

Ginger and Turmeric Production

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Presentation Plan

Quick overview of high tunnels

 Production information about Turmeric and Ginger

Discussion and questions



Season Extension

• refers to anything that allows a crop to be cultivated outside of its normal outdoor growing season.





Opportunity

- Season extension and out of season growth
 - Maximum yield and increased quality
 - Less insect and disease pressure
- Organic
- Locally grown
- Specialty crops









Ways to achieve an extended growing season

- Greenhouse
- High tunnel or hoop house
- Plastic mulch
- Row covers
- Cultural practices









High Tunnel

Resembles a conventional greenhouse

Crops are grown in the soil

- Season extension
 - Spring earliness
 - Fall extension

 Protects crops from adverse environmental conditions











High Tunnel vs. Greenhouse

- Greenhouse
 - Electrical input
 - Exhaust fans, evaporative cooling, heater, circulation fans
 - Crops usually grown in containers
 - Usually permanent
 - Cost \$\$\$
 - Crops grown year-round

- High Tunnel
 - No electricity
 - No automated systems no fans, heater, controls
 - Crops grown in the ground, conventionally
 - Temporary
 - Cost \$
 - Functions to extend the growing season, limited





HIGH TUNNELS





PVC









High Tunnel Costs

- Materials = approximately \$3-4/SF
- Construction = \$1-2/SF
- Example
 - 26' x 96' round tunnel
 - materials \$8,735
 - construction \$3,744







Ginger (Zingiber officinale)

The official name Zingiber drived, using the Indian Sanskrit name for ginger - **singabera**, or shaped like a horn.

Other spices in the same family with ginger are **Tumeric** and **Cardamom**.

http://www.herbs2000.com/herbs/herbs_ginger.htm



Ginger plant

The ginger plant has a long history of cultivation, having originated in Asia. Ginger is considered a tropical plant, has dark-green erect steams and lanced-shaped leaves that produces underground rhizomes. The plant may reach 2-4 ft in height.





Sustainable Ginger Production

- Market
- Seed-piece selection, mature, disease-free seed-piece, minimum 2 ounces
- Disease management, remove diseased plants and discard them as soon as possible
- Ginger is a heavy-feeder crop, and it will deplete your soil, fertilization and organic mater is critical

Sustainable Ginger Production

- Mounding plant, otherwise you will be marketing partially green ginger
- Plant spacing, 3 feet between rows and two feet between plants in the same row
- Shade
- Rotation
- Ginger is photoperiod sensitive crop, long days are needed for plant-foliage development

Ginger Seed Rhizomes



http://www.ctahr.hawaii.edu/oc/freepubs/pdf/scm-8.pdf: Paul Hepperly and Francis Zee

Ginger Seed-Rhizome

- Use only mature, clean, disease-free ginger hands
- Cut the selected hands into 2-4 oz sections, sterilizing the knife after each cut
- Each seed-piece should have two to four well developed "eyes."
- -Surface-sterilize the seed-pieces in a 10% solution of household bleach (1 part bleach in 9 parts water) for 10 minutes
- -Cure the seed-pieces in a clean, disease-free area for three days or more before planting

(Hepperly, P. and Francis Zee, 2004)





In February, plant the seed piece in a one gallon pot ½-¾ filled with soilless potting mix (2 parts Compost, 2-4 parts Sphagnum Peat Moss, 1 part Perlite, and 1 part Vermiculite). Maintain in a greenhouse.

In May the potted plants are ready to be transplanted in the high tunnel.

















Tissue Culture plants



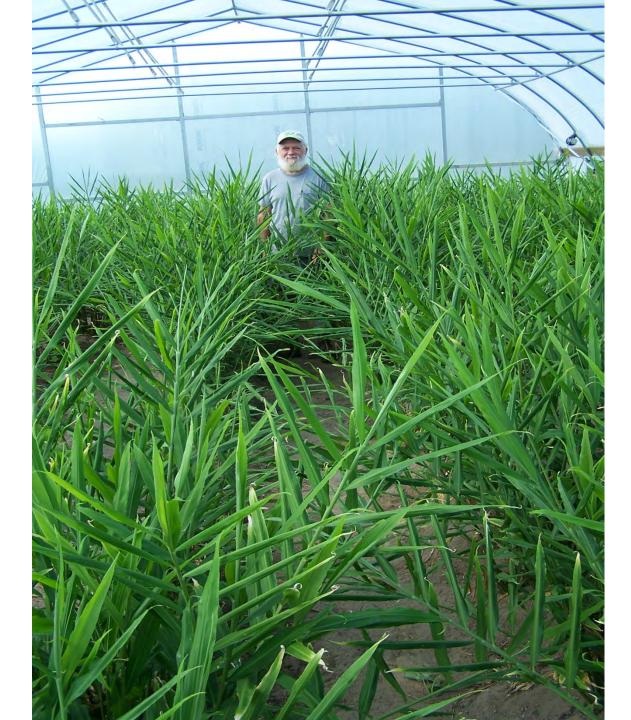






May





September

Fertilizer

- Ginger responds well with adequate fertilizer application.
- For detail of fertilizer need see
- http://www.ctahr.hawaii.edu/oc/freepubs/pdf/SCM-8.pdf

Mounding (Hilling)

Is the periodic covering of the upward-expanding rhizomes. It is an important process in ginger production.

















