Overview of Florida's Commercial Blueberry Industry

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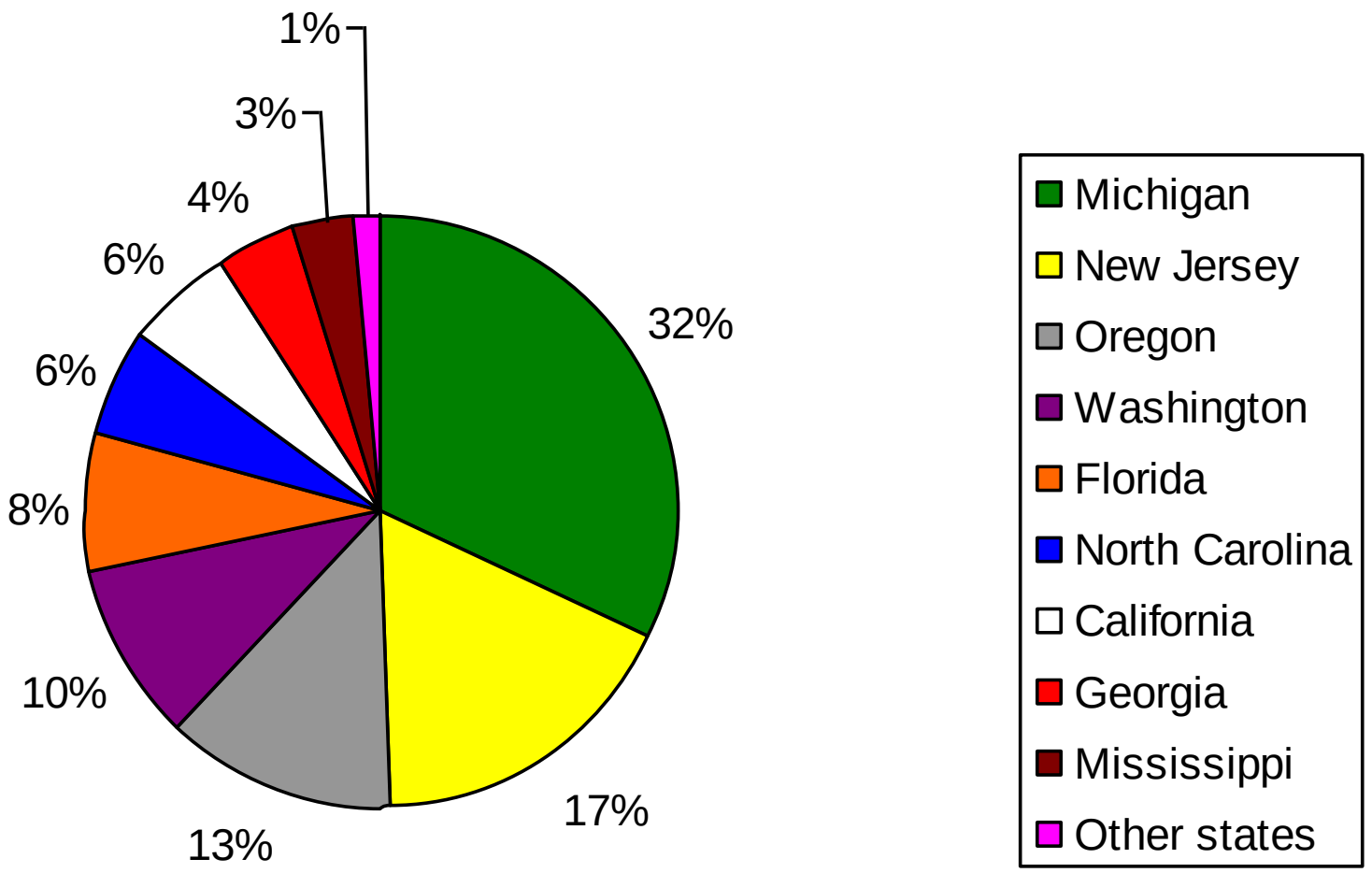
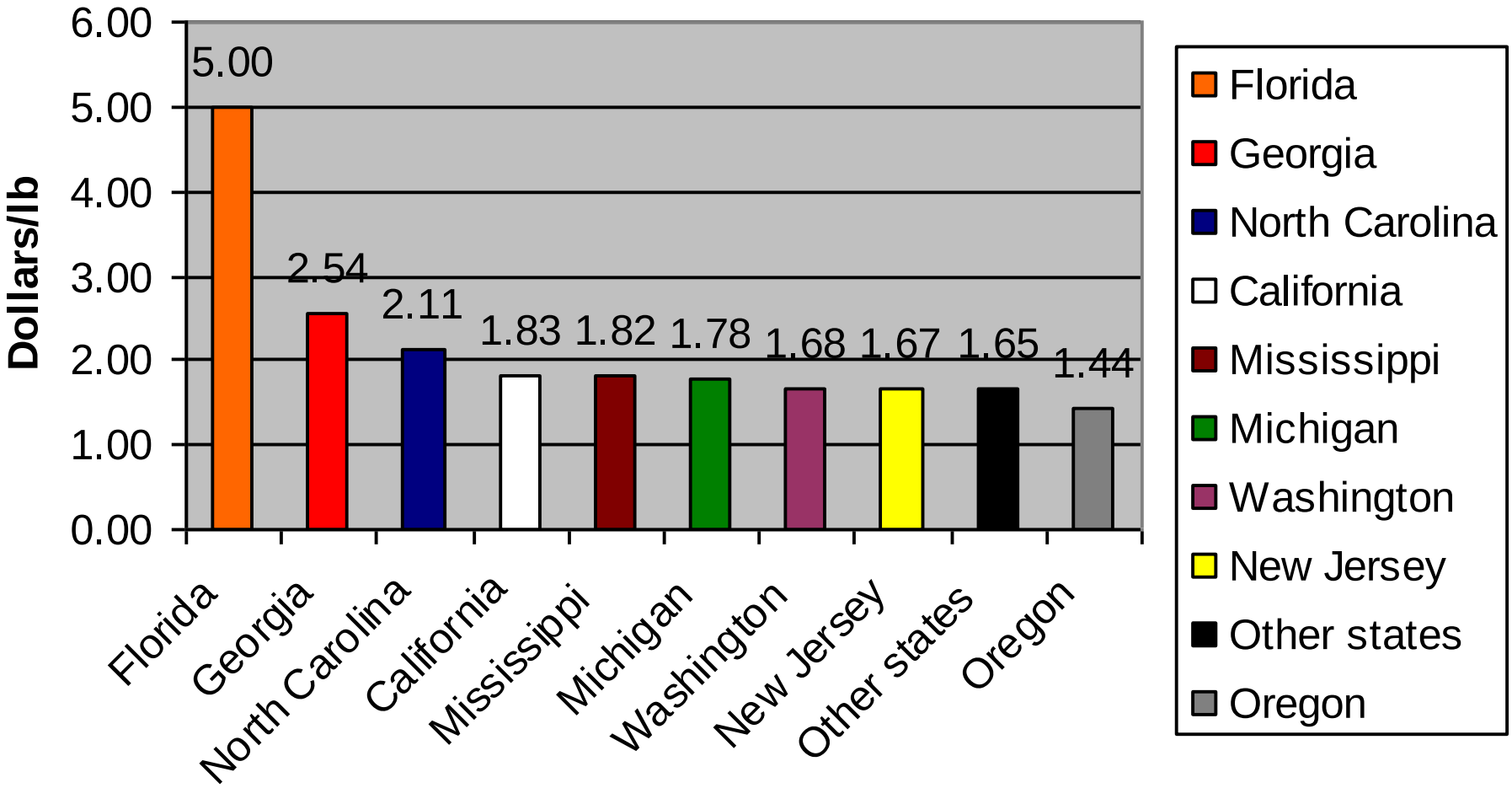
Percentage of Total U.S. Industry Value by State



