

Growing Blueberries and Blackberries in southwest Florida

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Specific cultivars are needed in Florida

- Many different temperate fruits can be grown in Florida.
- Florida's mild climate requires that low-chill cultivars of these fruits be grown.
- For example, neither the well known 'Elberta' peach nor 'Delicious' apple can be grown successfully in Florida.

Chilling Requirement

- The amount of exposure to cold temperatures required for the resumption of normal growth the following spring.
- 42-45 F seems to be the optimum temperature range to satisfy the chilling requirement.
- Higher and lower temperatures satisfy the chilling requirement less efficiently.
- Periods of high temperatures during dormancy can negate accumulated chilling.

Florida's Winter Climate

- Winter chilling is highly variable and unpredictable from year to year.
- Freezes occur during bloom and early fruit development for most early-flowering, low-chill, deciduous fruit species such as blueberries and peaches.

Insufficient Chilling

- Inadequate chilling results in delayed, weak, spring growth.
- Eventually plants become weak, non-productive and may die.



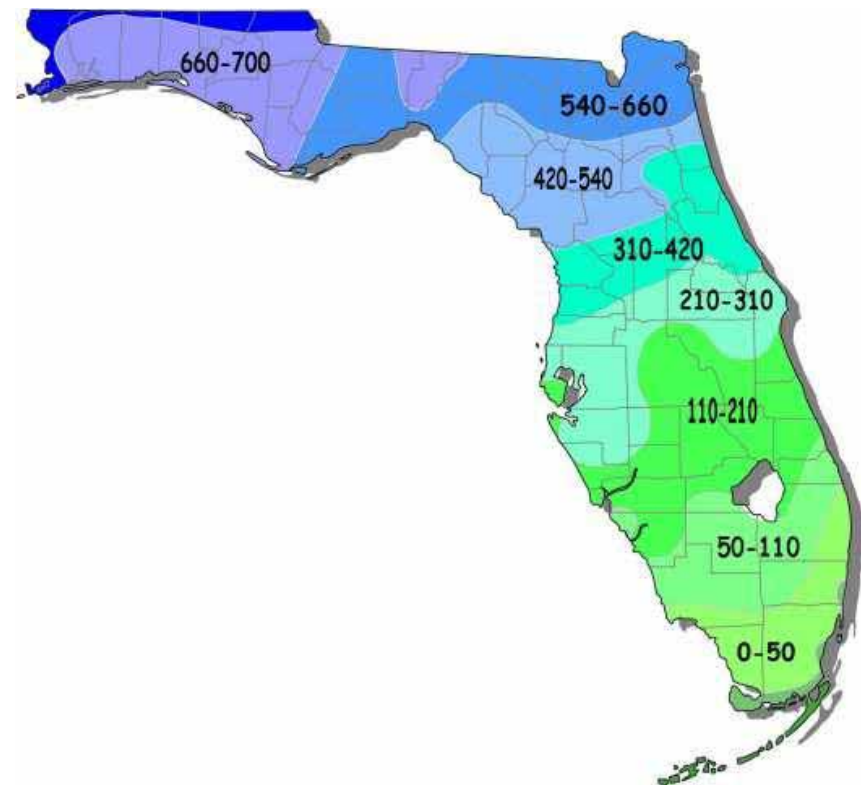
Excessive Chilling

- Excessive winter chilling often results in early flowering followed by freeze damage to flowers and young fruit.



Winter chill unit accumulation

- Map showing typical winter chilling units received during most winters in Florida.
- Chilling varies greatly from year to year.