Armyworm, *Pseudaletia unipuncta* potential problem with high tunnel ginger production







leaf-spot *Phyllosticta zingiberi*





Diseases

Bacterial wilt (*Pseudomonas solanacearum*) - wilt of entire plant, rhizome rot.

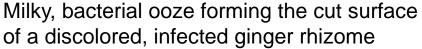
- spreads by infested soil adhering to hands, boots, tools, vehicle tires and field equipment, water from irrigation or rainfall, and infected ginger rhizomes (Janse 1996).
- Infects ginger roots and rhizomes through openings where lateral roots emerge or wounds caused by handling, parasitic insects or root-knot nematodes (Swanson et al. 2005).

Diseases

Bacterial wilt (*Pseudomonas solanacearum*) - wilt of entire plant, rhizome rot.

- The pathogen survives in soils within infected plant debris in soils and as free bacteria.
- Crop losses: Crop loss can be complete in heavily infested soils.





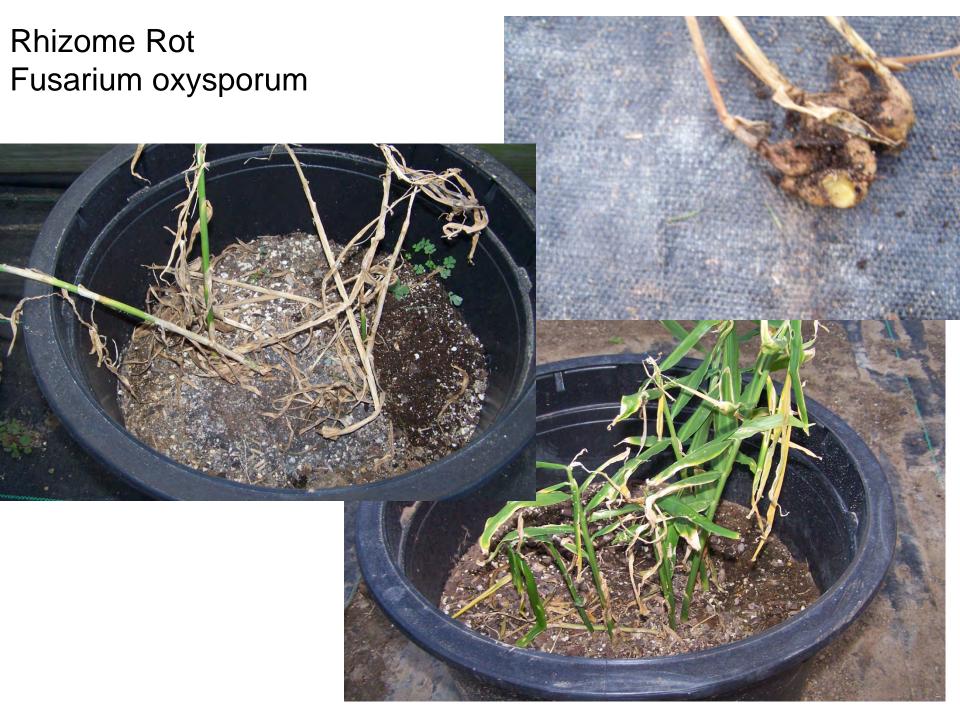


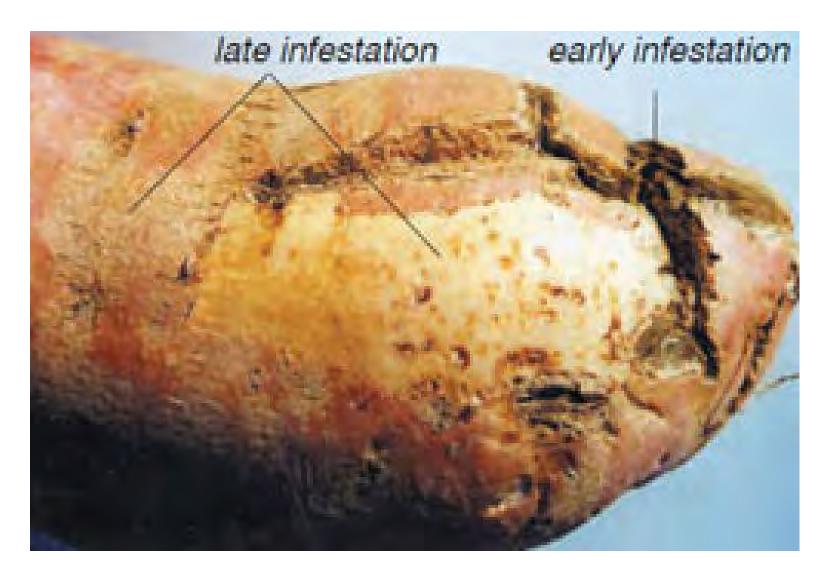
Bacterial streaming from an infected ginger rhizome suspended in water. The streaming begins only a few minutes after placing the cut rhizome in water

http://cms.ctahr.hawaii.edu/gingerwilt/Symptoms.aspx

Diseases

- **Bacterial soft rot** (*Erwinia* sp.) Leaf, pseudo stem and rhizome rot.
