



ECHO[®]

ASIA IMPACT CENTER

2017 to 2018

SEED CATALOG



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Seed Bundles

Nutrition Garden Bundle, กลุ่มพืชโภชนะสูง

- Amaranthus tricolor*, Vegetable Amaranth**
- Brassica carinata*, Ethiopian Kale**
- Perilla frutescens*, Perilla**
- Phaseolus vulgaris*, Cranberry Bean**
- Psophocarpus tetragonolobus*, Winged Bean**
- Salvia hispanica*, Chia**
- Sesamum indicum*, Sesame Black Seed**
- Sesamum indicum L.*, Sesame**
- Solanum lycopersicum*, Tomato**
- Solanum melogena*, Eggplant**

Green Manure Cover Crops Bundle, กลุ่มพืชคลุมดิน พืชปุ๋ยสด:

- Cajanus cajan*, Pigeon Pea**
- Crotalaria juncea*, Sunn Hemp**
- Lablab purpureus*, Lablab**
- Macrotyloma uniflorum*, Horsegram**
- Mucuna pruriens*, Velvet Bean**
- Stylosanthes capitata*, Stylo**
- Vigna radiata*, Mung Bean**
- Vigna umbellata*, Rice Bean**
- Vigna unguiculata*, Cowpea (Black-Eyed Pea)**

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Salad Garden Bundle, กลุ่มสลัดสวนครัว:

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- Brassica juncea*, Mustard Green
- Sesamum indicum L.*, Sesame
- Daucus carota*, Carrot
- Hibiscus sabdariffa*, Roselle
- Lactuca sativa*, Lettuce
- Phaseolus vulgaris*, Bush bean
- Physalis peruviana*, Cape gooseberry

Semi Arid, กลุ่มกึ่งแห้งแล้ง:

- Capsicum frutescens*, Chili pepper
- Coccinia grandis*, Ivy Gourd
- Coix lacryma-jobi*, Job's Tears
- Ipomea alba.*, Moonflower
- Passiflora edulis*, Passion Fruit
- Pennisetum glaucum*, Pearl Millet
- Phaseolus lunatus*, Lima bean
- Plukenetia volubilis*, Inca Nut
- Setaria italica*, Foxtail Millet
- Sorghum bicolor*, Sorghum

Herb/Flower, กลุ่มสมุนไพรและดอกไม้:

- Anethum graveolens*, Dill
- Capsicum chinense*, Velvet Bean
- Cosmos sulphureus*, Cosmos
- Eryngium foetidum*, Sawtooth Coriander
- Ocimum basilicum*, Sweet Basil
- Ocimum tenuiflorum*, Holy Basil
- Tagetes erecta*, Marigold
- Tagetes minuta*, Nematicidal Marigold
- Tithonia rotundifolia*, Mexican Sunflower/Golden Flower of the Incas
- Zinnia elegans*, Zinnia

FRUITS

Carica papaya Papaya

มะละกอ

Varieties: Sunrise, UHDP

Papaya is grown throughout the tropics for its fruit. Papayas are eaten both fresh as a vegetable when green, and as a fruit once soft and yellowish-pink. The leaves can also be cooked and eaten as a vegetable. Papaya is grown from seed and is often initiated by sowing directly at 5 cm (2 in) apart and 1 cm (0.5 in) deep in rows 15 cm (6 in) apart. At about 6-8 weeks, plants are transplanted into rows or ridges. Papaya prefers humid tropical climates. They are also shallow-rooted plants and are therefore susceptible to wind-damage. They prefer 1500 mm (60 in) of rain or more, but are sensitive to flooding. Plants are typically unisex, but some are male or female, with only female plants producing fruits. After plants reach flowering stage, they can be reduced to one male-flowering plant for every 15-25 female plants. Papaya trees are pollinated by moths.



Sunrise

A fleshy, shorter variety.



UHDP

Sweet in flavor, this is a taller plant with longer-shaped fruit.

Passiflora edulis Passion Fruit

เสาวรส

Varieties: Yellow

A woody perennial that climbs with a trellis, passion fruit is grown for its seedy pulp that is both sweet and tart in flavor. It is eaten fresh, used in smoothies or juices, or for making desserts. Subtropical fruit that can be grown between sea-level and 1,300 meters. Propagated by seed, it requires cross-pollination. Requires an annual rainfall of 90 cm. It can be grown on many soil types but prefers sandy loam with a pH of 6.5 to 7.5. Good drainage is important. Regular watering will keep a vine flowering and fruiting almost continuously.



Yellow

Flavor is a combination of sweet and sour. When ripe the fruit is yellow.

Peruvian groundcherry Cape Gooseberry

โถงทง

Varieties: Royal Project

Unripe fruits are green, and develop a golden-orange hue when ready for consumption. When ripe, gooseberries should fall upon shaking the branches and will continue to ripen over the course of a few weeks. The size of ripe gooseberries varies considerably: Some large fruits become the size of a golf ball, while small ones only grow to the size of a marble. Look for fruits with a round, smooth exterior and glossy sheen.

Note: unripe berries are toxic, and have caused deaths and illnesses amongst Australia's cattle populations. Few reports, however, indicate that unripe fruits are severely toxic for humans. To err on the safe side, wait until the fruit is fully ripe before consuming. Cape gooseberries are high in vitamins A and C. The ripe fruits also have concentrations of beta-carotene, calcium, iron, phosphorus, potassium, bioflavonoids, protein, and fiber.



Royal Project

Cape gooseberries look like an orange cherry tomato and taste like a sweet version of a cherry tomato. They also have a paper-like sheath on the outside that should be removed before eating.

GRAINS



PI 538255

Yellow inflorescence, white stem.



PI 538320

Red inflorescence, white stem.



PI 606767

Light brown inflorescence.

Amaranthus cruentus Grain Amaranth

ผักโขมเม็ด

Varieties: PI 538255, PI 538320, PI 606767

The young leaves and stems of grain amaranth can be cooked and eaten like spinach, but the plant is mainly grown for its high protein grain (~12-16%). If roasted in a hot pan, amaranth seeds pop like popcorn, making nutrients more accessible. Leaves can be prepared according to local cooking customs for other leaves. Leaves and stalks can also be used as live-stock feed. Grain amaranth varieties flower and set seed in response to shortening days. Grows best in warm temperatures with sufficient soil moisture. Amaranth tolerates poor soil fertility and drought, and responds well to fertilization. Soil pH above 6.0 is recommended.

Coix lacryma-jobi Job's Tears

ลูกเดือย

Varieties: Mekong Mix, Decorative Mix

Despite its minor crop status, Job's Tears is a nutritious grain, containing more fat and protein than rice and wheat. Both sticky and non-glutinous varieties are grown throughout much of South and Southeast Asia, as well as parts of China. Can be eaten like rice, ground into flour, added to soups and snacks, and fermented. The grain is fed to poultry and the foliage used as fodder. Seeds of certain varieties are used as beads for decoration. Often planted at the beginning of rainy season. Requires fertile soil for its best growth. In poor soils, many of the fruits are hollow. Reportedly best suited to latitudes between 22°N and 22°S.



Mekong Mix

A soft, round, edible variety. 120 days from seed to flowering. Seed coat turns gray or black when mature.



Decorative Mix

Non-edible mix of three decorative varieties. Two are thin and long, one is short and round. Used for embroidering shirts, bags, and tapestries. Can also be used for jewelry.

Pennisetum glaucum Pearl Millet

หญ้าไผ่มุก

Varieties: Palawan

Pearl millet grain is consumed either as flour, dough, or grain-like rice. It is used in making breads such as roti or chapati, fermented foods, porridges, steam-cooked dishes, beverages, and snacks. While a staple crop in parts of West Africa, it is less-commonly consumed in Asia and is an underutilized crop with much potential. Small amounts are used for animal feed, most often as green fodder. In upland Thailand, it is used as a relay crop. Pearl millet is adapted to heat and aridity. It is a short-day plant, prefers between 250-700 mm of rainfall, and is often found at higher altitudes. Prefers light, well-drained loams and has difficulty with waterlogging. It is tolerant of acidic soils. Easy to grow and less susceptible to diseases and pest issues than other grains.



Palawan

Particularly tall, a prolific seed producer, and is generally resistant to disease.



Salvia hispanica
Chia

เจีย

Varieties: Chiang Mai

Chia is an annual herbaceous plant in the mint family growing to about 1.5 meters (approx. 5 feet) in height. It originates from Central America, where it has been grown primarily for its tiny but highly nutritious seeds, for thousands of years. Chia is best planted towards the end of the rainy season, with the harvest of mature seeds taking place approximately four months later. Too much moisture during seed-setting and maturity can lead to harmful mold and bacterial growth on the seeds. Chia seeds yield 25-30% extractable oil which is rich in essential fatty acids. It is one of the highest known sources of Omega-3 fatty acids. Seeds can be added to any meal or drink and can be digested without breaking the seed coat. The widely acclaimed health benefits of Chia can be attributed to its overall high nutrient content: high in soluble fiber, 20-23% protein, rich in antioxidants and minerals. Seeds soaked in water will dissolve to create a gel that can be used in other cooking and mixed in juices. Leaves can be steeped to make tea used for a myriad of health problems.



Chiang Mai
Multicolored seeds, from white to brown to grey; originated from plants naturalized in northern Thailand.

Setaria italica
Foxtail Millet

ข้าวฟ่างกระจอก

Varieties: Chiang Dao

As with other grains, foxtail millet can be ground for flour or as a beverage base, boiled for porridge or roasted. An annual grass, millet is known to have been cultivated in China since the sixth millennium BCE. An alternate name for the grain is 'Chinese millet'. A staple in many countries, it is also useful as forage. Although foxtail millet is known as a short-term crop, this variety is sometimes intercropped with upland rice, requiring approximately 120 days. Plant height reaches about 2 m (6.5 ft) and yields yellow-brown seeds. Can be planted during the rainy season or during the dry season with irrigation. Foxtail millet can be grown up to an elevation of 1,800 m (5,900 ft) and up to a latitude of 50°N. Prefers sandy loam to clay loam soils. It is a water efficient (10-12 in / 25-30 cm per crop), warm weather crop.



Chiang Dao
From northern Thailand's Chiang Dao district.

Sorghum bicolor
Sorghum

ข้าวฟ่าง

Varieties: Pang Daeng, PI 521344, Local Sweet Sorghum

Sorghum is a 3-meter tall minor grain crop, often intercropped with upland rice. The grain is cooked like rice or popped like popcorn. Around the world, some types of sorghum are cracked like oats for porridge, some malted for beer, and others baked like wheat into flatbreads. Grain is also fed to chickens raw, or cooked as pig feed. Usually planted at the beginning of the rainy season in northern Thailand and harvested at the beginning of the dry season (approximately 6 months). Sorghum can be grown from sea level to 1,000 m (3,281 ft). Rainfall of 200–1,250 mm (8-50 in) is preferred. Adapted to a wide range of soils if moderately well-drained; pH 5.0-8.5. Sorghum is well-adapted to areas with low rainfall, although high temperatures will not produce a reliable crop.



PI 521344

A sweet sorghum variety. The seeds are red in color and the plant takes about five months to produce seed.



