caribbean, Gulf States, California, East Indies, Australia, and Southern Europe. Air transportation has made the fruit available to world markets in temperate areas. In the U.S. chayote is grown commercially in Florida, California, and Louisiana. The U.S. imports about 8,000 MT annually from Costa Rica, Mexico, Guatemala, and Dominican Republic. In Hawaii, chayote is grown primarily in home gardens. The fruit is available year-round in supermarkets with specialty fresh produce sections.

Crop Description

Chayote is an herbaceous perennial climbing vine which may grow up to 50 feet or more in length. The plants with yellow, greenish white flowers, are monoecious (produce separate female and male flowers in the same plant), and are frequently grown in trellises. The plant is very prolific, producing up to 100 fruits in a season. The pear-shaped fruits about the size of a mango have a smooth or spiny, white to pale green skin with a firm, delicate nut-flavored flesh. The fruit bears a single distinctive large seed, and mature 28-35 days after pollination by bees or manually. A distinctive botanical trait of the fruit is its ability to sprout from the seed embryo while the fruit is still attached to and growing on the vine, an undesirable and unique horticultural phenomenon defined as vivipary.

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Undesirable sprouting may also occur after harvest, during transit, marketing, and in the kitchen counter.

Uses

Edible parts of chayote include the fruit, flowers, seeds, young leaves and the root. The young and tender leaves are eaten and cooked like asparagus. The shoots are used in soups. The seeds are eaten fried and roasted. The tubers can be picked after two years and be boiled or fried. The fruit, however, is the most popular chayote product in the marketplace. For a healthy meal the fruit can be parboiled and blended with meat, vegetables and seasoned with garlic and onion. The versatile fruit may also be curried, fried in batter, casseroled, creamed, scalloped, sauteed, or pickled. Fruits are often peeled in running water because some people are sensitive to the slippery juice that exudes from the fruit skin. This irritant is harmless after cooking. Chayote is nutritious, high in fiber, potassium, calcium, iron, and vitamin C.

Climatic Responses

Chayote can be grown in the tropics and subtropics from sea-level to 6000 feet above sea-level. The crop is very sensitive to frost. Optimum conditions for growth and fruiting are 30C daytime and >15C nighttime temperatures. It requires 12 to 12.5 hr daylength for flowering. The plant can grow under full sun to mild shaded conditions. Fruits exposed to full sun are light yellow, while shade-grown plants produce darker green fruit.

Culture and Management

Soil

Chayote prefers rich, well-drained soil. It can not withstand water-logging. In wet high rainfall areas it is planted in raised hills or mounds. Good preparation of the planting hole is important. Work the soil 2 feet deep and 3 feet in diameter. Addition of organic matter will improve drainage and nutrient uptake.

Propagation and Planting

Propagation is by planting the entire fruit. Young basal shoot cuttings are also sometimes used. Place the fruit at a 45 degree angle with the shoot downward and the narrow stem-end base slightly protruding from the soil line. Deep planting will lead to fruit rot. Space plants 7-11 feet apart. Some growers use a 12 x 12 field spacing. The trellis is about 6 feet tall and needs to be solid to support the prolific growing vines. In home-gardens the plants can be trained to grow on trees or fences. In areas with no irrigation, the crop is planted at the beginning of the rainy season. Planting material (whole fruits) are normally available locally from fellow gardeners or growers.

Irrigation

Chayote needs ample soil moisture for good growth. Irrigation is necessary during dry spells in the growing cycle. Do not allow the soil to waterlog, however. Sprinkler irrigation may disrupt bee activity during pollination resulting in flower abscission.

Fertilization

In the homegarden chayote requires little nitrogen but fruit yields do respond to potassium fertilization. Excessive nitrogen applications may promote vine growth at the expense of fruit yields. Excessive nitrogen may also result in flower abscission. Under commercial conditions rates between 300-500 lbs/acre of N are required to attain maximum yields. For maximum yields the N is applied every two months at two application points 5 inches deep at a 5 inch distance from the plant, plus 50 lb/acre of P₂O₅ applied all at planting, and 50 lbs/acre of K₂O applied half at planting, and the second half six months after planting. Commercial growers in Florida, however, only fertilize three times: at planting in the fall, again at mid-summer, and when the fruits are small.

In Brazil chayote was found to extract from the soil in pounds per acre: nitrogen =20; phosphorus = 3.5; Potassium= 15.5; Calcium= 122.7; and magnesium= 4, in a 150 growing cycle. In a 200 day

growing season, chayote was found to absorb most nitrogen and phosphorus between 105 and 135 days after planting, and to absorb most potassium between 150 and 165 days after planting. In the 200 growth cycle chayote removed 48 lbs of N; 9.5 lbs of phosphorus, and 10 lbs of calcium on a per acre basis.

Nutrient tissue concentration in Chayote during flowering

N Treatment (lbs/acre)	N	P	K	Ca	Mg	No. marketable fruits/treatment
0	2.8	0.46	2	2.4	2.4	69
300	4.3	0.52	2.7	1.5	2	684

Mean of tissue concentrations from the 5th and 6th leaves taken at the 3 flowering peaks during the growing cycle (10 Mar., 30 May, and 30 July).

Source: Pacheco et al., Turrialba (40:304(1990)).

Harvest

The vines flower in 3-5 months and the fruits are ready for harvest 28-32 days after pollination. Under commercial conditions the fruit is picked two or three times weekly when slightly immature, just before the seed protrudes from the apex. Yields vary from 75-600 fruit per vine which amount to 50,000 fruit per acre in commercial fields (60-100,000 lbs/acre). Yields often decline after the third year. To control growth habit and for ease of harvest, vines may be trimmed after each harvest. In southern Florida commercial growers target two crops per year, a light crop which lasts from late spring to early summer, and the main crop from the fall to winter.

Postharvest handling

Fruits must be harvested and handled carefully to prevent cuts, bruises, and spread of diseases. It is normally pre-cooled in cold rooms or through forced air. In the market, it is packaged in fiberboard boxes with dividers, each piece in a film bag, single layer,

24-30 count for 20 lbs per box. The boxes are hand-loaded or unitized on pallets. During handling the fruits are sensitive to chilling at <41F (5C), to moisture loss, and are sensitive to ethylene. Chilling injury results in swollen, watery looking spots formed on the periderm. Chayote can be stored for 4-6 weeks at 45F and 85-90 RH. Sprouting is promoted at >78F (25C).

Pests and Diseases

Diseases and insects are similar to those affecting squash and pumpkin. Roots of chayote are susceptible to the nematode Heterodera radicum. The melon fly causes blemishes, but do not develop on the fruit. Other insect pests include cucumber beetle, squash ladybug, and the squash vine borer. Outbreaks of the chayote stem borer (Adetus fuscoapicalis) (Coleoptera; Cerambycidae) occur in Sao Paulo, Brazil. Early downy mildew attacks often kills chayote before reaching maturity. Common diseases in the tropics include Mycovellosiella cucurbiticola, and Ascochyta phaseolorum. These diseases are common during the rainy season and persist until harvest. High disease incidence of Mycovellosiella and Ascochyta have also been observed in fields receiving high nitrogen fertilization rates.