



Home Garden Oriental Leafy Greens

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A wide variety of Oriental greens are prepared as vegetables, and many are available to gardeners in Hawaii. These greens belong to several different species, and there are several varieties of each, making their classification a bit confusing. *Brassica rapa* (synonym, *B. campestris*) is the predominant species, with several different varieties. Chinese cabbage is *Brassica rapa* var. *pekinensis*, which includes subtypes that form heads, known as won bok and Napa cabbage, as well as loose-headed types. Mibuna and mizuna greens are *B. rapa* var. *nipposinica*; these plants form fairly large clumps with many stems bearing narrow leaves.

Pak choy (*Brassica rapa* var. *chinensis*) includes types called white cabbage, spoon cabbage, choy sam (Singapore), pechay (Philippines), and taisai and shirona (Japan), as well as others. The preferred type of pak choy has dark green leaves and long, white, somewhat wide petioles. Some other varieties have shorter, slightly green petioles. Some varieties are grown for the flowering stems rather than the leaves.

The species *Brassica juncea* includes the types called kai choy in Hawaii, the mustard greens grown in the southeastern United States, and the rai and sarson grown for oilseed in India and Pakistan. It is also called brown mustard and Indian mustard. Its forms are variable, with leaves that are either smooth or hairy, entire or divided, and petioles that are either narrow or wide. Compared to pak choy, its leaves are lighter green and its petioles are green and shorter.

The flowering brassicas include choy sum (*B. rapa* var. *parachinensis*), purple flowering pak choy (*B. rapa* var. *purpurea*), and Chinese broccoli or kailaan (*B. oleracea* var. *alboglabra*).

The oriental greens form larger plants and are slower to bolt (flower) when temperatures are cool, that is, when grown at Hawaii's higher elevations or during the win-

ter season, but some can be grown in warm conditions. Won bok may not form heads in warm seasons.

Varieties

The most common kai choy variety in Hawaii is the Waianae strain. It has wide green petioles, and the inner leaves form a slight head. The Mainland variety Osaka Purple has loose, purple leaves. Varieties of other oriental greens come from Taiwan, Japan, or the mainland United States.

Preparing the soil: amendments and fertilizer

Oriental leafy green plants grow best in well drained, moderately acidic to neutral soil (pH 6.0 to 6.8 is optimum) with a good level of soil organic matter. Have the soil analyzed to determine the soil pH and whether any soil amendments (including lime, dolomite, and phosphate) are needed. A soil analysis is particularly recommended for new garden sites. A "standard" soil analysis, which measures soil pH and available soil phosphorus, potassium, calcium, and magnesium, is relatively inexpensive and can be done by the CTAHR Agricultural Diagnostic Service Center** or a commercial laboratory (preferably one having experience with Hawaii's soils).

Soil with pH below 5.5 requires application of agricultural lime to increase the pH to a level more favorable for plant growth. Soil in high-rainfall areas often requires lime to increase the calcium supply.

*This document replaces Hawaii Cooperative Extension Service Home Garden Vegetable Series no. 10, "Mustard Cabbage," 1978.

**For information on sampling soil and arranging for its analysis by CTAHR-ADSC, see the CTAHR publication *Testing your soil—why and how to take a soil-test sample*, available at www.ctahr.hawaii.edu/freepubs under "Soil and Crop Management," or from UH-CTAHR Cooperative Extension Service offices statewide.

Low levels of available soil phosphorus limit plant growth in many of Hawaii's soils. Both lime and phosphate fertilizer must be mixed thoroughly into the surface 6–8 inches of the soil before planting.

Home garden productivity can usually be increased by amending the soil with organic matter, such as compost or well rotted animal manure (see the CTAHR publications *Backyard composting—recycling a natural product* and *Composted animal manures—precautions and processing*). If a suitable material is available, make an annual application to the garden of 1–3 inches spread over the soil and mixed into the surface 6–8 inches. If the material is in short supply, its application can be limited to the area within 6–10 inches from the planting row or spot.

