

Production Guide for Choy Sum—An Emerging Asian Vegetable in Florida¹

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Choy sum, also spelled choi sum, is a member of the genus *Brassica* of the mustard family, Brassicaceae (*Brassica rapa* var. *parachinensis* or *Brassica chinensis* var. *parachinensis*). This leafy crop is also known as Chinese flowering cabbage. In Mandarin, choy sum is called “caixin” which means “the heart of a cabbage.” It has been widely cultivated in southern China for more than 1,000 years and is currently cultivated and consumed by a growing population in the western world. In China, the plants are often harvested during winter, when there are fewer vegetable types available in the market. Although all aboveground plant parts of choy sum are edible, this crop is harvested primarily for the flowering stems that bear leaves during bolting. There are two common cultivars: choy sum (*Brassica rapa* subsp. *chinensis* var. *parachinensis*) (Figure 1A) and purple cai-tai choy sum (*Brassica rapa* subsp. *chinensis* var. *purpuraria*) (Figure 1B) (USDA 2020). The stem and branches of choy sum are light green while the purple cai-tai are purple. The flowering shoots of bok choy (*Brassica rapa* subsp. *chinensis*) (Figure 1C) are also sometimes categorized as a type of choy sum (Zhang et al. 2016).

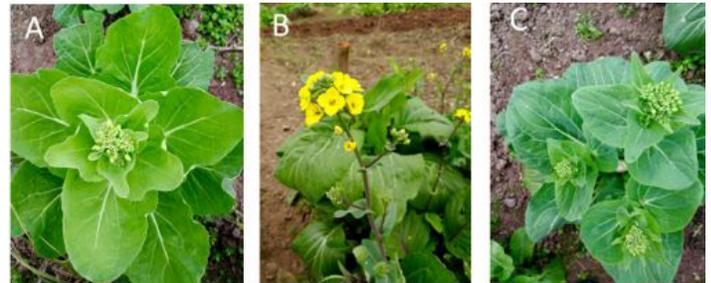


Figure 1. A) Choy sum (*Brassica rapa* subsp. *chinensis* var. *parachinensis*) plant. B) Purple cai-tai choy sum (*Brassica rapa* subsp. *chinensis* var. *purpuraria*) plant. C) Flowering bok choy (*Brassica rapa* subsp. *chinensis*) plant.

Credits: Qingrong Tang, Kaijiang, Sichuan, China

Choy sum has alternate leaves with small yellow flowers on the top of each shoot. Every flower has four oval-to-round petals and six stamens. The main stem is about 0.2 to 0.4 inches (0.5 to 1 cm) in diameter at the base and 6 to 8 inches (15 to 20 cm) in height (Figure 2). The leaves are oval, and the color is light to dark green or even purple on some purple cai-tai. It has silique fruit with small, dark, round seeds inside.

Description

Choy sum is an herbaceous annual plant and is 8 to 16 inches (20 to 41 cm) tall, depending on genetic and environmental conditions. The roots are shallow and can reach 5 inches (13 cm) in depth and radius in the soil. Flowers initiate when there are seven to eight leaves or when the plant is about 8 inches (20 cm) tall.

Cultivation

Choy sum is a cool-season crop. Low temperatures (59°F to 77°F or 15°C to 25°C) promote strong stalks and increase sweetness, but only the purple cultivar can tolerate frost (Moore and Morgan 1998). In Florida, choy sum should be grown in mid- to late spring and early autumn to avoid frost. Choy sum adapts to a wide range of soil types

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but prefers fertile and well-drained soils (Moore and Morgan 1998). It can tolerate moderate water deficit but is susceptible to waterlogging (Chin 1999). Choy sum should be planted in raised beds if waterlogging or heavy rain is a problem. The preferred soil pH range is 6–7 (Moore and Morgan 1998). In sandy soils, the typical plant spacing is 11 inches (28 cm) between rows and 8–12 inches (20–30 cm) between plants (Vavrina 1992). Seeds are planted at the depth of 0.24 inches (0.6 cm) (Moore and Morgan 1998). Transplants are often used for varieties with larger plant size and longer growth period (PlantUse English 2016). Harvest begins 30–50 days (Nguyen 1992) after sowing when the flower buds are fully developed but not open. Leaves, flower buds, and stems are harvested together. There are two to three harvests for each season, and the total yield is 9,800 to 16,000 lb/acre (11–18 t/ha) (Shuler 1995). Larger seeds and appropriate irrigation can improve yield and product quality (Yip et al. 1976). It is vulnerable to inadequate water and nitrogen fertilization (Nobel 2009).



Figure 2. A purple cai-tai choy sum shoot of about 8 inches (20 cm) in length.

Credits: Qingrong Tang, Kaijiang, Sichuan, China

There is no fertilization recommendation available for this new crop, but it belongs to the same family as cabbage. Therefore, Florida growers can use the recommendations for cabbage for the time being: 150, 120 and 100 lb/acre (168, 135, and 112 kg/ha) N phosphate pentoxide for very low, low, and medium P; it is the same rate of potassium oxide input for K (Liu et al. 2019). Irrigation should be once or twice a week based on evapotranspiration from your local weather station (<https://fawn.ifas.ufl.edu/>; Kamarudin et al. 2014; Khairun et al. 2016).

Choy sum is susceptible to pests and diseases common to the Brassica family. The common insect pests are beet armyworm (*Spodoptera exigua*) and fall armyworm (*Spodoptera frugiperda*) in fall, sporadic aphid infestations in winter and early spring, and diamondback moth (DBM, *Plutella xylostella*) in spring, as well as aphids (*Brevicoryne brassicaea*), green looper caterpillar (*Trichoplusia ni*), and white butterfly caterpillar (*Pieris brassicae*) (Nguyen 1992). Choy sum plants cannot withstand more than 40% volumetric soil water or 300 mm rainfall per month, which will cause bacterial soft rot (Vavrina 1992; DOA 1998; Kamarudin et al. 2014).