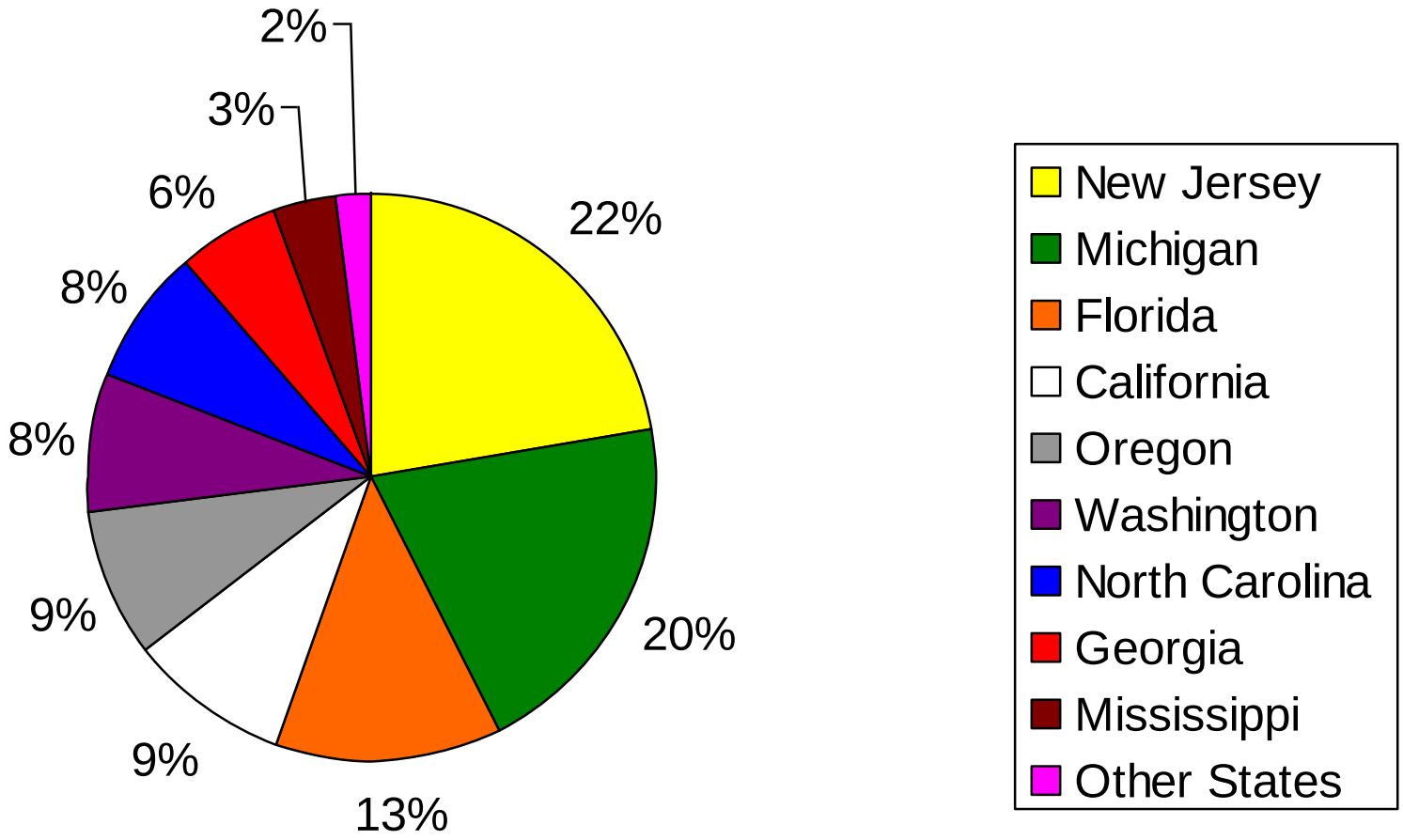
Source: NASS 2007

Average Price per lb. by State



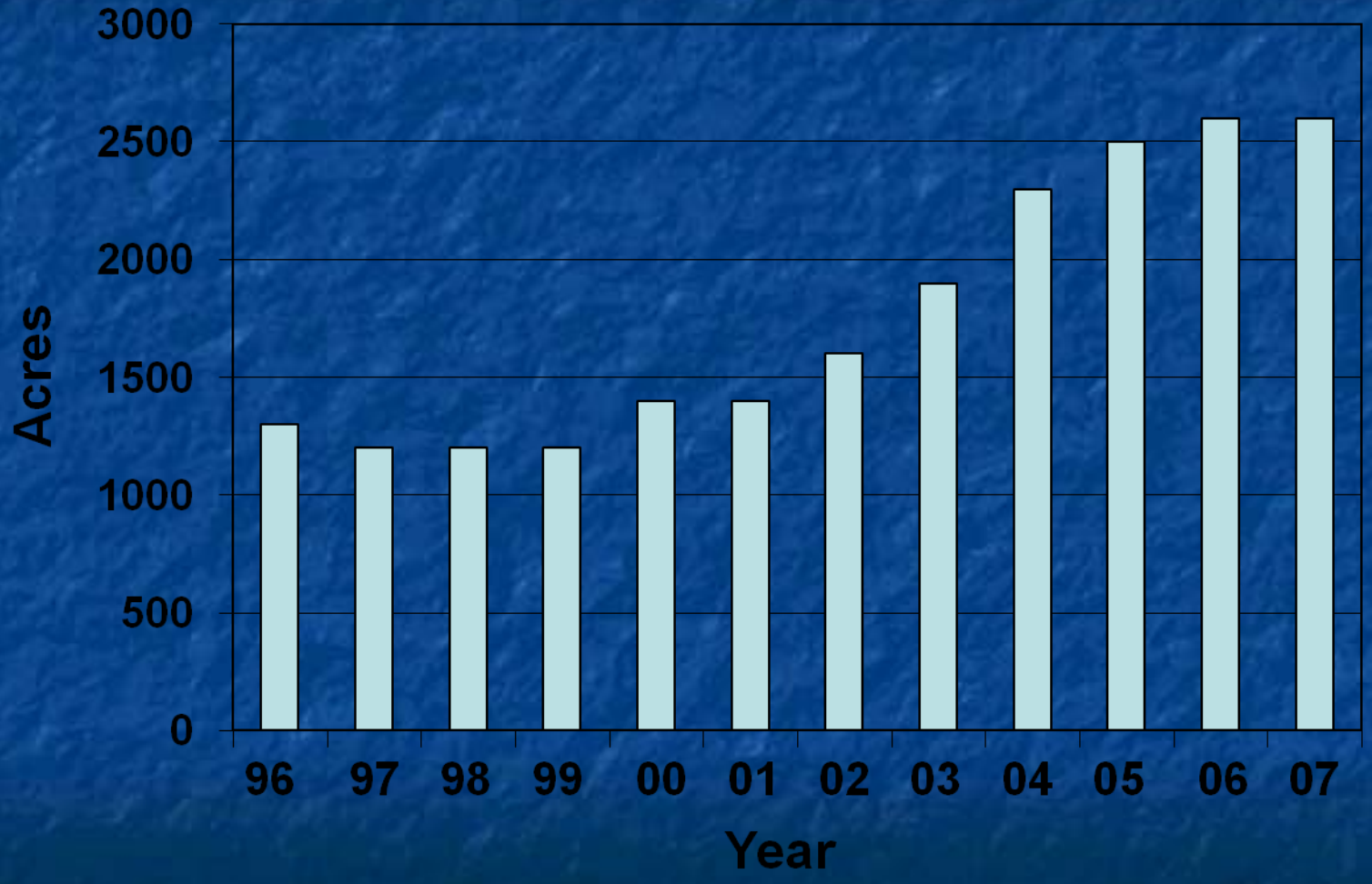
Source: NASS 2007

Percentage of Fresh Industry Value