Local Sweet Sorghum

From the Mae Jam and Pai regions of northern Thailand. Seeds are black in color. Can be made into a sweetener or for producing other agricultural products.



Pang Daeng

A local grain sorghum variety mostly grown for livestock feed.



Naga Multi-Colored

From Northeast India. Mid-sized ears with multi-colored kernels. Grows vigorously under suitable conditions.



Wachichu

Ranges from orange, light purple, to white. Heirloom variety from USA.



Purple Corn

Grains are a dark purple color.



Local (Chiang Dao)

Similar to Lampang variety in characteristics. White color.



Lampang

White-seeded variety with some slightly-purple kernels.



Local (Dark Red)

Wine red seeds with 19.05 cm (7.5 in) pods, grows vigorously.

Zea mays Flint Corn

ข้าวโพดพันธุ์พื้นเมืองเมล็ดสีส้ม

Varieties: Lampang, Local (Chiang Dao), Local (Dark Red), Naga Multi-Colored, Purple Corn, Wachichu

Mid-sized ears with multi-colored kernels that grows vigorously under suitable conditions. Having a hard "flinty" seed coat, flint corn is often multi-colored, hardy and grown for both human and livestock consumption. A rich carbohydrate food source, the immature kernels are consumed raw, cooked, or roasted. Maize grains are pounded or ground as meal or flour to be used in baking or as cooked cereal. Maize kernels are often soaked prior to grinding and after fermentation are used to prepare dishes such as kenkey or pozol. Corn starch is used as a thickening agent. Young tassels may be boiled and eaten and the pollen used as a soup ingredient. Maize is an important feed source for poultry, swine, and cattle. The whole plant is used as green fodder or as silage for cattle with kernels processed into various types of feed. Ground cobs may be used as litter material for animal bedding. It is a warm climate crop, thriving in open, sunny environments having daytime temperatures of 20-24°C (68-86°F). Rainfall during the growth period should be 500 mm (20 in) or more. Can be planted during the rainy season or dry season with irrigation. Prefers full sun and well-drained soil and grows best with a pH of 6.0-7.0.

Zea mays Popcorn

ข้าวโพดคั่ว

Varieties: Naga Popcorn

Popcorn has similar growth conditions to flint corn; however, this variety is well-suited for popping.



Naga Popcorn

From Northeast India. Small ears with hard, round, yellow kernels.

Can also be fed to animals. Hardy crop.

Zea mays var. saccharata Sweet Corn

ข้าวโพดหวานสีเหลือง

Varieties: Hawaiian Supersweet #9, Silver Sweet Corn

Sweet corn is sweeter than other types of corn because the endosperm (before becoming ripe and dry), contains sugar as well as starch. Grows well in tropical conditions and grows best during the rainy season. May be grown during the dry season if irrigated. Prefers full sun and well-drained soil. Grows best with a pH of 6.0-7.0. Matures in 68-75 days.

Hawaiian Supersweet #9

Yellow, sweet, and crispy; large ears; an improved open-pollinated variety.



Silver Sweet Corn

Similar to Hawaiian Supersweet in characteristics. White in color.

HERBS & INTEGRATED PEST MANAGEMENT

[Note: While many of the plants in this section have multi-purpose uses such as herbs for cooking or flowers for decoration, ECHO Asia has chosen to feature them together as resources for “Integrated Pest Management,” referring to the many practices that farmers may use to control pest populations in their fields.]



Burmese

A tall, well-branched plant. Bluish-green in color and disease-resistant.

Anethum graveolens Dill

ผักชีฝรั่ง

Varieties: Burmese

Dill is an annual plant cultivated for its seeds and leaves, and is used in cooking. It is a tall, feathery-leaved plant with yellow flowers and pungent smell. Its leaves can be used medicinally. Is also used in Integrated Pest Management systems to attract beneficial insects, such as parasitic wasps. The plant can be seeded directly, either broadcasted or planted in rows; it does not transplant well. Dill prefers moderately rich soils, an annual rainfall of 50-150 cm (20-60”) and temperatures of 7.2-29.4°C (45-80°F). Prefers full sun, but will bolt in hot, dry weather.

Cosmos sulphureus Cosmos

ดอกปอกระเจา

Varieties: Tung Khang Tong

Cosmos are effective nectaries for butterflies and can be planted to attract pollinators and other beneficial insects such as syrphid flies, lacewings, and parasitic wasps. Cosmos are also said to repel the corn earworm. As a companion plant, scatter seeds at plot edges, or plant at intervals within a garden. It is a warm-weather annual that tends to reseed itself. Highly adaptable to a wide variety of conditions. Plant in well-drained soil. Tolerant of low fertility. Will become leggy if soil is too rich. Prefers neutral to alkaline pH.



Mixed Sea Shell

Beautiful feathery flower, white and pink in color. Heirloom variety from the USA.



Tung Khang Tong

Local Thai annual, semi-hardy, up to 1-2 m tall with bright orange or yellow flowers.

Eryngium foetidum Sawtooth Coriander

ผักชีฝรั่ง

Varieties: Local

An herb that is strong in flavor, used both for culinary and medicinal applications. Sawtooth coriander is used in various dishes such as fresh Thai salads, “laap,” and to spice curries. It is also known as culantro. It is a perennial herb and can either be direct seeded or transplanted. Plants should be planted 10-15 cm apart (4-6 in), in rows no closer than 15 cm apart (6 in) apart. Young leaves are harvested for use, but as the plant begins to produce flowers the leaves become tougher. Flower stalks are pruned to maintain the growth of leaves. It prefers full sun.



Local

Strong variety from northern Thailand. Easy to grow, with potent flavor.



Burmese

A short, hardy variety from Burma about 0.5 m tall.

Foeniculum vulgare Fennel

ผักชีล้อม

Varieties: Burmese

Fennel is cultivated both as a flavorful, aromatic herb and a vegetable around the world. The bulbous base of the plant, its leaves, and the seeds (including the flowers) can all be eaten. The seed has a similar taste to anise and is used as a spice. The fruit (green, immature seed) is even more aromatic and is used both in cooking and as a flavoring for desserts such as licorice. The feathery leaves can be cooked in a variety of dishes, in either their fresh or dry form. The base can be used for similar purposes, and is both sweet and aromatic. Can be used in IPM to attract beneficial insects. Soak seeds for improved germination. Direct seed, thinning to 30 to 45 cm (12 to 18 in) apart, when they are approximately 10 cm in height (4 in). Prefers a well-drained area with sun. Plants will grow to be 0.5 to 1 m in height. Short-lived perennial. Will start to produce flowers after 90 days and will produce better in the second year.



Sweet Local

Dark green leaves with purple flowers and soft leaves.

Photo Credit: Kimberly B. Dunlap

***Ocimum basilicum*
Sweet Basil**

โหระพา

Varieties: Sweet Local

Used in both traditional medicine and in food for flavoring, sweet basil is an annual herb. Its leaves are used as a spice. In medicinal applications, sweet basil is used to help headaches, coughs, diarrhea, and constipation. Used in Integrated Pest Management systems (IPM) both to attract/repel certain insects, as well as for making natural pesticides. Can be grown in temperatures of 7-27°C and between 0.6-4.2 m of annual rainfall. Basil prefers a pH range of 4.3-8.2 and can tolerate dry soils. It is sensitive to frost. Plant seeds 0.3 cm deep at about 50-60 cm (6-12 in) apart. Plants require full sun and will grow to about 20-24" in height. Leaves can be harvested at any time of year and pinching young shoots off at the beginning of the rainy season will also encourage growth.

***Ocimum tenuiflorum*
Holy Basil**

กะเพรา

Varieties: Thai Local

Similar planting, care, maintenance, and use as Sweet Basil. Can-cross breed with Sweet Basil as well. Holy Basil has some different culinary uses, primarily in stir fried dishes.



Thai Local

Small leaves, blue/green in color.

Local

From the Fang District of northern Thailand. Green in color (rather than the more common purple variety) and easy to grow. ECHO Asia uses it in an integrated pest management system.



***Perilla frutescens*
Perilla**

กะชีมอน

Varieties: Local

Perilla is commonly known as beefsteak plant (due to its large leaves). It is also known as "wild basil," as it is often confused with and used for similar purposes as basil. It is native to the Himalayas and Southeast Asia. Leaves are both aromatic and sweet, and can be used as an herb. Regionally it is used in soups, salads, and as garnishes.

***Tagetes erecta*
African Marigold**

ดอกดาวเรือง

Varieties: Africa Heirloom

African marigolds can be added anywhere in the garden and serve as a beneficial companion plant. The strong odor repels pests and masks the smell of many crops, making it harder for pests to find and damage their host crop. It also attracts butterflies and other beneficial insects. Marigold roots exude a nematocidal toxin which has been shown to prevent damage from nematodes when planted in rotation with nematode-susceptible crops. This heirloom variety, from the United States, grows to 0.9-1.2 m (3-4 ft) in height. It is a hardy annual. Marigolds prefer the warm season but will survive cool weather. It prefers full sun. It tolerates drought and should not be over-watered. Requires well-drained soil. Tolerant of both acid and alkaline soils.

Africa Heirloom

Prolific bloomer with large yellow and orange double flowers on vigorous bushy plants.



Nematicidal Heirloom

Small white flowers. Plant is leggy but serves as a hearty variety effective against nematodes. Heirloom variety from USA.

***Tagetes minuta*
Nematicidal Marigold**

ดอกดาวเรืองไส้เดือนฝอย

Varieties: Nematicidal Heirloom

Maintenance and care is similar to *Tagetes erecta*. Different species known for its nematocidal properties.



Local

Plants can reach up to 6 feet tall and 2 feet wide in just a few months. Good for companion planting.

***Tithonia rotundifolia*
Mexican Sunflower**

ทานตะวันแม็กซิกัน
Varieties: Local

Provide well-drained, moderately fertile soil in full sun. Stake if necessary and shelter from strong winds. Grows best in hot, sunny weather.



Thung Khang Tong

Thai variety with a mix of purple and white flowers.

***Zinna elegans*
Zinnia**

ดอกบานชื่น
Varieties: Thung Khang Tong

Zinnia is an upright, bushy flower with a yellow and black inner flower and petals of varying color. Zinnias can be planted around and in garden beds to attract beneficial insects. Zinnias are often grown for sale as cut flowers. Zinnia is a warm-weather annual. It will flower more often with shortening days. Prefers full sun. Grows best with a long, dry hot season. Grows well in a well-drained loamy soil, rich in organic matter, pH 5.5-7.5.

LEGUMINOUS TREES

***Flemingia macrophylla*
Flemingia**

ถั่วมะแฮะ
Varieties: Local

Flemingia is a perennial, deep-rooting, leafy shrub with a native range extending from China to Indonesia. It is used in contour hedgerows for erosion control, using its debris as mulch, as a green manure in alley cropping systems, as a candidate for agroforestry systems (shading other crops such as coffee or cocoa), to suppress weeds, and also for fuelwood. It can be used as a forage, but has high tannin content. Immature flemingia leaves can be mixed with other grasses as a feed for ruminants and may be particularly useful consumed in the dry season. To plant, seeds can be scarified or boiled to improve germination, followed by soaking in cool water for twelve hours. Seedlings will emerge in 7-14 days. Plant spacing depends on the purpose, but in alley cropping, rows can be spaced approximately 90 cm (34.5 in) apart, with seedlings every 10-20 cm (4-8 in). Important to weed young plants during the first few months. Adapted to somewhat poor and acidic soils. Once established, it is a strong perennial plant that produces a lot of leaf growth. Can grow to be 3 m (10 ft) tall. Not easily affected by pests or diseases. Flemingia can become a weed in some areas and should be monitored closely. It will produce seeds 6-7 months after planting and thus should be coppiced; recommended cutting at 35-100 cm (14 - 38 in) in height.