- **Bacterial leaf blight** (*Xanthomonas* sp.) Leaf blight.
- Fusarium yellows and rhizome rot (Fusarium oxysporum f. sp. zingiberi) Wilt of entire plant, rhizome rot.
- **Pythium soft rot** (*Pythium graminicola, P. splendens* and *P. aphanidermatum*): root rot, and soft rot of rhizomes.





Root-knot nematode





Shade

Ginger prefers 30% shade, high tunnel plastic provide sufficient shade. However, if you are growing it under field conditions, you need to intercrop it with other crops, Corn and Pigeon pea









Local Knowledge







Seed-Piece removal

Ginger Deseeding Experiment



Deseeded



Date harvested and Yield per plant (lbs.) for two treatments; ginger plan were 'deseeded' and 'seed not removed' at transplanting. VSU, Randolph Farm, 2017.

Date Harvested	Deseeded (lbs.)	Date Harvested	Seed not removed (lbs.)
10/4/17	5.5	9/8/17	11
10/10/17	10	9/28/17	13
10/16/17	7	10/3/17	14
10/19/17	10	10/10/17	11
10/26/17	6	10/12/17	11
10/26/17	7.5	10/12/17	7
10/27/17	13	10/13/17	9
11/10/17	7.5	10/13/17	11.5
11/11/17	-	10/12/17	0

10/16/17	/	10/3/1/	14	
10/19/17	10	10/10/17	11	
10/26/17	6	10/12/17	11	
10/26/17	7.5	10/12/17	7	
10/27/17	13	10/13/17	9	
11/10/17	7.5	10/13/17	11.5	
11/14/17	5	10/13/17	9	
11/15/17	g	10/26/17	Q	

