



## Growing Bok Choy (*Brassica rapa Chinensis* Group) Varieties for Guam

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Source: <https://tinyurl.com/y7wqxrgb>

### Introduction

Bok choy is a type of Chinese cabbage (*Brassica rapa* or *Brassica campestris*) of the *Chinensis* group, sometimes called *Brassica chinensis*. It is a loose leaf, non-heading type of Chinese cabbage with thick white leafstalks with green leaves that form in clusters. Cultivated since the 5th century in Asia, bok choy is now grown in many countries around the world (Stephens, 2015). It has been cultivated on Guam for at least 30 years (Barber, personal communication, February 2, 2018).

In retail stores, bok choy prices have ranged from \$1.99-\$2.99/lb. in recent years (Bamba, personal communication, January 10, 2016).

There are many cultivars/varieties of bok choy, and many common names including pai-tsai, pak choi, pe-tsai, and more. Some common names of bok choy overlap with common names of the other type of

Chinese cabbage, *Brassica rapa Pekenensis* group. Varieties of *B. rapa Pekenensis* group, sometimes called *B. pekenensis*, are broadleaved, compact-heading type Chinese cabbages (Stephens, 2015).

In this fact sheet, information is provided on bok choy basics, nutrition, and results on a 2018 bok choy variety trial conducted on Guam.

### About Bok Choy

Bok choy is most widely consumed as a fresh leafy vegetable in dishes like salads and the popular Korean kimchi dish. It is also used as a cooked vegetable in many dishes as well (Fig 1).



**Fig 1. Bok Choy cooked in stir-fry dish.**

Source: <https://tinyurl.com/y6uq94jp>

Bok choy is low in saturated fat and cholesterol. It is also a good source of dietary fiber, protein, thiamin, niacin, and phosphorus, and a very good source of dietary fiber, vitamin A, vitamin C, vitamin K, vitamin

B6, folate, potassium and manganese (Self Nutrition Data, 2014). Fig 2 displays the nutritional value of 100g of raw bok choy.

Principle	Nutrient Value	Percentage of RDA
Energy	13 kcal	<1%
Carbohydrates	2.18 g	1.5%
Protein	1.5 g	3%
Total Fat	0.20 g	1%
Cholesterol	0 mg	0%
Dietary Fiber	1 mg	2.5%
<b>Vitamins</b>		
Folates	66 µg	16%
Niacin	0.500 mg	3%
Pantothenic acid	0.088 mg	1.5%
Pyridoxine	0.194 mg	15%
Riboflavin	0.070 mg	5%
Thiamin	0.040 mg	3.5%
Vitamin A	4468 IU	149%
Vitamin C	45 mg	75%
Vitamin K	45.5 µg	38%
<b>Electrolytes</b>		
Sodium	65 mg	4%
Potassium	252 mg	5%
<b>Minerals</b>		
Calcium	105 mg	10.5%
Iron	0.80 mg	10%
Magnesium	19 mg	5%
Manganese	0.159 mg	7%
Phosphorus	37 mg	5%
Zinc	0.19 mg	1.5%
<b>Phyto-nutrients</b>		
Carotene-α	1 µg	--
Carotene-β	2681 µg	--
Lutein-zeaxanthin	40 µg	--

Fig 2. Nutrition facts of raw bok choy, nutrition value per 100g.

Source: USDA National Nutrient database.

### Growing Bok Choy

Bok choy can be transplanted or direct-seeded into the ground. Seeds will usually germinate within one (1) week on Guam. Bok choy is considered a cool-season crop that can withstand light frost. It grows best in temperatures of 55 to 70°F (13-21°C), but can tolerate higher temperatures with ample soil moisture (Kelley, 1999). There are many heat-tolerant varieties of bok choy that can grow in Guam’s tropical environment. In open fields, plants are commonly spaced from 8-20 inches apart depending on variety. Bok choy can be planted in single or multiple rows as shown in Fig 3 and Fig 4.



Fig 3. Bok choy planted in single rows.

Source: <https://tinyurl.com/y7sjler3>



Fig 4. Bok choy planted in multiple rows.

Source: <https://tinyurl.com/yakk7n6y>

A general fertilizer recommendation for one growing season for bok choy is 1500 lbs of 10:10:10 (N-P2O5-K2O) per acre, or approximately 3.5 lbs. of the same nutrient ratio for every 100 sq ft. (Hemphill, 2014).

Bok choy grows best in fertile, well-draining soils with high organic matter such as Guam-Yigo complex, Pulantat clay, and Togcha-Akina silty clay soils. Fertile compost is also a good media source to grow lettuce. Bok choy prefers a media/soil pH of 5.8-7.5 (Andersen, 2013).

Irrigation of bok choy should consist of frequent watering. During dry periods, ensure soils are kept moist and not saturated. During extended rainfall events, watering may not be necessary until soils are nearly dried. Mulching around plants will conserve moisture.

### Common pests and diseases

Bok choy is a host for a wide range of pests and diseases. Some common diseases that infect bok choy include Black Rot (*Xanthomonas campestris*) (bacterium), Powdery Mildew (*Sphaerotheca spp.*) (fungus), and leaf spot (*Alternaria brassicae*) (fungus). Some common pests that infest bok choy include cabbage webworm (*Hellula undalis*), diamondback moth (*Plutella xylostella*), aphids (Family: Aphididae), cabbage looper (*Trichoplusia ni*), and red fire ants (Family: Formicidae) (Kelley, 1999).

Registered insecticides can help control insect infestations. Insect pests can also be controlled by cultural practices such as monitoring, crop rotation, weeding, and general field sanitation.