Local

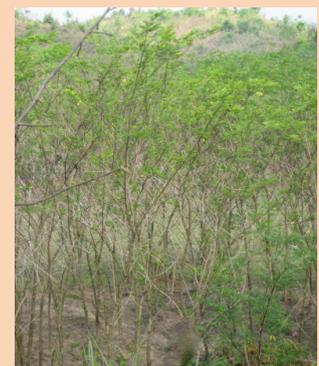
A local variety promoted for its ability to prevent soil erosion in sloping agriculture systems.

***Indigofera zollingeriana syn. L. teysmannii*
Large Indigo**

ครามใหญ่
Varieties: Philippines

In Asia, Large Indigo is grown for forage production for goats, soil conservation hedgerows, firewood production, as well as overstory (shade) for agroforestry projects. Can be used to suppress imperata grass. Grows best in tropical/sub-tropical, humid/sub-humid climates. It is a pioneer species which often invades open areas or fields after burning. Found at altitudes up to 850 m. Needs full sun. Tolerates acid soil, and can grow on poor soil.

Philippines
Medium-sized nitrogen-fixing tree. Can attain heights of 3-5 m (10-16 ft) within two years.



Leucaena diversifolia **Red Leucaena**

กระถิน

Varieties: UHDP

The pods, seeds and shoots of *Leucaena diversifolia* are used for food. In Thailand, young shoots are eaten fresh as a dipping vegetable or cooked in soups or fried with eggs. In Indonesia, fermented seeds are used to make a food called “tempeh lamtoro.” Green, unripe seeds are eaten as well. The green pods and high-protein leaves are a source of livestock fodder. Good for alley cropping and intercropping (especially as it offers filtered shade for other crops), red leucaena also has timber and firewood potential because it coppices well. Forage quality is reportedly lower than *L. leucocephala* but better adapted to higher elevations and cooler temperatures. Red leucaena has been promoted by the Mindanao Baptist Rural Life Center for its tolerance of acidic soil and as a psyllid resistant alternative to *L. leucocephala*. The tree flowers year-round in northern Thailand.



UHDP

Reddish brown pods (when mature), from the UHDP Center in Northern Thailand.

Leucaena leucocephala **White Leucaena**

กระถิน

Varieties: K-500 Cunningham

Similar to the UHDP variety, the pods, seeds and shoots are used for food. The green pods and high-protein leaves are a source of livestock fodder. Dried leaves can be processed as pellets for livestock and poultry. *L. leucocephala* is one of the highest quality and most palatable fodder trees of the tropics, often described as the ‘alfalfa of the tropics’. It also serves well as an alley crop and windbreak. Leucaena grows well with rainfall from 600-2000 mm/year. It does well in soils with pH 5.5-8.0. Intolerant of highly acid soils, low phosphorus, high salinity, high aluminum saturation and water-logging.



K-500 Cunningham

An excellent forage variety developed in Australia. A cross-breed between Salvador and Peru-type cultivars.



Burma Common

The leaves are high in protein and can be used as fodder for pigs and cattle. Can be planted to provide ground cover and erosion control between perennial crops. Suitable for rehabilitating degraded land.

Tephrosia candida **White Hoary Pea**

ครามป่า

Varieties: Burma Common

A leguminous, perennial shrub with a dense leaf canopy. The leaves are high in protein and can be used as food supplement for pigs and cattle, but are not eaten by humans. Insecticidal properties are also reported. Used for numerous applications including improved fallows and soil conservation. Grows well up to 1,600 m (5,249 ft) in elevation and prefers a mean annual temperature range of 18-28°C (64-82°F) as well as a mean annual rainfall between 700-2,500 mm (28-98 in). Grows on a wide range of soils including very poor soils where few other crops can grow. Tolerates a pH of 3.5-7; more acidic soils seem to be more suitable. Does not tolerate waterlogged soils.

Senna siamea
Siamese Senna

ซีเหล็กบ้าน

Varieties: Thai Local

An evergreen, leguminous tree with compound leaves. It grows to between 15 and 20 m (50-65 ft) in height. Commonly planted and found in the wild. Unlike many leguminous trees, it does not fix nitrogen. In Southeast Asia, its hard wood is found to be especially useful as fuel wood but is also used in construction and furniture making, in windbreaks or as a shade tree. It has also been employed in alley cropping and intercropping systems. Young leaves, flowers and tender pods are edible. The taste is bitter, but the plant parts are boiled 1-3 times (water discarded) before being added to soups and curries or eaten with chili pastes. Traditional senna leaf curries were reportedly used as a mild laxative drug. Grows best in well-drained, fertile soils; intolerant of saline soils. Prefers sun or light shade; does not grow well above 1,300 m (4,265 ft) elevation.



Thai Local

Local variety from Thailand. Fast growing, strong wood producer, does not fix nitrogen.

Sesbania grandiflora
Sesbania (Hummingbird Tree)

ดอกแคว้นขาว

Varieties: Local Mix

Sesbania is a nitrogen-fixing tree that grows to 5 m (16 ft.) tall with compound leaves and large flowers. It is used for fodder as well as a green manure. It is also planted as a light shade tree, as support for climbing crops, and in windbreaks. The flowers can be eaten raw, in curries, or steamed as a side. Young leaves and pods are also occasionally consumed by humans. Best to plant seedlings in moist but well-drained soil. Will survive some flooding. Will tolerate poor, acidic, or saline soils and grows well in full sun and light shade, but is sensitive to long periods of cool temperatures or frost.



Local Mix

White flower type from Thailand.

OIL SEEDS

Guizotia abyssinnica
Niger Seed

งาคูญี่ปุ่น

Varieties: Burmese

A member of the Aster family, Niger is an oilseed crop which has culinary, livestock-production, and soil-improvement uses. Seeds contain around 40% oil and about 20% protein. Seed cake is used for livestock feed. Requires short day-length for flowering. Along the Thai-Burma border, Niger seed is sown into harvested hill fields near the end of the rainy season. Recommended planting distance is 20 to 30 cm (8 to 12 in). Niger is best planted during the period of decreasing day-length in the higher latitudes of the tropics and sub-tropics. Grows well at soil pH values between 5.2 and 7.3 or on almost any soil that is not extremely heavy.



Burmese

Drought tolerant once established and ready for harvest approximately three months after planting.



Chiang Dao

A local variety that averages 2.5 m in height. The flowers are around 15 cm across and petals are yellow in color. The seeds have a striped pattern and the kernel is quite tasty.



Black Seed

Local northern Thai variety with kernels black in color. Can grow between 2-3 m (6.5-10 ft) in height.

Helianthus annus
Sunflower

ดอกทานตะวัน

Varieties: Chiang Dao, Black Seed

Sunflower is an upright annual plant that varies in height from 1-4 m. Seeds can be roasted and eaten whole or pressed for oil. In small-scale farming and backyard garden settings, sunflowers can be a good choice for intercropping (taking note of spacing and species). Sunflower can also be planted along plot borders to attract pollinating insects. Sunflower is grown principally in temperate regions, but tolerates subtropical and tropical climates. Subtropical varieties can stand -6 to -10°C, but the plant is sensitive to frost at all stages of growth. Can be grown at elevations up to 2600 m in the tropics, but best below 1500 m. Will succeed in most soil types. Well-drained soils are important as it is intolerant of waterlogged soils. Will tolerate both drought (comparable to sorghum and millet) as well as very acidic soils (4.5 - 8.7).

Plukenetia volubilis

Inca Nut

ถั่วดาวอินคา

Varieties: Lao

Inca nut is a woody vining perennial plant in the Euphorbiaceae family native to the high altitude rain forests of the Andes in South America. It has been grown for centuries for the large seed and seed oil, which is used in cooking. Seeds are oval, dark brown, and 1.5-2 cm (0.5-0.8 in) in diameter. Raw seeds are inedible, but roasting after shelling makes them very palatable. The viscous oil is yellow to orange in color and used for cooking. With adequate water and temperature, Inca nut will produce multiple times per year. Growth and fruit set are reduced in dry, cool seasons if no irrigation is provided. Found at altitudes up to 1700 m (5500 ft) and temperatures between 10-36°C (50-96°F). Prefers consistent rainfall and full sun, and is adapted to a variety of soil types and does well in acid soils.



Lao

Fruits are 3 to 5 cm in diameter with 4 to 5 points. Green pods ripen to blackish brown.

Sesamum indicum L.

Sesame

งาขาว

Varieties: AVRDC, Kasetsart, Lao

Sesame is an annual plant growing 50 to 100 cm (1.6 to 3.3 ft) tall. Seed is high in oil content. Sesame seeds, which contain approximately 50% oil and 25% protein, are usually roasted or stewed. They can also be ground into flour, added to breads, vegetables etc., used to make sweetmeats, or crushed and used as a butter. The seeds can also be sprouted and used in salads. Sesame oil is used in cooking, salad oils, and margarine. Young leaves are used as a soup vegetable in sub-Saharan Africa. Sesame occurs mainly in the tropics and subtropics from sea-level to 1500 m. High temperatures are required for optimal growth and production. Sesame is very drought-tolerant, with a minimum rainfall of 51-66 cm (20-26 in) per season for reasonable yields. Intolerant of water-logging. Thrives on moderately fertile and well-drained soils with pH ranging from 5.5 to 8.0. Most cultivars are sensitive to saline soils.



Lao

Small seed and small fruit. Caution required when harvesting, as pod tends to split open and release seeds.



Kasetsart

Big seed and fruit, resistant to disease. Pod does not split before harvest.



AVRDC

Taller fruit and dark green pod than Lao variety with high yield.

PULSES / GREEN MANURE COVER CROPS (GMCCs)

Cajanus cajan Pigeon Pea

ถั่วมะเดาะ

Varieties: Pa-O, Thailand Mix

Pigeon pea is a short-lived perennial which may live up to 5 years. The tree-like shrub grows to between 1.2 and 3.0 m (4-10 ft) tall and is used for food and fodder as well as in agroforestry systems. Pigeon pea can be eaten as dried peas, flour, or green vegetable peas. Seeds are high in protein (~21%). Produces a deep root system and fixes nitrogen quickly (168-280 kg/ha or 150-250 lb/acre). Can be planted as an annual. It is grown in the tropics and subtropics between 30°N and 30°S latitudes. Optimum average temperatures range from 18-29°C; does not tolerate frost. Grows best where annual rainfall ranges from 500-1,500 mm (20-60 in) a year. Generally considered drought-resistant, pigeon pea can be grown on a wide range of soil types. Waterlogging is harmful. Drained soils of intermediate water-holding capacity and with a pH between 5.0-7.0 are favorable.

