



**ECHO<sup>®</sup>**  
ASIA IMPACT CENTER

2019 to 2020

# SEED CATALOG



## **ECHO Asia Seed Catalogue 2019-2020**

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For further resources or seeds, including networking with other agricultural and community development practitioners, please visit our website: **ECHOcommunity.org**. ECHO's general information website can be found at: **echonet.org**

## FOREWORD

Seeds are a strategic starting point for any agricultural development programs and projects, and good seeds are undoubtedly one of the most important material inputs for farmers, both men and women. In some farming communities and families, seeds are the most significant predictor of productivity. For subsistence and small-scale farmers, whose resources are limited and risk taking capacity is low, what matter most are seeds that are yield-dependable, climate-smart and sustainable. Seed security – access to enough quality seed in time of planting – is paramount.

ECHO Asia has been operating a Seed Bank in Thailand since 2009, the first Seed Bank outside of ECHO Inc. Florida Headquarters. The goal of the ECHO Asia Seed Bank is to serve as a resource facility for development workers within the region who wish to experiment with and/or promote underutilized crops as they find ways to improve the lives of the poor. The seed bank maintains a collection of hard-to-find seeds that thrive under difficult growing conditions in the tropics and sub-tropics, apart from select species akin to sustainable agriculture practices.

Through the ECHO Asia Seed Bank, members of the ECHO community network can either acquire free small sample packets, or purchase bulk orders of selected seeds. This transaction is aided by this catalog, the “ECHO Asia Seed Catalog.”

ECHO Asia endeavors to keep the Seed Bank Catalog up to date considering that we discover, collect and acquire seeds as we move and travel around Asia in the course of conducting training and networking activities and events with partners.

This version of Seed Bank Catalog 2019-20 is predecessor of Seed Catalog 2017-2018. It provides the latest collection of seeds categorized into fruits, grains, herbs and botanical pesticides, legumes, oil seeds, pulses and cover crops/ green manure. I hope that this catalog will greatly facilitate the choice that any interested individual takes.



Eduardo A. Sabio, Ph.D.  
Regional Director  
ECHO Asia



# HISTORY OF ECHO ASIA SEED BANK

## HOW IT ALL STARTED:

ECHO Asia, a regional extension arm of ECHO Inc. serving the region, exists to equip and empower workers in agriculture and community development so that they can be more effective in their work with smallholder farmers and the poor in Asia to improve food security and livelihoods.

Established in 2008, the ECHO Asia project initially consisted of a small office in Chiang Mai and a seed bank facility at the Upland Holistic Development Project (UHDP) Agroforestry and Small Farm Resource Center in the Mae Ai District of Chiang Mai province.

Beginning in 2017, ECHO Asia began to move the seed bank from Mae Ai to Chiang Mai, just 20 minutes from the Chiang Mai office. The new site sits on 4 hectares and features a seed bank storage facility; seed garden/ production plots; biocharcomposting and urban gardening demonstration areas; research facilities; an agroforestry lane, animal raising and feedstock production demonstrations; and training facilities. The move was completed in 2019 and ongoing work on the farm is focused on initiatives that will better serve those intermediaries who are part of the ECHO Asia network.

**The ECHO Asia Seed Bank is committed to providing open-pollinated seeds** since they can be saved and replanted continuously, allowing farmers to have self-sufficient seed supply.



The ECHO Asia Small Farm Resource Center and Seed Bank is only 25 minutes outside of Chiang Mai!



## ABOUT ECHO ASIA

### ECHO ASIA IMPACT CENTER:

ECHO Asia, a regional extension arm of ECHO Inc., exists to equip and empower workers in agriculture and community development so that they can be more effective in their work with smallholder farmers and the poor in Asia to improve food security and livelihoods.



We do this by providing free resources, information, training, and seeds to our network members residing in Asia.

### SERVICES OFFERED:

**ECHO Asia Notes and News** - technical articles on a wide variety of topics as well as information on upcoming events and happenings in the network. We currently translate these articles into 7 other regional languages including Thai, Burmese, Vietnamese, Mandarin, Indonesian, Hindi and Khmer. All of these resources are available in **ECHOcommunity.org**

**Sharing of new ideas & information** - we desire to “ECHO” and promote good agricultural practices happening in Asia!

**Hosting Agriculture and Community Development events** - we routinely host regional and country-wide workshops with organizational partners in order to offer context-relevant information in local languages.

**Cultivating seeds and sharing seed banking techniques!** We currently produce a catalog of nearly 200 seeds from the Chiang Mai Thailand Seed Bank- a continuously expanding seed inventory is available and for sale on **ECHOcommunity.org**. Our members qualify for 10 free seed packets per year!

