

The Passion fruit



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UF / IFAS EXTENSION - MARION COUNTY

Objectives - Why we are here



- Passion fruit is a new alternative crop for the north central Florida region.
- Discuss the background & fundamentals of passion fruit production.
- Pest prevention & Management
- Current state of the market & economic aspects
- Crop characteristics: nutrition, culinary uses, potential to promote the fruit.
- Irrigation methods
- Maximizing fruit production
- The pros and cons of the fruit. What we know & what we don't know.
- Q & A with the current and prospective growers, 2-way communication

Origins & History



FAMILY: Passifloracea

GENUS: *Passiflora*

SPECIES: *P. edulis* (includes var. *flavicarpa* (yellow))

There are about 550 species within the *passiflora* genus, while only a small number produce edible fruit. Most are tendril-bearing vines and many have ornamental value.

The name likely originates from 1700s missionaries in Brazil as an illustrative aid while working to convert the indigenous population to Christianity.

Its name was “flor das cinco chagas” or “flower of the five wounds” to represent the Christ’s crucifixion.

Passion fruit (*P. edulis*) should not be confused with Passion flower (*P. incarnata*)

Origins & History

Description: Passion fruit is a short-lived evergreen perennial vine that produces an aromatic and tropical-tasting fruit.

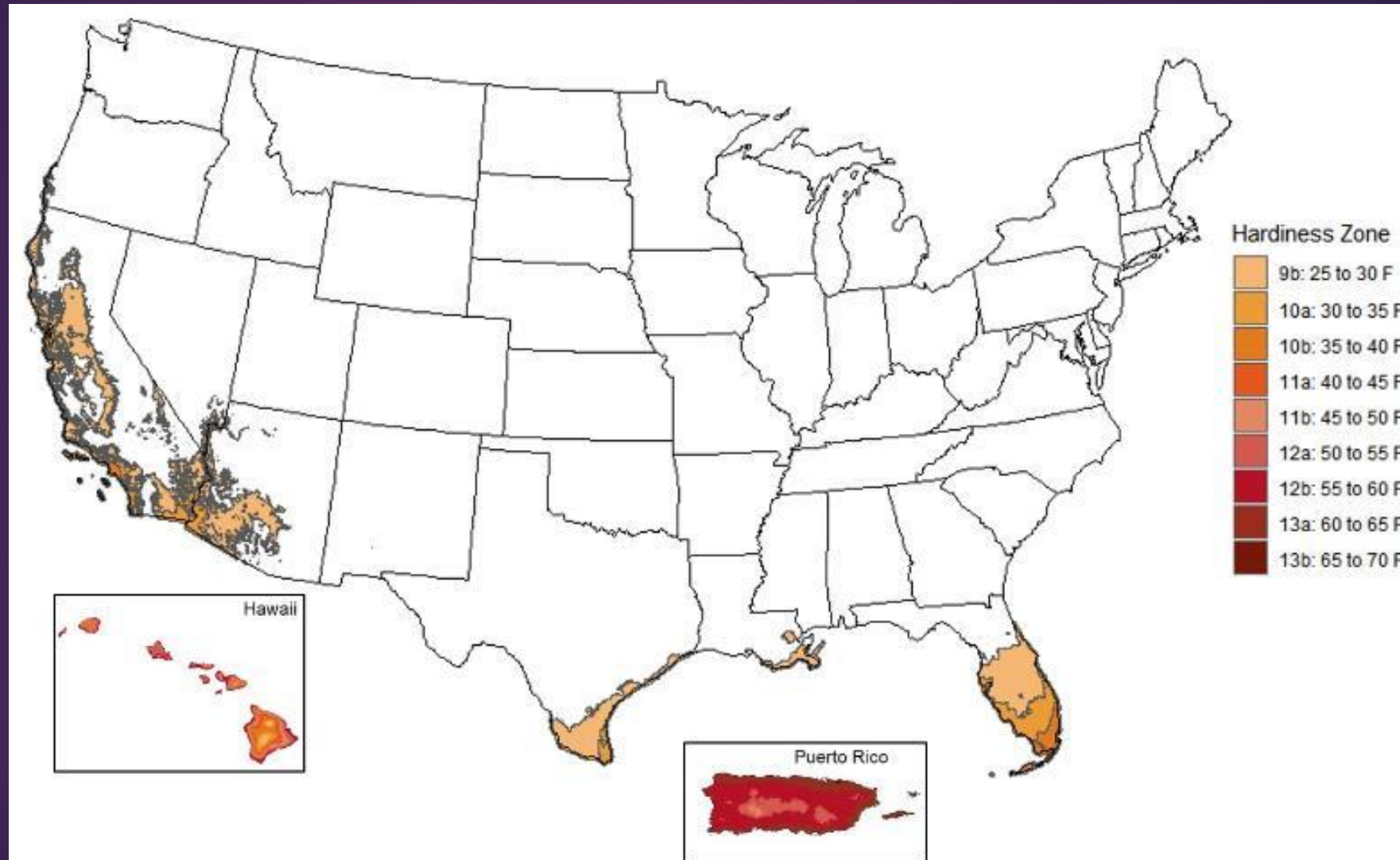
The most cultivated types in the United States are the purple passion fruit (*Passiflora edulis*), some yellow passion fruit (*P. edulis flavicarpa*)

