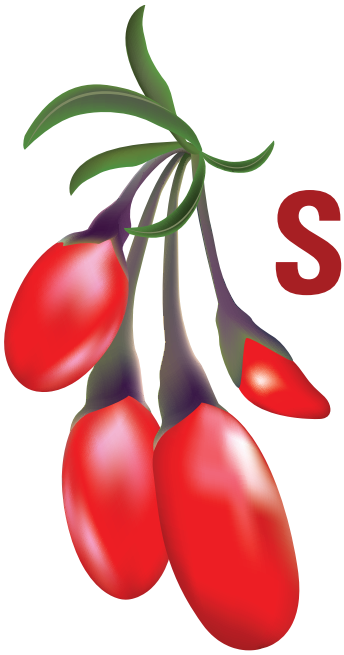

WHAT ABOUT SUPER FRUIT FOR WYOMING?

GOJI BERRIES ARE PACKED WITH VITAMINS, MINERALS, AND AMINO ACIDS. RESEARCH IN WYOMING SHOWS THEY CAN BE GROWN HERE BUT THERE ARE SEVERAL CONSIDERATIONS.

In the past several years there has been much interest in locally grown foods, diversifying Wyoming's agricultural commodities, and identifying other crops that can potentially grow here.

Several local food producers approached the University of Wyoming about investigating the potential production of goji for Wyoming.

So what about goji, the "super fruit"?

Goji (*Lycium barbarum* L.) is also known as goji berry, wolfberry, boxthorn, and matrimony vine. The plant is a slightly thorny, woody shrub that naturally reaches approximately 8 to 12 feet in height and produces single red berries. The fruit can be consumed fresh, dried, as a powder, or as a juice.

Goji is known as a super fruit because it can contain 11 essential minerals, 22 trace minerals, 7 vitamins, and 18 amino acids. Gojis have more vitamin C than an orange and are the best source of carotenoids (antioxidants) of any known foods. The increase in the health food market in the United States has vastly increased the demand for crops such as goji. Producers have indicated organic goji berries can fetch prices as high as $40 per pound for organic production.

Currently, much of the goji berry supply for the United States health food market comes from China; hence the growing interest to establish U.S.-based goji production.

Goji origins and plant characteristics

Goji is in the Solanacea (nightshade) family, related to the tomato, potato, and chili pepper. Native to China, its use is traced back 2,000 years through

written text as a wild edible herb commonly used in traditional recipes and Chinese medicine.

Goji is a multi-stem deciduous perennial. The stems have a smooth, whitish bark with lanceolate leaves that contain small thorns. This plant produces purple or white flowers at the end of the shoots, which becomes a solitary red berry. Goji is an indeterminate plant, which means it continually flowers and fruits until environmental factors trigger it to stop.

Evaluation of goji for Wyoming

Gojis were evaluated at UW's Sheridan and Powell Research and Extension Centers, 50 plants per site. There was a 98 percent survival rate over the three years of the study (2016-2018). Unfortunately, the plants at Sheridan were planted too shallowly, resulting in poor establishment with low or no flowering and fruit set.

The results below are from the Powell Research and Extension Center:

- Broke dormancy between March 25 and April 5.
- On average, there were 11 shoots per plant, with a range of 3 to 22 shoots per plant.
- Plants initiated flowering May 20 through June 5 and continued flowering into October.
- At the end of June, plants averaged 2 flowers per shoot, middle of June averaged 3 flowers per shoot, and beginning of August had 4 flowers per shoot.
- Fruit set started on June 15.
- The first harvest in September resulted in an average of .22 pounds of fruit per plant, with a range of .03 pounds to .66 pounds.
- The October harvest resulted in .34 pounds of fruit per plant, with a range of .005 pounds to 1.8 pounds.
- The total yield for the Powell vineyard was 14 pounds, which is an average of .28 pounds per plant.
- Flowering and fruiting stopped after a killing frost of 22-24°F in mid-October.

Goji pros and cons

This project demonstrates goji plants can be grown in parts of Wyoming, cold hardy likely to Zone 3, and established plants will produce fruit. In particular, gojis handled Wyoming's cold winters, early and late frosts with no visible effect on growth and development of

Bright goji berries show plainly against fall foilage.

Birds and insects can damage fruit and reduce yield.

the plants. Gojis broke dormancy earlier and continued fruiting later than the grapes in the same vineyards.

To maximize yield production, more research is needed to understand fertility and irrigation requirements, pruning and trellising techniques, and cultivation spacing for Wyoming.

A few concerns were observed about goji. Goji is a labor-intensive crop, especially during harvest. The flowering and fruiting of goji is a continual process with harvest starting between the end of July to the middle of August until the killing frost (mid-October).

To maximize production and yield, all ripe fruit from each plant would need to be handpicked during this long period (possibly two or more times per week), which increases the demand for labor. This could be a limiting factor for cultivation and commercial production for Wyoming.

The second concern is the bird and insect damage observed to the ripened berries, which makes harvest timing critical to save as much yield as possible. Netting can be used to protect the crop; however, the net also increases harvest loss as the constant removal and placement of the net damages and knocks fruit off.

The last concern observed was the spread of goji plants within the plot. Once the gojis were established at the end of 2016, suckers were seen in 2017 and 2018. These suckers were seen growing up in empty spaces, holes occupied by grape plants, and along the edges of the vineyard. These suckers indicate goji are rhizomatous, and the maximum distance grown away from the parent plant was approximately 4 feet.

There are concerns in Wyoming and bordering states goji could become the next weed issue. A national risk assessment of goji berry found it to be a high risk of becoming an invasive plant. (Models are run to try to predict the invasiveness potential of plants.) Observations from this study support this to a degree, primarily with the plants moving rhizomatously and likely by seed with bird dispersal. Mechanical control like mowing or brush hogging has little effect on the plant. The crown of the plant must be killed to kill the plant. There is no information about whether the remaining roots can rejuvenate.

photos: Jeremiah Vardiman

Trellised goji plants at Powell Research and Extension Center.

Are gojis for Wyoming?

This study only shows the plant can survive, grow, and produce fruit in Wyoming. There still is a lot of information needed to take this crop to full commercial production. In addition to the issues already mentioned, the biggest limitation to commercial production would be an undeveloped/undefined market for the berries.

Those considering growing this plant for personal use in Wyoming may want to take some time researching and considering its ability to spread across a property (as mentioned above).

Jeremiah Vardiman is a University of Wyoming Extension educator based in Park County and serving northern Wyoming. He can be reached at (307) 754-8836 or at jvardima@uwyo.edu.