



AVRDC

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Suggested Cultural Practices for Kangkong

by M.C. Palada and L.C. Chang¹

Introduction

Kangkong (*Ipomoea* spp.) is one of the most popular leafy vegetables in South and Southeast Asia. It is known by many names including swamp cabbage, water convolvulus, and water spinach. The plant has flowers that range in color from white to pink, and its stems come in shades of green and purple. The leaves are a good source of protein, vitamin A, iron, and calcium.

The following suggested cultural practices were developed at AVRDC in the Taiwan lowlands. Growers may need to modify the practices to suit local soil, weather, pest, and disease conditions.

Climate and soil requirements

Kangkong is adapted to a wide range of climate and soil conditions but requires a relatively high

soil moisture for optimum growth. Soils with high levels of organic matter are preferable. The plant produces optimum yields in the lowland humid tropics under stable high temperatures and short daylengths. Temperatures averaging between 25–30°C are ideal. Plants are damaged at temperatures of 10°C or less.

Choosing a variety

There are two common types. Upland kangkong (*Ipomoea reptans*) has narrow leaves (Fig. 1). It is adapted to moist soils and is harvested once. Lowland or aquatic kangkong (*Ipomoea aquatica*) has broader, arrow-shaped leaves (Fig. 2). It is adapted to flooded conditions and is harvested several times. Regardless of type, the choice of variety can be influenced by local growing conditions, seasons, and consumer preferences. Local testing is recommended to identify superior varieties.



Fig. 1. Upland, narrow-leaved kangkong



Fig. 2. Lowland, broad-leaved kangkong

¹Visiting scientist from the University of the Virgin Islands and AVRDC olericulturalist, respectively. Edited by T. Kalb.

Asian Vegetable Research and Development Center; P.O. Box 42, Shanhua; Taiwan 741; ROC
tel: (886-6) 583-7801 fax: (886-6) 583-0009 email: avrdbcbox@netra.avrdc.org.tw www: http://www.avrdc.org

Field preparation

Kangkong requires a well-prepared seed bed for good seedling growth. Form 20-cm-high beds using a plow or mechanical bed shaper. The distance between centers of two adjacent furrows is about 150 cm with a 90-cm bed top. Kangkong can tolerate flooding since it is a semi-aquatic plant, thus, there is no need for a raised bed that is high.

Planting methods

Kangkong is planted either by direct seeding, transplanting, or using stem cuttings. The choice of planting method depends on the availability of seed and labor, growing season, and type of kangkong. Direct seeding is used when plenty of seed is available, labor is limited, and during the dry season when frequency of flooding is less. Transplanting or using cuttings are preferred when there is limited amount of seed, plenty of labor, and during the wet season when heavy rains and flooding may wash seeds away. Stem cuttings are used for lowland kangkong.

Option 1. Direct seeding

Direct seeding is done either by line-sowing or broadcasting. When line-sown, seeds are sown in rows on well-prepared seedbeds (Fig. 3). Make furrows 1.0–1.5 cm deep and space them 15–20 cm apart. Sow seeds 5 cm apart in rows. Cover seeds with a layer of compost. After developing two to three true leaves, thin seedlings to stand 10–15 cm apart. On a commercial scale, with a density of 50,000 plants/ha, 5 kg/ha of seed is required.

Broadcast sowing is used in large intensive production systems (Fig. 4). Broadcast seeds uniformly at a rate of 5–10 kg/ha on well-prepared seedbed. Thinning is not necessary.



Figs. 3 and 4. Line-sown and broadcasted plantings

Option 2. Transplanting

There are two steps to transplanting: seedling production and setting plants into the field.

Seedling production. Seedlings can be grown in divided trays or in seedbeds. The first method is preferred since there is less damage to the seedlings when they are pulled for transplanting.

Use plastic seedling trays for growing containerized transplants. Seedling trays may vary in sizes. For kangkong, size 50–100 cell trays with cells approximately 4 cm wide and deep are suitable (Fig. 5). Fill the tray with a potting mix that has good water-holding capacity and good drainage. Use peat moss, commercial potting soil, or a potting mix prepared from soil, compost or rice hulls, vermiculite, and/or sand. AVRDC uses a mixture of 66% peat moss and 34% coarse vermiculite. If you use non-sterile components, sterilize the mix by autoclaving or baking at 150°C for 2 hours.



Fig. 5. Seedlings in tray

Sow two or three seeds per cell at 1.0–1.5 cm depth; thin to one seedling after they develop two or three true leaves. If seedlings are started in a raised seedbed, the soil should be partially sterilized by burning a 3–5 cm thick layer of rice straw or other dry organic matter on the bed. The burned ash also adds minor amounts of P and K to the soil, which helps establish the seedlings. Sow seeds in furrows 0.5–1.0 cm deep, spacing seeds 3–5 cm apart in furrows spaced 5 cm apart. Cover with soil.

Cover the seedbeds with an insect-proof net or sow them inside a screenhouse. This provides shade and protects seedlings from heavy rain and pests. Water the seedlings thoroughly every morning or as needed (moist, but not wet), using a fine mist sprinkler to avoid soil splash and plant damage.

If seedlings have been grown in shade, harden them off by gradually exposing them to direct sunlight during the 4–5 days just prior to transplanting. On the first day, expose them to 3–4 hours of direct sunlight. Increase the duration until they receive full sun on the fourth day. Seedlings are ready for transplanting about three weeks after sowing or when transplants have five to six leaves.

Setting plants into the field. Recommended spacing varies depending on variety and harvest method. Narrow spacing is used for once-over harvesting. Wider spacing is used if plants are allowed to produce long vines with multiple harvests.