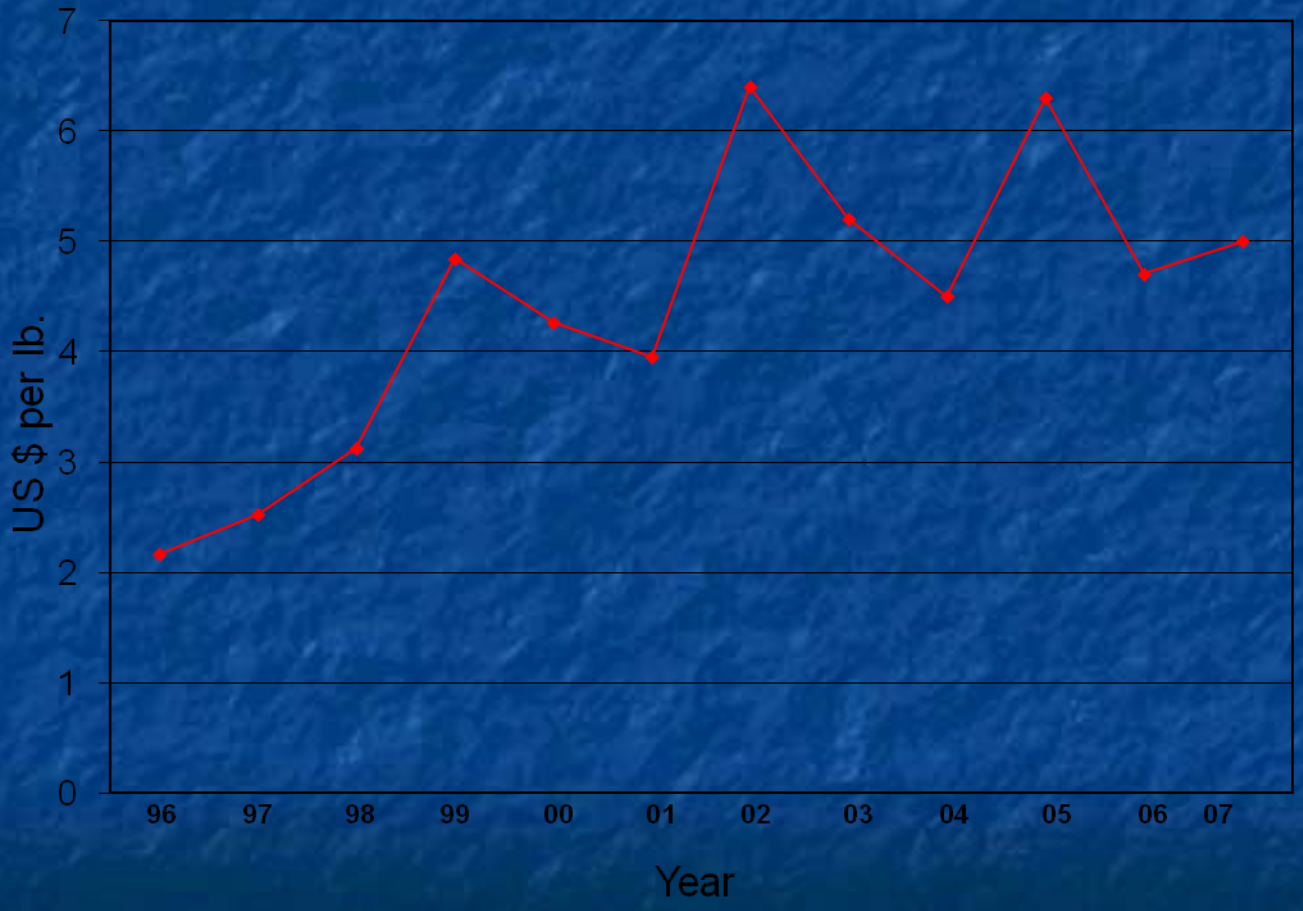
Source: NASS 2007

Florida's Harvested Blueberry Acreage

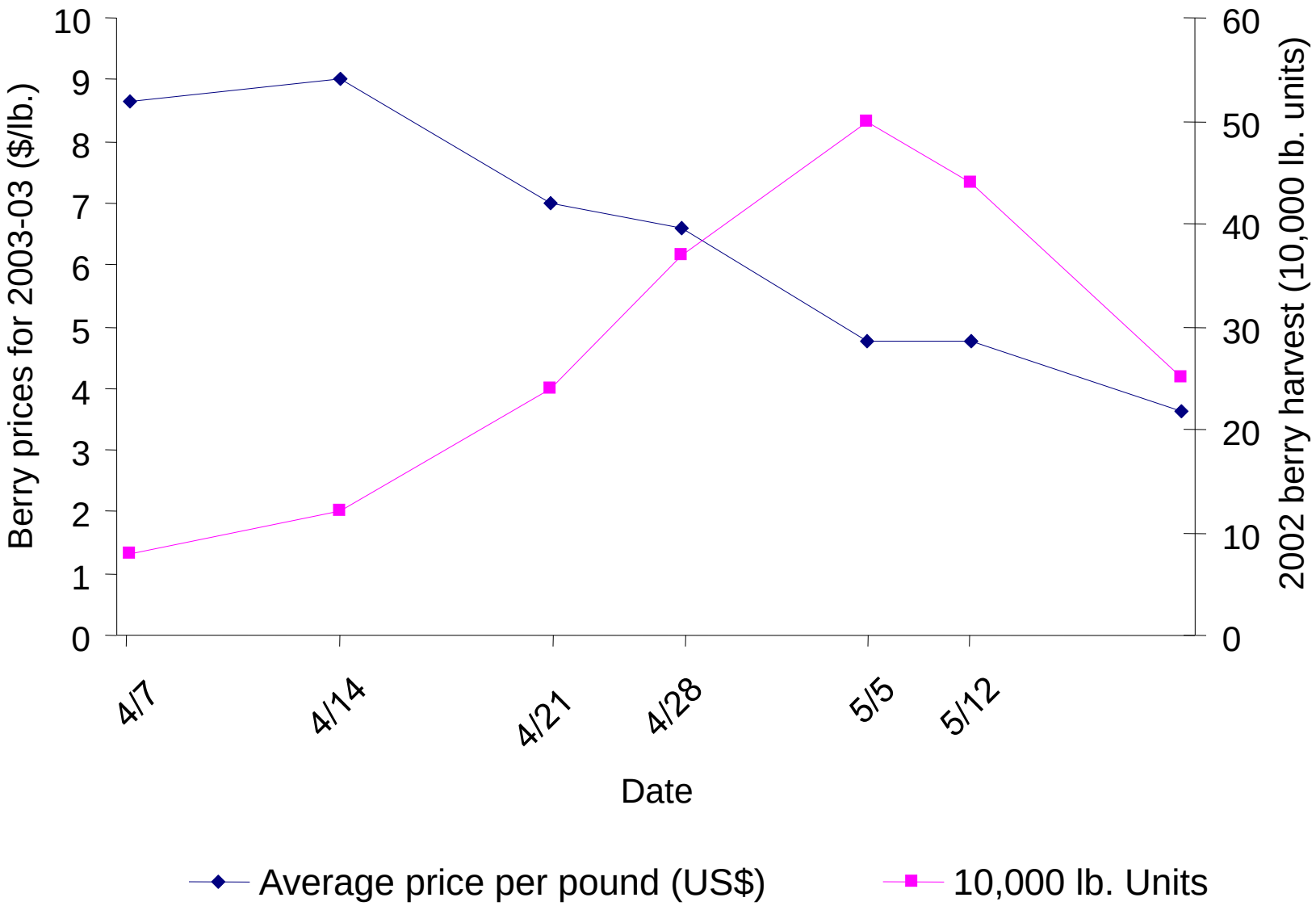


Florida Blueberry Production (million pounds)