Thailand Mix

Local Thai variety with good flavor.



Pa-O

From Shan State, Myanmar. Leaves, pods, and seeds are edible.



Chiang Dao

Local Thai variety with a bushy growth habit. Matures in 120 days.

ECHO

A more aggressive climber than the local variety.

Canavalia ensiformis Jack Bean

ถั่วพริ้ว

Varieties: Chiang Dao, ECHO

Produces large leaves and smooth pods, which are edible when tender. Yields large, smooth, white seeds. Seeds are toxic and require special preparation in order to be consumed. Can be used for fodder for ruminants. An excellent green manure/cover crop, jack bean produces considerable amounts of biomass (29.4 t/ha or 13 short t/acre fresh weight) and fixes up to 230 kg N/ha (205 lb N/acre). Jack bean grows well at 14 to 27°C (57-81°F) average temperature, from warmer parts of temperate zone to hot, tropical rainforest areas. Can thrive with rainfall as high as 4,200 mm (165 in) and as low as 700 mm (28 in). Can be grown up to 1800 m (5,906 ft).

Canavalia gladiata Sword Bean

ถั่วดาบ

Varieties: Mae Jo

Sword bean is a drought-tolerant legume known for its extremely large seed pods (25-36 cm or 10-14 in long) and large red or pink smooth seeds (4 cm or 1.5 in long). It is typically grown as a green manure/cover crop. Immature pods are sliced cross-wise before being prepared in stir fried dishes and curries. Sword bean seeds are somewhat toxic. However, the large, but not fully mature, seeds from green pods can be prepared for consumption by boiling for 10 minutes and peeling. Preferred environmental conditions are found in the humid lowland tropics with temperatures of 15-30°C (59-86°F), but the plants may be grown with success in tropical elevations of up to 1,000 m (3,200 ft). Will grow in areas experiencing annual rainfall anywhere between 700-4,200 mm (approximately 27-165 in). Optimum growth occurs in full sunlight, but sword bean is tolerant of some shade.



Mae Jo

Thai variety with large, pink seed. Matures in about 180 days.



Burma Red

Produces small, rough-coated, red-brown seed (Desi type); approximately 3.5 months to first seed harvest.

Burma Round

Produces large, round, smooth, light brown seed (Kabuli type); approximately 4.5 months to first harvest.

Cicer arietinum

Chickpea, Garbanzo Bean

ถั่วหัวช้าง

Varieties: Burma Red, Burma Round

One of the oldest cultivated legumes on record, chickpea is the second most important pulse crop in the world. The immature green pods and tender shoots are used as vegetables and mature seeds are prepared as dahl or flour. Chickpea is a key ingredient in such well-known Asian and Middle-Eastern foods as humus, falafel, and Burmese tofu. Can be fermented into tempeh. Dried seeds can be ground and used as a coffee substitute. A strong acid dew forms on the plant overnight that is gathered and made into vinegar or cooling drinks. Dried seeds are about 60% carbohydrate and 23% protein. Small bushy plants 20–50 cm (8–20 in) in height, chickpeas are grown in tropical, subtropical, and temperate climates, but produce better in tropical or subtropical climates with 400 mm (16 in) or more of rain annually. Too much water will cause plant roots and stems to rot. Will need irrigation when dry. Varieties vary in production time from 45-75 days from seed to flower.

Crotalaria juncea
Sunn Hemp

ปอเทือง

Varieties: Chiang Mai

Sunn hemp is an annual legume with stems that grow to a height of one meter (3 ft) or more. It produces bright yellow edible flowers and plump, velvety pods. It can serve as animal fodder; however, it contains toxins and should not form more than 10% of a cow's diet and should not be fed to horses and pigs. Fiber from the bark is used to make rope, canvas, fishing nets, pulp and paper. It is commonly used as a green manure cover crop. The plant performs well any time of year if moisture is adequate. It may suppress nematodes and shows some drought resistance. Although it is adapted to hot climates, this plant will endure slight frost. Prefers full sun and performs well in almost any soil that is not waterlogged. Grows vigorously in well-drained soils with a pH of 5.0 to 7.5, and thrives even on poor soils with little or no nitrogen fertilizer. If grown as a fiber crop, sunn hemp should be sown in light, loamy soil. It will produce coarse fiber with low yields if grown on heavy clay.



Chiang Mai

A prolific local variety. Can grow up to 2 m (6 ft).

Fagopyrum esculentum
Buckwheat

บัควีท

Varieties: GMCC

Buckwheat is an important grain crop in temperate areas. Does best in cool, moist temperate regions. Tolerates tropics at high elevations. Plant about 2.5cm (1 in) deep, 15-18cm (6-7 in) apart. Doesn't flower well in heat. Turn in to build soil. Matures in 75-90days. Does not set seed well where daytime temperatures exceed 25°C (77 F). Soil pH 4.4-7.5 is best.



GMCC

Buckwheat, a short-season crop, does well on low-fertility or acidic soils, but the soil must be well drained.

Glycine max
Soybean

ถั่วเหลือง

Varieties: Local

Soybean is a commonly known legume. It is an annual bean native to Asia domesticated over 3,000 years ago, and is grown in many different climates. Pods can be harvested as a fresh vegetable (known as the “edamame” in Japan), or when pods are fully mature and dried. In dry form, soybeans are used in a wide range of dishes throughout Asia including soups, salads, and desserts. Sprouts can also be eaten in various forms. It is used to make various food products including curd, tofu, milk, sauces, and meat and dairy substitutes. Fermented versions are used in various culinary traditions as a base and to provide great depth of flavor. High in protein as well as oil. Can also be used as silage. Has a tap root that reaches as much as 2 m (6.5 ft) in depth. Planted 2.5 to 4 cm (1 and 1.5 in) in depth and can be spaced according to need (from 18-76cm, or 7-30 in apart). Requires well-drained soil, preferably sandy or medium-loam. Intolerant of drought and requires a pH of 6.0 or above. Should be weeded while establishing. Grows vigorously and is competitive once a full canopy is established. Nitrogen-fixing ability is from 200-617kg/ha (178-559 lb/acre). Susceptible to various diseases and pests and should be monitored closely.



Local

From Ban Chan region of northern Thailand. Produces well with small seeds.

Lablab purpureus
Field Lablab

ถั่วแปะยี

Varieties: Chiang Dao Mix, Highworth

Lablab beans can be sprouted, soaked in water, shelled, boiled and then smashed into a paste which is then fried with spices. Dried seed can be processed to make a bean cake (tofu) or fermented to make a meat substitute (tempeh). In Thailand, field lablab is sold as a fried, salty snack. The crop is grown for fodder, a cover crop, and/or for pulse production and the growing crop can be grazed by cattle, goats, pigs, and sheep. Field varieties of lablab are drought-resistant summer annuals or short-lived perennials. Grows best at average daily temperatures of 18-30°C (64-86°F) and is tolerant of high temperatures. Lablab is also quite cold tolerant, able to grow at low temperatures (down to 3°C or 37°F) for short periods; can also tolerate very light frosts. Being drought tolerant when established, will even grow where rainfall is <500 mm (20 in), but loses leaves during prolonged dry periods. Tolerates light shade. Lablab grows in a wide range of soils from deep sands to heavy clays, provided drainage is good, and with pH between 4.5-7.5. However, lablab has low salinity tolerance.



Chiang Dao Mix

A white-seeded field lablab.

Highworth

Produces non-shattering pods with black seeds. Quick maturing; yields well.



Burmese

Easy to grow variety from Myanmar. Bushy and good producer of seed with potential as a cover crop.

Macrotyloma uniflorum
Horsegram

ถั่วขี้ม้า

Varieties: Burmese

Horsegram is a lesser-known climbing annual that can be used as a pulse for both livestock and human consumption. For animals it can help supplement grazing or be used as a fodder crop in dry season feed. Though not widely known, horsegram is consumed as whole seed, sprouts, or as meal in India, particularly in the southern region. It can be cut as a green fodder six weeks after sowing. It is often intercropped with annual grains or in orchards. Horsegram is particularly valued as a pioneer plant. Seeds can either be sown 1-1.5 cm (0.4-0.6 in) deep and covered lightly (do not need to be scarified) or broadcasted, with sowing rates ranging for 1-3 kg/ha (0.9-2.6 lb/acre) in a mixed pasture and up to 45 kg/ha (40 lb/acre) in pure stands. Well-adapted to a wide range of well-drained soils with a pH from about 5.0-8.0. Should be grown in sun and produces best in hot season. A short-day flowering plant that will typically flower in 120-180 days. Relatively free of disease and pests.



Chiang Dao

Climbing variety. Requires short days for flower and pod production. Seeds are black.



Tropical

Climbing variety. Requires short days for flower and pod production.



Bush

Doesn't climb. Seeds are white with black speckles.

Mucuna pruriens
Velvet Bean

หมามุ่ย

Varieties: Bush, Chiang Dao, Tropical

Velvet bean is an annual legume crop extremely valuable for intercropping in cornfields, rehabilitating depleted land, and for controlling weeds. Velvet bean is not recommended for human consumption due to the presence of L-dopa. The pods often are used for feeding cattle and sheep; pigs can also eat velvet bean as long as it is less than 25% of the total diet. It is not a suitable food for poultry. In addition, the vines can be grazed, made into hay, or mixed with corn as silage. It serves as a good green manure, able to fix nitrogen at reported rates of 228 kg/ha (200 lbs/acre). It can tolerate drought, low soil fertility, and acidic soil. It is best in a soil pH of 4.0-7.5. It is sensitive to frost and does not grow well in cold, wet soils. It grows best at altitudes under 1,500 m (4,500 ft) and thrives in areas with full sun and high rainfall.

Phaseolus vulgaris
Cranberry Bean

ถั่วแครนเบอร์รี่

Varieties: Bush (Cranberry), Mae Ai

Cranberry bean can be eaten by humans as either a fresh, green vegetable or a dried, cooked pulse. It is low in fat, high in calcium, phosphorus, and iron, and is 22% protein. Will succeed at high altitudes with a cool growing season. Prefers a well-drained, loose soil in full sun with a pH of 5.5 to 7.0. Thrives in the tropics at elevations between 1,000-3,000 m (3,280-9,842 ft) when the soil temperature is over 10°C (50°F). At lower elevations, best to plant during the cool-dry season. Mature seeds are ready to be picked 60-65 days from planting.



Bush (Cranberry)

Bush characteristics, does not need a trellis.



Mae Ai

Pole variety, the pod is a distinctive speckled-pink color. Shows good resistance to disease. Considered to have a creamy / nutty flavor.

Stylosanthes capitata
Stylo

ถั่วสไตโล

Varieties: Ubon

Stylo is a short-lived perennial shrub native to South America used in permanent pastures for intensive grazing. Scarification of seeds for five minutes is recommended to improve germination. Seeds should be sown 1 cm (0.4 in) deep (no more). Soil should be compacted above to increase emergence. Can be grown in infertile, well drained soils. Tolerant of low soil pH greater than 5.5. Rainfall in its native habitat is 1500 mm (59 in) per year, but can tolerate rainfall as low as 500 mm (20 in) per year. Does not tolerate flooding. Prefers full sunlight. Flowers in short-days. Susceptible to forms of anthracnose disease. seed yield can also be drastically reduced by stemborers and budworms. Self-pollinated and can be easily spread by its seed drop; should be monitored for potential to invade and become a weed.