**Partnering with our network** to print expanded resources for sale and in our resource library. We have nearly 60 books available at cost at the office and a resource library of nearly 850!

**Offering technical responses** to field questions from network.

**Providing on-site consultations** for organizations and individuals.

**Volunteer Opportunities & Internships** are available to our network and those that wish to learn more about sustainable agriculture, seed banking, research and living cross-culturally.

### VISITING THE IMPACT CENTER & SEED BANK:

We are pleased to welcome visitors to our Small Farm Resource Center & Seed Bank in San Pa Pao, San Sai, Chiang Mai! If you are interested in taking a tour, please contact us by email ([asiahospitality@echonet.org](mailto:asiahospitality@echonet.org)). At this time, we are NOT open on the weekends, but we would be pleased to offer a tour Tuesday-Friday mornings. This map below can guide local drivers to our location.



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[www.ECHOcommunity.org/regions/asia](http://www.ECHOcommunity.org/regions/asia)



# SEED ORDERING & RESEARCH STEPS

## STEP #1: ORDER SEEDS

Go to the ECHO Asia Seed Bank store on [ECHOcommunity.org](http://ECHOcommunity.org). If you are not a member of ECHOcommunity, it is free! You can order seed, register for events, subscribe to publications like the quarterly ECHO Asia Notes, and much more!

If you are an active worker in agriculture and community development, you are eligible for **10 free sample seed packets** per calendar year (shipping is included). Please enter the promotional code **"FreeAsiaSeeds"** at checkout. We are able to ship seed to most (but not all) countries in SouthEast Asia. If you are not sure you can receive seed from outside your country, please contact us and we can help you determine this.

If you are ordering seed in bulk, this is not eligible for the promo code. After we have your order we will calculate the final cost (seeds and shipping) and send to you for final payment.



## STEP #2: TAKE PRECAUTIONS

**ECHO supplies small, open-pollinating, 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. Promoting "miracle technologies" or "wonder plants" before giving them adequate trial and experimentation on-site can have serious consequences for your work or ministry.



## STEP #3: OBSERVE

Before disseminating seeds in the wider community, it is important to conduct trials to find the conditions and seasons of optimal performance. Likewise, it is important to watch the plantling carefully the first few seasons to make sure it is not likely to produce too-aggressively.

Throughout each planting season, take time to write down general impressions on your seeds' suitability to the locality and culture.

In all cases, we look upon those who request seeds as collaborators with us in field trials. This does not mean that you must conduct elaborate experimentation, but we highly value all information you can feedback about your seeds.



## STEP #4: REPORT

Let us know what happened! After your crop has been harvested, email us at: [asiaseeds@echonet.org](mailto:asiaseeds@echonet.org) and we will respond with a **seed trial report form** that you can fill out. (Or go directly to: [members.echocommunity.org/page/Seed\\_Trial](http://members.echocommunity.org/page/Seed_Trial))



## HOW TO USE THIS CATALOGUE

### SEED INFO ORGANIZATION:

Each seed entry has the same format. If you are looking for a specific piece of information, such as the Latin name or elevation, **refer to the example below.**

### EXAMPLE SEED ENTRY:

**Latin Name**

**English Common Name**

ชื่อสามัญภาษาไทย

**Varieties:** variety name 1, variety name 2

elevation: 1000-3000m



Here you will find a description of the species; information such as rainfall needs, planting depth, or specific uses.



**Variety 1**

Information specific to this variety.



**Variety 2**

Information specific to this variety

### SYMBOL KEY:



**Fodder:** plant can be used to feed animals



**Non-Edible:** plant is toxic for human consumption



**Warning:** read description of plant closely

### INDEX:

If you are looking for a particular species or variety, refer to the index at the back of the catalogue. Plants are alphabetically **sorted by Latin name, English common name, and Thai name.**



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***Carica papaya***  
**Papaya**

มะละกอ

**Varieties:** Sunrise, UHDP

**elevation:** best below 900m, up to 2100m

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 unisexual, 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.

***Cucumis melo***  
**Mash Melon**

แตงลาย

**Varieties:** Local

**elevation:** 0-1000m

Mash Melon or "Thai melon" has a strong smell and mild sweet flesh. It is used in Thai desserts (smoothie) and eaten with chilli sauce. It is pest resistant, so watch for excessive growth. However, it is a very sensitive plant; do not touch the young fruit or flowers. It can be used as a cover crop or for intercropping (ex. highland rice).



**Local**

Light green, sweet flesh with many seeds.