Average Price Per Pound of Berries (US dollars)



Blueberry Prices and Shipments



Cost of Establishment

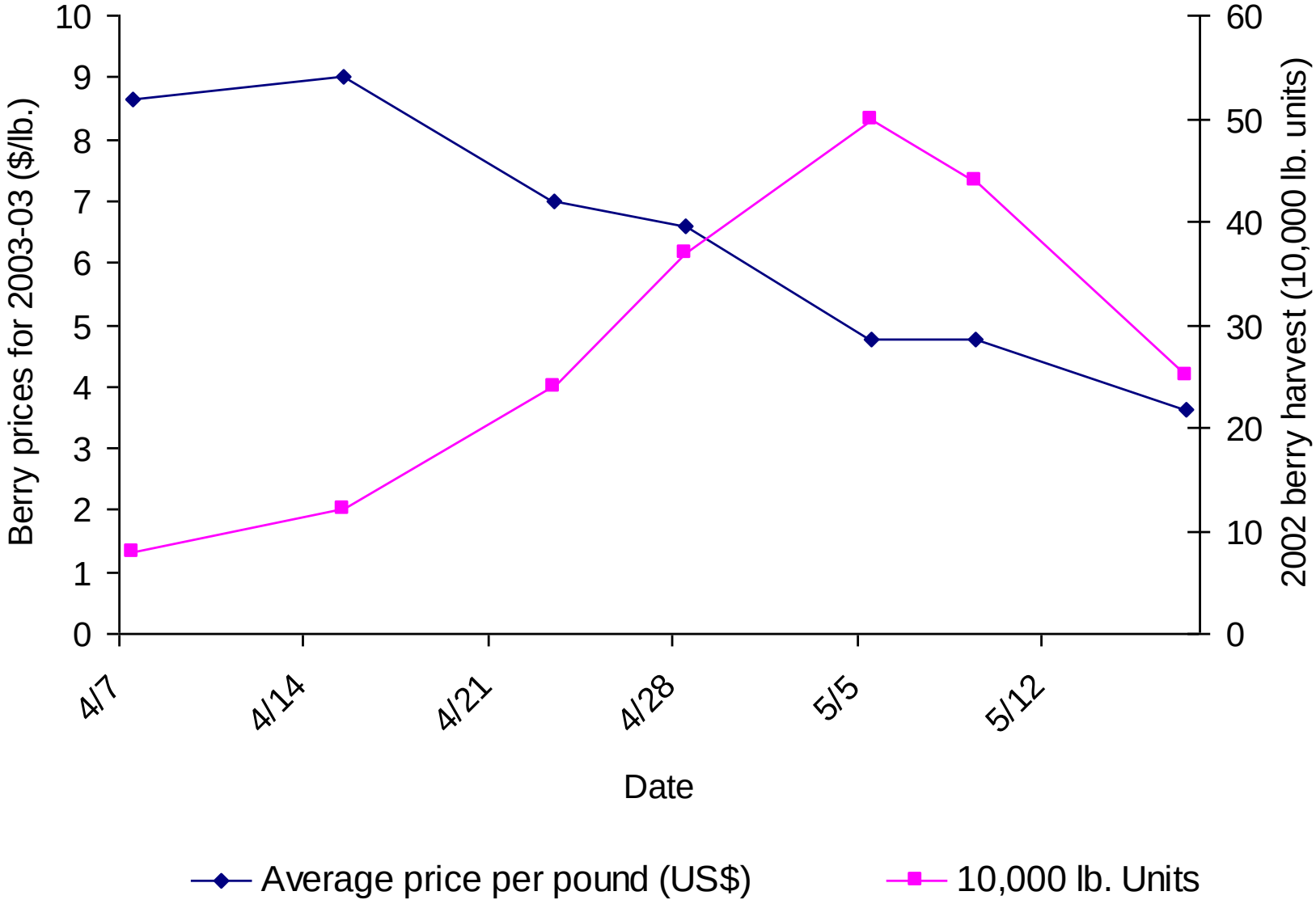
Land Preparation	$1000 to 1500
Pine bark (450 yd^3)	$3675 to $6300
Plant costs (1800/a)	$2700 to 4500
Overhead irrigation	$5000
Labor (planting, etc.)	$2000 to $3000
Labor (maintenance 2.5 years)	$3000
Chemicals	$500
Total establishment costs	$17,875 to $23,800

Harvest Costs

- Picking costs per flat $4.90
- Packing costs per flat $0.75
- Packing materials per flat $1.28
- Broker fee per flat $2.35
- Upkeep and maintenance $2.00
- Total costs per flat* $11.28

*Many growers believe $12.00 per flat is the approx. break even point.

Early harvest is key to profitability



Emerald

- Released 1999.
- Patented.
- First harvest is a few days before Sharpblue.
- Normal season in Gainesville: April 15 – May 10.
- High yielding potential.

Jewel

- Patented.
- Ripening begins about 10 days before Sharpblue.
- Harvest season: April12 – May 10.
- Leafs well.
- Fruit quality is excellent but berries are tart until fully ripe.
- Moderately susceptible to *Phytophthora* root rot and various leaf spot diseases.

Star

- Patented.
- Excellent fruit quality and postharvest characteristics.
- Performs better in North Florida and south Georgia.
- Compressed harvest period.
- 50% ripe fruit by April 26.

Windsor

- Patented.
- Blooms about 3 days after Sharpblue.
- Harvest, April 18 – May 15.
- Large fruit.
- Fruit tend to have wet scars. May not store well.

Millennia

- Released in 2001.
- Patented.
- Spreading growth habit.
- Fruit are large and firm.
- High yield potential.

Gulfcoast

- Not patented.
- A long-time favorite for south-central Florida.
- Strong, early and productive.
- Stemmy fruit can cause problems at packing house.

Sharpblue

- Not patented.
- Old industry standard.
- No longer planted in Florida.
- Problems with post harvest quality.
- Small fruit by today’s standards.
- Extended harvest season.

Misty

- Not patented.
- Old standard pollinizer for Sharpblue.
- Over fruits.
- Plant stress from over fruiting results in high incidence of blueberry stem blight.
- No longer planted or recommended in Florida.

Use of Dormex in Florida Blueberries

What is Dormex?

- Dormex is a commercial formulation of hydrogen cyanamide (50% a.i.).
- Dormex is classified as a plant growth regulator.
- Dormex is classified as a restricted use pesticide.
- Dormex is very toxic to humans.
- The Dormex label has very specific restrictions on how it must be handled and applied.

Why use Dormex on blueberries?