Ubon

Bush characteristics, does not need a trellis.

Vigna angularis
Adzuki Bean

ถั่วอะซูกิ

Varieties: Palawan

Adzuki is a transliteration from its Japanese name; this bean is also commonly known as "red bean." It is an annual vine with a small bean. Grown throughout East Asia and the Himalayas. In Asia, adzuki is often used in various desserts, sweetened, and made into either porridges or pastes (used for fillings). Beans can also be eaten sprouted, boiled in a hot drink, or cooked as other dried pulses. Nutty in flavor. A good source for a variety of minerals including magnesium, potassium, iron, and zinc. Can be spaced 7-15 cm (3-6 in) and planted about 2.5 cm (1 in) in depth. Will grow to about 60-90 cm (24-36 in) in height. Can be grown in full sun to partial shade and requires some water, preferring well-drained soil. Flowers are yellow in color.



Palawan

From Palawan, Philippines. Bushy with a red seed and green pod. Good production and somewhat resistant to pests and disease.



Burmese Green

Day-neutral, bush variety. Green seed.

Lao

Day-neutral, bush variety; approximately 60 days from seed to flowering. Green seed.

Lombok

Indonesian variety. Taller than other varieties - will grow to about 1 m. The pods are larger and will produce more seed.

Vigna radiata
Mung Bean

ถั่วเขียว

Varieties: Burmese Green, Lao, Lombok

Mung bean is an early-maturing bush/slightly vining legume which is high yielding and widely adaptable. It is used throughout Asia as a food legume, for flour, in desserts, and sprouted for use in other dishes. It has a protein content of approximately 25%. Mung bean is cultivated most extensively in the India-Burma-Thailand region of Southeast Asia but also found in countries such as Iran, Pakistan, Vietnam, and China. Mung bean is a short-season crop requiring 60 to 90 days from planting to maturity. Grows mainly within 20-40° C (68-104°F) and up to 2000 m (6,562 ft) in the tropics. Grows well in areas with average rainfall of 600-1000 mm (24-39 in) but it can survive with less precipitation. Generally grows well on warm, sandy or otherwise loose soils but prefers well-drained loams or sandy loams with a soil pH range of 6.2-7.2.

Vigna umbellata
Rice Bean

ถั่วเน่า

Varieties: Chiang Dao, Department of Agriculture, ECHO, Rice Bean, Thai Green

Slender, annual, twining vine with pods approximately 10 cm (4 in) long, produced in groups of 5-12. Both young pods and dry seeds are edible. Rice bean is most often served in India as a dhal and can also be made into flour. It can also help with soil improvement and is known as a high-quality fodder. It is often relay-cropped with corn as a green manure/cover crop. Fixes approximately 80 kg N/ha (71 lb N/acre). Requires short days to flower. Drought-tolerant; known for its wide adaptation to diverse soil conditions. Five months to maturity.



Chiang Dao

Local Thai variety, red seed.



Department of Agriculture

Local Thai variety; black seed.



ECHO

Light yellow-green seed.

Thai Green

Light yellow-green seed, slightly larger than 'ECHO' variety.



Chiang Dao

Vining cowpea, good GMCC. Vines less than 1 m long; pods approximately 20 cm (8 in) long.



India Black Eyed Pea

Trellising vine. Prolific seed-bearing variety. Beans are white with black spot around hilum.



Pa-O

Speckled dark brown and white seed. Vining-type with a bumpy pod. From Shan State, Myanmar.



Lahu/Mae Ai

Bush variety; shows good resistance to disease; grayish seed.



Samoeng

Short creeping vine; intercropped with upland rice; tasty plump pod; black seed.

Vigna unguiculata
Cowpea / Black-Eyed Pea

ถั่วดำ

Varieties: Lahu/Mae Ai, Samoeng, Chiang Dao, India Back Eyed Pea

Cowpea can be eaten as a leafy vegetable and its seeds eaten green or dried. Young pods can also be eaten like green beans. In Southern India, the beans are called thatta kaai and are an integral part of the regional cuisine. In Tamilnadu, cooked and mashed cowpeas are combined with agery, ghee, and other ingredients to make cake-like sweets. Often used as a green manure cover crop and relay cropped. In northern Thailand, cowpea is intercropped with upland rice and can be grown on very poor acid soils as a soil-improver. Cowpeas tolerate high heat, dry conditions, and can be grown with less rainfall and under more adverse conditions than *Phaseolus vulgaris* and *Phaseolus lunatus*. Cowpea yields mature green beans in 60-90 days. Harvesting of leaves can begin about 30 days after planting. Fixes approximately 80 kg N/ha. Drought tolerant if root system established. Thrives where soil is well drained, properly inoculated, and moderately rich with lime.

VEGETABLES

Abelmoschus esculentus Okra

กระเจี๊ยบเขียว

Varieties: Bhutanese, Clemson Spineless, Red Maroon, Star of David

Okra is an upright annual plant with plump, hairy pods. Young tender pods are eaten. Leaves are reportedly edible as well. Pods are mucilaginous (containing a slimy substance) but adding cumin, salt, and/or lime cuts mucilage. Can be fried with chilies or boiled. Grows best in hot climatic conditions and needs full sunlight on fertile, well-drained soils, ideally well-manured loam; with a pH of 6.0-7.0.



Bhutanese

Produces green pods, eaten when 7-10 cm (3-5 in) long. Pods become hairy and spiny when mature, but young pods are edible.



Clemson Spineless

Prolific producer of dark green, spineless pods, which can be harvested continuously for weeks. Pods best when 7-10 cm (3-5 in) long. Plants grow to about 1.2 m (4 ft) in height.



Red Maroon

Produces dark red pods that can reach 20 cm but are eaten when 12-15 cm long.



Star of David

The plant is not covered with hairs. They are much less slimy than other types of okra.



Greenleaf

Light green leaf.



Tigerleaf

Produces leaves with green and red stripes.

Amaranthus tricolor Vegetable Amaranth

ผักโขมผัก

Varieties: Greenleaf, Tigerleaf

Mostly short-day crops, amaranths are fast growing, short-lived annuals grown for their protein-rich leaves and shoot tips. Amaranths are also high in calcium and iron. Leaves can be eaten raw but usually cooked (boiled, stir fried, etc.). Leaf tips and young shoots are both consumed. The leaves are also often used as feed for pigs and possibly other livestock. Amaranth grows well in both hot-humid and hot-dry climates. Can grow in a wide range of soil types and soil moisture levels. Amaranth can tolerate a range of soil pH between 4.5 and 8.0.

Basella alba Malabar Spinach

ผักปลัง

Varieties: AVRDC, Bangladesh

Malabar spinach is a perennial twining herb grown for its tender stems and leaves, which can be cooked like spinach. The leaves and shoots are mucilaginous when cooked. Its fruits have been used for dyeing. Malabar spinach needs night temperatures above 14°C (60°F) and is best suited to humid regions. Tolerates a wide range of soil conditions but does best on slightly acidic (pH 6-6.7), humus-rich sandy loams. Trellising is recommended.



AVRDC

Smaller-leaved than Bangladesh variety and vigorous. Leaves and tender stems are eaten as salad, boiled, stewed or stir-fried, or in soups.



Bangladesh

Large-leaved and vigorous, producing edible shoots in 70 days.

Benincasa hispida Wax Gourd / Winter Melon

ฟักเขียว

Varieties: Arunothai, Upland Mix

Wax gourd is an annual squash-like vine, with large, soft, hairy leaves. Fruits are large, oblong, 25-120 cm long, usually hairy when young, with a waxy covering when ripe. Fruit may weigh up to 40 kg, though 10 kg is normal. They have solid white flesh and cucumber-like seeds. Fruit may be eaten raw or cooked and is used in soups and curries. Young leaves can be boiled and seeds roasted. The fruit may be stored for many months at room temperature. Wax gourd can be grown year-round in tropical climates but is usually planted at the beginning of the rainy season. Frost sensitive. Prefers a soil pH of 5.0-7.5.



Arunothai

Round variety about 15 cm (6 in) across.



Upland Mix

Produces a large, green edible gourd about 46-61 cm (1.5 to 2 ft) long.



ECHO

ECHO Florida variety that grows well in Southeast Asia. Leaves have a blue-green color, and plant grows to about 1.5 meters in height.

Brassica carinata
Ethiopian Kale

คะน้า

Varieties: ECHO

Leaves and stem tips are eaten raw or cooked similarly to mustard or collard greens. Flowering stalks are sometimes cooked like broccoli. Leaves are nutritious, high in vegetable-rich protein, vitamins A and C, and a good source of minerals. Has reportedly been used as a fodder crop species. Ethiopian kale is propagated from seed, and seeds germinate rapidly in moist soil. Seed is often broadcasted, or can be planted in rows. Plant tolerates cooler temperatures and in Kenya is grown at an altitude range of 1-1600 meters with a rainfall range of 600-1600 mm (24-63 in). The plant will grow up to 1-1.6 m (3-5 ft) in height and will continue to produce new leaves, allowing the top to be frequently harvested. The plant is short lived, with only about two months between seed to seed. It does best in sandy loam with a soil pH of 5.5-8.0.

Brassica juncea
Mustard Green

ผักกาดเขียว

Varieties: Khasi, Mizuna

Mustard is a leafy, cool season green, often used in salads or cooked. Seeds may also be pressed for oil. Mustard grows best in cooler, milder temperatures (15-18°C or 59-64°F) and can tolerate annual rainfall between 500-4200 mm (20-165 in) and elevation up to 2000 m (6561 ft). Best to plant at the end of the rains, just prior to the cool season. Prefers loamy, well-drained soil and a pH 5.5-6.8.



Khasi

Extremely spicy/hot variety from NE India with rounded, spiny leaves. Performs better than Mizuna if planted during rainy season.



Mizuna

Thai variety of the mildly spicy mustard originating in Japan.

Brassica oleracea
Chinese kale

ผักคะน้า

Varieties: Mae Tha

White flower color, large, delicious stems and flower buds are cooked like broccoli, but it is easier to grow and thrives in much warmer weather. The texture is very tender and crisp, perfect for stirfries, soups, and more. A great variety for Asian markets.



Mae Tha

White flowers. The white flower variety is popular and grows up to 48 cm (19 in) high. This variety is heat resistant and will grow through the winter in most areas.



Extra Dwarf Pak Choy

It has dark green, wrinkled leaves with thick, white petioles. Very tender and delicious.

Brassica rapa var. chinensis (L.)
Pak Choy /Bok Choy

ผักกวางตุ้งฮ่องเต้

Varieties: Extra Dwarf Pak Choy

This tiny pak choy is picked when just 6 cm tall. The perfect baby vegetable for marketing, planting-to-harvest time is around 5-6 weeks. Can be used whole to make amazing salads and stir-fries.

