

## Grow Superfoods in Containers: Ginger and Turmeric

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### INTRODUCTION

Ginger and turmeric are traditionally used as spices in powder form, especially in curries and masalas. Ginger is also used as an ingredient in beverages such as ginger ale or ginger beer, and to make candies, preserves or tea. Fresh or dried ginger rhizomes can be easily found in most supermarkets and ethnic grocery stores. However, fresh turmeric rhizomes are less widely available in New Zealand.

These plants have also been used in Indian and Chinese medicine for centuries. Ginger is mostly taken to improve digestion and to counter nausea, and turmeric as an anti-inflammatory and for skin health. In recent years these two crops have been included in the category of superfoods in Western markets – i.e., foods that are rich in antioxidants, nutrients or vitamins, or that have health benefits. There are claims that both ginger and turmeric relieve inflammation and are good for joint health, for reducing blood sugar, and even fight cancer. Nowadays ginger and turmeric can be commonly found in capsules, drinks or

tonics, and their teas are sometimes labeled as herbal supplements. They are also used as ingredients in healthy smoothies, therefore fresh rhizomes are sought-after items and can obtain high prices in farmers' markets or grocery stores. There is also a potential market for nursery owners to grow and sell edible ginger and turmeric container plants in the spring to consumers that want to grow and harvest their own product.

Both ginger and turmeric (Figure 1) are in the Zingiberaceae family. They are ancient crops domesticated centuries ago, and there are no live wild relatives. Edible ginger is *Zingiber officinale*, and there are about 150 species of *Zingiber* – 34 of them from India and 24 from China. *Zingiber zerumbet* and *Z. spectabilis* have spikes with colorful bracts and are used as ornamentals, as well as *Z. mioga*, which is a dwarf variegated plant with edible buds. Another ornamental ginger is *Hedychium gardeniarum*, considered an in-vasive plant in New Zealand and Hawaii. However, *Z. officinale* is sterile and does not produce seeds. Edible turmeric is *Curcuma longa*,

which is also mostly sterile, and *C. amada* is also edible and tastes like green mango. There are about 110 species of *Curcuma*, and the greatest diversity is found in India, Myanmar, and Thailand. There are more than 10 ornamental *Curcuma* species, among



them *C. alismatifolia*, *C. elata* and *C. roscoeana*, with beautiful and colorful spikes. *Curcuma caesia* or black turmeric has attractive leaves with a dark central vein, rhizomes with dark blue centers, and is used as a traditional medicine.



Fig. 1. Rhizomes of ginger (left) and turmeric (right).

## CULTIVATION

To plant ginger or turmeric, rhizome fingers should be cut to 5 to 8 cm (15 to 75 g) with two to four buds. The cut areas should be surfaced sterilized with a 10% bleach solution, and then the seed pieces should be dried (cured). Because sprouting of buds can be uneven, it is recommended that seed pieces are maintained on humid potting mix under 75 or 80% humidity for sprouting before planting. Alternatively, tissue culture plantlets may be available for planting. These provide uniform and pathogen-free planting material, however the yield and quality of the first-year harvest is usually lower than when planting rhizome seed pieces.

When planting containers, a well-aerated potting mix should be used, with components such as coarse coconut coir, peat or bark. Tissue culture plantlets should be planted at the crown, and seed pieces should

be planted about 5 cm below the surface. Enough empty space should be left at the top of the containers to allow mounding of the plants twice, around 45 and 90 days after planting, which will help increase the rhizome size. Bigger containers work best – we harvested only 350 g of rhizomes per plant of Hawaiian Red turmeric in 7 L pots, whereas yields were 1000 g per plant in 60 L pots. Plastic bags can also be used as containers, with the tops of the bags being unrolled as needed after mounding the plants. Ginger plants can show tip burn if the substrate is not kept sufficiently moist, or if the fertilizer levels are either too low or too high.

In the field, ginger and turmeric plants prefer a pH of 5.5 to 6.5. They are usually planted in early spring in raised beds, spaced 20 x 20 cm apart, and covered with 5 to 10 cm of soil. As with container

production, plants should be mounded twice during the growing season, around 45 and 90 days after planting. Plants yield the most in tropical to subtropical climates of 25 to 35°C, but in colder climates they can be grown in high tunnels or greenhouses. Plants also tend to be more vigorous under 30% shade rather than full sun in high light environments.

Ginger and turmeric are quantitative short-day plants for flowering and rhizome swelling. As the temperature gets colder and the days are shorter in the autumn, plants enter into dormancy and leaves yellow. At this point the irrigation can be stopped and after three weeks the wilted plant tops can be cut off. Three additional weeks may be allowed for rhizome drying before harvest. The harvest time after planting depends on the end use. Five months after planting is enough for rhizomes that will be sold as fresh vegetables, with low fiber content, and with segments of green leaves attached. Rhizomes harvested between five and seven months after planting are suitable for curing and selling in retail, and for making preserves. Rhizomes with longer growing periods of eight to nine months are more suitable to be dried or used to extract essential oils.