Chill unit accumulation in north and central Florida beginning November 1*

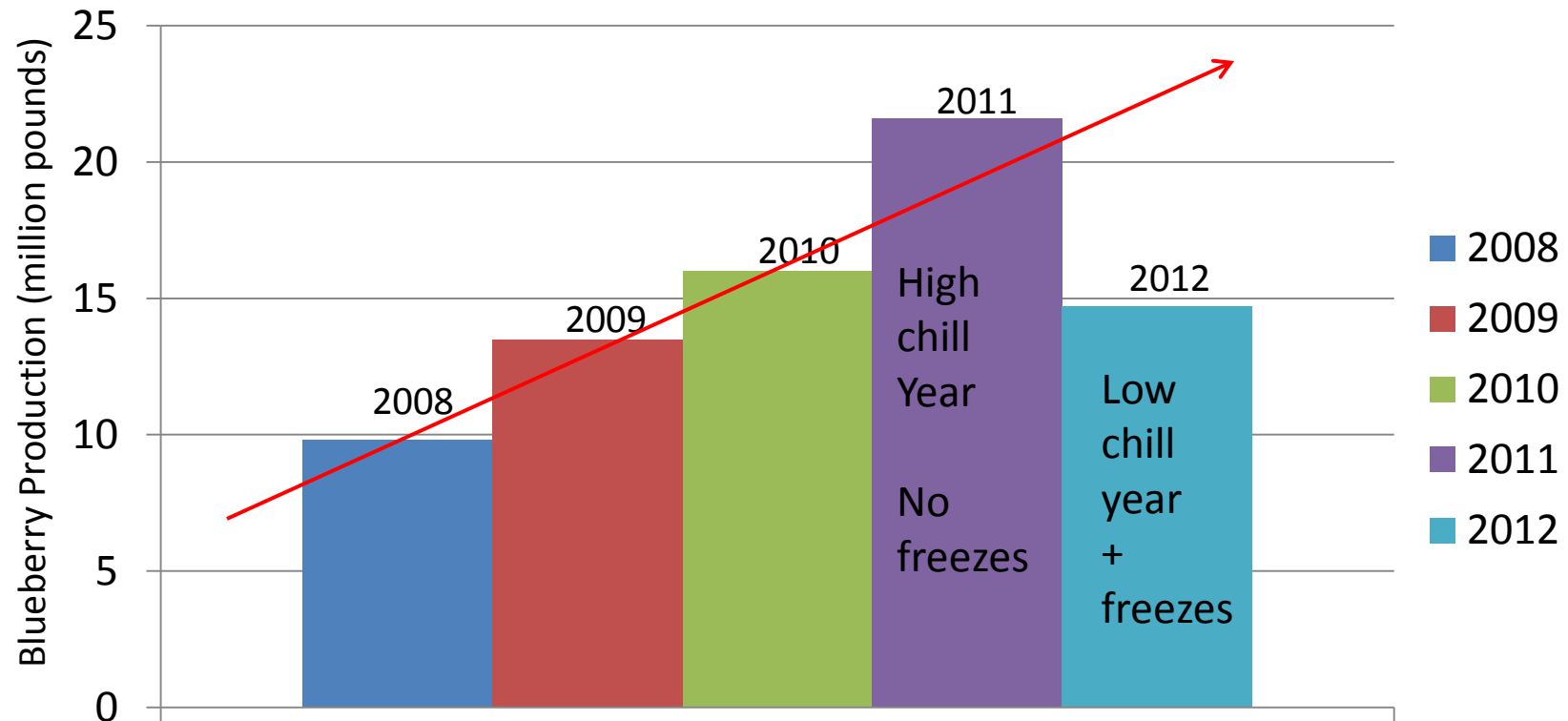
Date	Long-term Average		Winter 2010/2011		Winter 2011/2012	
	Alachua	Polk	Alachua	Polk	Alachua	Polk
Dec. 15	182	46	346	146	139	15
Dec. 31	283	85	520	254	195	22
Jan. 15	384	127	664	307	275	81

- Winter chill accumulation is highly variable by year.
- Winter chilling was well above average during 2010/2011 and much below average in 2011/2012.

*Data taken from the AgroClimate website.

Florida blueberry production by year

An example of the effects of chilling and freezes on production *



2011- above average chill accumulation coupled with little to no freeze damage = record crop.

2012 – below average chill accumulation and severe February freeze = reduced production.

*Data taken from the USDA Agricultural Marketing Service.

Freezes and Frosts

- Freezes and frosts probably reduce yields of temperate fruit crops more than any other single factor in Florida. There are two types of freezes.

Types of Cold Weather Events

- **Freeze** - generally used to describe an invasion of a cold, dry, air mass. Winds usually in excess of 5 mph. Often referred to as advective freezes. Usually occur in late winter, less common in late March and April.
- **Frost** – (radiation frost or freeze). Associated with calm winds (0-3 mph) and clear skies. The most common type of freeze during spring bloom periods in most fruit growing areas.