Brassica rapa* var. *parachinensis
Choy Sum

ผักกาดขวางตั้ง

Varieties: Mae Tha, Burmese Local

Choy sum is a cultivar of *Brassica rapa*, a species of vegetable that includes a wide range of subspecies including turnips, bok choy, and napa cabbage. Choy sum is a leafy green also known as Chinese flowering cabbage. It is eaten widely around the world. The shoots and young leaves can be stir-fried, boiled, or steamed, and contain Vitamin A, calcium, potassium, and folic acid. Growing conditions are very similar to mustard green. Harvested 30 to 50 days after sowing.



Mae Tha

Especially hot in flavor. Used for making natural pesticides.



Burmese Local

Especially hot in flavor. Used for making natural pesticides.



Local

Leaves are unique green/purple in color with serrated edges. A distinct peppery taste.

Brassica rapa* subsp. *trilocularis
Mustard

ผักกาดดอย

Varieties: Local

Mustard is another cultivar of *Brassica rapa*, a species of vegetable that includes a wide range of subspecies including turnips, bok choy, napa cabbage, among many others. Its preparation methods are similar to choy sum and its growing conditions are similar to mustard greens. Similar to other cool season leafy greens, it can be susceptible to pests such as aphids, caterpillars, or snails and slugs.

Capsicum chinense
Ghost Pepper

พริก

Varieties: Mae Ai

Related to habaneros, ghost peppers are known to be the hottest in the world. Can be used as an additive or flavoring for dishes. It contains a chemical compound that gives it hot and irritant characteristics, making it useful for natural pesticide sprays. Ghost pepper prefers looser soils (sandy/loamy) so that its roots can receive extra oxygen. Favors hot weather, above 20°C (50°F) and long growing seasons. Plants are self-fertile, grow to be between 0.75-1.25 m high (2-4 ft), and produce peppers 2-5 cm (1-2 in) long. Usually transplanted at 8-10 weeks old. When harvesting and cutting up peppers, take care to use personal protective measures (gloves and even goggles) so as to avoid irritation.



Mae Ai

Especially hot in flavor. Used for making natural pesticides.



Hawaiian

Milder peppers, 4-6 cm (1.6-2.4 in) in length.



Karen

Hot red peppers, 2-4 cm (0.8-1.6 in) in length.



Tiny Hot

Very hot, very small peppers, 2-3 (0.8-1.2 in) cm in length.



Local

Hot peppers, white in color. 2 - 4 cm (0.8 - 1.6 in) in length.



Purple

Hot peppers, deep purple to magenta and red in color. 2 - 4 cm (0.8-1.6 in) in length.



Essaan

Long fruit in 7.62 cm (3 in) pods, extremely high yield, vigorous.

Capsicum frutescens
Chili Pepper

พริก

Varieties: Hawaiian, Karen, Tiny Hot, Local, Purple, Essaan

Chili peppers are eaten raw or cooked and can be dried and ground into a powder for use as flavoring. Leaves are sometimes cooked as a potherb. Pepper plants are usually grown as annuals in temperate climates but can be perennial if there is no frost. Height varies with variety, but 1 m (3.3 ft) is typical. Chili peppers require full sunlight and a long, hot season for growth. In humid areas, it is best to grow peppers during the dry season and water as needed. Grows best in a loam or silt loam soil with good water-holding capacity, but can grow in many soil types, as long as the soil is well-drained. Tolerates a pH of 4.3 to 8.3.



Thung Kwang Tong

Edible leaves, strong smell, good for companion planting.

Chrysanthemum coronarium
Edible Chrysanthemum

เบจมาศกินได้

Varieties: Thung Kwang Tong

Any type of chrysanthemum flowers can be blanched, then the petals removed and added to your favorite dish. This is easiest with large petaled varieties of mums. Use only the petals, since the flower base is usually very bitter. You can also make wine from chrysanthemum flowers. Traditionally yellow or white blossoms are used.

Cautions: Pyrethrum, a plant based insecticide, is made from the dried flowers of *Chrysanthemum cinerariaefolium* or *Chrysanthemum coccineum*. Although it takes a pretty high concentration of flowers to make pyrethrum, still avoid planting these types of mums in an edible garden.

Clitoria ternatea
Butterfly Pea

ดอกอัญชัญ

Varieties: Chiang Mai Mixed

Butterfly Pea, a climbing vine, is also used as a cover crop or green manure. Very drought-tolerant, but does not compete well with weeds. Some weed control can be achieved by mowing the crop; flowers are used to give blue tinge to rice; young pods eaten like string beans. Can be grown with tall grasses for rotational grazing, hay, or silage. It is well adapted to a variety of soil types (pH 4.5 – 9.0), including calcareous soils, and survives both extended rainfall and prolonged periods of drought.



Chiang Mai Mixed

White color and blue color used for drinking, making salad.



ECHO

ECHO's variety has leaves without irritating hairs.

Cnidocolus aconitifolius
Chaya

ชaya

Varieties: ECHO

Chaya is a fast-growing perennial shrub that produces large, dark green leaves. The leaves and thick succulent stems of chaya are a good source of protein, calcium, phosphorous, iron, vitamins A and C, as well as niacin, riboflavin, and thiamine. Chaya is generally cooked and eaten as a potherb. Raw chaya leaves are toxic, as they contain a cyanide-producing glucoside. However, cooking inactivates the toxic compounds. The entire plant may also be ground, dried, and used as animal feed. Tolerant of both drought and hot, humid weather, and moderately frost-tolerant. Chaya does not tolerate water-logged soils and has been killed by standing water within a few days' duration. Tends to be highly disease and pest-resistant. Chaya tolerates a wide variety of soil conditions but does not perform well in highly acidic soils. Chaya does not set seed and can only be propagated by cuttings. Not able to be shipped to all locations.

Coccinia grandis
Ivy Gourd

ผักตำลึง

Varieties: Local

Ivy gourd is a perennial vegetable common to the Southeast Asia region. It is a climbing vine that can grow up to 20 m (66 ft). Young shoots are prepared and eaten in a variety of methods. Fruit is eaten when young and green; it will turn bright red when ripe. Fruit is bitter in flavor and is a good source of nutrients, vitamins, and minerals. Various other parts are said to have medicinal properties (including roots, stems, and fruits). Does well in a range of soils but best in sandy soils and prefers to grow in full sun. Seeds can be first sown in containers and will take about 4-6 weeks to germinate. Young plants can be transplanted along a fence or an area where the vine can climb, spaced about 12-15 cm (5-6 in) apart. Can also be propagated by cuttings. Pollinated by insects. Should be monitored closely as, while common in Southeast Asia, it has also become invasive in Guam, Saipan, and Hawaii - growing rapidly and smothering local garden plants.



Local

Variety from a local northern Thai community. Common to this region and often collected along the roadside for consumption. Very easy to grow and eat.

Cucumis sativus Cucumber

แตงกวากัมพูชา

Varieties: Burmese, Khmer, Lampang, Sikkim

Cucumber is eaten raw, pickled, or cooked in soups, stews, and stir-fried dishes. The young leaves and stems of cucumber may be cooked as a green vegetable. Cucumber seeds are sometimes consumed as a diuretic. Cucumbers perform best in loose, well-drained soils amended with organic matter, and with a pH of 4.5-8.7. Hot, dry weather is ideal. Irrigation is encouraged, as water stress may cause bitter fruit. Daytime temperatures of no lower than 15° C (60°F), humidity of 80-90%, and rainfall of 100-200 mm (4-8 in) per month produce the best results. Cucumbers are not suited to high mountain climates or very dry seasons.



Burmese

Small variety about 6 cm (2.3 in) in length and round in shape. Good for pickling or fermenting.

Sikkim

Unique outside texture, speckled and brown similar to a cantalope. Heritage variety from the USA.



Khmer

From Cambodia. Approximately 30 days from seed to flowering. Large fruit averaging 30 x 7 cm (12 x 2.75 in) in size.

Lampang

Local to Northern Thailand; often planted with highland rice. Over 20 cm (8 in) in length. Light green in color.



Uberlandia

Tropical variety from ECHO Florida. Originally obtained from Dr. Warwick Kerr of the Federal University of Uberlandia in Brazil, who used tropical flowering carrot strains to produce this variety.

Daucus carota Carrot

แครอท

Varieties: Uberlandia

While most carrot varieties are temperate biennial plants that require a cold period to flower, this is a tropical carrot variety. Carrots are a commonly consumed vegetable and a good source of vitamin A from the orange-coloured carotene pigments contained in the carrot root. Leaves are sometimes eaten in Java. Both tops and roots can be used as small animal and livestock fodder. Seeds can be sown directly into shallow trenches 1 cm (0.5 in) deep, about 2.5 cm (1 in) apart. Will germinate in approximately 7-10 days. Seedlings should be thinned to about 8-10 cm (3-4 in) apart. Will take 60-70 days to reach maturity. Large carrots can be harvested first to prolong the season. May suffer from nematode, wireworms, or larvae of click beetle infestations and should be rotated with non-root crops. Aphids and mites may affect the tops.

Hibiscus sabdariffa Roselle

กระเจี๊ยบแดง

Varieties: Burmese, Bhutanese, Royal Project

Roselle has edible leaf shoots. It is an annual shrub of Southeast Asian origin. Leaves are edible raw or cooked with fresh leaves containing 2-3% protein and traces of calcium, phosphorus, and iron. Roselle flower calyces are used for tangy-flavored drinks and teas, sauces, or eaten fresh. It also has a number of reported medicinal uses. Roselle seeds can be pressed as a source of cooking oil. Suitable for tropical climates with well-distributed rainfall of 1500–2000 mm yearly, from sea-level to about 600 m altitude. Grows best in permeable soil with a friable sandy loam with humus being preferable; however, will adapt to a variety of soils. A short-day plant, it can be grown in temperate regions, but will not produce fruit.



Burmese

A hardy, red-stemmed roselle that produces many calyces. 90 days from seed to flower.



Bhutanese

Bigger fruits, dark edible leaves, and thicker calyces. Good for making drinks.



Royal Project

Similar looking to Bhutanese variety, but fruit and stalk are longer.

Ipomea alba Moonflower

ดอกชมจันทร์

Varieties: Chiang Dao

Often called moonflower or moon vine, *Ipomoea alba* is only one of many different plants commonly called "Moonflower." It is a species of morning glory native to the Americas but naturalized throughout the world. A perennial long-stemmed woody vine, moonflower produces fragrant white or pink flowers 8-14 cm (3-5.5 in) in diameter. They open in the evening and remain open until morning sunrise. Flowers that are previously unopened are broken at the stem and eaten cooked or fried and are said to help in digestion and with other stomach ailments. Flowers that have opened on previous nights are edible but not commonly eaten. Moonflowers grow vigorously. In some places it can be invasive.



Chiang Dao

A local naturalized variety that produces hundreds of large white flowers.



Chiang Dao

Yields purple pods with black seed.

Lablab purpureus
Vegetable Lablab

ถั่วแปบ

Varieties: Chiang Dao

A climbing, semi-perennial legume grown for its edible purple pods, leaves, and flowers. Young and old bean seeds are also consumed once cooked (raw dry seed is reportedly poisonous). Usually planted during the rainy season. In Thailand, begins flowering indeterminately in November; green pods harvested from December to March. Lablab is remarkably adaptable, growing in various climates and regions with annual rainfall ranging from 200 to 2,500 mm (8–98 in) and elevations ranging from sea level to 2,133 m (7,000 ft). Vegetable lablab can be grown in many types of soils with the pH varying from 4.4 to 7.8 and ideal temperatures for vegetable lablab production range from 22° to 35°C (72–95°F). Can tolerate light shade.

