

ECHO Asia Seed Fact Sheet

Scientific name – *Solanum lycopersicum* (syn. *Lycopersicon esculentum*)

English common name – Tomato

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

- Chinese: 蕃茄 番茄 Fan qie
- Khmer: Peeng pâh
- Laotian: Khüa sômz
- Malay: Terung masam
- Tagalog: Kamatis
- Thai: มะเขือเทศ Ma khuea thet
- Vietnamese: Cà chua, Cà tômách



Varieties –

- **Burmese** - Medium sized variety, producing dark red fruit. Indeterminate.
- **Tommy Toe** - An heirloom cherry tomato variety, well-known for its juiciness and flavor as well as general disease resistance. Fruits are 2.5 cm (1 in) and is a prolific fruiter.

General description and special characteristics – The tomato originated in South America as a weed in fields of corn, but was domesticated in Mexico and Central America. From there it spread around the globe. The plant is erect or spreading and viney, and coarsely hairy with small yellow flowers. Hundreds of varieties exist with fruits of different shapes, sizes and colors. It is closely related to potatoes, eggplants and peppers, all of which are in the Solanaceae family.

Crop uses – Tomatoes are grown for their edible fruits. Other parts of the fruit can be poisonous. Ripe fruits are eaten raw, added to salads, stewed, pureed, stuffed, made into sauce, paste, juice and catsup, or used in soups and stews. Unripe fruits are pickled, fried, roasted, or made into marmalade, pies and relishes. Tomato flour, made from dry fruits, can be used to flavor and thicken. Tomatoes contain vitamins C, A, B1 and B2. Seeds (containing 24% oil) are used as a salad oil or for making margarine and soaps. The seedcake can be fed to livestock or used as fertilizer. The red pigment in tomatoes is caused by lycopene, which acts as an antioxidant.

Seasons of production – Tomatoes are day-neutral plants and will flower based on Growing Degree Days (an amount of time spent above a certain temperature), determined by each variety. Determinate tomato varieties will flower and set fruit once, about 70-120 days from transplanting. Some varieties may require 120-140 days. Indeterminate varieties will continue to flower and set fruit over time, even as fruit are harvested from the plant. This quality makes indeterminate tomatoes a possible perennial. Typically, tomatoes are grown during warmer times of the year to meet flowering requirement, although in the tropics it is possible to grow them all year.

Length of production and harvest period – Determinate varieties are harvested at one time. Indeterminate tomato varieties can live and produce as a perennial, usually up to 3 years or more.

Pollination – Most modern tomato cultivars are thought to be self-pollinating. In reality, tomato flowers are self-fertile and pollination is aided greatly by a vibrating agent, usually wind or an insect. In outdoor conditions, this essentially means tomatoes will pollinate without help. However, in greenhouse conditions, vibrators, fans or a cultured sonicating bee, such as a bumblebee, are necessary.

Planting space – Tomato plants are ideally transplanted at 8-10 inches (20-25 cm) tall. Planting distance depends on the type of tomato grown. Ideal spacing is generally 24 to 36 inches (60-90cm) between plants. Planting closer than 24 inches reduces air circulation around the plants and can trigger disease outbreaks. Large-vine tomatoes should be spaced 36 inches apart. Rows should be 4 to 5 feet (1.2-1.5 m) apart.

Production methods – Tomatoes can be direct-seeded, but transplanting allows you to cull the weaker seedlings and save the best for transplanting. Sow the tomato seeds in flats or seedling beds 3 to 6 weeks before they are to be transplanted. Keep the tomato flats or beds moist (not wet). When the first leaves emerge, expose plants to daylight. The ideal transplant has 3-5 true leaves, is disease-free, and does not have buds or flowers. About 6-9 days before transplanting, harden seedlings by slightly withholding water and exposing them to open weather. Plant seedlings in areas with full sun with the stem buried up to the first true leaves. Tomato plants are not drought resistant, and, therefore, should be watered regularly. Conversely, they cannot tolerate long periods of flooding, so do not overwater.