Windy freezes

- Most common in winter months (Jan. and Feb.).
- Temperatures are uniform over a given area.
- Plant tissue temperature is similar to air temperatures.
- Often associated with a dry air mass.
 - Dry air increases evaporative cooling when irrigation is used for protection.

Spring frosts

- Usually occur on still nights with clear skies.
- Without wind to mix the air, cold pockets can develop in low areas.
- Temperatures may not be uniform for a given area.
- Plant tissue can be several degrees colder than air temperatures.
- Cloud cover, slight wind, and high dew point temperatures are helpful at moderating temperatures during radiation frosts.

Example of a frost night

- Predicted minimum temperature is 33 F.
- Predicted dew point temperature is 22 F.
- Predicted wind speed is 0-1 mph.
- Predicted cloud cover is for clear skies.
 - Plant tissue temperatures can be 29 or 30 F when the air temperature is 33 F. The result can be damage to sensitive plant tissue at above freezing air temperatures.
 - Plant tissue varies in its sensitivity to cold temperatures based on its stage of development.

Water vapor content of air

- The amount of water vapor in the air has a direct effect on the rate of heat loss (cooling) during a radiation freeze.
- The higher the water vapor content of the air, the slower the radiant heat loss from the orchard.
- Use dew point temperature, not relative humidity to assess the water vapor content of air.

Freezes – what can you do?

- Examples of active freeze protection
 - Overhead irrigation
 - Outdoor lighting
 - Covers
- Examples of passive freeze protection
 - Irrigate soil the day before a freeze.
 - Remove vegetation and mulch from around plants.
 - Select site which provides protection from freeze.

Overhead irrigation – primarily used for freeze protection in commercial plantings

Most commercial fields require protection several times per year

Overhead irrigation for freeze protection is not recommended for home gardeners but if used, sufficient water application rates and thorough coverage are needed.



Heavy ice loads can break canes and uproot plants



Clear ice is usually a sign of successful protection



Site Selection

- Adequate sunlight exposure.
- Adequate soil drainage.
- Sufficient space for mature plant.
- Near source of high quality water for irrigation.
- Protection from freezes and spring frosts.
- Soil test before planting.
- Remove difficult to control perennial weeds (wild brambles, smilax, etc.)

Adaptation of mineral soils (sands) for blueberry production in Florida

- Ideal blueberry soils are coarse, acidic, and high in organic matter.
- Few soils in Florida are naturally suited for blueberry production.
- Good blueberry soils in Florida tend to be in frost pockets.
- Most commercial blueberry production in Florida is on highly amended sandy soils.

Most Florida soils need additional organic matter

Pine bark is commonly used for soil amendments and mulch



New planting in pine bark on a sandy soil





Plants are grown on top of soil in beds of pine bark



Planting and establishment

- Soil test several months before planting and make necessary adjustments.
- Plant temperate fruit crops in dormant season - late winter or early spring.
- Can plant in late spring or summer if you have irrigation.
- Plant at depth the tree was grown in the nursery.
- Amend backfill with organic matter.
- Irrigate original root ball until tree is established.

Pruning for young plant establishment

- Blueberries are usually cut back to about 10 to 15 inches at planting to remove most flower buds and adjust the root:shoot ratio.