In a greenhouse, the temperature and day length can be manipulated to extend the growing season. Providing a night interruption period with incandescent lights strung above the plants between 10 pm and 2 am with a minimum of 2 micromol·m<sup>-2</sup>·s<sup>-1</sup> of photosynthetically active radiation provides a similar effect to naturally long day length, and plants remain vegetative. This allows for off-season harvest of fresh rhizomes, which may result in higher sale prices.

After harvest, it is recommended to wash the rhizomes by soaking or with pressure hoses to remove soil, and then treat them

with a sanitizing 10% bleach solution to disinfect them. Rhizomes that will be used for seed can also be treated with fungicides. Storage should be at low temperature and high relative humidity to prevent drying (13°C and 70%), and any moldy rhizomes should be discarded.

At the University of Florida, we are evaluating different species and varieties of ginger and turmeric under different growing conditions. In our first-year harvest (February 2018) we found significant differences in yield between turmeric varieties grown in 60 L containers under natural days, with Hawaiian Red having the highest yield (average of 1 kg per plant) compared to the lowest yielding tissue culture plantlets (0.28 kg per plant). For ginger there were no significant differences in yield between plants started from seed pieces or tissue culture plantlets started at two different dates, and plants yielded on average between 0.8 – 0.98 kg per plant (Figure 2).

We are now starting our second year of research and evaluation of species and varieties for rhizome yield as well as ornamental value as landscape or greenhouse plants. We will also use different treatments on seed pieces aiming to obtain uniform sprouting as compared to the control, such as a water soak for 24 hours, a water soak at 50°C for ten minutes and ten days before planting, and hormone treatments with different concentrations of ethephon or benzyladenine. Additionally, we plan to do chemical analyses on rhizomes, and research the profitability and marketing of live transplants and rhizome use as local fresh food or for use in the beverage industry.

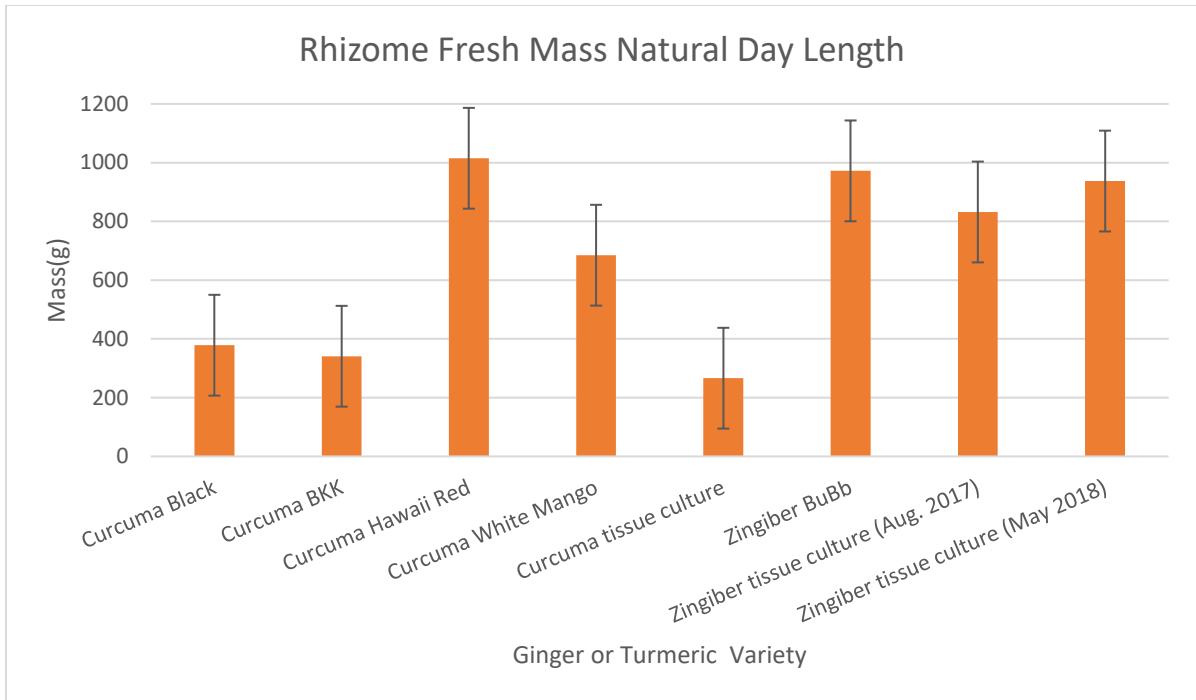


Figure 2. Rhizome production in ginger and turmeric.