



Goji in the Garden

Tiffany Maughan, Research Associate, and *Brent Black*, Extension Fruit Specialist

Summary

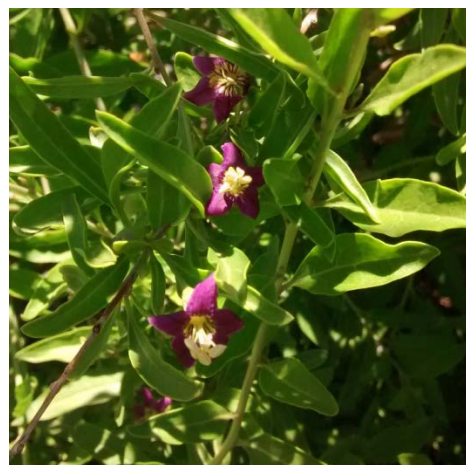
Goji (*Lycium barbarum* L.) is native to tropical or warm regions of mainland East and Southeast Asia and South Africa. Other common names are wolfberry, matrimony vine, and boxthorn. Plant growth habit varies significantly among cultivars, ranging from viney to erect. Spines are present on most cultivars but vary in size and number. When pruned, plants are typically 3 to 6 feet tall but if left without cultivation they can reach 12 feet. Solitary, purple blossoms form in the late spring (although some species have greenish or cream flowers) and are followed by small orange to red fruit about 4 to 6 weeks later. Plants are self-fruitful and do not require cross-pollination.

In some areas, they are considered a weed due to their tendency to sucker and spread by seed. Goji are recommended for zones 4 to 7.

Goji is in the same family as tomato (Solanaceae) and some cultural and nutritional needs are similar.

Recommended Cultivars

Although plants can readily be propagated from seeds, using a named cultivar will ensure you are planting a high-quality and productive plant. In China, where goji is most widely produced, *Lycium barbarum* L. var. *barbarum* is commonly planted. Goji is a new crop in American markets, so cultivar selection is still limited.



Goji plant in bloom.

'Crimson Star' (also known as Ningxia #1) and 'Phoenix Tears,' are available. Both begin bearing 1 to 2 years after planting, although they will not reach full production for 3 to 5 years. 'Wolfberry Agrodevco' is another cultivar, but it has limited availability. Many nurseries do not list specific cultivars of goji, but rather list them simply as *Lycium barbarum*.

How to Grow

Site Selection: Plant goji in a location with full sun (although some shade can be tolerated). Plants can handle relatively harsh conditions and are a good choice for locations that may not work well for other, more traditional, fruits. Fruit quality is best during hot, dry conditions and diminishes if weather is cool and humid.

Soil: Natively, goji grow in slightly alkaline soil (pH of 7 to 8) so many Utah soils support plant growth well. They do not grow well in acidic soils. Goji plants tolerate a wide range of soil types but prefer a light loam. Although goji can be grown in clay soil, they do not do well if roots are consistently wet, and care should be taken when irrigating on heavy soils to avoid waterlogging.

Plant Material: Due to the newness of goji as a crop in the U.S., it may be difficult to find at local nurseries. Ordering online may be the best option for purchasing plants. Visit Cornell University's Nursery Guide

(<http://www.fruit.cornell.edu/berry/nurseries/index.html>) for a list of reputable nurseries selling goji plants. Plant in the spring into a hole two-times wider than the roots to encourage easy root spreading. Applying organic mulch around the base will help moderate root temperatures and minimize weeds.

Spacing: In a home garden, goji can be tucked into many areas of the landscape, provided they are not too shaded. However, make sure there is enough room in all directions for the plant to reach full size and to allow for easy harvest (about 4 to 5 feet in all directions). If establishing multiple rows, leave 2 to 4 feet between plants within a row and 6 to 8 feet between rows.

Irrigation: Although fairly drought-tolerant once established, more frequent irrigation is needed to establish the roots of new transplants. Irrigation needs vary depending on soil type and time of year. Sandy soils need to be watered more frequently than clay soils as they drain quickly. In general, apply approximately 1 inch of water per week.

Plants can be watered by surface flooding, micro-sprinklers or drip irrigation. Drip irrigation is the most efficient method and helps keep weed and disease pressure low. If drip irrigation is not available, a deep soak with the hose at the base of the plant works well. Fruit are prone to blossom end rot, a localized calcium deficiency that results from lack of irrigation or extreme wet/dry cycles.

Fertilizer: Too much fertility results in excess vegetation, shading, and reduced fruit quality. There are no specific fertilizer recommendations for goji in our region; however, some growers amend the

soil based on recommendations for tomato production. Remember that annual crops, such as tomato, typically require more fertilizer than perennial crops and that applying fertilizer based on tomato recommendations may only be appropriate during plant establishment. Goji fertilizer recommendations for other areas in the U.S. are 4 to 5 tablespoons of 16-16-16 per 10 square feet per year. Reduce this rate in fertile soils to avoid over-fertilizing. Split total fertilizer amount into three applications for the year: at budbreak, flowering, and as the fruit begins to ripen. There is some evidence suggesting that goji perform very well without any fertilizer at all.



Ripe goji berries on plant.

Pruning: Fruits form on current year's wood and pruning encourages new growth, increasing yields. Pruning is also important to keep the plant open to allow for good light penetration and air circulation. Typically, no pruning is required in the first year. However, increased pruning in subsequent years is needed to maintain vigorous new growth.

During the dormant season, begin pruning by removing any weak, damaged or crossing branches. Next, shorten lateral branches by cutting back from the tip by 6 to 18 inches. Limit plant height to keep harvesting manageable. During the early summer, pinch off the top 2 to 3 inches of terminal growth. This practice, commonly referred to as tipping, encourages canes to produce more lateral branches which produce more fruit than branches that grow straight up.