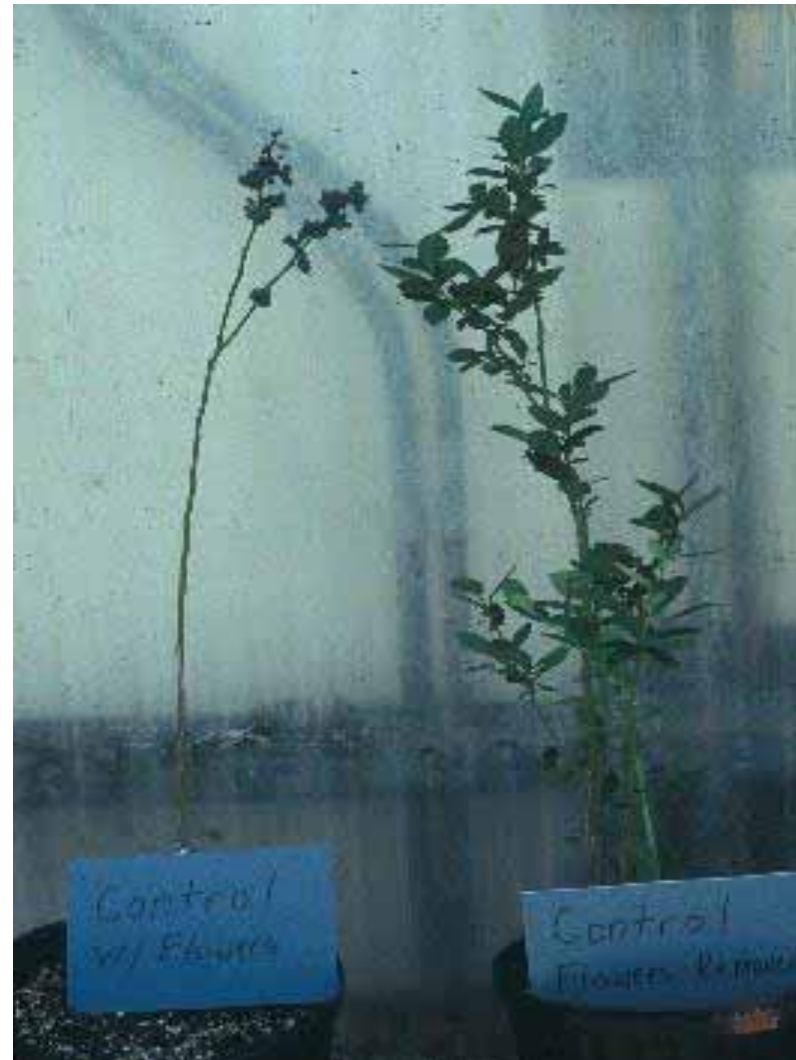
Young Plant Establishment

- Fruit on young plants can inhibit leaf and shoot development and predispose plants to blueberry stem blight.



Blueberry Plant Establishment

- Fruit on plant (left) has prevented leaf development. The plant is beginning to dieback from the shoot tips.



Young Plant Establishment

- Adjust root:shoot ratio; reduce transpiration from leaf surfaces until root establishment occurs and root function resumes.
- Remove fruit and flowers from young plants which increase plant stress and slow vegetative growth
 - Benefits - faster plant establishment and potential for significant crop production sooner

Irrigation

- Plant water demands are related to the stage of plant growth and the weather.
 - Winter – dormant or semi-dormant plants require little water.
 - Water requirements increase rapidly during bloom and spring growth. The fruit development period is critical for large, high-quality fruit.
 - As the canopy develops and the days become longer and warmer, water requirements increase.
 - Water requirements decrease in the fall as temperatures cool and day lengths become shorter.
 - Blueberries have shallow root systems and require frequent, light irrigations in the absence of rain.

Excavated mature blueberry plant – know where the root system is located.



Excavated blueberry plant with a typical shallow root system.





The majority of roots are located in the top 5 to 6 inches of soil profile.

Know where the root system is located:

Blueberry roots at three soil depths for two soil management systems.

Soil depth (inches)	Soil treatment	Percent of total root system
0 to 4	Bark bed	44
	Bark incorporated	46
4 to 7	Bark bed	37
	Bark incorporated	45
7 to 10	Bark bed	19
	Bark incorporated	8

Match your system to your soil type

Example: Micro-irrigation in Blueberry:

- Root zone coverage is critical in pine bark culture where lateral water movement is limited.