Native range of Brazil, Paraguay, and northern Argentina and is grown commercially worldwide in suitable tropical / subtropical climates.

Under ideal conditions, vines are mature within a year and produce flowers. Production typically lasts 3-4 years.



Origins & History



Other *Passiflora*

Sweet passion fruit (*P. Alata*) has yellow to orange fruit

Sweet granadilla (*P. Ligularis*) has an orange shell when ripe

Water lemon (*P. Laurifolia*) has yellow or orange fruit and coconut flavor notes

Sweet calabash (*P. Maliformis*) has round yellow-brown fruit

Giant granadilla (*P. Quadrangularis*) has greenish-yellow fruit up to 8 Inches long.



Passiflora incarnata



Passiflora coccinea

Anatomy

The Flower Is Pentamerous; (5) Petal, (5) Sepals, (5) Anthers.



Anatomy

The fruit ripens into a pithy pepo (botanically a berry) with flesh-covered seeds. Each seed is surrounded by a membranous sac filled with pulpy juice.



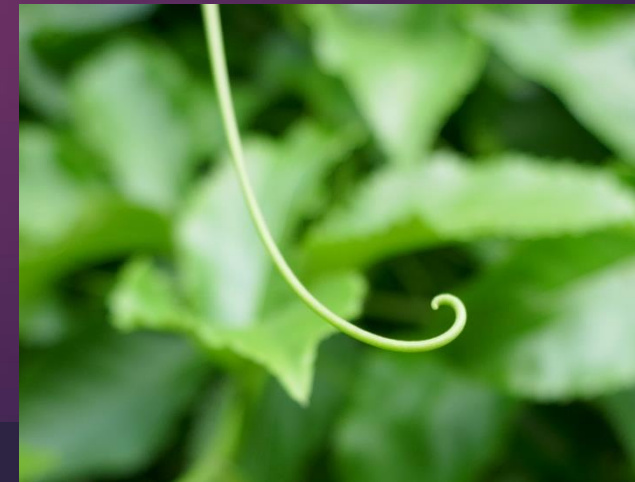
Anatomy

Extrafloral nectaries at base of leaves.

Leaves typically have three lobes.



Tendrils



Planting & Fertilization

Timing: Best planted when frost is no longer a concern.

Prefers slightly acid soils (5.5-6.5 ph)

A soil with good drainage is important to prevent death or disease.
Use infrequent irrigation.

Can be grown in containers – controlling many variables.

Plant spacing: 6 -10ft.

Row spacing: 10 -15ft (depends upon equipment, etc.)

Approximately 300-500 plants per acre.

Planting & Fertilization

Application methods: fertigation, granular, & foliar spray.

NPK formulas 8-3-9, 6-6-6, or similar at 4-6 week application intervals.

Young vines should be fertilized to encourage maximum growth of the roots and vines.

Apply secondary & micronutrients along with standard N-P-K applications.