***Momordica cochinchinensis***  
**Gac Fruit**

ฟักข้าว

**Varieties:** Local

**elevation:** 400-1100m

Gac is a woody, vining perennial that can cover trees and buildings. The plants are dioecious meaning that some plants will be male (only male flowers) and some will be female (only female flowers). One plant of each sex is needed for fruit set but planting 1 male plant for every 10 female plants is best. Hand pollination may be required if the natural pollinator is not present. The vine needs 8-9 months before it will produce fruit and it fruits once a year. The green fruit turn a dark orange color when ripe. Underneath the thick yellow-orange flesh are seeds that are covered in an oily, bright red membrane or sac. This membrane is the edible portion and is the most nutritious part of the fruit. Young gac leaves and immature (green) fruits can be cooked and used as a vegetable.



**Local**

Fruit is about 13 cm (5 in) in length and 10 cm (4 in) in diameter.



***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.

elevation: 0-1300m



**Yellow**

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

***Peruvian groundcherry***  
**Cape Gooseberry**

โทงเทง

**Varieties: Royal Project**

elevation: 300-2400m



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.

Caution: 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

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***Amaranthus cruentus***  
**Grain Amaranth**

elevation: 0-1200m

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.



**PI 538255**  
 Yellow inflorescence, white stem.



**PI 538320**  
 Red inflorescence, white stem.



**PI 606767**  
 Light brown inflorescence.

***Coix lacryma-jobi***  
**Job's Tears**

elevation: up to 2000m

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.

***Salvia hispanica***  
**Chia**

elevation: 400-2500m

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**

ข้าวฟ่างหางกระรอก  
**Varieties: Chiang Dao**

elevation: up to 1800m

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**

elevation: 0-1000m



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.



**Pang Daeng**

A local grain sorghum variety mostly grown for livestock feed.

**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.

***Zea mays***  
**Popcorn**

ข้าวโพดคั่ว  
**Varieties: Naga Popcorn**

elevation: up to 2000m



Popcorn has similar growth conditions to flint corn (see next page) ; 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*  
Flint Corn**

elevation: up to 2000m

ข้าวโพดพันธุ์พื้นเมืองเมล็ดสีสน

**Varieties:** Lampang, Local (Chiang Dao), Local (Dark Red), Local (Thai), Local (Thai), Local 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.



**Local**

Sticky and sweet, 10-15cm long, dark purple color



**Local (Thai)**

Tall plant with slender, light yellow ears, used for fodder



**Naga Multi-Colored**

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



**Purple Corn**

Grains are a dark purple color.



**Lampang**

White-seeded variety with some slightly-purple kernels.

**Local (Thai)**

multicolor: orange and yellow, full shape, used for fodder.



**Wachichu**

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



**Local (Chiang Dao)**

Similar to Lampang variety in characteristics. White color.



**Local (Dark Red)**

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



***Zea mays var. saccharata*  
Sweet Corn**

elevation: up to 2000m

ข้าวโพดหวานสีเหลือง

**Varieties:** Hawaiian Supersweet #9, Silver Sweet Corn, Yellow 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.



**Yellow Sweet  
Corn**

Similar to Hawaiian supersweet, 111 days to harvest.



**Silver Sweet Corn**

Similar to Hawaiian Supersweet in characteristics. White in color.





## HERBS & INTEGRATED PEST MANAGEMENT

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***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.

**elevation:** above 200m



**Burmese**

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

***Coriandrum sativum***  
**Coriander/Cilantro**

ผักชี

**Varieties:** Pyin Oo Lwin

Coriander is an annual herb in the family Apiaceae. It is also known as Chinese parsley, and the stems and leaves are usually called cilantro in North America. All parts of the plant are edible, but the fresh leaves and the dried seeds are the parts most traditionally used in cooking.

**elevation:** up to 2200m



**Pyin Oo Lwin**

Seeds, leaves, and roots are all edible.

***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.

**elevation:** 1100-2100m



**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 (3-6 ft) 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.

**elevation:** up to 1700m



**Local**

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



***Feoniculum 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.

**elevation: above 500m**



**Burmese**

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

***Hibiscus acetosella***  
**Cranberry hibiscus**

**ชบาเมเปิล**

**Varieties: ECHO**

A medium sized, semi-perennial bush that produces edible purple-red leaves. The long taproots require deep, loose, well-drained soils for maximum growth. Tends to escape/spread easily when self-seeding. Cranberry Hibiscus is propagated from seeds or from stem cuttings. Seeds may be sown in spring-time directly in field environments with well-prepared soil or transplanted as young seedlings from seedbeds to field conditions. The plants need to be widely spaced to accommodate this species' wide-spreading branching habits. Elevation: sea-level up to 3,000 ft (900 m), Rainfall: needs at least 500 mm (20 in) during growth, Temperature: frost sensitive, Soil: deep, loose, well-drained soils, Light: Will grow in full sun, but prefers some shade.