- Because Dormex may offer certain advantages for some cultivars.
  - Earlier fruit harvest
  - Slight increase in fruit size
  - Slight increase in yield
  - Reduced plant stress from over cropping

Non-treated Misty plants

Dormex-treated Misty plants

Dormex-treated Misty plants

Heavy fruit set inhibits leaf development and causes stem blight - Misty

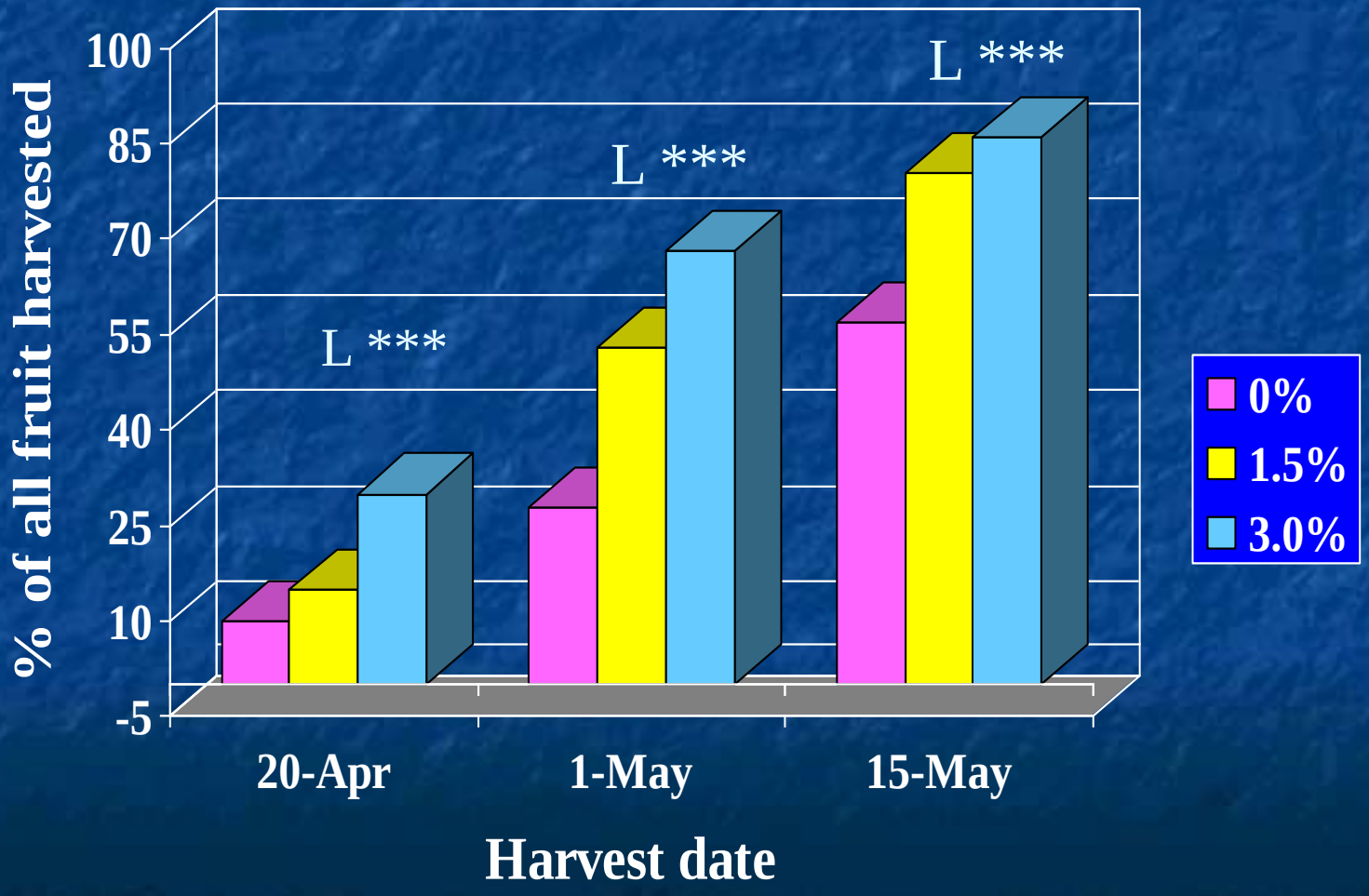
Dormex

- Advanced ripening.
- Increased fruit size.
- Increased yield.
- Improved plant health.

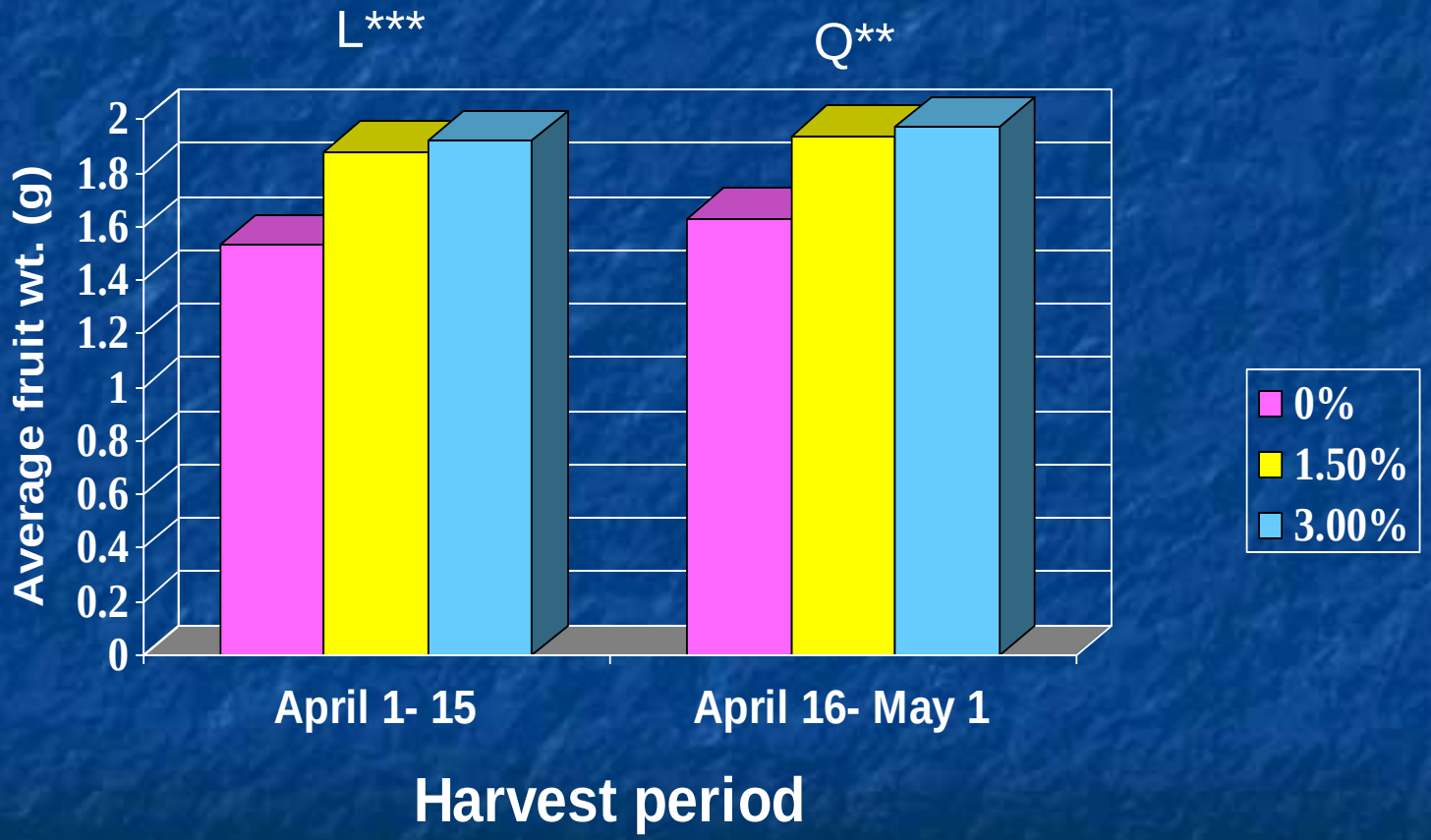
Potential disadvantages

- Cultivars specific response.
- Phytotoxicity from improper rate, timing, or unusual environmental conditions.
- Phytotoxicity can reduce plant yields.