Consumption

Choy sum is nutritious and is especially rich in folate (Vitamin B9) (Table 1) (Houlihan et al. 2011) and carotenoid (Wills and Rangka 1996). Like other vegetables of Brassicaceae (Cruciferae) (broccoli, cabbage, spruce sprout, etc.), choy sum also contains high levels of sulfur compounds that can reduce the risk of cardiovascular diseases and some cancers (Lin and Harnly 2010). Antioxidants were almost triple in steamed choy sum compared with raw (Wachtel-Galor et al. 2008).



Figure 3. Cooked choy sum. A) Flowered choy sum chopped into pieces and stir-fried with dried chili pepper. Credit: Yi Wang; B) Purple choy sum chopped and stir-fried with garlic and Sichuan peppercorns. Credits: Yi Wang, Kaijiang, Sichuan, China

Consumers often stir-fry choy sum with garlic or dried chili pepper (Figure 3A, B). Choy sum is also used in salads and soups. The shelf life of choy sum can reach up to nine days in ideal conditions (Temperature = $5 \pm 1^\circ\text{C}$, R.H. = 40%–60%) (Chung et al. 2012). It should be consumed as soon as possible to avoid loss of quality, especially the conversion of nitrate to nitrite, which has detrimental effects to human health (Chung et al. 2012).

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Table 1. Table 1. Nutrient composition of raw choy sum (long pale to mid-green stem with rounded pale and mid-green leaves and flowers).

Nutrient	Unit	100 g	1g
Energy, without dietary fiber	kJ	48	0
Energy, including dietary fiber	kJ	71	1
Moisture	g	94.2	0.9
Protein	g	1.3	0
Nitrogen	g	0.21	0
Fat	g	0.3	0
Ash	g	1.1	0
Dietary fiber	g	2.8	0
Ethanol	g	0	0
Fructose	g	0.3	0
Glucose	g	0.5	0
Sucrose	g	0	0
Maltose	g	0	0
Lactose	g	0	0
Total sugars	g	0.8	0
Added sugars	g	0	0
Free sugars	g	0	0
Starch	g	0.1	0
Available carbohydrate, without sugar alcohols	g	0.9	0
Available carbohydrate, with sugar alcohols	g	0.9	0
Organic acids	g		
Citric acid	g	0	0
Lactic acid	g	0	0
Malic acid	g	0	0
Oxalic acid	g	0	0
Quinic acid	g	0	0
Minerals			
Calcium (Ca)	mg	70	1
Iodine (I)	mg	4.1	0
Iron (Fe)	mg	1.7	0.02
Magnesium (Mg)	mg	12	0
Phosphorus (P)	mg	40	0
Potassium (K)	mg	340	3
Selenium (Se)	µg	0	0
Sodium (Na)	mg	13	0
Zinc (Zn)	mg	0.5	0
Vitamins			
Retinol	µg	0	0
Alpha carotene	µg	15	0
Beta carotene	µg	1360	14
Cryptoxanthin	µg	20	0
Beta carotene equivalents	µg	1378	14
Retinol equivalents	µg	230	2
Thiamin (B1)	mg	0.01	0
Riboflavin (B2)	mg	0.1	0.001

Nutrient	Unit	100 g	1g
Niacin (B3)	mg	0.8	0.01
Niacin derived from tryptophan	mg	0.14	0
Niacin derived equivalents	mg	0.94	0.01
Pyridoxine (B6)	mg	0.09	0
Cobalamin (B12)	µg	0	0
Folate, natural	µg	425	4
Folic acid	µg	0	0
Total folates	µg	425	4
Dietary folate equivalents	µg	425	4
Vitamin C	mg	46	0
Cholecalciferol (D3)	µg	0	0
Ergocalciferol (D2)	µg	0	0
25-OH Cholecalciferol (25-OH D3)	µg	0	0
25-OH Ergocalciferol (25-OH D2)	µg	0	0
Vitamin D3 equivalents	µg	0	0
Alpha tocopherol	mg	0	0
Vitamin E	mg	0	0
Fatty acids			
Total saturated fatty acids (%)	%T	0	0
Total monounsaturated fatty acids (%)	%T	0	0
C18:2w6	%T	0	0
C18:3w3	%T	0	0
C20:5w3	%T	0	0
C22:5w3	%T	0	0
C22:6w3	%T	0	0
Total polyunsaturated fatty acids (%)	%T	0	0
Total long chain omega 3 fatty acids (%)	%T	0	0
Total saturated fatty acids (g)	g	0	0
Total monounsaturated fatty acids (g)	g	0	0
C18:2w6FD	g	0	0
C18:3w3FD	g	0	0
C20:5w3FD	mg	0	0
C22:5w3FD	mg	0	0
C22:6w3FD	mg	0	0
Total polyunsaturated fatty acids (g)	g	0	0
Total long chain omega 3 fatty acids (mg)	mg	0	0
Total trans fatty acids (%)	%T	0	0
Total trans fatty acids (mg)	mg	0	0
Amino acids			
Tryptophan (mg/g N)	mg/g N	40	40
Tryptophan (mg)	mg	8	0
Other			
Caffeine	mg	0	0
Cholesterol	mg	0	0
Source: Australian Food Composition Database - Release 1.0 at: https://www.foodstandards.gov.au/science/monitoringnutrients/afcd/Pages/fooddetails.aspx?PFKID=F001990			