Apply fertilizer after pruning (late winter) and continue at regular intervals into early fall.

Excess nitrogen will encourage vegetative growth and discourage flowering.

Optional: A wide, shallow hole can be dug and filled with well-drained, organic-rich soil. Compost is excellent for this.

Fertilization

Months old	Application frequency	NPK rate/oz per vine °	NPK rate/lb for 84 vines
1-2	Every 4 weeks	4	21
3	Every 4 weeks	4	21
4	Every 4 weeks	6	31.5
5	Every 4 weeks	6	31.5
6	Every 4 weeks	6	31.5
7	Every 4 weeks	6	31.5
8	Every 6 weeks	10	52.5
9	Every 6 weeks	10	52.5
10	Every 6 weeks	10	52.5
11	Every 6 weeks	10	52.5
12+	Every 6 weeks	16	52.5

Trellising

Will need to fit the growth habit of the plant – will require management.

The vine naturally climbs over any available plants or structures to reach sunlight.

Growth can be made to cover the wires of the trellises or fences manually or through pruning.

A singular strong vine may be better than multiple vines.

Once the vine begins to grow, it should be allowed to grow without pruning throughout the season to encourage fruit production.

Trellis Designs

Many designs available – their efficacy has not been extensively evaluated.

The goal: maximizing exposure to direct sunlight.

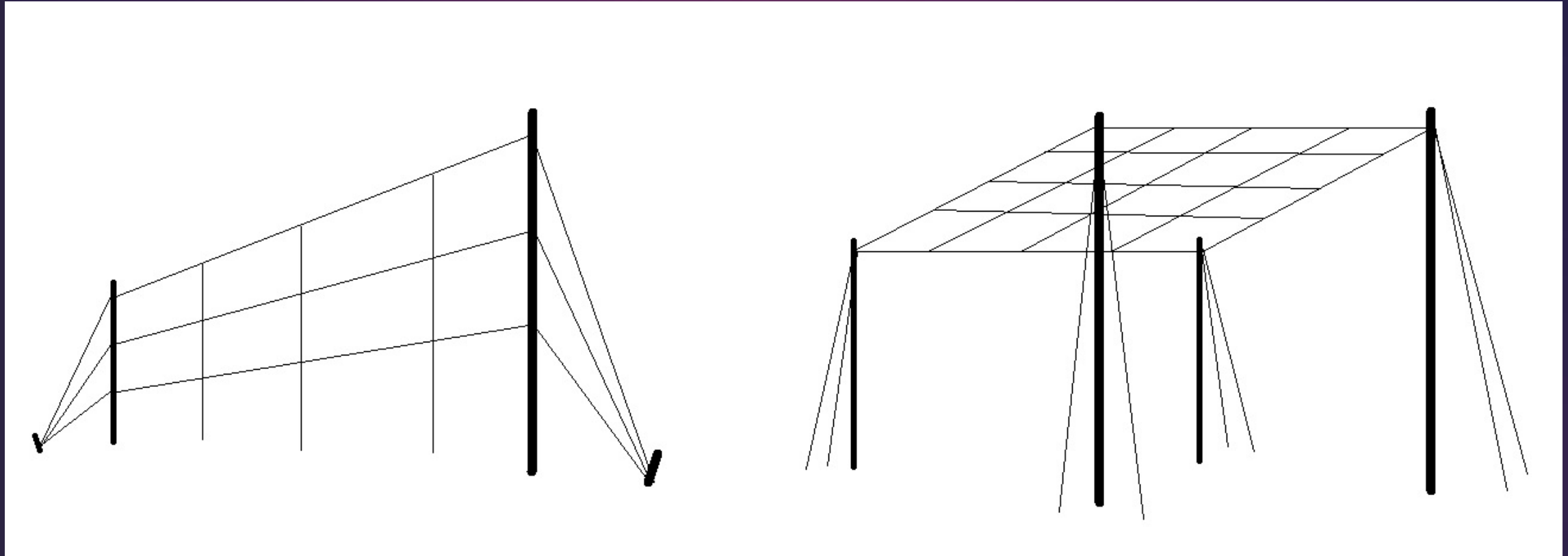
Trellising lines should be oriented north to south for maximum exposure to the sun.