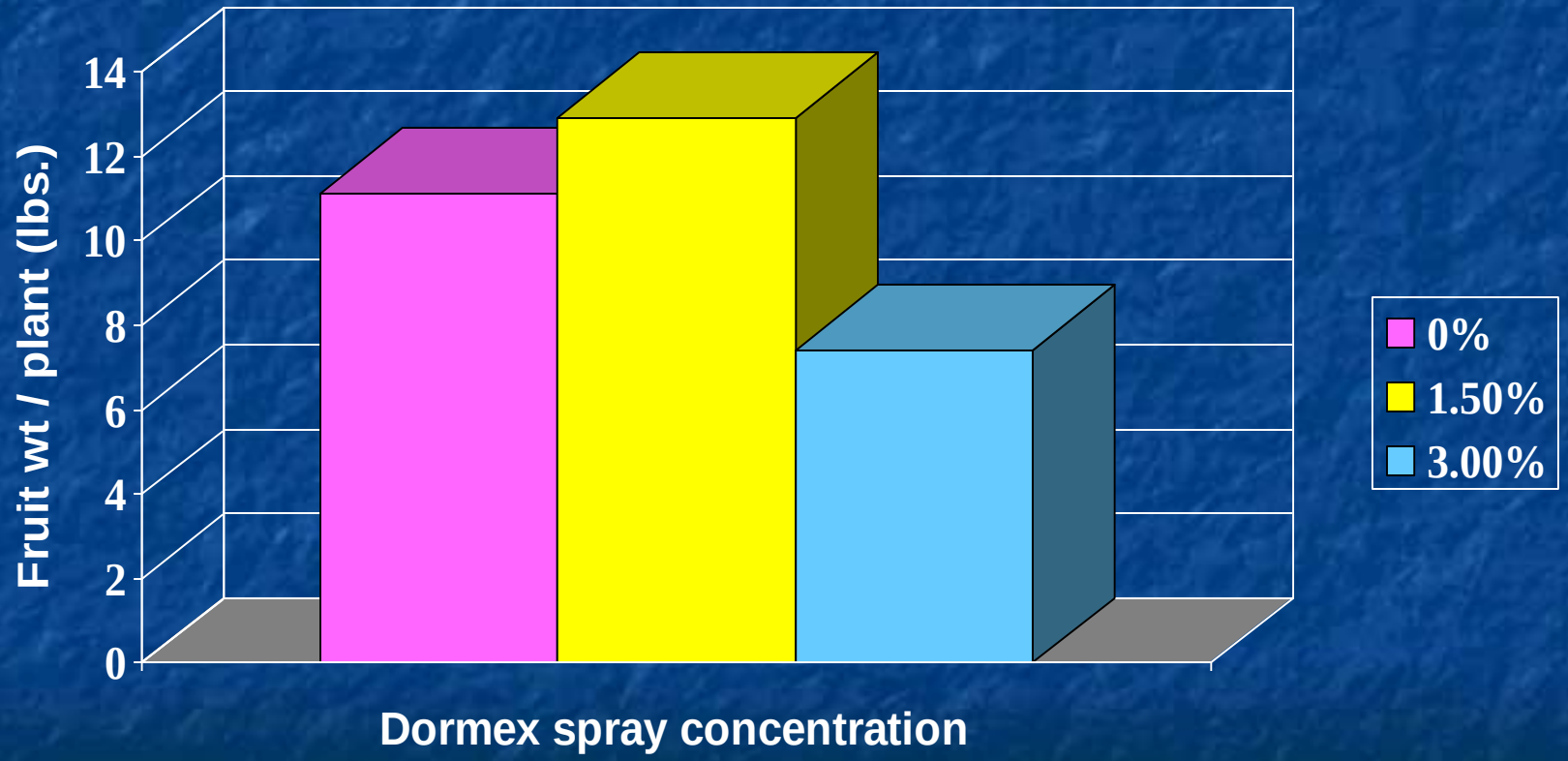
Misty percent cumulative fruit harvest



Misty average fruit wt. (g)



Misty total fruit yield (lbs.)



Effect of Dormex spray concentration on leaf area and fruit weight

Dormex	Leaf area (cm^2) per stem length (cm)	Mean fruit weight (g)
0 %	4.85	1.44
2 %	8.9	1.64
4 %	8.7	1.86
Sig.		
L	ns	***
Q	*	ns
R^2 value	.20	.18

Dormex Spray Concentration and Pre-chilling Affect Flower Mortality

Interaction of Dormex and chilling on flower bud mortality (%) of 'Misty' blueberry.

Spray conc. (%)	Chilling (hrs)			Linear	Quad.
	0	150	300		
0	1	2	1	ns	ns
2	20	11	2	***	ns
4	38	26	19	*	ns
Sig.					
Linear	***	***	***		
Quad.	ns	ns	**		
R^2 value	.63	.78	.79		

Conclusions

- Greater vegetative budbreak and earlier canopy development.
- Earlier fruit harvest.
- Greater average fruit weight for treated plants than for controls.
- Fruit yield may be slightly increased by proper application, or greatly reduced by misapplication.
- Flower bud mortality increased with: a) increasing spray concentration, and b) decreasing chilling.

Emerald, 2.5% Dormex (1/16/06)

Emerald, 1.5% Dormex (1/16/06)

Emerald, 2.5% Dormex (1/16/06)

