Growing High Tunnel Ginger in High Tunnels: A Niche Crop with Market Potential

Reza Rafie*, Theresa Nartea, and Chris Mullins
Virginia State University, School of Agriculture, Cooperative Extension Service, P.O. Box 9081, Petersburg, VA 23806

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Recent media promotion of health attributes of ginger (Zingiber officinale) root as a functional and nutraceutical food has led to increasing consumer and health community marketplace demand. In 2011, the U.S. imported 49,991,000 t of ginger valued at 55.9 million dollars. Medical research demonstrated ginger consumption was a safe remedy for: 1) nausea in chemotherapy treatments of cancer patients; 2) morning sickness treatment during pregnancy; and 3) anti-inflammation treatment for arthritis ailments. Hawaii is the only commercial producer of ginger in the United States. Ginger production in Hawaii is on the decline due to ginger wilt caused by the bacterium Ralstonia solanacearum. Ginger represents a potential niche crop for U.S. farmers outside of Hawaii. Ginger rhizomes require a tropical growing season of 9 to 10 months, eliminating successful field production in non-temperate climatic conditions. To address this production challenge, Virginia State University researchers conducted Extension demonstrations in Cologne and Petersburg, VA to produce and market ginger grown under high tunnel culture. Preliminary results demonstrate that locally grown, high tunnel ginger is a profitable niche crop for direct-to-consumer markets.

Zingiber officinale, commonly referred to as ginger, originated in Asia and has a long history of domestic cultivation due to both fabled and proven medicinal properties (Maitre et al., 2011; Pillai et al., 2011; Shukla and Singh, 2007). Ginger is the most widely cultivated spice around the world with an international production volume of 1,620,493 t (Food and Agriculture Organization of the United Nations, 2012). Ginger is known to have considerable medicinal properties. Fresh and powdered ginger rhizomes are traditionally used to treat digestive ailments, diarrhea, and nausea (Butt and Sultan, 2011).

Ginger is a tropical plant with lance-shaped leaves on dark-green erect stems reaching up to 5 ft at maturity. Upon maturity at 10 months, underground rhizomes are harvested and sold as ginger root in the wholesale and retail marketplace. Most ginger sold in the U.S. is imported from other countries. Domestic imports of fresh ginger rhizomes have steadily increased from China (Fig. 1). In 2011, the U.S. imported 49,991,000 t of ginger rhizomes with a total value of 55.9 million dollars (USDA Foreign Ag. Service. 2012). Hawaii is the only U.S. state with considerable commercial ginger production (Hepperly et al., 2004). Ginger production in Hawaii is on the decline due to ginger wilt caused by the bacterium Ralstonia solanacearum (Hepperly et al., 2004; Kumar et al., 2012). In 1993, R. solanacearum bacterial wilt cut Hawaiian ginger production by 45% (Hepperly et al., 2004).

There is national consumer demand for healthy, locally grown food and promotion of ginger as a safe, alternative for anti-cancer, anti-nausea and anti-aging treatments. These demands support the need for additional production and marketing research of ginger as an alternative crop in temperate climates (Butt and Sultan, 2011; Maitre et al., 2012; Pillai et al., 2011; Shukla and Singh, 2007). The cultural application of high tunnel structures encourages small producers to grow ginger under temperate weather conditions. A high tunnel is an unheated, plastic-covered structure that provides an intermediate level of environmental protection and control. High tunnel use protects tender tropical crops during the winter months, allowing for an extension of the growing season for crops that cannot be cultivated under temperate field conditions.

Materials and Methods

A Virginia Department of Agriculture and Consumer Services Specialty Crops grant was awarded in fall 2010 to support Virginia State University Cooperative Extension research on high tunnel ginger production and marketing efforts. In Sept. 2010, a demonstration high tunnel structure measuring 30 ft wide and 48 ft long was constructed in collaboration with a Cologne, VA farm producer. Sixty pounds of mature, clean, disease-free ginger seed stock pieces were obtained Feb. 2011 from a produce wholesaler.