Vines should be allowed to grow together in the trellises to stimulate cross-pollination if using yellow and purple varieties.

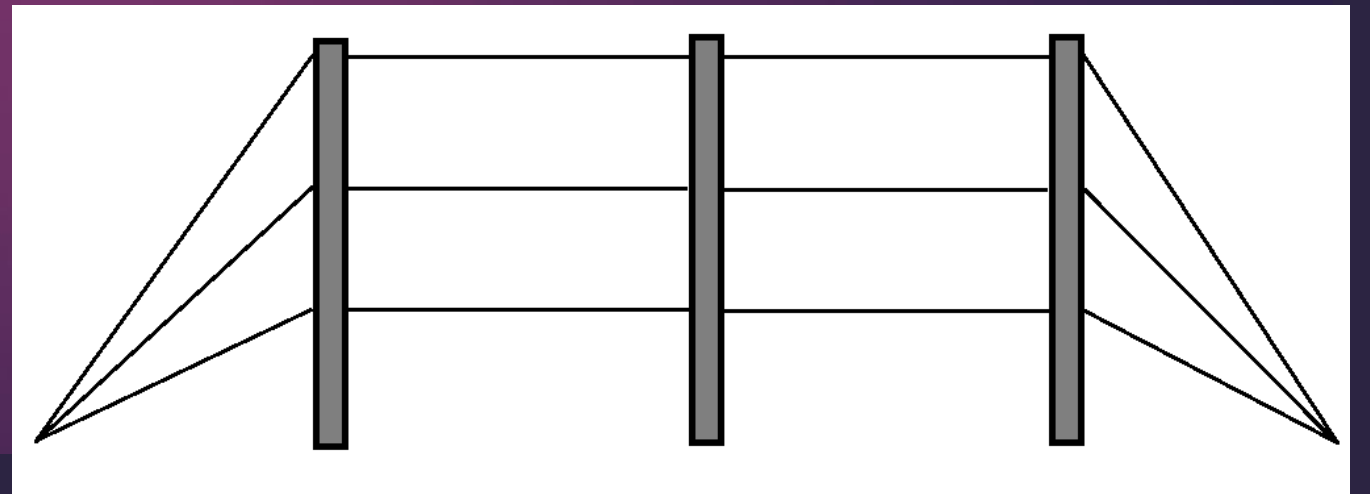
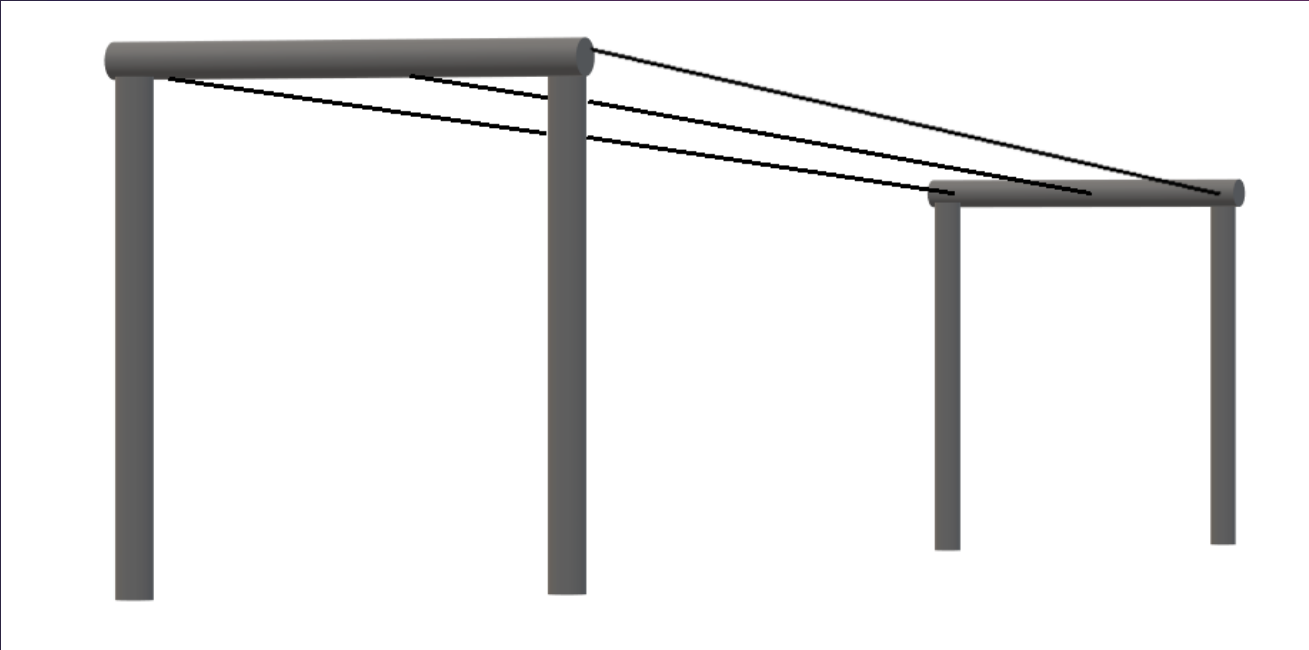
Avoid thatching with open trellises and removal of dead vegetation.