Pine Bark Culture

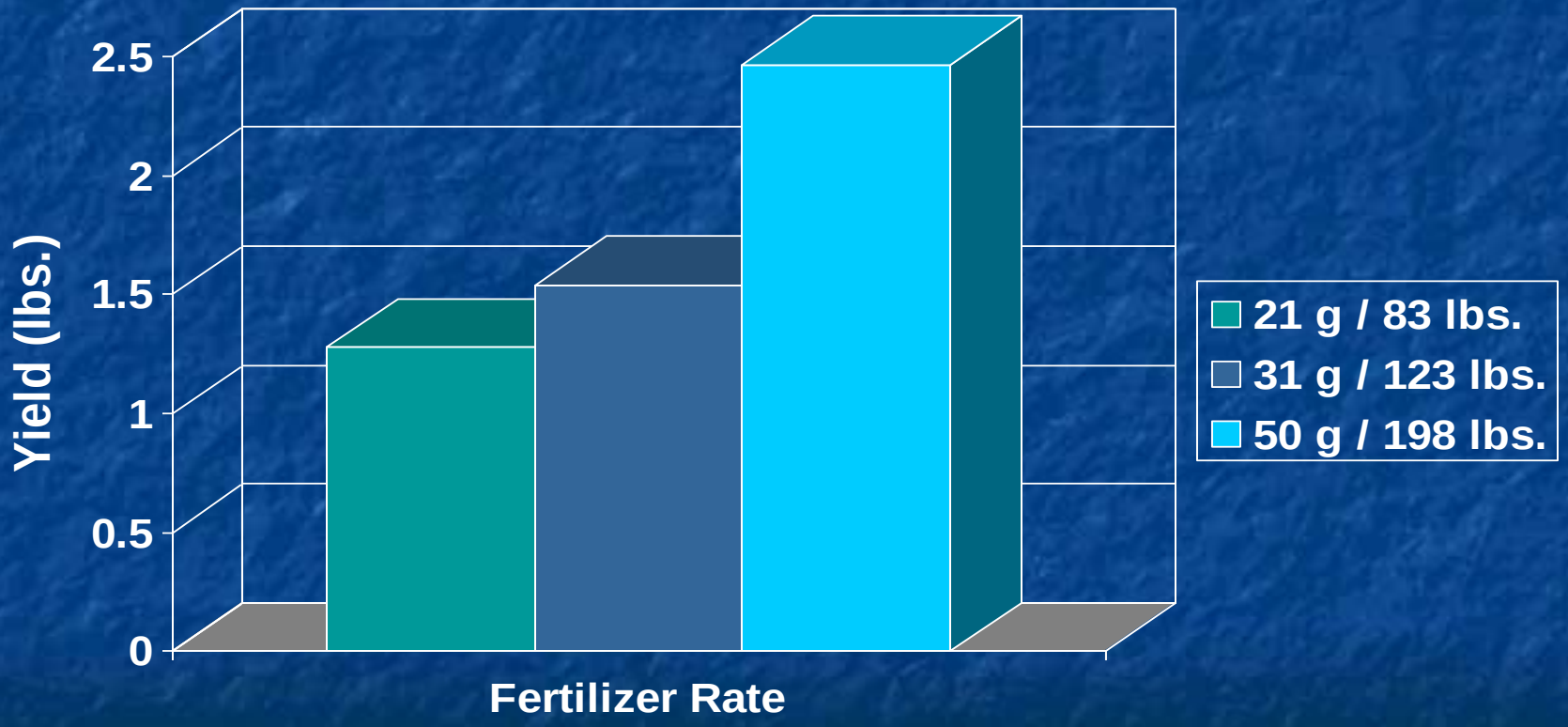
New blueberry field being prepared for planting in Florida

Key characteristics of pine bark

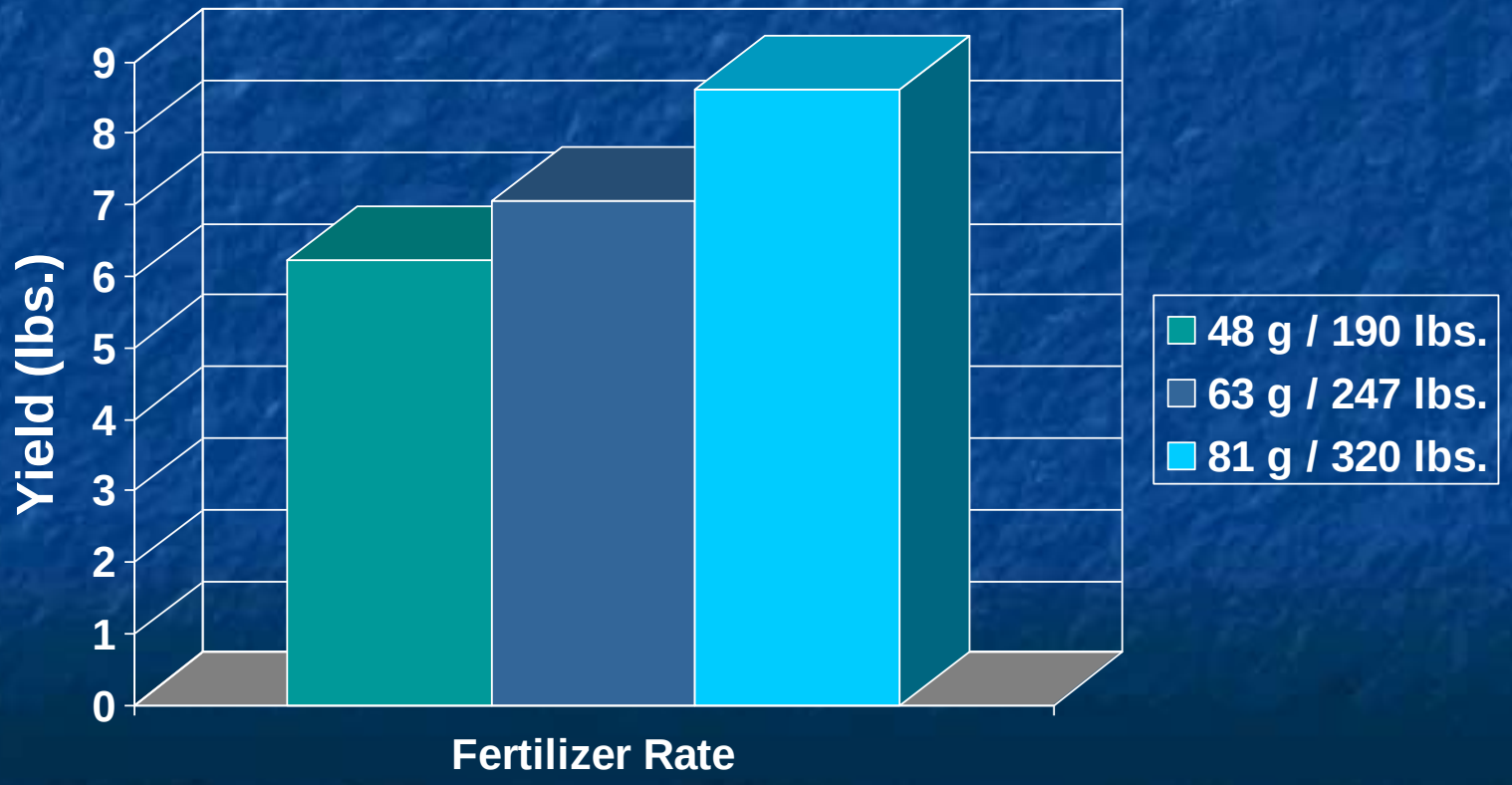
- Low pH
- Relatively low C/N ratio
- Well aerated
- Moderately low cation, and very low anion exchange capacities
- Moderate water holding capacity
- Properties largely depend on level of decomposition
- High cost ($3675 - $6300/acre)

