ECHO Asia Seed Fact Sheet

Scientific name – *Cnidoscolus aconitifolius*

English common name – chaya, tree spinach, spinach tree, Mayan spinach

Asian common names – (from Multilingual Multiscript Plant Name Database http://www.plantnames.unimelb.edu.au/)

- Thai: ชา ยา

Variety –

- **ECHO**

General description and special characteristics – Sometimes called the spinach tree, chaya is a fast-growing perennial shrub native to Mexico that produces large, dark green leaves. Relatively new to Asia, the young 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. Raw chaya leaves are toxic, because they contain a cyanide-producing glucoside. Cooking chaya in boiling water for at least ten minutes inactivates the toxic compounds.

Crop uses (culinary) – Tender shoots, young leaves and stems are all used for food. Both the domesticated strains, known as "chaya mansa," and the wild forms, "chaya brava," are edible. However, the wild forms characteristically possess stinging epidermal hairs that are highly irritating to the harvester's skin. Young leaves and thick, tender shoots are cut and boiled and eaten as "spinach." Leaves do not have a strong or distinct taste, but tend to take on flavors from whatever seasonings are added. Cooked chaya leaves feel quite dense when compared to other cooked greens. In northern Thailand, young chaya leaves and shoots are cooked and eaten with nam prik (green chilli dipping sauce) or in combination with other vegetables and meat in stews and soups. In the Yucatan region, chaya leaves are used as tamale wrappings and the pieces may be incorporated into tamale fillings. A popular drink is made by blending raw chaya leaves in sugar water with lemons, pineapple and other fruits and is said to heighten virility. Chaya should never be eaten raw, because it contains cyanogenic glycosides, which are sources of cyanide poisoning. Cooking chaya in boiling water for ten minutes or frying (for how many minutes?) removes the poisonous cyanide components from the stem and leaf materials.

Crop uses (livestock production) – The entire plant may be ground, dried and used as animal feed. Mayans feed chaya leaves to chickens and chaya leaf meal has been developed as a chicken feed in Ghana. The results from a study published in 'Tropical Animal Health and Production,' suggests that chaya leaf meal may be included up to 150 g/kg in commercial diets without having an adverse effect on poultry performance, and may also be mixed with maize up to 250 g/kg to improve the performance of chickens fed on low-protein diets.

Crop uses (medicinal) – A 1991 survey conducted by Ross-Ibarra and Molina-Cruz in the state of Morelos (Mexico) found that treatment of kidney disorders, and specifically kidney stones, was overwhelmingly the most commonly cited medicinal use of chaya, and in most cases the only medicinal use of the wild species (in which case, the root, instead of the leaves, was always used).

Seasons of production – A perennial, chaya can be grown year-round. In northern Thailand, chaya shoots grow best in the hot-rainy season (May-September).

Length of production and harvest period – A crop can be harvested just 4 months after cuttings are planted. Chaya will produce abundantly throughout the warm months. During the coldest 2-3 months, plants may appear to stop growing until new growth resumes with warm weather.

Pollination – Chaya rarely flowers and produces seeds, which makes propagation of chaya mainly through asexual means.

Plant spacing – Establish cuttings at least 50 cm (1.64 ft.) apart. Plant cuttings slightly closer for use as an edible fence.

Production methods – To propagate, cut a 15-60 cm (6-24 in) long section from an existing moderately woody stem with 5-7 nodes. Remove all stems and leaves from the cutting and let cure for 1-14 days before planting. Plant upright

or on a slant in moist (not water-soaked) soil. Be sure to plant the cutting with the top end up. Water planted cuttings sparingly until they're well rooted. New plants require little attention after establishment; however, young plants should be mulched to suppress weed growth and soil water loss by evaporation. Chaya growth is rapid during the growing season; chaya users may have to prune plants back to maintain a manageable size for harvesting. Do not harvest leaves from young chaya plants, as stunting may result. Established plants, however, withstand repeated harvesting of stem tips and young leaves as often as two to three times per week. Charlie Forst, who for years was the Appropriate Technology specialist at ECHO, pointed out that for maximum production of tender leaves and 4- to 6-inch new shoots, you should pollard chaya (i.e. cut back the larger limbs and upper canopy to about 4 feet) rather than coppicing it (cutting back the whole plant, including the stem, to around 18 inches). For maximum leaf production, harvest leaves every 2 to 3 months (Ross-Ibarra and Molina-Cruz, 2002).

Environmental conditions for production – Chaya, characteristically of the dry tropics, exhibits exceptional drought tolerance. However, it also is well suited to low elevation regions in the hot humid tropics. It will die back to the base from occasional frosts in subtropical climates but normally it survives, producing sprouts from the base. Chaya does not tolerate water-logged soils and has been killed by standing water of a few days duration. It prefers sun or partial shade.

Soil requirements – Chaya tolerates a wide variety of soil conditions but does not perform well in highly acidic soils.

Pests – Chaya is highly disease and pest resistant. Young chaya plants are susceptible to root-knot nematodes (*Meloidogyne* spp.), but damage from this may be reduced by the application of a high dose of organic manure and coppicing. Chaya is also susceptible to defoliation by leaf-eating tomato hornworms (*Manduca* spp.), but recovery by new leaf production is normally rapid. Chaya is also susceptible to Cassava Common Mosaic Virus, and since it is propagated from cuttings, care should be taken to ensure that any new planting stock is not infected.

Seed saving – Cultivated chaya varieties typically do not set seed, so they are propagated by stem cuttings. Stem cuttings should be about 40 cm long, and dried 1–14 days before being planted, with buds in the same orientation as when on the plant (ensure the stems are planted upward).

References -

ECHOcommunity. "Chaya." (2006). *Plant Information Sheet*. Web 11 Jan 2013. https://c.ymcdn.com/sites/echocommunity.site-ym.com/resource/collection/59800F4C-2723-4074-9CA3-DB23AA9F576A/Cnidoscolus_aconitifolius_Chaya.pdf

Ross-Ibarra and Molina-Cruz. 2002. *The Ethnobotany of Chaya: A Nutritious Maya Vegetable.* Economic Botany, Winter 2002, Volume 56, Issue 4, p 350-365.. Web. 12 Jan 2013. http://link.springer.com/article/10.1663/ 0013-0001%282002%29056%5B0350%3ATEOCCA%5D2.0.CO%3B2 .

PROTA. "Cnidoscolus aconitifolius" *PROTA (2004). PROTA 2: Vegetables/Legumes*. Web. 11 Jan 2013. http://database.prota.org/PROTAhtml/Cnidoscolus%20aconitifolius_En.htm

Tropical Animal Health and Production May 2002, Volume 34, Issue 3, p 257-269. *Performance of Broilers Fed on Diets Containing Different Amounts of Chaya Leaf Meal*. Web. 13 Jan 2013. http://link.springer.com/article/10.1023/A%3A1015238810447.