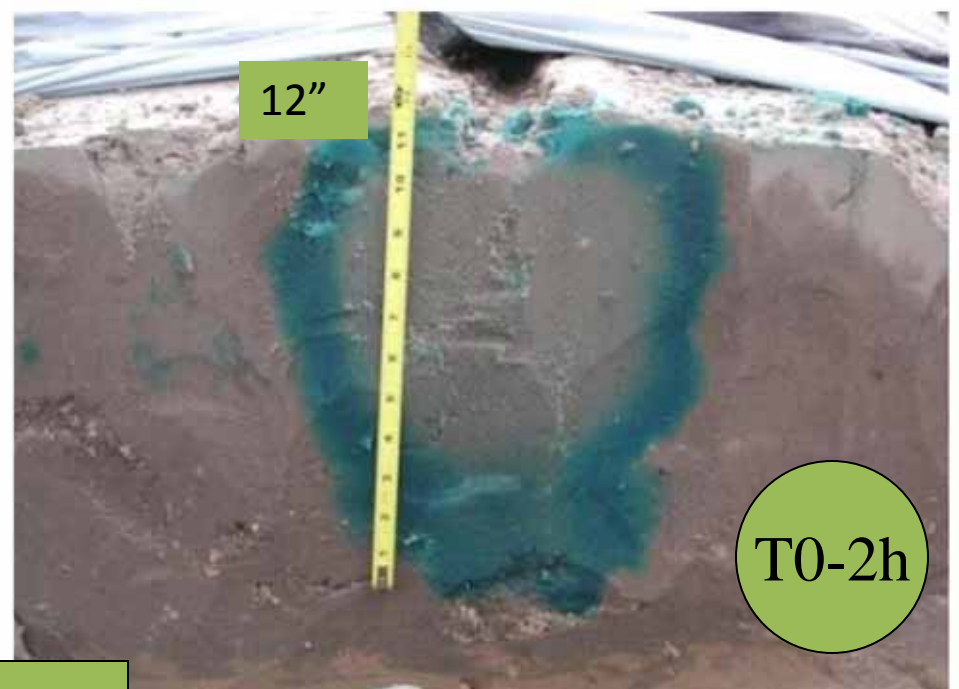
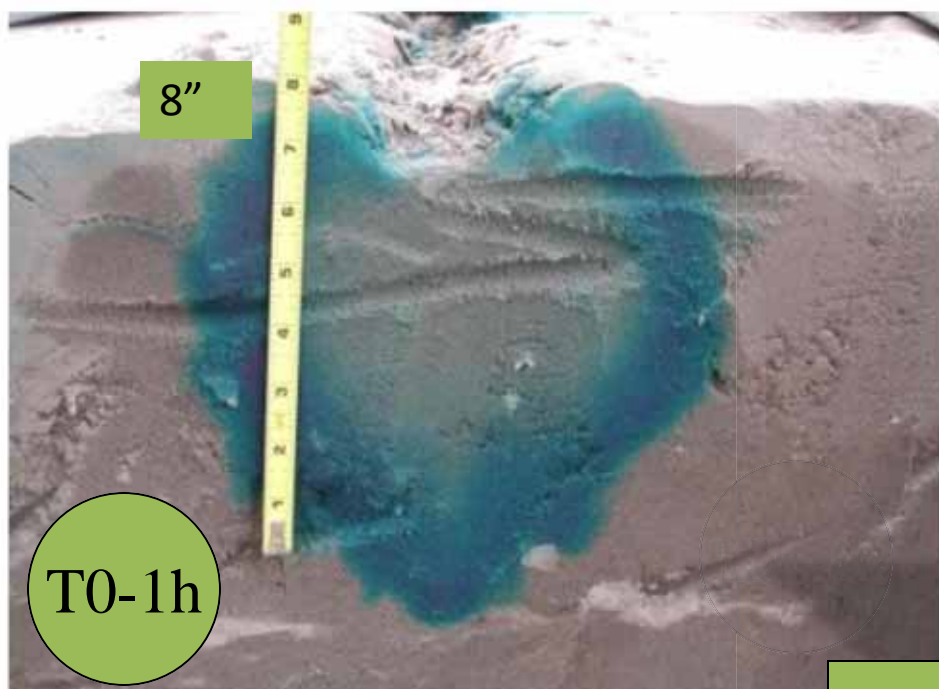