Lactuca indica
Tropical Lettuce

ผักกาดหอมบ้าน

Varieties: ECHO Tropical

Tropical lettuce is a fast-growing, self-seeding, semi-perennial vegetable which grows up to 2m (6.5 ft) in height. Leaves are a fair source of vitamins A and C. Young leaves can be eaten raw; older leaves, which are bitter, can be served raw with vinegar, steamed, or boiled. At times, the leaves are employed as wrappers in which to fry fish. Thrives under warm, moist conditions. Optimum temperature range is 25-30°C (77-95°F). If planted in well-drained soil, can tolerate rainfall in excess of 3500 mm/year (138 in/year). Prefers a soil pH of 5-8.



ECHO Tropical

Grows over 2m (6.5ft) tall.

Lactuca sativa
Lettuce

ผักกาดหอม

Varieties: Khasi Green, Celtuce, Red Oak

In Asia, in addition to salads, lettuce is consumed raw as a side vegetable to dip in chili sauces, curries, and other dishes. It is also boiled as a potherb, pickled, braised, sautéed, fried, pureed, or used in soups and stews. Lettuce thrives under cool, moist conditions and can survive a light frost. Long, hot days generally prompt plants to bolt (send up a flowerstalk), and at this point the sap in the leaves turns unpalatably bitter and leaf harvest ends. Heavy rains can encourage the growth of fungus and subsequent rotting. Needs regular watering and welcomes shade from taller crops. A rich, loose soil with a pH between 6-7 is ideal.



Khasi Green

Loose-leaf type from Northeast India. Light green leaves usually eaten raw.



Celtuce

Young leaves can be eaten as well as the hardy stem at the base of the mature plant.



Red Oak

Beautiful local variety. Leaves are deep red and maroon in color with wavy edges.

Burmese

Produces very large oblong fruit up to 50 cm (20 in) in length.



ECHO Bottle Gourd

Produces light green multi-lobed fruit up to 15 cm (6 in) in length. Mature fruits can be made into bottles or birdhouses when dry.



Om Koi Long

Produces edible fruit up to 60 cm (24 in) in length.



Caveman's Club

From Chiang Rai, Thailand. Wrinkled-looking on the outside with a crooked neck. Light green in color. Young fruit tastes similar to zucchini.

Lagenaria siceraria
Calabash Gourd

น้ำเต้า

Varieties: Burmese, ECHO Bottle Gourd, Om Koi Long, Cavemen's Club

Calabash gourd fruit is eaten when very young throughout Asia in the same way as pumpkin, and often used in curries. The young shoots and leaves are also eaten as vegetables. The seeds, containing 45% oil, can be pressed for cooking oil. The dried gourd is also known to have many other practical uses including cups, utensils, pipes, musical instruments, and as a floatation aid for fishing nets. Can be planted year-round and is very prolific in the subtropics; tolerates heat and humidity better than most cucurbits. Grows best in well-drained, loose soil (pH 4.5-7.5) with a good layer of compost. Grow on a trellis.

Luffa acutangula
Angled Luffa

บวบเหลี่ยม

Varieties: Burmese, Chiang Dao Small Luffa

A climbing annual that produces oblong, fibrous fruit about 30 cm (1 ft) long, with black seeds. Eaten throughout South, East, and Southeast Asian countries and can be cooked as a vegetable or used in soups. Although smooth luffa is generally preferred as a sponge source, the procedure for sponge harvesting is similar for both angled and smooth types. Angled luffa is well adapted to the warm dry tropics but often can be grown in the wet tropics as well. Luffas are frost-sensitive and do not thrive in temperate regions. Can be planted year-round in the tropics but best if planted at the beginning of the rainy season. Although the vines can be allowed to trail along the ground in dry regions, trellising is recommended to reduce fruit rot, particularly in humid areas. Luffa prefers well-drained, fertile soil, although it does not require soil as fertile as other cucurbits need.



Burmese

Edible fruit less than 30 cm (1 ft) long and edible leaf shoots.



Chiang Dao Small Luffa

Cucumber-like edible fruit 3-5 cm (1-2 in) long. Does not become spongy.



Smooth (ECHO)

Produces smooth plump fruit.



Thai Long

Produces smooth long fruit (~30 cm/12 in).



Thai Oval

Produces large oval fruit.

Luffa aegyptiaca
Smooth Luffa

บวบหอม

Varieties: Smooth (ECHO), Thai Long, Thai Oval

A climbing annual that produces oblong, fibrous fruit about 30 cm (1 ft) long, with black seeds. The young leaves, shoots, and fruit of luffas are eaten. Older, dry fruit are used as sponges. Luffas produce vigorous climbing vines; plants should be trellised. Well-adapted to warm dry tropics, but can be grown in wet tropics. Luffas may be planted year-round in the tropics but best growth is obtained by planting at the beginning of the rainy season. Luffas are frost-sensitive, making it difficult to grow them outside tropical or subtropical climates. Fences or trellis supports for luffas need to be sturdy to support the weight of the fruit. Vines can be allowed to trail over the ground in the dry tropics.

Momordica charantia
Bitter Melon

มะระกัมพูชา

Varieties: Khmer

The immature fruit of bitter melon, as well as the tender vine tips, are consumed as cooked vegetables. The fruits are high in folic acid and vitamin C and the leaves are rich in vitamin A and calcium. They are very versatile in cooking, as they can be boiled, fried, curried, pickled or baked. Bitterness is reduced by soaking the peeled fruit in salt water before cooking. Tender shoots and leaves are also used as greens. It is a slender annual climbing to 3.05-3.66 m (10-12 ft) tall with edible fruits and young vines that may be prepared in a variety of ways. The fruits are pear-shaped or oblong, growing to 10-15 cm (4-6 in) long. Flowering is day neutral. Bitter melon prefers a well-drained, sandy loam soil but will grow in areas with poorer soils. Prefers daytime temperatures between 24-27°C (75-81°F) as well as regular rainfall or irrigation.



Khmer

Fruits are pear-shaped or oblong, grow 10-15 cm (4-6 in) in length, and turn from green to orange when ripe.

Moringa oleifera
Moringa

มะรุม

Varieties: Regional Mix

Tree with small rounded, compound leaves, and long pods with large, winged seeds. Leaves are especially high in protein, calcium, and vitamins A, B, and C; can be eaten raw, cooked, or dried and ground. Young pods are included in curries (inner portion is edible). Roots can be used as a spicy condiment similar in taste to horseradish. Grows well in poor soils and full sun but must be established in well-drained sites; yellow leaves and dieback may indicate too much water. Moringa tolerates a soil pH of 5-9 and grows best between 25 to 35°C (77-95°F), but will tolerate up to 48°C (118°F) in the shade and can survive a light frost.



Regional Mix

Mixture of various types native to Southeast Asia.



Local

Local variety collected from UHDP Center's agroforestry plots.

**Oroxylum indicum
Indian Trumpet**

เพกา

Varieties: Local

Indian trumpet tree grows well in warm tropical and subtropical regions with moderate rainfall. Has a tall erect trunk with large podded fruits that hang down from bare branches. The Thai and Laotian names of these vegetables pods are "Tree Tongue" or "Sky Tongue," describing the shape of these pods, which are used in traditional medicine throughout the region. Studies have shown that crude extracts of stem bark, root bark, and fruit exhibit potential for various medicinal uses, including: antimicrobial, anti-inflammatory, anti-arthritic, anticancer, anti-ulcer, hepatoprotective, antidiabetic, antidiarrheal, and antioxidant properties. Large pods are eaten when young. They are bitter in taste and may be soaked first in salt water or grilled over a fire to be made more palatable. After preparation, pods can be sliced into small strips and either stir-fried or used in curries. To plant, prepare seeds in a nursery area in poly bags. Once established, after about 3 months, transplant in a field or forested area. Should be irrigated immediately after transplanting. Best to plant in the rainy season for adequate water during establishment. It prefers shade and is great for intercropping or agroforestry systems. Can be susceptible to powdery mildew and may be affected by aphids or mites.

**Pachyrhizus erosus
Yam Bean, Jicama**

มันแกว

Varieties: Laoda

Yam bean is a leguminous plant with a bulbous tuber that may be eaten raw or cooked. Tubers are low in calories and contain less than 10% carbohydrates and slightly more than 1% protein (fresh weight). They are also a good source of vitamin C. The young seed pods are sometimes cooked and eaten as a vegetable. Leaves and beans contain rotenone, a natural insecticide, and therefore should not be consumed. Yam bean requires short days for tuber production. Produces well in hot, humid environments with a long, warm, frost-free growing season. Can be used as a cover crop or trellised. Prefers well-drained soil. Optimal soil pH 6.5-8.



Laoda

Regional variety with vigorous growth. Prefers full sun.

Burmese

A strong plant and prolific producer of delicious pods with a soft, melting flavor.



**Pisum sativum
Sugar Pea**

ถั่วลันเตา

Varieties: Burmese

Sugar pea produces large tasty pods with immature seeds, meant for eating. Often consumed raw, in salads or stir fried. Vines can also be treated as a cover crop, either left on top as a mulch or tilled in to improve soil. Sweet peas perform best in cooler weather and prefer soil that is well-drained. Plants can be direct-seeded rows about 75 cm (30 in) apart, and trellised. Seeds should be sown 1-3 in (3-8 cm) deep. In tropical locations, sugar peas are planted in the cold season. Pods should be harvested when immature, 60 to 75 days after germination. When harvesting for seed, allow pods to fill and turn yellow and brittle.

**Phaseolus vulgaris
Green Bean**

ถั่วแขกต้น

Varieties: Bhutanese, Khasi, Naga, Naga Speckled

In northern Thailand, the immature pods are eaten raw or stir fried with oyster sauce. The beans are used in soups. Can be sautéed lightly in butter, steamed briefly, or cooked in a stir fry. Can be preserved by pressure canning and freezing. Spent vines can be used as mulch or cultivated into soil, and vines and foliage may be used as fodder. Green (or French) beans do well in the tropics when planted at elevations between 1,000 and 3,000 m and when soil temperature is over 10°C (50°F). Grow during the cool dry season at lower elevations. These beans prefer full sun and well-drained, loose friable soils with a pH of 5.5 to 7.0.



Bhutanese

Bhutanese variety. Similar looking to other varieties, but fruit is slightly larger. Prolific producer.



Khasi

Quick producing pole variety from NE India that produces pods about 12 cm (5 in) in length with dark brown seeds.



Naga

From NE India. Produces tender, sweet pods about 12 cm (5 in) in length. Seeds are brown with a distinctive swirled pattern.



Naga Speckled

Similar looking to other varieties, but fruit is a dark red and green color and is a smaller size.