*Corresponding author; phone: (804) 524-5840; email: arafie@vsu.edu

Fig. 1. Worldwide and China’s total volume and value of imported fresh ginger to the U.S., 2000–2009. Source: USDA, FAS.
(Hepperly et al., 2004). Depending on size, purchased ginger rhizomes were divided into 2- to 4-oz sections. Seed pieces were maintained under ambient room conditions for 3 d to cure. Each seed-piece was planted 2 inches deep in a 1-gal container filled with a Fafard 3B media/soil mixture (Conrad Fafard Inc., 2012) and maintained in a greenhouse at a minimum temperature of 75 °F (54 °C). Within 4 weeks, 85% of the planted seed-pieces germinated. After the 4-week germination period, the plants were maintained in the greenhouse for an additional 4 weeks.

In Apr. 2011, healthy ginger plants were transported to the Cologne, VA location and transplanted directly into the existing high tunnel soil of sandy loam. The soil was tilled several times and eight rows were established to transplant the 1-gal ginger plants. The distance between rows was 3 ft and between plants, 2 ft. Each row was prepared by opening a trench 8 inches deep, using a tiller with a furrow opener. Prior to planting the ginger plant, a 1-inch (2.54 cm) layer of mushroom compost was uniformly placed in the bottom of each row-trench (Lar-Lyn Farms, 2012). The mushroom compost was then covered by 1 inch (2.54 cm) of the soil that had been removed from the trench. The ginger plants were planted in the trench and covered to the top with soil. A drip irrigation system was established and the drip tape was placed beside the ginger plant in each row and water was provided as needed. The ginger plants were fertilized, using Neptune’s Harvest, 2–4–1 (Neptune’s Harvest, 2012) liquid fish emulsion fertilizer. Five applications of fish emulsion fertilizer were made, using a fertilizer injector via drip irrigation. During the production season, the high tunnel ginger plants were mowed 3 times; in July, August, and September. (Ginger plants require mowing, which is the periodic covering of the upward-expanding rhizomes). This is an important activity in ginger production as it protects the rhizomes from sunburn. Two applications of Serenade biofungicide were made as a preventive measure against leaf spot, Phyllosticta zingiberi. A total of 200 ginger plants were planted in the high tunnel.

**Results and Discussion**

Recently, growers have been able to harvest premature ginger rhizomes and market it under “baby ginger.” Baby ginger is different from regular mature ginger. Baby ginger has distinct pink and cream-colored rhizomes that are very attractive when presented to customers. Mature ginger has tough outer skin and is usually very potent. Baby ginger is very tender and easy to use without having to peel through a tough skin (Flores, 2012). The demand for locally grown baby ginger is on the rise by consumers and chefs, who will pay premium prices for it. Growers usually harvest a few ginger plants at a time based on their market needs. Therefore, a farmer with several hundred ginger plants can continue harvesting for several months. Initiating harvest in mid-September, the product is marketed as baby ginger. However, as the season progresses, the ginger rhizomes mature and if growth continues until January of the following year, the rhizomes reach full maturity.

The harvest for the ginger plants grown in the high tunnel located in Cologne, VA was initiated in mid-September and continued until 15 Nov. Ginger harvested from mid-September to mid-October was sold as baby-ginger and the rest was sold as mature ginger. The harvested plants were taken out of the high tunnel, the shoots were cut, removed and the rhizome-hands were taken to a washing facility. At this facility, the rhizomes were cut into smaller pieces, washed, dried and packed for the market. The average weight of marketable ginger harvested from the high tunnel was 5 lb per plant. The ginger grown in the high tunnel was marketed by the collaborating grower to community supported agriculture (CSA) customers, where the grower offers a certain number of shares to the public (Nartea et al., 2006).

**Conclusion**

After several years of on-farm research in high tunnel ginger production, Virginia State University researchers recommend ginger as an economically viable niche crop when grown for local markets. Potential limitations are the availability of fresh and disease-free mature ginger rhizomes for seed-pieces to grow.

**Literature Cited**