Trellis Designs



Trellis Designs





Trellis Designs









Pruning

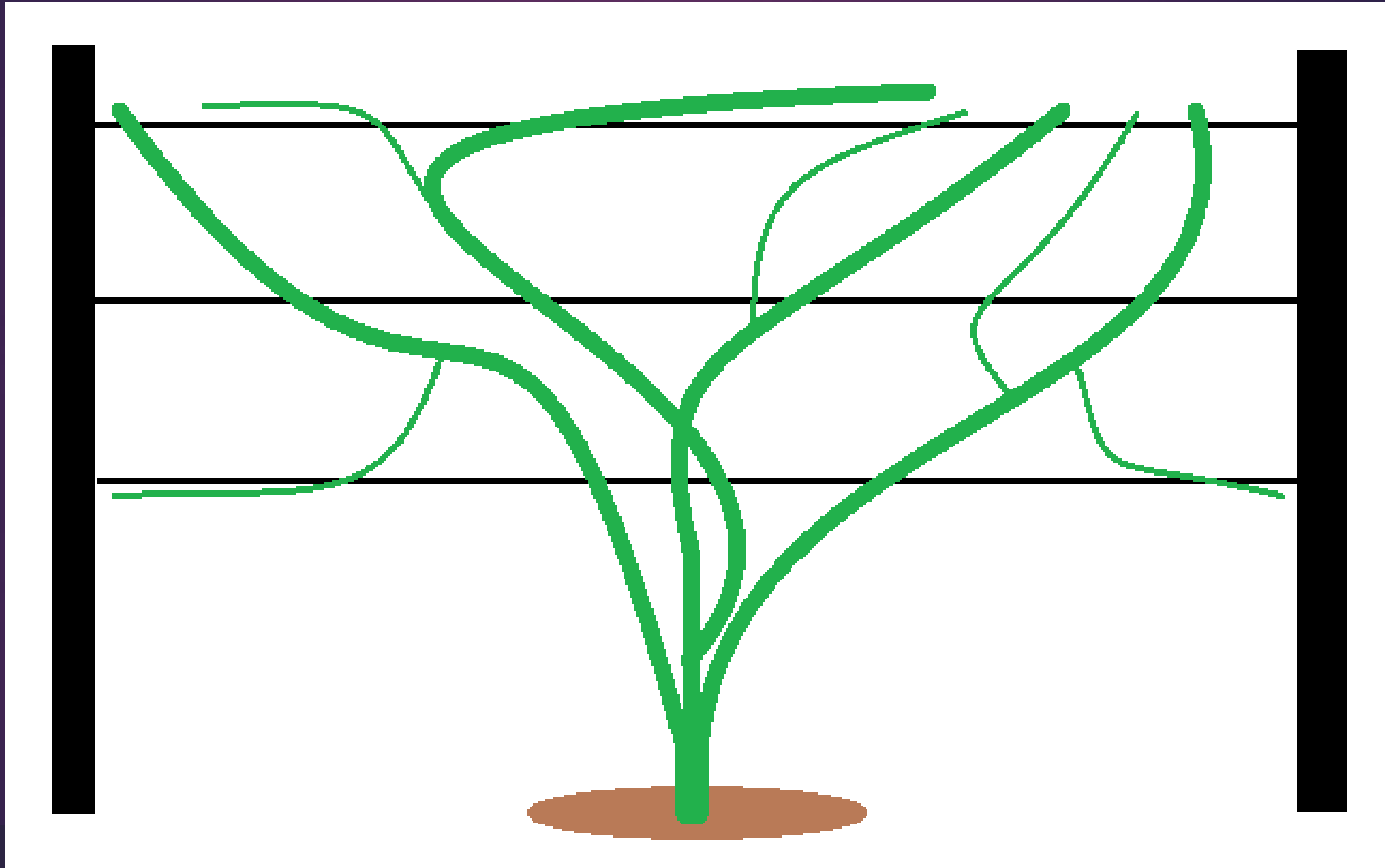
Vines should be pruned at the end of winter when they are not growing.