To ensure adequate levels of the major plant nutrients, include a general fertilizer when preparing the garden before planting. Commonly available rapid-release fertilizer formulations suggested for vegetables are 16-16-16 (“triple-16”) and 10-20-20 (these numbers refer to the percentages of nitrogen, phosphate, and potash in the fertilizer). Commercial growers often figure on applying a total of 150 pounds of N per acre to a crop of oriental leafy greens. On a 100 square-foot (sq ft) basis, this is equivalent to two applications (one preplanting, the second after thinning the crop) of 1¾ pounds of 10-20-20 or 1 pound of 16-16-16 per application. Gardeners who prefer to use slow-release formulations will apply all of the nutrients before planting. Preplanting fertilizers should be mixed well with the garden soil.

Soil phosphorus can increase to an undesirably high level after long-term application of high-phosphate fertilizers, such as 10-30-10. If this is part of the garden's history, a soil analysis should be done to check the phosphorus level. If it is in excess, a zero-P formulation can be created by mixing equal amounts of urea and muriate of potash to produce a formulation that is about 23-0-30. For the 100 sq ft basis fertilizer schedule mentioned above, about ¾ pound of this fertilizer would be applied in each of two applications.

Planting

Plant seeds directly in the soil 3–4 inches apart in rows spaced 12–15 inches apart. Three to four weeks after planting, thin the seedlings to 10–12 inches apart for

larger plants such as kai choy, won bok, and mibuna and 8–10 inches apart for pak choy. If thinning is delayed, the plants may become spindly and leggy and may bolt before forming a useful plant.

Fertilizer application to the growing crop

After thinning the seedlings, apply the second dose of general fertilizer. Divide the amount of fertilizer being applied into small doses according to the number of plants in a 100 sq ft garden area. Apply each dose 6–8 inches from the base of each plant. Some gardeners spread the fertilizer on the soil surface, but others believe it is best to use a trowel to incorporate it 2–4 inches into the soil, using care to minimize damage to the plant root system. If planting in rows, distribute the fertilizer along a trough 6–8 inches from the base of the plants and cover it with soil. One application of fertilizer after thinning should be sufficient for leafy greens, which usually are harvested about 45–50 days after seeding. Irrigate after the application. Liquid fertilizers are also suitable for postplanting applications.

Overapplication of fertilizer may result in plants that are too succulent and may develop tip burn under warm conditions.

Irrigation

A steady supply of water is important for good plant growth and quality. Insufficient moisture may result in tip burn, slow growth, and less tender leaves. Irrigate as necessary to maintain available soil moisture, but avoid soil waterlogging. To minimize leaf disease, avoid wetting the plant when applying water. If possible, irrigate only the soil using furrows, drip lines, or soaker hoses. If using overhead (sprinkler) irrigation, do it in the morning so the plants dry quickly as the day warms.

Insect management

The most common insect pests are cutworms, aphids, thrips, cabbage webworms, loopers, and spider mites. The caterpillar pests can be controlled with insecticide products containing the bacteria *Bacillus thuringiensis*. Aphids, thrips, and mites can be suppressed with insecticidal soaps. When using a pesticide product, read the label to make sure it is approved for use on the crop and the pest, and follow the label directions.

Disease management

The most common diseases of oriental leafy greens are damping off, mosaic, white rust, and soft rot. Damping off and soft rot are soil borne-diseases and can be avoided by planting in clean soil. Addition of compost may help to combat soil-borne diseases. Avoid white rust by irrigating as suggested above to minimize wetting the plants and by promptly removing diseased plants that could serve as a source of fungal inoculum.

Harvest

If white rust is a problem, harvest when the plants are young, before infection occurs. “Baby greens” are also harvested early. Otherwise, oriental leafy vegetable plants are harvested as they near maturity, about 45–50 days after planting, before the flower stalks appear. Cut off the whole plant at ground level and remove any damaged outer leaves. For flowering types such as choy sum, the flowering stalks are harvested just before the flowers open.

Seed availability

Seeds of the Waianae strain of kai choy are available from the CTAHR Agricultural Diagnostic Service Center Seed Lab on the UH Manoa campus and from some garden stores. Other varieties can be found in garden stores and seed company catalogs. CTAHR Seed Lab order forms can be obtained online at <www.ctahr.hawaii.edu/seed> or from Cooperative Extension Service offices statewide.