

Suggested Cultural Practices for Basella

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Introduction

Basella (*Basella alba* and *Basella rubra*) is also known as Ceylon spinach, Malabar spinach, Indian spinach, and vine spinach. It is a climbing perennial plant, but is sometimes cultivated as an annual vegetable. The vine is succulent with tender leaves. It is a fast growing, productive, leafy vegetable for home gardens and market growers.

Basella is a good source of calcium, iron, and vitamins A and C. Red-stemmed types are especially nutritious.

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, insect pest, and disease conditions.

Climate and soil requirements

Basella grows well in hot, humid climates. Low temperatures slow growth rates and result in small leaves. Growth is also limited at altitudes higher than 500 m, due to day/night temperature variations. Partial shading will produce larger leaves compared to when grown under full sunlight. Daylengths shorter than 13 hours result in flowering.

Although basella is adapted to many soils, a sandy loam is most suitable. The ideal soil will be moist, fertile, and well supplied with organic matter. Recommended soil pH is from 5.5 to 8.0.



Figs. 1 and 2. *Basella alba* (top) and red-stemmed *B. rubra* (bottom)

Choosing a variety

There are two common types. *Basella alba* has dark-green, oval or almost round leaves (Fig. 1). *Basella rubra* has green, oval-round leaves, and red stems (Fig. 2). Yields among varieties vary widely and testing is recommended to identify superior varieties under local conditions.

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Preparing the field

Basella requires a well-prepared seed bed for good germination and seedling growth. At AVRDC, we use a plow or mechanical bed shaper to form beds that are 20 cm high during the dry season and 30 cm or higher during the wet season. The distance between centers of two adjacent furrows is about 150 cm with a 90-cm bed top. Flat beds may also be used but are more subject to flood damage.

Planting

Basella is planted either by direct seeding, transplanting, or using rooted or unrooted cuttings. The choice of planting method depends on availability of seed and labor, and may also vary with the growing season. Direct seeding is appropriate 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 are most likely to occur.

Option 1. Direct seeding

When direct seeding is used, seeds are sown in rows on well-prepared seedbeds. Make furrows 1.0–1.5 cm deep and space them 10–15 cm apart on the bed. Sow seeds 5 cm apart in rows. Cover seeds with a layer of compost. After they develop 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, 10 kg/ha of seed will be required.

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 basella, cell trays with cells 3–4 cm wide and deep are recommended (size 100–128). Fill the seedling tray with a potting mix that has good water-holding capacity and good drainage such as peat moss, commercial potting soil, or a potting

mix prepared from soil, compost, rice hulls, vermiculite, and/or sand. We recommend a mixture of 66% peat moss and 34% coarse vermiculite. If you use non-sterile components, we suggest you sterilize your potting mixture by autoclaving or baking at 150°C for 2 hours.

Sow two or three seeds per cell at 1.0–1.5 cm depth. Thin to one seedling after seedlings develop two to 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. This 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 insect-proof nets, or sow seeds inside a greenhouse or 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 or watering can 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 when they have five true leaves.

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

For once-over harvest, AVRDC uses raised beds that are 20–30 cm high with bed tops about 90 cm



Figs. 3 and 4. Transplanting basella

wide. Rows are spaced 10–15 cm apart with 15 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 (Fig. 3). 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 basella crop can be used for planting when seeds are not available or insufficient. Stem cuttings 20–25 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. Wider spacings are required when using stem cuttings.

Dig holes 5–10 cm depth and plant two or 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.

Fertilizing

Basella can thrive under conditions of moderate soil fertility, but is quite responsive to nitrogen fertilizer. It also responds to application of organic manure. A combination of both 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 rates and application schedules for basella at AVRDC are shown in Table 1. Recommendations depend heavily on local conditions, so consult your fertility management specialist.

Irrigating

Basella requires plenty of water because of its high succulence. It easily wilts during prolonged dry spells. Water should be applied especially just after sowing or transplanting to ensure a good stand.

Table 1. Recommended fertilizer rates (kg/ha) for basella 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

At AVRDC, fields are furrow-irrigated every 10 days during the cool-dry season, and weekly during the hot-dry season. As a rule, the plants should be irrigated if wilting occurs around noontime.

Irrigate thoroughly to maintain vigorous plant growth. Avoid over-irrigation, which may enhance disease development and nutrient leaching. Drip irrigation or micro-sprinkler irrigation is recommended in areas with limited water supply. If sprinkler irrigation must be used, avoid late evening irrigation to prevent diseases. During the rainy season, drainage is essential for plant survival and growth. Raised beds, clean furrows, and large drainage canals facilitate quick drainage of excess water after heavy rain.

Controlling weeds

Weed are controlled through a combination of practices. Thorough land preparation is the first key to effective weed control. Basella seeds are relatively slow to germinate, therefore, early weed control is essential when direct seeding. A seedbed free of weed seeds allows basella seedlings to grow and establish a canopy before weeds emerge.

Mulching is recommended to reduce weed competition, soil compaction, erosion, and loss of 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 to the soil surface. Mulching is easier to apply if the basella is transplanted, but can also be used for row-seeded crops after the seedlings reach a height of 10–15 cm.

Controlling insect pests and diseases

Insect pests and diseases must be controlled to ensure good yield and quality. Just like any other leafy vegetable, basella is susceptible to damage

by foliar insects such as leafminers and cutworms. Root-knot nematode is sometimes a serious pest.

An effective method of controlling many insect pests is to cover the bed with fine screen or a fine mesh nylon net (32-mesh or finer). 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 beneficial insects. Choose pesticides that have short persistence, i.e., their effects last only a few days. Chemical 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.

Few diseases affect basella, most notably leaf spot (Fig. 5), which may be caused by *Cercospora*, *Alternaria* or *Colletotrichum*. 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 basella in the region and conditions favor disease development.



Fig. 5. Leaf spot disease

Harvesting

Basella is usually ready for harvest in 30–45 days after planting. Plants may be harvested once or



Fig. 6. Basella ready for harvest

several times (Fig. 6). Once-over harvest is adapted for early maturing and quick growing varieties. Stems or shoots 15–25 cm in length are cut close to the ground, washed, and tied in bundles (Fig. 7).

With multiple harvests, young leaves and shoots are picked at weekly intervals. Frequent harvesting delays flowering and stimulates growth of side shoots. When plants are not regularly harvested, side shoots develop into longer vines. There is a need to support long vines with trellis (Fig. 8).

Leafy vegetables like basella have large surface-to-volume ratio and lose water easily. To reduce water loss, harvest during the cooler time of day, such as early morning or late afternoon. Keep the produce in a cool shaded place. ☼



Fig. 7. Basella with other vegetables at the market



Fig. 8. Basella growing on trellis

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