**ECHO**

Originally from Africa growing in wetter climate areas. The tangy, deep maroon leaves can be eaten raw or cooked and the flowers blended in teas or lemonade.



***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 (44-81°F) and between 0.6-4.2 m (2-13.5 ft) 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 (0.1 in) deep at about 50-60 cm (6-12 in) apart. Plants require full sun and will grow to about 51-61 cm (20-24 in) 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.

**elevation: 0-2500m**



**Sweet Local**

Dark green leaves with purple flowers and soft leaves.

***Ocimum tenuiflorum***  
**Holy Basil**

**กะเพรา**

**Varieties: Thai Local**

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

**elevation: 0-2500m**



**Thai Local**

Small leaves, blue/green in color.

### *Perilla frutescens*

#### Perilla

#### งาขี้ม่อน

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.

#### 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.



### *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.

elevation: 0-2000m



#### Africa Heirloom

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

### *Tagetes minuta*

#### Nematicidal Marigold

#### ดอกดาวเรืองไล่เดือนฝอย

Varieties: Nematicidal Heirloom

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

elevation: 0-2000m

#### Nematicidal Heirloom

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



### *Tagetes patula*

#### Red Marietta Marigold

#### พันธุ์กลีบสีผสม

Varieties: Red Marietta Marigold

Continuous succession of beautiful 2" blooms provides a spectacular splash of color all summer and into fall! Perfect for borders or scattered throughout the garden. Classic marigold aroma.

elevation: 0-2000m



#### Red Marietta Marigold

Red flowers with yellow edged petals..

### *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.

elevation: up to 1500m



#### Local

Plants can reach up to 6 feet (1.8 m) tall and 2 feet (0.6 m) wide in just a few months. Good for companion planting.

### *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.

elevation: 600-1800m



#### Thung Khang Tong

Thai variety with a mix of purple and white flowers.



## LEGUMINOUS TREES

<i>Flemingia macrophylla</i> , Flemingia, ถั่วมะแฮะ	21
<i>Indigofera zollingeriana</i> syn. <i>I. teysmannii</i> , Large Indigo, ครามป่า	21
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***Flemingia macrophylla***  
**Flemingia**

ถั่วมะแอะ

Varieties: Local

elevation: up to 2000m

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

elevation: up to 850m

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

elevation: 700-2500m

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* (see below) 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**

elevation: 0-800m

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 acidic 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.

***Tephrosia candida***  
**White Hoary Pea**

ครามป่า

**Varieties: Burma Common**

elevation: up to 1600m



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.



**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.

***Senna siamea***  
**Siamese Senna**

ซีเหล็กบ้าน

**Varieties: Thai Local**

elevation: up to 1300m

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)**

ดอกแคสีขาว

**Varieities: 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.

elevation: up to 1500m



**Local Mix**

White flower type from Thailand.



## OIL SEEDS

<i>Guizotia abyssinnica</i> , Niger Seed, งาญี่ปุ่น	25
<i>Helianthus annus</i> , Sunflower, ดอกทานตะวัน	25
<i>Plukenetia volubilis</i> , Inca Nut, ถั่วดาวอินคา	25
<i>Sesamum indicum</i> L., Sesame, งาขาว	26



***Guizotia abyssinnica***  
**Niger Seed**

งาญี่ปุ่น

**Varieties:** Burmese

**elevation:** 1600-2200m

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.

***Helianthus annuus***  
**Sunflower**

ดอกทานตะวัน

**Varieties:** Chiang Dao, Black Seed

**elevation:** 40-2500m

Sunflower is an upright annual plant that varies in height from 1-4 m (3.2-13 ft). 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 (21-14 °F), but the plant is sensitive to frost at all stages of growth. Can be grown at elevations up to 2600 m (8770 ft) in the tropics, but best below 1500 m (4920 ft). 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, see pg. 8) as well as very acidic soils (4.5 - 8.7 pH).



**Chiang Dao**

A local variety that averages 2.5 m (8.2 ft) in height. The flowers are around 15 cm (6 in) 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.

***Plukenetia volubilis***  
**Inca Nut**

ถั่วดาวอินคา

**Varieties:** Lao

**elevation:** up to 1700m

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 ( 1.2-2 in) in diameter with 4 to 5 points. Green pods ripen to blackish brown.



***Sesamum indicum* L.**  
**Sesame**

elevation: 0-1500m

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 sweet-meats, 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 (4920 ft). 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

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## *Cajanus cajan* Pigeon Pea

elevation: up to 1000m

ถั่วมะแฮะ

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 (64-84 °F); 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.