Phaseolus lunatus
Lima Bean

ถั่วราชมาช

Varieties: Burma Red, 7-Year, Christmas pole lima bean

Immature shoots, leaves, green shelled beans, and pods are consumed in Asia (raw seeds may be toxic). Dried vines may be used as animal fodder. Well-adapted to lowland tropics, especially the highly leached, infertile soils of the more humid regions, but prefers well-drained, well-aerated neutral (pH 6-7) soils. Elevations for production range from sea level to 2400 meters (7,874 ft) in the tropics. Plant at the beginning of the rains; dry period needed for seeds to mature.



Christmas Pole Lima Bean

Very large maroon-white mottled beans with beautiful, dark red splashes, and rich flavor; heavy yields even in very hot weather; long vines. Approximately 90 days after planting.



Burma Red

Indeterminate climbing lima bean; produces medium-sized red beans approximately 90 days after planting.



7-Year

Seeds are half white and pink. Can be made into soups, stir-fried dishes, salads, mashed, or with curries.

Psophocarpus tetragonolobus
Winged Bean

ถั่วพู

Varieties: Bogor, Day Neutral, Pang Daeng Nawk, Purple (Esaan), Purple Mae Tha

Perennial (sometimes cultivated as an annual) legume with long, winged pods on a climbing vine. Leaves, shoots, flowers, pods and seeds are all edible. The root tuber underground is white and firm and averages 20% protein. Young pods, harvested while still tender and bendable, can be boiled and served like green beans or used with dip sauces and curries; protein-rich bean milk and flour are useful dietary treatments for protein-deprived children. Winged bean thrives in hot, wet climates, although a dry period is favorable to fertilization and the production of mature pods. It can, however, be grown in the tropics at elevations up to 2100 m (6,890 ft). Grows well under a variety of soil conditions except in sand or high salinity environments. Drought sensitive. Most varieties are planted at the beginning of the rainy season with flowering induced by short day-length. However, day-neutral varieties can be planted year-round.



Bogor

20 cm (8 in) pods, vigorous, high yields. A short day-length variety.



Day Neutral

Blooms during longer days, allowing for out-of-season.



Pang Daeng Nawk

Short day-length variety from northern Thailand; produces long, tender pods (30 cm/12 in).



Purple (Esaan)

A short day-length variety with 25 cm (10 in), dark purple.



Purple Mae Tha

A short day-length, young pod with green-purple tip, mature pod is maroon.

Solanum lycopersicum
Tomato

มะเขือเทศ

Varieties: Burmese, Local Variety, Tommy Toe, Yellow Pear, Mae Tha, Sansai

The tomato plant is erect or spreading and viney, coarsely hairy with small yellow flowers. Hundreds of varieties exist with fruits of different shapes, sizes, and colors. The fruits are prepared and eaten in a variety of ways and are high in lycopene, an antioxidant. It is closely related to potatoes, eggplants, and peppers. Tomatoes can be grown at altitudes between sea level and 2,000 m (6,560 ft) in the tropics, but yields are generally higher at elevations over 1,000 m (3,280 ft). A diurnal variation (daily temperature fluctuation) of at least 5-6°C (9-11°F) is considered necessary for optimum development. High relative humidity can be harmful to the tomato crop and fruits rarely ripen fully in wet weather. On the other hand, tomato is also sensitive to sunburn and hot dry winds can lead to flower drop and reduced yields. Tomatoes can be grown on many soil types; however, sandy or sandy loam soils with a pH of 5.5 to 7.0 are preferable. The optimal soil temperature for germination is 20-30°C (85°F).



Burmese
Medium sized variety, producing dark red fruit.



Tommy Toe
An heirloom cherry tomato variety, well known for its juiciness and flavor as well as general disease resistance. Fruits are 2.5 cm (1 in) and prolific.



Local Variety
Small, cherry tomato variety. Grows easily on almost any soil as an annual vegetable. Produces many sour/sweet fruits with bumpy shape.



Yellow Pear
Yellow, sweet variety. Often eaten as a fresh vegetable.



Mae Tha
Large sweet variety that can be used for making tomato sauce.



Sansai
Similar looking to Tommy Toe variety, but more yeild. Round fruit 10 cm (4 inches) and disease resistance.

Solanum melogena
Eggplant

มะเขือ

Varieties: Bitter Eggplant, Mae Tha, Naga, Small Eggplant, Yellow, Crispy Purple, Tung Kwang Tong

An annual or semi-perennial shrubby plant. Immature fruits are used as a cooked vegetable. Eggplants may be boiled, fried, stuffed or eaten with Asian chili sauces. In Southeast Asia, unripe fruits are commonly used in curries. Productive at ECHO Asia, even with nematodes, but susceptible to various soil pathogens. A semi-perennial, eggplant does best in well-drained soils with temperatures 28-35°C (75-100°F). Can plant all year, but growth is best during the cool dry season. Eggplant prefers a soil pH of 4.3-8.5.



Bitter Eggplant
Burmese variety. Color is green and red, with bumpy ridges. Flavor is bitter and often eaten with chilli.



Mae Tha
Fruit is 2-3 cm in diameter, white, and crispy. Eaten raw as vegetable, in salads or with spices like chili paste.



Naga
Perennial, producing many large fruits all-year round. Plant in cold season. Fruit is edible while young.



Small Eggplant
Smaller in size, fruit is white. A strong variety and prolific producer. Crunchy texture. In Thailand, it is often eaten raw with chilli paste.



Yellow
Productive in hot, humid weather. Edible when young and green (firm) and when mature and yellow (soft and slightly bitter).



Crispy Purple
Small local eggplant light purple in color. Often used for eating with chili paste.



Tung Kwang Tong
Deep purple in color and fleshy meat; 20 cm (8 in) long and 28 cm (11 in) round.



Burmese

Round edible fruit 20 cm (8 in), with a sour flavor.

Solanum quitoense
Naranjilla

มะอึ๊ก, มะเขือขาน

Varieties: Burmese

Naranjilla is a thorny perennial plant that can reach 250 cm (8 ft) in height, producing yellowish-orange fruits in a similar fashion to tomatoes. The berries have a subacid flavor and are used to make juices, jams, jellies, and a flavoring for ice cream or sherbet. Naranjilla prefers short days within a long growing season, cool, moist growing conditions, and well-drained, fertile soils. It is susceptible to root knot nematodes. Fruit is covered in bristly, sharp fuzz that can be rubbed off when the fruit is ripe; wearing gloves when handling the fruit is advised. This fruit grows on the ECHO farm which has a very low elevation (300-400m), but it prefers higher elevations. Naranjilla cannot tolerate frost or temperatures above 85°F. Soil pH: 6.5-7.0.

Solanum scabrum
African Nightshade

มะแว้งนก

Varieties: AVRDC

The leaves of this fast-growing edible nightshade contain protein, iron, vitamin A, and other minerals in much higher levels than European leafy vegetables such as cabbage. Leaves, and particularly fruits, are bitter in taste; fruits are typically removed before cooking. Grown best in soil high in organic matter, prefers the humid tropics with at least 500 mm rainfall during the growing season, with optimal soil pH 6-6.5. Grows up to 100 cm high, widely spreading. Can also be used as animal fodder.



AVRDC

Young shoots and leaves are blanched, boiled or stir-fried, cooked with other vegetables or added to soups. Berries are bitter in taste and usually not eaten.

Vigna unguiculata ssp. Sequipedalis
Yard Long Bean

ถั่วฝักยาวลาย

Varieties: Kachin, Chinese Red Noodle, Tung Kwang Tong, Yasothon

A legume cultivated for its edible immature pods. The leaves are edible raw or cooked. Fresh leaves contain 2-3% protein and traces of calcium, phosphorus, and iron. The crisp, tender pods are eaten both fresh and cooked. They are at their best when young and slender. They are sometimes cut into short sections for cooking uses. As a West Indian dish, they are often stir-fried with potatoes and shrimp. Prefers deep, fertile, well-drained loam. Can be grown on a trellis. A short-day plant. Can be grown in temperate regions, but will not produce fruit.



Kachin

A local variety with green purple-speckled pods. Preferred for its soft texture.



Chinese Red Noodle

Red pod 58 cm (23 in) long. Prolific producer.



Tung Kwang Tong

Green pod 40 cm (16 in) long. Soft in texture.



Yasothon

Dark red color, bush variety.



The Nature of Plant Introduction: Some Important Cautions

ECHO supplies small seed packets for trial. It is important to understand that the plants must be treated at first as experimental before making recommendations to members of your community. Many development workers have introduced and promoted 'miracle technologies' and 'wonder plants' before giving them adequate trial and experimentation on-site. Not even studies in the same country can guarantee acceptance or success. Hasty introductions of new ideas or plants are likely to encounter serious problems. Farmers may have planted their fields with the new varieties or invested their savings in the new tool when the problems surface; perhaps a pest or disease strikes, or the equipment is faulty or unsuitable. In the end, farming families will suffer, and the development worker will understandably have a very difficult time promoting any further ideas or innovations. People may lose confidence or trust, with serious consequences for your work or ministry.

There are many advantages to conducting your own trials before disseminating seeds in the wider community. It is important to know whether the plant can grow in your area before farmers devote land and time to cultivating it. Through conducting trials, you may find the best 'window' in your seasons for the optimal performance. You receive only a small packet of seeds from ECHO; if the plants produce well, you will have plenty of seeds to share. If the plants do not grow and produce seed, perhaps they are not suited to your region. Should the species be enthusiastically accepted, ECHO can refer you to commercial sources for some seeds if you need larger quantities or want to broaden the genetic base. If the plant holds great promise in your area, it is best to obtain more seeds from another source before the planting areas become too large. Genetic diversity not only offers potential for superior plants to be identified, but also affords protection in case of disease outbreak.

Beyond avoiding the risk of total planting failure, small trials allow you to evaluate the 'weed potential' of certain species in your area. Watch the planting carefully the first few seasons to make sure it is not likely to become a problem plant. Unfortunately, one definition of a weed, "plants which thrive under stressed conditions, often with high seed production," fits some of the plants in ECHO Asia's Seed Bank. We are very aware of this risk and have in fact eliminated certain species from our seed bank when the danger of introducing a weed seemed too great. However, hardy plants which can establish themselves may be a great blessing in many situations; for example, it is difficult to imagine a tree which could become a pest in certain areas of Africa or Haiti with severe fuelwood shortages. Sending out only small trial packets of seed is another safeguard against introducing a weed, as too-aggressive plants may be identified and controlled easily in a small area. Finally, remember that many of the plants in ECHO Asia's Seed Bank are commonly accepted food plants somewhere in the world, even if very localized. In this, too, there is a measure of safety, as we can all learn and benefit from the years of plant selection by people in other parts of the world.

In all cases, we look upon those who request seed as collaborators with us in field trials. This does not mean that you must do elaborate experimentation, but we do expect you to take time to write to us after the food has been harvested, letting us know your general impressions on your seeds' suitability to the region and the culture. A seed trial report form is available online- please contact us at asiaseeds@echonet.org. We enter your results in our database and use this information to make more refined recommendations to others and to share with interested scientists. These reports are very important to us, to be aware of germination or weediness problems, as well as to learn of successful introductions and acceptance of the plant in the community. We are always glad to receive the seed trial reports, but we also have special interest in longer-term results of plant introductions and the effects of ECHO's work. If you receive seed from ECHO and the plants are adopted in the fields and gardens in your area, please let us know.