Dead and weak branches should be cut, leaving only the vigorous vines with many buds. this allows rapid growth at the beginning of spring.

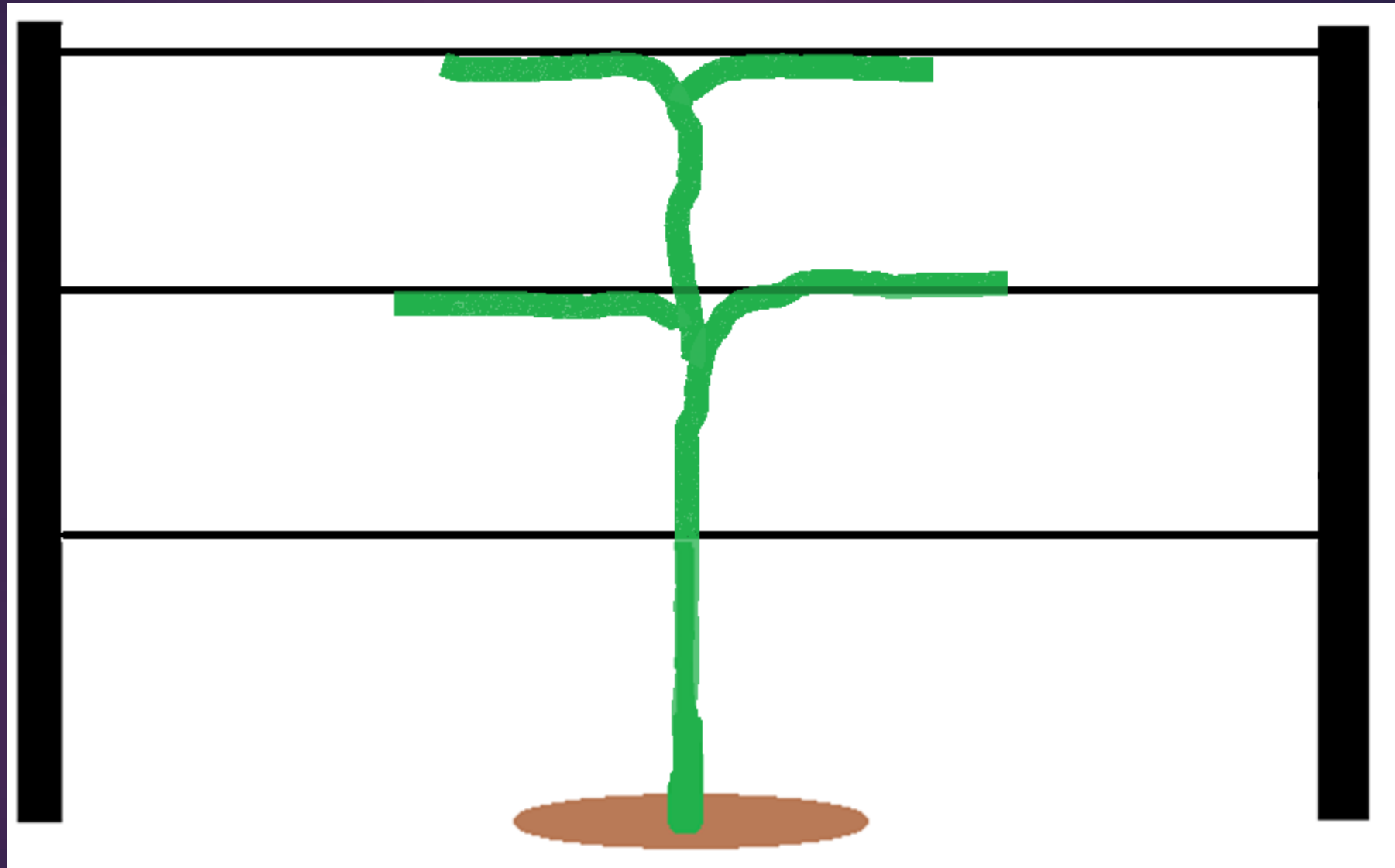
Disinfect the pruning shears when completing one vine or start with another to prevent the transmission of diseases between plants.