## *Canavalia ensiformis* Jack Bean

elevation: up to 1800m

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).



### Chiang Dao

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

### ECHO

A more aggressive climber than the local variety.

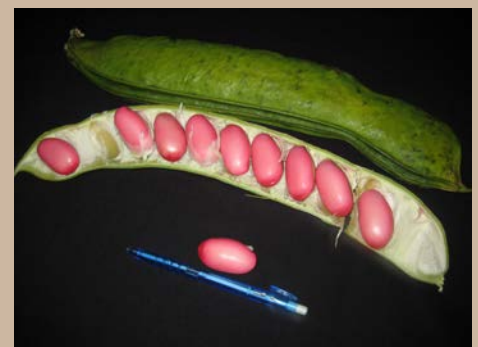
## *Canavalia gladiata* Sword Bean

elevation: up to 1000m

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).



### Mae Jo

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

***Cicer arietinum***  
**Chickpea, Garbanzo Bean**

ถั่วหัวช้าง

**Varieties:** Burma Red, Burma Round

**elevation:** up to 1200m

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.



**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.

***Crotalaria juncea***  
**Sunn Hemp**

ปอเทือง

**Varieties:** Chiang Mai

**elevation:** 0-1500m

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).

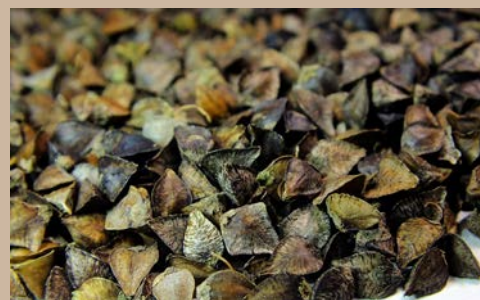
***Fagopyrum esculentum***  
**Buckwheat**

บัควีท

**Varieties:** GMCC

**elevation:** 0-1500m

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, 15-18 cm (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.



***Gossypium hirsutum***  
**Cotton**

ฝ้าย

Varieties: Laos

This cotton is: pest resistant, tolerant of varieable conditions (low water), and highly productive. Can be pruned after harvest for new growth/production. If taken care of, can produce for 2+ yrs as a short term perrenial. Used for making thread for clothing.

elevation: best at 0-1500m, up to 2200m



**Laos**

This variety has a light yellow flower.

***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 both protein and 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 18-76 cm, 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.

elevation: 0-2000m



**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 temperature of 18-30°C(64-84 °F ) and is tolerand 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.

elevation: 0-2100m



**Chiang Dao Mix**  
A white-seeded field lablab.

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

## *Macrotyloma uniflorum*

### Horsegram

ถั่วขึ้นม้า

Varieties: Burmese

elevation: 0-1500m



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.

#### Burmese

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

## *Mucuna pruriens*

### Velvet Bean

หมามุ่ย

Varieties: Bush, Chiang Dao, Tropical

elevation: up to 2100m



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.



#### Bush

Doesn't climb. Seeds are white with black

#### 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.

## *Phaseolus vulgaris*

### Cranberry Bean

ถั่วแครนเบอร์รี่

Varieties: Bush (Cranberry), Mae Ai

elevation: 1000-3000m

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

elevation: up to 1000m



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 stem borers 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

elevation: above 420m

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.

### *Vigna radiata*

Mung Bean

ถั่วเขียว

Varieties: Burmese Green, Lao, Lombok

elevation: up to 2000m

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.



#### 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 (3.2 ft). The pods are larger and will produce more seed.

***Vigna umbellata***  
**Rice Bean**

elevation: 0-1800m

ถั่วแป่

**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.

***Vigna unguiculata***  
**Cowpea / Black-Eyed Pea**

elevation: 0-2000m

ถั่วดำ

**Varieties:** Lahu/Mae Ai, Samoeng, Chiang Dao, India Black 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 (71 lb N/acre). Drought tolerant if root system established. Thrives where soil is well drained, properly inoculated, and moderately rich with lime.



**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.



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***Abelmoschus esculentus***  
**Okra**

elevation: up to 1000m

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.

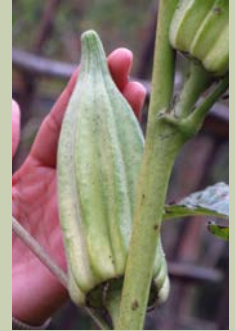
**Red Maroon**

Produces dark red pods that can reach 20 cm (7.8 in) but are eaten when 12-15 cm (4.7-6 in) long.



**Star of David**

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



**Manee Maejo**

This variety has two colors, green and light maroon. The pod of this variety is longer than the Red maroon variety.



**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



***Amaranthus tricolor***  
**Vegetable Amaranth**

elevation: up to 2000m

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.