For once-over harvesting, AVRDC uses raised beds that are 20 cm high with bed tops 90 cm wide. Rows are spaced 10 cm apart with 15 cm between plants within rows (Fig. 6). For multiple-harvesting, rows are spaced 20 cm apart with 30 cm between plants within rows.

Transplant in the late afternoon or on a cloudy day to minimize transplant shock. Place transplants in holes that are 10 cm deep, cover the roots with soil, and lightly firm. Irrigate immediately after transplanting to establish good root-to-soil contact. Transplanting can be done manually or by machine.

Option 3. Using stem cuttings

Stem cuttings from an existing kangkong crop can also be used for planting when seeds are not available or insufficient. This method is commonly used when planting the broadleaf, lowland type of kangkong (Fig. 7).

Stem cuttings 15–25 cm in length with three to four internodes are normally saved during the first harvest and soaked in water overnight before transplanting. In some cases stem cuttings are soaked in water for 1–3 days to develop roots before transplanting in the field.

Dig holes 5–10 cm deep and plant two to three stem cuttings per hole. Spacing between rows is 20–30 cm and plants within rows are spaced 15–20 cm apart. Irrigate immediately after planting.



Fig. 7. Lowland crop

Fertilizing

Kangkong can thrive under conditions of moderate soil fertility, yet is quite responsive to nitrogen fertilizer. It also responds to application of organic manure. A combination of inorganic and organic fertilizers improves yield and maintains soil fertility.

The amount of fertilizer to apply depends on soil fertility, soil type, fertilizer recovery rate, and soil organic matter. A soil test is highly recommended to determine the available N, P, and K. The amount of applied fertilizer can then be calculated based on your target yield and adjusted for residual nutrients.

Fertilizer recommendations for kangkong at AVRDC are shown in Table 1. Fertilizer recommendations depend on local conditions, so consult your local fertility management specialist.

Table 1. Recommended fertilizer rates (kg/ha) for kangkong production at AVRDC

Nutrient	Preplant	Days after sowing/transplanting		
		10	20	30
Compost	10,000			
N	48	30	8	8
P ₂ O ₅	64	8	8	0
K ₂ O	48	15	8	0

Irrigating

Kangkong requires plenty of water because of its high succulence. It easily wilts during a prolonged dry spell. Water should be applied especially just after sowing or transplanting to ensure a good stand. At AVRDC, fields are furrow-irrigated every 10 days during the cool-dry season, and weekly during the hot-dry season (Fig. 8). As a rule, plants should be irrigated if wilting occurs around noon.



Fig. 8. Irrigated upland crop

Controlling weeds

Weeds compete for light, water, and nutrients resulting in reduced yield. The first step to controlling weeds is to cultivate the land thoroughly. Kangkong seeds are slow to germinate and early weed control is essential for direct-seeded crops.

Mulching is recommended in upland plantings to reduce weed competition, soil compaction and erosion, as well as to conserve soil moisture. Be sure the organic mulching materials are free of weed seeds. Organic mulches can be laid down before or after transplanting and after sowing. Apply a layer of mulch above ground level. Mulching is easier to apply if the kangkong is transplanted, but can be used for row-seeded crops after the seedlings reach a height of 10–15 cm.

Controlling diseases and insects

Diseases and insect pests must be controlled to ensure good yield and marketable quality. Few diseases affect kangkong, the most common being white rust (*Albugo ipomoeae-panduratae*) (Fig. 9). Numerous cultural practices can reduce the incidence of disease, including crop rotation, field sanitation, adequate plant spacing, and using furrow rather than overhead irrigation. Chemical fungicides are rarely used unless there is a history of fungal diseases for kangkong in the area and conditions favor disease development.

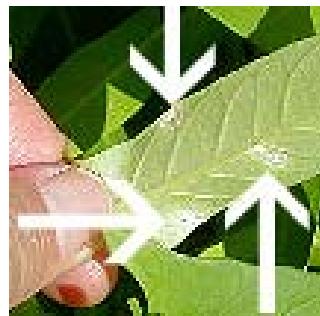


Fig. 9. White rust lesions

Like other leafy vegetables, kangkong is susceptible to damage by foliar insects such as leafminers and cutworms. An effective method of controlling insect pests is to cover the bed with fine screen or a fine mesh nylon net (32-mesh or finer). Root-knot nematodes may also cause serious damage.

Chemical control of pests should be used mainly as a corrective measure. Choose a pesticide that targets the specific insect that is causing the damage, and avoid pesticides that kill or inhibit the development of beneficial organisms. Choose pesticides that have short persistence, i.e., the effects last only a few days.

Pesticides should be applied in the evening, and workers should not be allowed into the field until the recommended waiting period (usually 12 to 24 hours) has passed. Wear protective clothing and follow all instructions on the label when applying pesticides.

Harvesting

Kangkong is ready for harvest in 30–45 days after sowing or transplanting depending on variety and plant type. Plants may be harvested once or several times. For once-over harvesting, plants are uprooted (Fig. 10). For multiple harvesting, stems or shoots 15–25 cm in length are cut close to the ground, generally on a weekly basis. Frequent harvesting delays flowering and stimulates growth of side shoots. When plants are not harvested, side shoots develop into longer vines.



Fig. 10. Harvesting kangkong

The harvest is washed and tied in bundles (Figs. 11–12). Leafy vegetables like kangkong have large surface-to-volume ratio and lose water easily. To reduce excessive water loss, harvest during the cooler time of day, such as early morning or late afternoon. Keep the harvested produce in a cool shaded place. ♫



Figs. 11 and 12. Kangkong wrapped for the market

For the latest information on vegetable production and research, go to the AVRDC website at <www.avrdc.org>.