Determinate varieties typically do not require pruning. However, large-vine (indeterminate) varieties benefit from the removal of some of their axillary or side shoots, or from being topped to prevent plants from becoming too bushy and tall.

Tomatoes often require fertility supplementation because they are heavy eaters. Trellising tomatoes greatly improves yields and fruit quality while decreasing disease. For fresh market, start harvesting at the breaker stage when the blossom end of the fruit turns pinkish or reddish. For processing, you can harvest the red, ripe fruit or the green, unripe fruit.

Known environmental conditions for production – Tomatoes can be grown at altitudes between sea level and 2000 m in the tropics, but yields are generally higher at elevations over 1000 m. A diurnal variation (daily temperature fluctuation) of at least 5-6°C is considered necessary for optimum development. High relative humidity can be harmful to the tomato crop and fruits rarely ripen fully in wet and dull weather. On the other hand, tomato is also sensitive to sunburn and hot dry winds can lead to flower drop and reduced yields.

Known soil requirements – Tomatoes can be grown on many soil types, but sandy or sandy loam soils with a pH of 5.5 to 7.0 are preferable. The optimal soil temperature for germination is 20-30C (85F).

Known pests – Tomatoes are prone to a number of pests and diseases, thus they should not be grown on the same land more than once every four years, and areas with previous crops of other solanaceae plants should be avoided; crop rotation is key to breaking the pest and disease cycle. Also, all plants should be pulled up and burned or effectively composted at a high temperature at the end of the season. Some common diseases in Southeast Asia are: bacterial wilt (*Ralstonia solanacearum*), blossom end rot, damping off caused by a range of pathogens, buck eye rot (*Phytophthora parasitica*), early blight (*Alternaria solani*), fusarium wilt (*Fusarium oxysporum*), late blight (*Phytophthora ifestans*), leaf curl virus, powdery mildew (*Laveillul taurica*) and spotted wilt. Pests include: fruit borer (*Helicoverpa armigera*), leaf eating caterpillar (*Spodoptera litura*), serpentine leaf miner (*Liriomyza trifolii*), whitefly (*Bemesia tabaci*), thrips (*Thrips tabaci*, *Frankliniella schultzei*), spotted leaf beetle (*Epilachna spp*), red spider mite (*Tetranychus cinnabarinus*) and leaf hoppers (*Amrasca devastans*).

Seed saving – Tomatoes are self-fertile, but in older varieties that are closer to wild ancestors, a certain amount of cross-pollination will occur. To reduce hybridization, plant older varieties in a block and save seeds from the central plants, or plant beans, or other climbers, in between the rows. The fruit of the lower parts of the plant are best for seed, but seed can be collected entirely from only one bush, if that is all that you have. Allow fruit to ripen just beyond the eating stage. Cut them open, squeeze out the seeds and pulp, putting each variety in a separate bowl or jar. Label the jars and leave in a warm spot for 2-3 days to allow fermentation to develop. Do not stir. Leaving the seeds for five days, but not longer, will allow more complete control of bacterial canker, a seed-borne disease. A foam will form on top which helps to break down the sticky gel that surrounds the seeds. As soon as the foam forms, scoop it off and any floating seeds, and pour the remaining mixture through a sieve. Rinse the pulp from the seeds and spread them on paper in a single layer to dry before final cleaning and packaging. For long term storage, store in a cool dry place.

References –

“Tomato.” ECHO Plant Information Sheets. ECHO Inc, North Fort Myers, FL.

"Lycopersicon esculentum." Ecocrop. FAO. Web. <http://ecocrop.fao.org/ecocrop/srv/en/cropView?id=1379>

"SUSVEG-Asia Tomato Manual (TNAU)." . SUSVEG-Asia. Web. <http://susvegasia.nri.org/susvegasiatomatotnau4.html>