### Plant care

It is always good practice to consistently monitor plants for pests and diseases. If a pest or disease is unknown, collect samples and submit to CNAS Extension & Outreach program at the University of Guam for correct identification and treatment recommendations.

Weeding and mulching around plants will reduce weed competition and conserve soil moisture.

It is also advisable to keep good records of all field activities. Good record-keeping will identify good practices and mistakes, along with identifying desired varieties of plants. This will improve decision-making for future crops.

### Harvest

Depending on variety, bok choy is generally harvested within 8 weeks after germination (Kelley, 1999). Baby bok choy varieties usually are harvested within 5 weeks after germination. Most varieties of baby bok choy are harvested when plants are no taller than 10 inches. Standard varieties of bok choy are usually harvested between 5-8 weeks after germination and may reach up to 2 ft. tall.

Entire bok choy plants are usually harvested by cutting plants just above the soil line as a one-time harvest. Bok choy leaves can be harvested multiple times from individual plants with the 'cut and come again' harvest method. This method basically consists of harvesting the outer, older leaves of the plant by cutting off leaves approximately 1 inch above the soil line. This allows the younger new leaves to grow and form new heads for multiple harvests from individual plants. The 'cut and come again' harvest method may be performed continuously for bok choy until overall plant growth declines.

### Post-harvest handling

Immediately after harvesting and cleaning, bok choy is best stored at 32°F (0°C) at 95-100 percent relative humidity for up to three (3) weeks (Kitinoja and Kader, 1995).

### 2018 Bok Choy trial on Guam

There are numerous bok choy varieties available on the internet from seed companies like Baker Creek Heirloom Seed Co. (<http://www.rareseeds.com/>), Kitazawa Seed Co. (<http://www.kitazawaseed.com/>), Asian Vegetable Seeds EvergreenSeeds (<http://www.evergreenseeds.com/index.html>), and Asia Seeds



(<http://www.asiaseeds.com/>). Guam Home Center, located in Dededo, is a registered vendor for Known You Seed Company, which provides many varieties of bok choy.



**Fig 5. Bok Choy varieties growing in Guam Cobbly Clay Loam soil in Yigo, Guam**

The four heat-tolerant varieties grown for the variety trial included San Feng, Brisk Green, Bino, and Gracious. All seeds of all varieties are products of Known You Seed Company and were obtained from Guam Home Center in Dededo. On January 29, 2018, entire bok choy plants were harvested individually, and measured for fresh weight and classified as marketable or non-marketable. Individual samples are depicted on Figs 6, 7, 8 and 9.



**Fig 6. Bok Choy variety San Feng.**



**Fig 7. Bok Choy variety Brisk Green.**



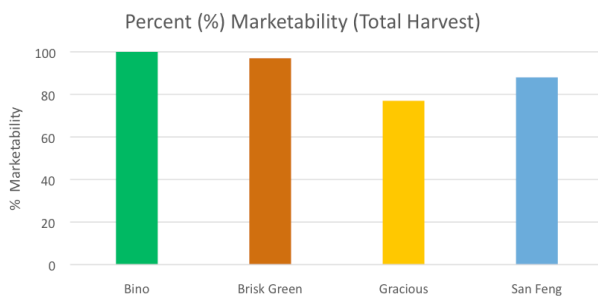
**Fig 8. Bok Choy variety Bino.**



**Fig 9. Bok Choy variety Gracious.**

**Discussion**

All varieties produced quality cabbage heads that were highly marketable as shown in Fig 10. Average yields of San Feng, and Bino resulted in fresh weights similar to what was advertised by Known You Seed Company. Average yields of Gracious and Brisk Green were slightly lighter in weight than what was advertised by Known You Seed Company. This was likely due to early pest infestation from the cabbage webworm or cabbage looper. Larval damage was apparent within one week from transplanting. Dipel DF (*Bacillus thuringiensis subspecies kurstaki*) and Neem (*Azadirachta indica*) oil extract were applied weekly for three weeks, which proved to be adequate to control the pest. The irrigation system was not adequately working in where plants were not watered for one whole day. This may have also contributed to the poorer growth development of Gracious and Brisk Green. Table 1 displays comparisons between average weights of individuals from this trial and average weights of individuals as advertised by Known You Seed Company



**Fig 10. Percent marketability of total harvests of 4 bok choy varieties grown in Yigo, Guam from January 9, 2018 through January 29, 2018.**

**Table 1. Average weights of individual plants from the Guam trial versus average weights of individual plants as advertised by Known You Seed Company.**

Bok Choy Variety	Average weight of individuals from Guam Trial (lbs.)	Average weight of individuals from Known You Seed Company (lbs.)
Bino	0.51	0.44
Brisk Green	0.28	0.35
Gracious	0.31	0.39
San Feng	0.45	0.44

**Summary**

Like many crops, growing bok choy successfully in respective localities highly depends on varieties. Understanding that bok choy is generally a cool-season crop, choose varieties that are adequate for Guam’s tropical climate. Seek characteristics from seed sources that include the term like ‘heat-tolerant.’

**For support**

Contact the College of Natural & Applied Sciences’ Cooperative Extension & Outreach at 735-2080 for help or more information. Additional publications can be found on our website at: [www.cnas-re.uog.edu](http://www.cnas-re.uog.edu) under the Publications tab.

**Acknowledgements**

This research was funded by Hatch Project No. 100885. Project title: Evaluation of Important Vegetable Varieties Grown in a Local Soil Type in the Tropical Environment of Guam.

Thank you to R. J. San Miguel and Seanne Clemente for assistance in field experiment preparation and maintenance, data collection and recording, and data analysis.

**Disclaimer**

Mention of a company or organization is to provide an example and is not an endorsement or recommendation in preference to others that may also be suitable.

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