Micro-sprinkler

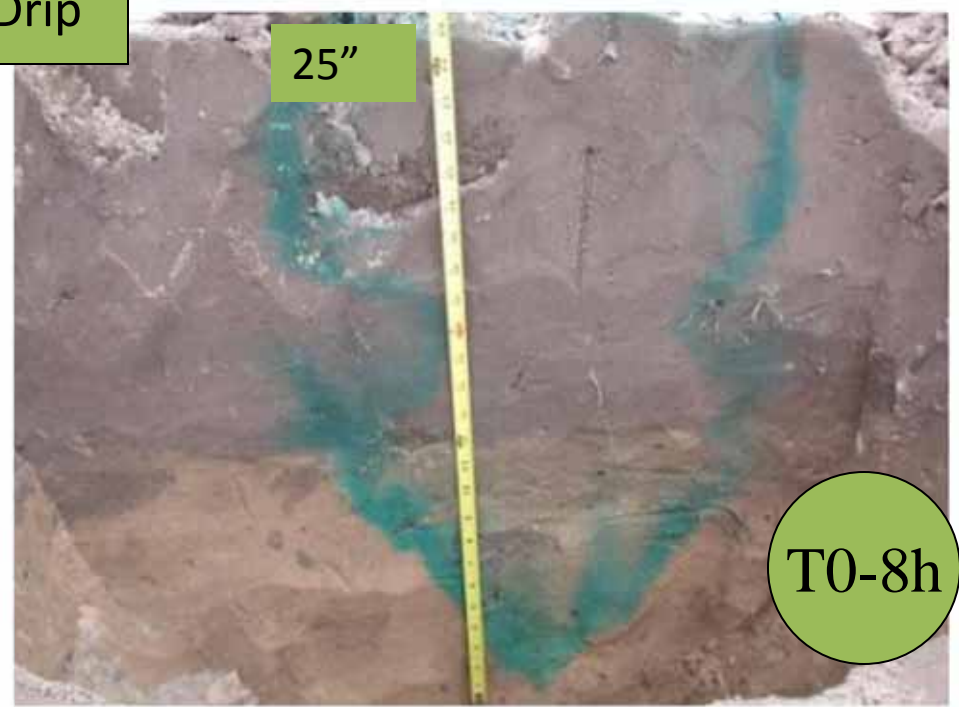
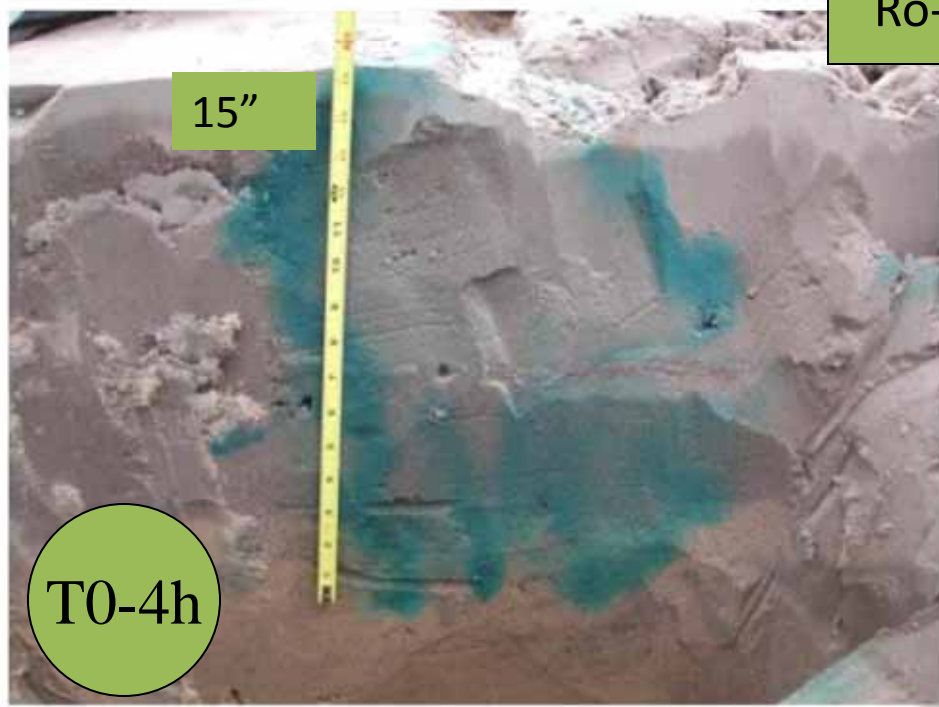
Drip irrigation

- Coverage of the root system can be limited depending on the soil characteristics.
- Double-line drip is most common.





Ro-Drip



Pine bark incorporated beds with double row drip irrigation



Newer system - pine bark incorporated beds with woven fabric ground cover and double row drip irrigation



Bark incorporated beds with ground cover



Blueberries

- Many rabbiteye and southern highbush varieties will grow in Florida.
- Advantages – healthy, relatively low maintenance, long season, excellent cultivars, attractive form.
- Disadvantages – cross-pollination, specific soil requirements, birds.
- Suggested reference-
Blueberry Home Gardener's Guide – EDIS website UF.