10/26/17

10/31/17

11/10/17

11/13/17

13

13

12

10

10.9

10.5

11/15/17

Average

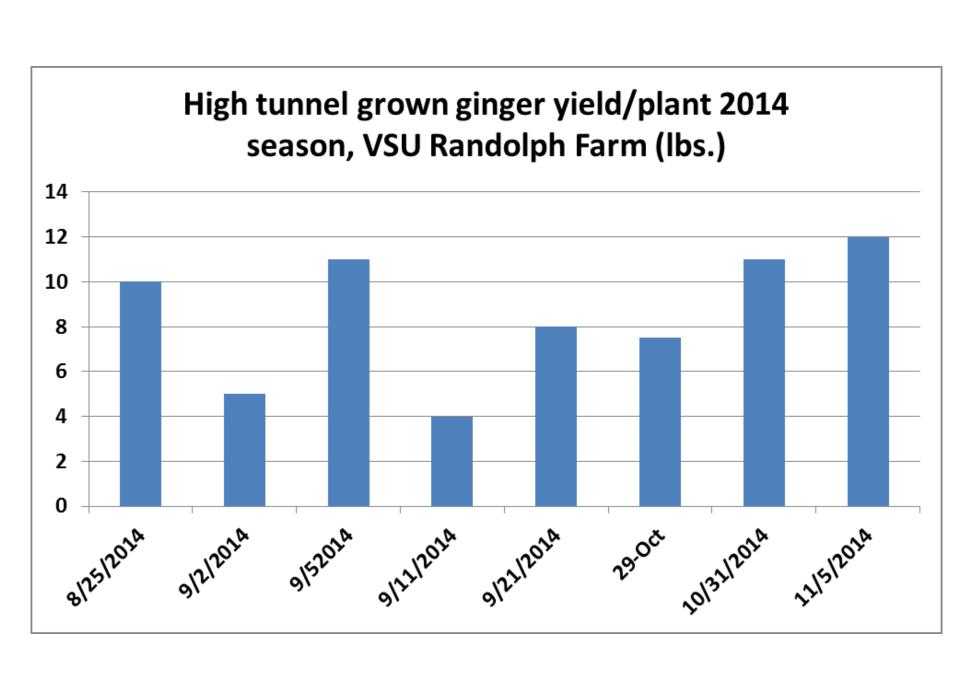
with **BW**

Number of plants

8.5

8.1

8







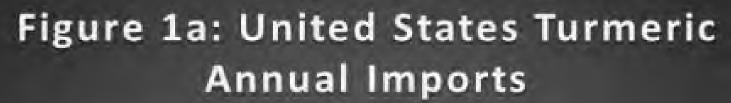


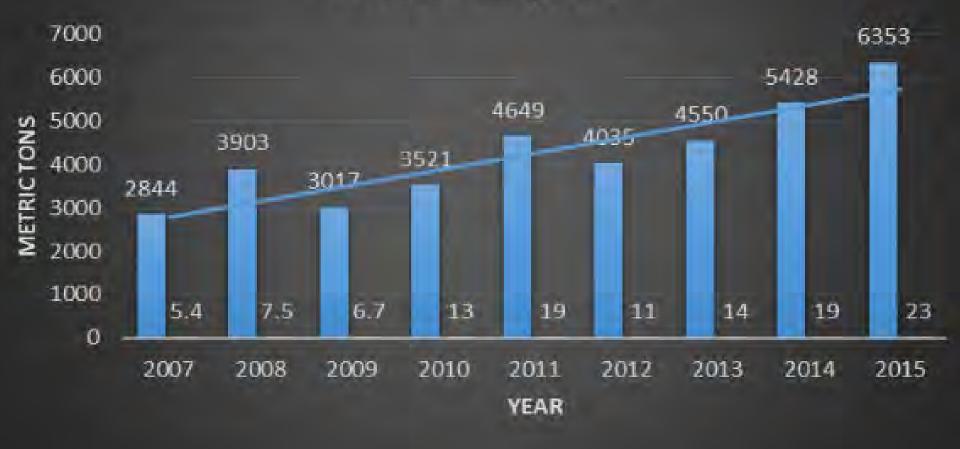












223% increased from 2007 to 2015

Turmeric, Curcuma longa

- Is a rhizomatous herbaceous perennial plant of the ginger family, Zingiberaceae.
- It is native in Southeast Asia. Growing turmeric requires 9-11 month from planting the rhizome seed pieces until the harvest.
- In temperate zones as in Virginia, where the growing season is 7-8 month, it is recommended to grow turmeric in high tunnel structure



Turmeric, Curcuma longa

The roots are used for a multitude of purposes including

- Spice,
- Food flavoring and coloring agent
- In cosmetics, for coloring fabric
- For medicinal purposes





Start in January
Sprouting is slow, greenhouse temperature >75 F helps with sprouting



Turmeric production













September





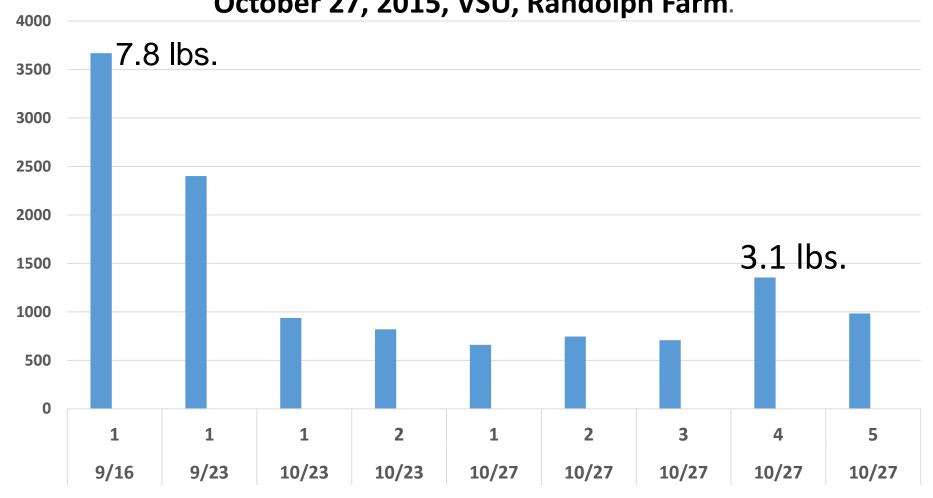








Turmeric weight (grs.) per plant, September 16-October 27, 2015, VSU, Randolph Farm.



Education and marketing