Vines are short-lived perennials. vine life expectancy is 3-5 years. a vine with excessive dead branches has lost its vigor and should be removed and replaced by a young and healthy plant.

Pruning - Before



Pruning - After



Pest Control Overview

- Insects – few significant insect pests
- Disease – prevent as much as possible. Prune out or remove infected plants.
 - Don't plant in the exact spot an infected plant was.
 - Allow airflow around the leaves to prevent persistent moisture.
 - Use of fungicides as preventive applications.
- Weeds – only a problem for very young plants.
- Nematodes – don't plant back into the same soil unless several years has elapsed with non-host or solarized. Grafting purple passionfruit onto the yellow passionfruit may reduce the nematode pressure as well as other diseases. Grafting onto *P. Incarnata*?

Cold Weather Protection

Frost protection is essential!

Cold can kill a mature plant completely if low enough temp.

Cover the base of the plant to ensure survival.

Small vines and leaves are non-essential.

Prune out the dead growth once weather warms up.

Cold Weather Protection



Cold Weather Protection



END Background & Fundamentals

Propagation - Seeds



Seeds can be a challenge to germinate.

All types of passion fruit can be propagated from seeds, which must be fresh (less than a year).

Seeds should be planted in pots or other containers containing sterile soil and kept in a moist place protected from intense sunlight.

The seeds germinate normally in 10-20 days; small plants grow quickly and should be placed in individual containers as soon as possible. They can be transferred to the permanent sowing site when they reach a height of about 1 ft.

The purple passion fruit is sometimes grafted into yellow passion fruit to mitigate the diseases and nematodes that affect its root system. The seedlings of both types must be about 18 high and have a diameter similar to that of a pencil at the time of grafting.

Propagation - Cuttings

Cuttings are a viable option for propagation.

Use clean tools.

Needs to be cut from mature disease-free vines that are the diameter of a pencil. About 8-inch segments.

Use growth hormone if available.

Plant 3 to 4 inches deep in clean soil, pack the surface, and keep moist regularly.

Keep in partial shade or reduced sunlight.

Plant after a flush of new growth occurs, indicating roots.

Flowers

- Flowers occur on mature vines
- Up to a year for a healthy vine to begin flower production.
- Flowers emerge only from new growth
- Will know potential yield based entirely upon new growth.



Pollination



Pollination

- Pollination is essential for fruit production and quality
- Pollen is sticky and insects assist in pollination.
- Carpenter bees are effective pollinators.
- Bees & carpenter bees can be attracted with pollinator plants. (ex. Salvia or Beebalm)
- Hand pollination?



New fruit development



The Fruit

Fruit continue to “dry”, shrinking and dimpling. The flavor is not degraded over several weeks in spite of external appearance.



Harvesting

- Maturation occurs in mid-late summer in N. Central Florida.
- Fruit can vary in size, shape, and color.



Harvesting

Production ranges from June – August.

Mature fruit will have a somewhat hard gourd-like feel and will often be slightly sunken or dimpled.