Blueberry types

- Rabbiteye varieties are best suited in Ocala and points north into Georgia.
- Southern highbush varieties are best suited for Gainesville and points south to Arcadia.



'Springhigh' (USPP # 16,404)



- Early bloom
- Early ripening
- Popular in central and north-central Florida
- Darker berry color, lower firmness
- Vigorous, upright growth habit, excellent field survival

'Jewel' (USPP # 11,807)



- Low chill (Gainesville-south)
- Blooms 1 week before 'Star'
- Ripens with 'Star'
- Excellent fruit quality, but berries are tart until fully ripe
- High yield potential, survives well in the field
- Often paired with 'Emerald'
- A popular cultivar south of I-4
- Very susceptible to rust leaf spot – requires fungicide sprays

'Emerald' (USPP # 12,165)



- Low chill requirement
- High yield potential
- Vigorous, spreading bush
- Large fruit size, good quality, tight clusters
- Blooms 1 week earlier than 'Star'
- Long harvest period
- Often planted with 'Jewel'
- Popular south of I-4.

'Farthing' (USPP # 19,341)



- Vigorous, compact growth habit, good survival
- Blooms mid-late (between 'Emerald' and 'Star')
- High yield potential, long picking season
- Very firm fruit, potential for mechanical harvest
- Color can be non-uniform (red on back of berry)

'Snowchaser' (USPP # 19,503)



- Low chill, early bloom (mid January in Gainesville)
- Very early ripening, ≈ 20 days before 'Star'
- Excellent flavor, medium sized fruit
- Susceptible to stem blight – field survival is marginal in FL



Bacterial leaf scorch -
Meadowlark





Evergreen – Arcadia,
(1/16/14)

Availability of Florida Blueberry Cultivars

- Blueberry cultivars released by the University of Florida are patented.
- For licenses to propagate UF blueberry cultivars, contact Florida Foundation Seed Producers WWW.FFSP.net (John Beuttenmuller beutt@ufl.edu).
- Phone – (352) 392-9446.

Blueberry Pollination

- Blueberry varieties benefit from cross-pollination.
- Plant more than one cultivar close together.
- Bumblebees are very efficient pollinators.
- Honey bees are effective because of their high populations.



BEEES

NO BEEES



Fertilization

- Blueberries prefer frequent light applications of a balanced fertilizer with ammonium or urea as the N source (azalea, Camelia or blueberry formulations)
- Often 12-4-8, or similar formulation.
- Controlled-release fertilizers also work well.

'Sharpblue' SHB



NH_4

From Rebecca Darnell, Horticultural Sciences Dept., IFAS, UF



NO_3

Pruning established blueberry plants in Florida

- Summer hedging and topping
 - Usually mechanical (non-selective)
- Dormant pruning
 - Cane renewal and detailed hand-pruning

Typical appearance of non-pruned blueberry plant during fall



Typical appearance of pruned blueberry plant during fall



Flower bud development on Misty defoliated in September (left) and December (right)



No selective cane renewal pruning



Selective cane renewal pruning



Numerous new canes resulting from
cane renewal pruning



Summer hedging and topping



Summer hedging and topping



Rough mechanical pruning cuts



Cane renewal pruning (base pruning) to thin out canopy and stimulate new cane development



Individual cuts may be rough; touch-up hand pruning is often needed.



Highbush blueberry, before (left) and after winter pruning



Courtesy of Bill Cline, N.C. State University

Remove thin, twiggy “matchstick” wood during routine winter pruning AND with summer hedging after harvest



Courtesy of Bill Cline, N.C. State University

Healthy vs “matchstick” fruiting wood



Courtesy of Bill Cline, N.C. State University

Misty overfruiting



Blueberry pests, diseases and problems

Nutrient deficiency



Phylosticta Leaf Spot



Phyllosticta leaf spot



Gloeosporium leaf spot aka anthracnose

Septoria Leaf Spot



Septoria leaf spot



Courtesy of Phil Harmon



Rust

Courtesy of Phil Harman

Flower bud development on Misty defoliated in September (left) and December (right)



- Birds, especially cedar waxwings, are a serious pests of blueberry



Botrytis flower blight



algal stem canker

Cephaleuros virescens

More common in central and southwest Florida than in north Florida.