**Greenleaf**  
Light green leaf.



**Tigerleaf**  
Produces leaves with green and red stripes.

***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 (10-47 in) 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

elevation: up to 1000m



**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.

***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 Keyna is grown at an altitude range of 1-1600 m (3-5250 ft) 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.

elevation: up to 2600m



**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 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 50-420 cm (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.

elevation: up to 2000m



**Khasi**

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



**Mix Variety**

Needs Caption.

***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.

elevation: up to 1000m



**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.



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

ผักกวางตุ้งฮ่องเต้

**Varieties:** Extra Dwarf Pak Choy

elevation: 500-1500m

This tiny pak choy is picked when just 6 cm (2.4 in) 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.



**Extra Dwarf Pak Choy**

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

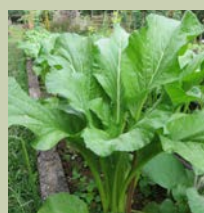
***Brassica rapa* var. *parachinensis***  
**Choy Sum**

ผักกาดกวางตุ้ง

**Varieties:** Mae Tha, Burmese Local

elevation: up to 2000m

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.

***Brassica rapa* subsp. *Trilocularis***  
**Mustard**

ผักกาดดอย

**Varieties:** Local

elevation: up to 2000m

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.



**Local**

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

***Capsicum chinense***  
**Ghost Pepper**

พริก

**Varieties:** Mae Ai

elevation: 0-1800m+

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.

***Capsicum frutescens*** elevation: 0-1800m+  
**Chili Pepper**

พริก

**Varieites:** 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.



**Hawaiian**

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



**Local**

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



**Karen**

Hot red peppers, 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.



**Tiny Hot**

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



**Essaan**

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

***Chrysanthemum coronarium***  
**Edible Chrysanthemum**

เบจมาศกินได้

**Varieites:** 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.



**Thung Kwang Tong**

Edible leaves, strong smell, good for companion planting.

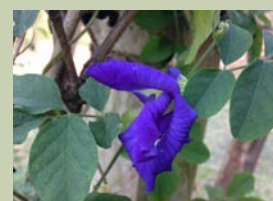
***Clitoria ternatea***  
**Butterfly Pea**

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.

elevation: up to 1800m



**Chiang Mai Mixed**

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

***Cnidoscolus aconitifolius***  
**Chaya**

ชายา

**Varieites:** ECHO

elevation: 0-1300m



**ECHO**

ECHO's variety has leaves without irritating hairs.

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

elevation: up to 2400m



**Local**

Variety from a local northern Thai community. Very easy to grow and eat.

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.

***Cucumis sativus***  
**Cucumber**

แตงกวากัมพูชา

Varieties: Burmese, Khmer, Maetha

elevation: up to 1800m

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.



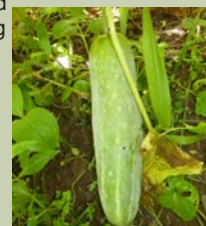
**Burmese**

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



**Khmer**

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



**Maetha**

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

***Daucus carota***  
**Carrot**

แครอท

Varieties: Uberlandia, Pyin Oo Lwin

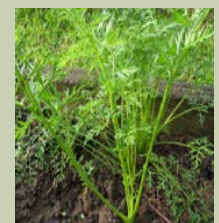
elevation: above 500m

While most carrot varieties are temperate biennial plants that require a cold period to flower, this is a tropical carrot variety. Carrots are 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.



**Pyin Oo Lwin**

root is bigger than Uberlandia, stem is more bushy with many flowers, less pests.



**Uberlandia**

Tropical variety from ECHO Florida.

***Hibiscus sabdariffa***  
**Roselle**

กระเจี๊ยบแดง

Varieties: Burmese, Bhutanese, Royal Project

elevation: 0-600m

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 150-200 cm (60-80 in) yearly, from sea-level to about 600 m (19,700 ft) 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.

elevation: up to 600m



**Chiang Dao**

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

***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.

elevation: 0-2100m



**Chiang Dao**

Yields purple pods with black seed.

***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.

elevation: 0-2500m



**Regional Mix**

Mixture of various types native to Southeast Asia.

***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 (see below) 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.

elevation: up to 1800m



**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.



***Luffa aegyptiaca***  
**Smooth Luffa**

elevation: up to 1800m

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, but trellis supports are essential to prevent fruit rot in the wet tropics. Similar to angled luffa, smooth luffa also prefers fertile, well-drained soil



**Smooth (ECHO)**  
Produces smooth plump fruit.



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



**Thai Oval**  
Produces large oval fruit.

***Momordica charantia***  
**Bitter Gourd**

elevation: 0-500m

มะระกิมพูชา

Varieties: Khmer

The immature fruit of bitter gourd, 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 gourd 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.