Mature fruit have a normal abscission point on their stem and will drop when mature.

The interior of the fruit is consumed and not the exterior, thus ground-harvest may not be an issue?

Fruit plucked from the vine may remove the stem from the top of the fruit, creating a hole in the top. Avoid this



Processing, Flavor, & Nutrition

Marketing potential:

The juice of passion fruit is a good source of ascorbic acid (vitamin C) and carotenoids (vitamin A).

It has a rich and strong acidic fruity flavor but pleasantly aromatic. The undiluted juice is highly concentrated but it is an excellent additive for other juices.

Can be used to flavor other drinks and dishes.

The juice can be used to make jellies, or flavoring for cakes and cake frostings.

The seeds with their juice sacks can be used in fruit salads.

Can be eaten raw.











Storage & Handling

Passionfruit ripen well under ambient temp, but usually harvested fully ripe.

Skin will shrivel the pulp is still quite good for some time.

Maintain good condition at ambient temp without shriveling when the humidity is kept above 85% (non-condensing).

Refrigerated storage & humidity is best.

Passion fruit are very durable when compared to other crops.



Economic Value & Marketing

Passionfruit is grown on minimal acreage domestically.

Sold as a commodity for its juice, concentrates, and raw fruit. Most fruit are imported to the USA.

Fruit are particularly high value. Range from \$1.00 - \$2.50 depending upon market conditions and other factors. See: USDA Agricultural Fruit Marketing

Sold usually as a dozen or by weight.

Selling options include:

- selling direct to customers (local) – count or by weight
- selling wholesale (domestic or international)
- Value-added products (brewing, juice, candies, ice cream, jellies, etc.)
- selling direct to customers (shipped) – count or by weight

Will require substantial work to find contacts and establish market relationships.



Crop Pros + Cons

PROS

- New opportunities in a non-saturated market.
- Rapid growth.
- High value crop
- Value-added products

CONS

- No widely established market.
- Cold sensitive
- High costs to establish
- Some disease problems
- No established crop standard...yet



Upcoming Programs:

Growing the U.S. Passion Fruit Industry

A Strategic Conference for:

Growers, Marketers, Researchers, and Stakeholders

Purpose:

- Learning and discussion on the current state of the U.S. passion fruit industry
- Identifying key challenges for the industry
- Local grower vineyard demonstrations
- Strategic planning to overcome challenges faced by growers, propagators, marketers, and stakeholders

Pre-meeting Grower/Stakeholder Survey

Please help us, help the U.S. passionfruit industry!



Describe current production practices and issues facing the industry in a short online survey:

<https://tinyurl.com/22shzfx8>

Organized by:

- Mississippi State University
- University of Florida
- University of Georgia
- University of California-Davis
- University of Puerto Rico
- USDA-ARS



To register: <https://tinyurl.com/b9bcuwxs>

**Tuesday June 14th -
Wednesday 15th, 2022**

Location:

John D. Campbell Agricultural Center
Homestead, Florida

Registration fee:

\$20 (In-person and virtual options)

Registration deadline:

May 28th, 2022

Lunch provided both days

Non-local South Florida travel and lodging must be arranged as early as possible to be accommodated. Full or partial travel and lodging cost assistance is available.

For more information, contact:

Dr. Eric Stafne

eric.stafne@msstate.edu

Expected Questions

- **What is the cost of installation per acre?**

Currently no established industry standard. Variables could include: preparing land, irrigation well + system, trellising material, weed barrier, labor costs, and plants / planting density. \$7-10,000?

- **What is the cost of production and harvest per acre?**

Currently no established production costs. Variable could include: labor, fertilizers, pesticides, equipment use, repairs, irrigation.

- **What are the recommended varieties?**

We know of several varieties that have worked well in other parts of the world, however thoroughly proven varieties will need to be investigated and are on-going.

- **What are the key pest problems?**

Developing a spray program as well as recommended varieties will need to be investigated. Pathogens present the greatest threat to production.

- **What about market saturation?**

Currently <75 acres total USA production. Market saturation is unlikely for years given the range of marketing strategies.

Discussion / Questions?

For more information please call:

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