Prune out diseased Wood.





Bacterial leaf scorch -
Meadowlark



Foliage-feeding insects



Sooty mold



Scale on blueberry



Thrips



Thrips damage



Flower thrips injury on blueberries



- **Flowers**
- **Scars on fruit**
- **Drop in yield**



Symptoms of Chilli thrips infestation



Bronzing



Shoot Die-back



Blueberry gall midge damage – once thought to be freeze damage.



Raspberry/Blackberry

- Raspberry ideal conditions – sunny, cool temperatures.
 - Regions of highest commercial yields – Washington State, British Columbia, and parts of Chile.
 - Do not like Florida’s hot, humid climate
- Blackberry – lower chill requirement and tolerates heat better than raspberry.
 - Grown in the southeastern U.S. and across the Gulf Coast states as well as California and the Pacific NW.
 - Chilling of many cultivars is still be too high for SW Florida.

Growth and fruiting habit

- Perennial root and crown system; biennial canes.
 - Primocanes – canes that emerge and grow vegetatively (may or may not fruit the first year).
 - Floricanes – Canes that developed the previous year and bear fruit the second year before dying.

Fruiting habit –

Primocane fruiting – will fruit in late summer/fall on upper 1/3 of primocanes. The lower flower buds open the following year. Can potentially get two crops per year.

Floricanes fruiting – fruits only on floricanes (second year canes). After fruiting the floricanes die.

3-wire vertical trellis



Canes are tied to wires



4-wire V trellis



Floricanes tied to wires



Floricanes tied to upper wire



4-wire V trellis



4-wire V trellis



Standard Pruning for V trellis

- Floricanes are tied to the trellis wire to form a v-shaped canopy.
- Primocanes are allowed to grow in the middle of the V.
- Floricanes are removed after fruiting.
- The primocanes are tied to the wires and become next year's floricanes.

Raspberry/blackberry

- Soil –
 - well-drained sandy loam soil.
 - Do not tolerate poor drainage
 - Water table should be at least 3 ft. below the soil surface.
 - Roots grow best at temps below 60 F.
 - Soil pH 6.0 – 6.5.
 - Respond well to mulch.

Blackberry

- Blackberries and can be grown in much of Florida.
- Erect types include Brazos, Kiowa. Generally lower chill requirements.
- Thornless Natchez and Ouachita. \approx 400 chill hours.
- Thornless are generally too high-chill for central Florida.



'Kiowa'

- Thorny
- Moderate chilling (about 300 hrs)
- Productive
- Large size
- Good for local sales
- Poor distant shipper
- Grown commercially in Guatemala.



'Tupy' very low chill, thorny.



'Ouachita' in north-central Florida



'Natchez'

- 2007, Arkansas
- Ripens one week prior to Ouachita in Arkansas.
- Yields have been large, about twice that of Arapaho (in Ark.)
- Berry size is large: 8-10 g
- Berries are long, and remain large season long



Some major pests in South Ga.

- Orange cane blotch
- Planting on plastic appears to help reduce this problem
- Control is usually accomplished with copper fungicides



Common blackberry diseases

- Anthracnose – small purple lesions on canes. Remove and burn infected canes.
- Leaf spots – dark red spots with white centers.
- Crown gall – soil-borne bacterium. Tumors on crown. Spreads through wounds.
- Rosette (double blossom) – Abnormal flowering, witches broom effect, Remove infected canes to the ground after harvest. Can become systemic.
- Orange rust – bright orange masses on underside of leaves. Can become systemic. Plant removal.
- Orange blotch – cane disease, causes defoliation, Cu fungicides.

Common blackberry pests

- Thrips
- Spider mites (dry weather)
- Raspberry crown borer
- Stink bugs
- Spotted wing drosophila (new pest)
- Sap beetles – keep ripe fruit picked

Conclusions

- Blueberries and blackberries can be successfully grown in the home garden in SW Florida.
- Blueberries have unique soil requirements – low soil pH and high organic matter content.
- Proper cultivar selection is critical (emphasis on low chill requirement for SW Florida).
- Multiple blueberry cultivars are needed for cross-pollination. There are several to choose from.
- Thornless blackberry cultivars are only marginally adapted to SW Florida due to their higher chilling requirement.
- Site selection and preparation are very important for both fruit types.