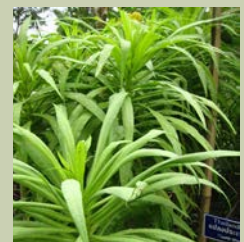
***Lactuca indica***  
**Tropical Lettuce**

elevation: 0-2000m

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 2 m (6.5 ft) tall.

***Lactuca sativa***  
**Lettuce**

elevation: above 1000m

ผักกาดหอม

**Varieties:** Khasi Green, Celtuce, Red Oak, Red Bowl MJ4, Green Bowl MJ3

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.



**Celtuce**

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



**Khasi Green**

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



**Green Bowl MJ3**

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



**Red Bowl MJ4**

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



**Red Oak**

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

***Lagenaria siceraria***  
**Calabash Gourd**

elevation: 0-2500m

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.

**Burmese**

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



**Om Koi Long**

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



**ECHO Bottle Gourd**

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



**Caveman's Club**

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



***Momordica charantia***  
**Chinese Gourd**

มะระจีน(เขียวยาว)  
**Varieties: Local**

elevation: up to 1000m



**Local**  
 6in  
 diameter,  
 9in long

A slender annual climbing to 3.0 -3.7 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. The immature gourds and tender vine tips are consumed as cooked vegetables. The fruits are high in folate and vitamin C and the leaves are rich in vitamin A and calcium.

***Phaseolus lunatus***  
**Lima Bean**

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

elevation: up to 2400m



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.



**7-Year**

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



**Burma Red**

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

***Oroxylum indicum***  
**Indian Trumpet**

เพกา  
**Varieties: Local**

elevation: 1100-2000m

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, anit-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.



**Local**

Local variety collected from UHDP Center's agroforestry plots.

***Pachyrhizus erosus***  
**Yam Bean, Jicama**

มันแกว  
**Varieties: Laoda**

elevation: up to 70m

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.

***Pisum sativum***  
**Sugar Pea**

ถั่วลันเตา

Varieties: Burmese

elevation: up to 1000m+

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 tinned 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.

**Burmese**

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



***Phaseolus vulgaris***  
**Green Bean**

ถั่วแขกต้น

Varieties: Bhutanese, Khasi, Naga, Naga Speckled, Pa-o

elevation: 1000-3000m

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 (3300-9800 ft) 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.



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



**Pa-o**  
Edible mature seed and young pod, thick reddish pod with large white/pink spotted beans, similar with kahsi variety



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



**Huay Hom**  
Similar to naga variety, thin pod with white bean, beans occur in pairs



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



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



***Psophocarpus tetragonolobus***  
**Winged Bean**

elevation: up to 1000m

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 (see pg. 28); 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 production.



**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**

elevation: 0-2000m

มะเขือเทศ

**Varieties:** Burmese, Local Variety, Tommy Toe, Yellow Pear, Mae Tha, Sansai, Columbia Yellow, Partner, Deep Red Fat Bumpy

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. Indeterminate.



**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.



**Deep Red Fat Bumpy**

Mashed for tomato sauce or soup, a little sweet



**Mae Tha**

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



**Sansai**

Round fruit 10 cm (4 inches) and disease resistance.



**Partner**

Similar care and flavor as Tommy Toe..



**Columbia Yellow**

Mild flavor, not sour, tolerant and very productive.

**Tommy Toe**

Similar looking to Sansai variety, but less yield. 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.

## ***Solanum melogena*** **Eggplant**

มะเขือ

**Varieties:** Bitter Eggplant, Mae Tha, Naga, Small Eggplant, Yellow, Crispy Purple, Tung Kwang Tong, Round Eggplant (Chao phaya), Pingtung Long, Phupan, Nakornsritamaraj

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. a pH of 5.5 to 7.0 are preferable. The optimal soil temperature for germination is 20-30°C (85°F).

elevation: up to 900m



### **Naga**

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



### **Mae Tha**

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



### **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.



### **Round Eggplant**

This variety is easy to grow in all tropical seasons. The fruit has a round shape with some stripes and a crispy taste. It is suitable for the fresh market and many recipes. Harvest time is 45 days from transplant.



### **Bitter Eggplant**

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



### **Pingtung Long**

This long, slender oriental variety is resistant to many diseases; an ECHO favorite.



### **Phupan**

Giant white fruit around 800g



### **Nakornsritmaraj**

Has few seeds located in bottom half of fruit, productive, about 10in long. Color is dark and light purple with white stripes.