After about 3 years (sometimes less) the plant usually begins to sucker, sending up additional new

shoots from the root system. If left unchecked, the plant can become very unmanageable. Dig up the shoots and either discard or transplant them.

Problems

Weeds: A heavy mulch around each plant will help reduce weeds. Keeping weeds clear around the plant minimizes competition and improves goji performance. A spring application of pre-emergent herbicide will greatly reduce annual weeds. Using landscape fabric or a heavy plastic can be very effective and will minimize suckering.

Insects and Diseases: Since goji is still a fairly new crop, pest information is limited. The only pest reported on goji in Utah is the goji gall mite (see table below). Potato leafhopper, thrips, aphids and spider mites have been reported as pests of goji in other states and should be watched for during routine scouting.

Always refer to product labels, and follow all directions specified on the label, before applying any pest control product.



Heavy goji berry yield at a commercial orchard, grown through black plastic mulch to control weeds.

Problem	Identification	Control
Goji gall mite (<i>Aceria kuko</i>)	Extremely small, difficult to see with naked eye. Pale salmon and wormlike mites with six to seven generations per year. Small bead-like galls form on leaves. They are yellow/green on the bottom and reddish on top. Each gall holds large numbers of mites.	Sulfur, insecticidal soap, or horticultural oil (0.5% solution) can be used to control. None of these should be used when temperatures will be above 90 °F within 4 hours of spraying. A spray application of 2% horticultural oil, either in the fall (just before leaves drop) or in the spring (just as leaves emerge) will be most effective. Keep alternative hosts such as pepper, eggplant, and black nightshade, clear from the area.
Powdery mildew (<i>Sphaerotheca</i> spp.)	Fungal disease that forms white patches of powder on leaves and stems.	Prune to improve air circulation and minimize wet foliage. Horticultural oils can help prevent further spreading once present in field.
Blossom end rot	Calcium deficiency related abiotic disorder resulting in a water-soaked spot on the end of fruit.	Control by careful irrigation to minimize extreme fluctuations in soil moisture (particularly during bloom and fruit sizing).



Galls on a goji leaf caused by goji gall mite. Photo courtesy of Ryan Davis, Utah State University.

Harvesting, Productivity and Use

Harvest goji berries when they reach full color (approximately 35 days after full bloom). Unlike some berries that can be shaken or beaten from the plants by mechanical harvesters, goji fruit must be picked by hand as the fruit do not easily separate from the stem, and bruised berries will turn black. Also, the plants continuously produce new blossoms, so that fruit are ripening over a long period of time. They will fruit from mid-summer to late fall. When picking, pull the berries slightly to the side instead of straight up to reduce the amount of stem that comes off with the berry.

Goji plants will begin producing fruit when plants are 2 years old. Maximum production will not be reached until 3 to 5 years after planting. Depending on variety, expect to harvest 2 to 6 pounds per plant. Goji berries are sought after for their health benefits. They can be dried, juiced, frozen or eaten fresh. Possibly the most common way to consume goji berries is as a dried fruit, similar to a raisin, and they can be eaten alone or used in baking. They can be dried by laying the fruit out on drying trays in the sun, or in a food dehydrator (set the temperature

to 105 °F) for about 3 days. Steam juicing works well, and another option is to soak dried berries in water overnight and then strain out the berries to obtain the nutrient-rich juice. Berries can be frozen and thaw well, maintaining their color and flavor. Fresh eating is possible, but many people do not like the texture of the berry and prefer to consume the berries once processed. Once harvested, the fruit will store for approximately 2 weeks in the refrigerator.

Leaves can also be harvested throughout the year to consume fresh or dried. They can be used to make tea or powdered and used as a nutritional supplement.

Sources

- Cornell University. 2015. Nursery guide for berries and small fruit crops. Cornell Fruit, Cornell University.
<http://www.fruit.cornell.edu/berry/nurseries/Honeyberries.html>
- Daug's, D. 2014. Grow the alpha superfood in your garden. Countryside and Small Stock Journal. P. 63-67.
- Demchak, K., and C. Heidenreich. 2014. Goji berry culture. Penn State Extension.
<http://extension.psu.edu/plants/tree-fruit/news/2014/goji-berry-culture>
- Hummer, K.E., K.W. Pomper, J. Postman, C.J. Graham, E. Stover, E. W. Mercure, M. Aradhya, C. H. Crisosto, L. Ferguson, M.M. Thompson, P. Byers and F. Zee. 2011. Management of temperate fruit nut and specialty crop genetic resources. Chapter 4: Emerging fruit crops. UC Davis.
<http://ucce.ucdavis.edu/files/datastore/234-2455.pdf>

Utah State University is committed to providing an environment free from harassment and other forms of illegal discrimination based on race, color, religion, sex, national origin, age (40 and older), disability, and veteran's status. USU's policy also prohibits discrimination on the basis of sexual orientation in employment and academic related practices and decisions. Utah State University employees and students cannot, because of race, color, religion, sex, national origin, age, disability, or veteran's status, refuse to hire; discharge; promote; demote; terminate; discriminate in compensation; or discriminate regarding terms, privileges, or conditions of employment, against any person otherwise qualified. Employees and students also cannot discriminate in the classroom, residence halls, or in on/off campus, USU-sponsored events and activities. This publication is issued in furtherance of Cooperative Extension work, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Kenneth L. White, Vice President for Extension and Agriculture, Utah State University.

This project is funded in part by USDA-Risk Management Agency under a cooperative agreement. The information reflects the views of the author(s) and not USDA-RMA.