***Solanum scabrum***  
**African Nightshade**

มะแว้งนก

**Varieties:** AVRDC

**elevation:** up to 2000m



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 50 cm (20 in) rainfall during the growing season, with optimal soil pH 6-6.5. Grows up to 100 cm (40 in) 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.

***Solanum quitoense***  
**Naranjilla**

มะอีค, มะเขือขุ่น

**Varieties:** Burmese

**elevation:** 900-2400m



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 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 29°C (85°F). Soil pH: 6.5-7.0.

**Burmese**

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

***Trichogusanthes anguina***  
**Snake gourd**

บวบงู

**Varieties:** Essaian

**elevation:** up to 1500m



**Essaan**

Dark/light green fruit 35cm long.

Snake Gourd is well suited to growth in the humid lowland tropics. Optimum average growth temperature is 30°- 35°C (86°- 95°F). Planting typically takes place at the beginning of the rainy season. Recommended seeding is 2 - 3 seeds per hill in rows 150 cm (5 ft) apart, the hills widely spaced, approximately 1 m (3 ft) apart, to allow room for the twining vines to grow. Seedlings appear usually within 8 - 11 days. A horizontal bamboo trellis is a useful support for the vines and long fruits. The vines also may be allowed to grow up poles, over thatched rooftops, or over walls. The elongate fruits should be allowed to hang down. Weights, such as small stones, sometimes are tied to the tips of the developing fruits to make the fruits grow straight. Good for making soups and stir fry, similar flavor to water gourd

***Vigna unguiculata* ssp. *Sequipedalis***  
**Yard Long Bean**

elevation: up to 1000m

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.



**Chinese Red Noodle**

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



**Kachin**

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



**Local Burmese**

Similar to Tung Kwang Tong variety



**Tung Kwang Tong**

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



**Yasothon**

Dark red color, bush variety.



## SEED BUNDLES

<b><i>Nutrition Garden Bundle</i></b> , กลุ่มพืชโภชนะสูง	51
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## Nutrition Garden Bundle

กลุ่มพืชโภชนะสูง

**Varieties Included:** Vegetable Amaranth, Ethiopian Kale, Perilla, Cranberry Bean, Winged Bean, Chia, sesame Black Seed, Sesame, Tomato, Eggplant

All plants in this bundle are highly nutritious; good for supplementing diets with vitamins and proteins. Easy to grow.

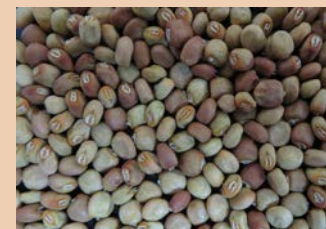


## Green Manure Cover Crops Bundle

กลุ่มพืชคลุมดิน พืชปุ๋ยสด

**Varieties Included:** Pigeon Pea, Sun Hemp, Lablab, Horsegram, Velvet Bean, Stylo, Mung Bean, Rice Bean, Cowpea (Black-Eyed Pea)

This bundle contains multi-purpose plants: they are good for covering fields and restoring nutrients to the soil, use as fodder, and human consumption. All are edible except Stylo, which is used for fodder.

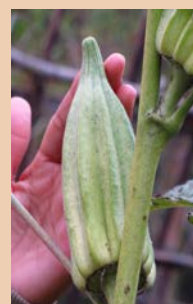


## Salad Garden Bundle

กลุ่มสลัดสวนครัว

**Varieties Included:** Okra, Mustard Green, Sesame, Carrot, Roselle, Lettuce, Bush Bean, Cape Gooseberry

The bundle contains plants that are edible in their raw form: leaves, fruits, and beans good for eating. They do not take up a lot of space and could be grown outside of a house.



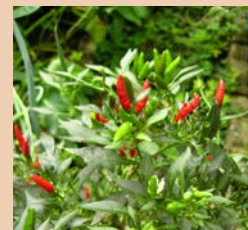


## Semi Arid Bundle

กลุ่มกึ่งแห้งแล้ง

**Varieties Included:** Chili Pepper, Ivy Gourd, Job's Tears, Moonflower, Passion Fruit, Pearl Millet, Inca Nut, Foxtail Millet, Sorghum

This bundle contains plants which are resistant to low-water conditions. They are sturdy and can survive without intensive care. Some are perennials (Moonflower, Passion Fruit).



## Herb/Flower Bundle

กลุ่มสมุนไพรและดอกไม้

**Varieties Included:** Dill, Velvet Bean, Cosmos, Sawtooth Coriander, Sweet Basil, Holy Basil, Marigold, Nematicidal Marigold, Mexican Sunflower, Zinnia

These plants are good for companion planting, use as seasonings in meals, and as insecticide spray (Marigold, Nematicidal Marigold).



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