Bark should periodically be re-applied to blueberry fields

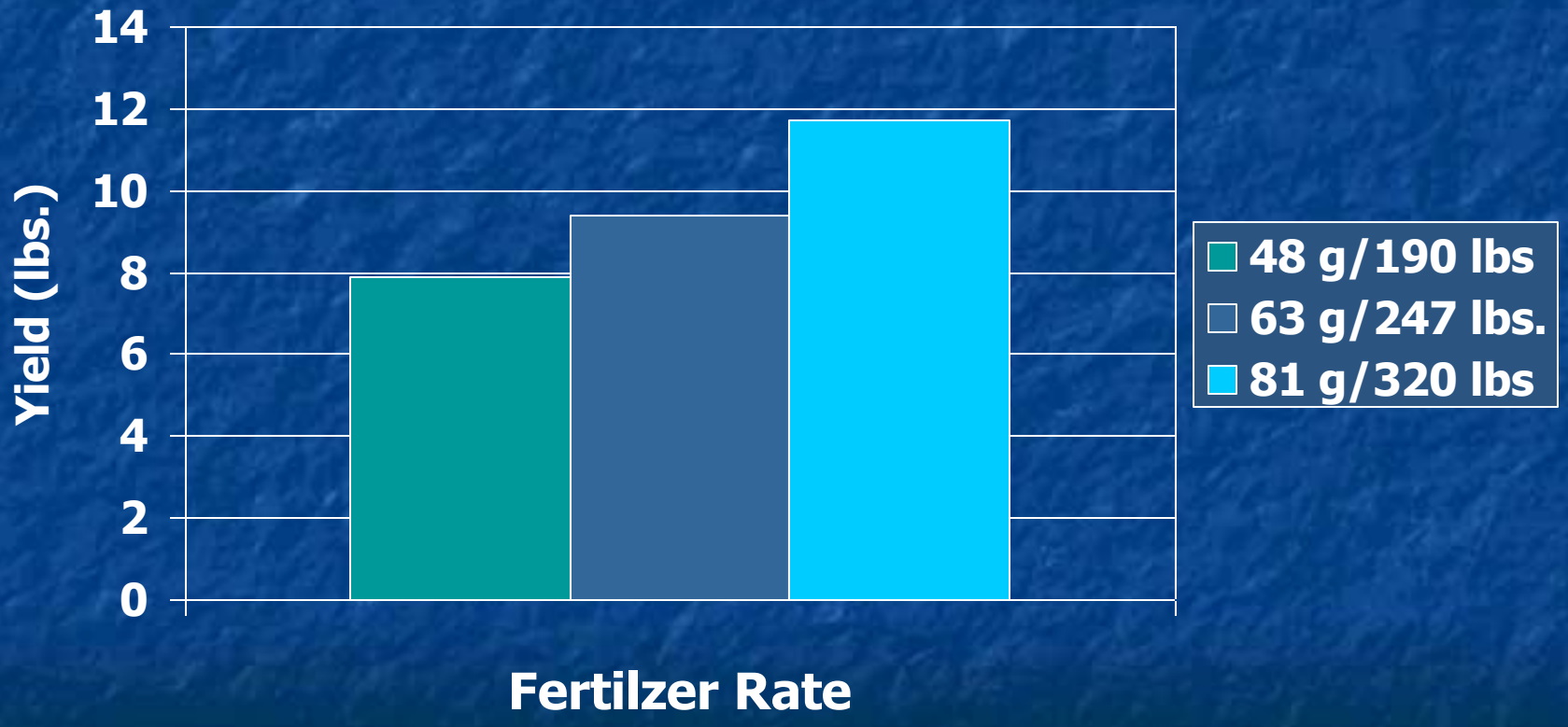
Effect of fertilizer rate on average fruit yield of 3-year-old Star and Misty



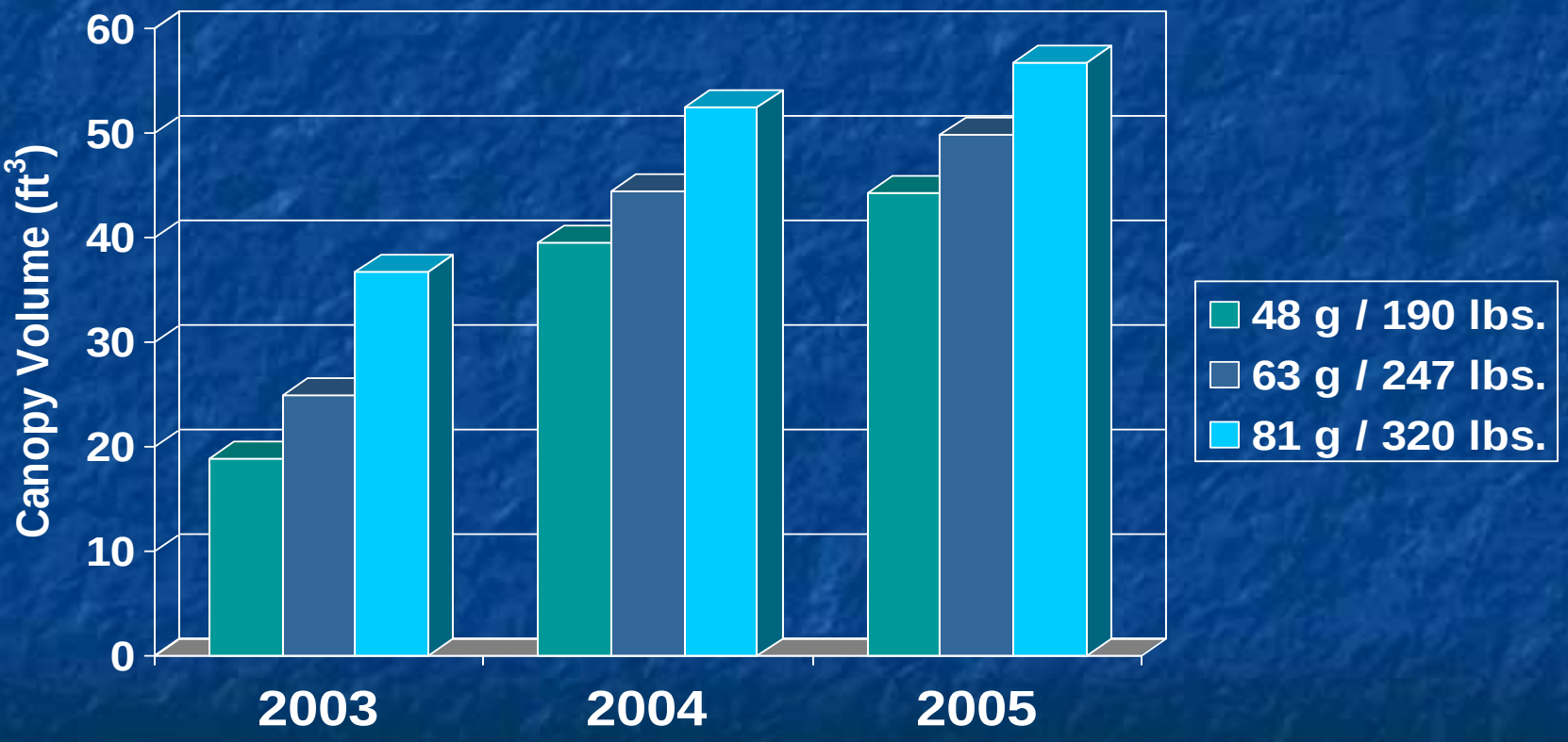
Effect of fertilizer rate on total fruit yield of 4-year-old Star and Misty



Effect of fertilizer rate on total fruit yield of 5-year-old Star



Effect of fertilizer rate on canopy volume (ft^3) of Misty and Star



Very few roots were located in the underlying soil

Root system was easily separated from underlying soil

Excavated Blueberry Plant

Preliminary Conclusions

- Rooting depth in pine bark beds was restricted to the pine bark layer.
- Frequent irrigations were necessary in pine bark beds to prevent drought stress during periods of warm temperatures and rapid growth.
- Very high rates of fertilizer were required for maximum growth and fruit yield.
- Was fertilizer lost to leaching below the shallow root zone?

Why are pine bark systems subject to fertilizer leaching?

Factors contributing to potential fertilizer leaching:

- Pine bark has a moderately low cation exchange capacity and a very low anion exchange capacity (i.e. it has a low nutrient holding capacity).
- Root systems of blueberries grown in pine bark beds are usually restricted to the pine bark layer (4 to 8 inches rooting depth).
- Plants with restricted root systems require frequent irrigations.
- Irrigation events are often in excess of that needed to wet the root zone profile.
- Heavy summer rains are common in Florida.

Soil Management Experiment

Objective: Compare methods of pine bark application on growth and yield of southern highbush blueberry.

Treatments

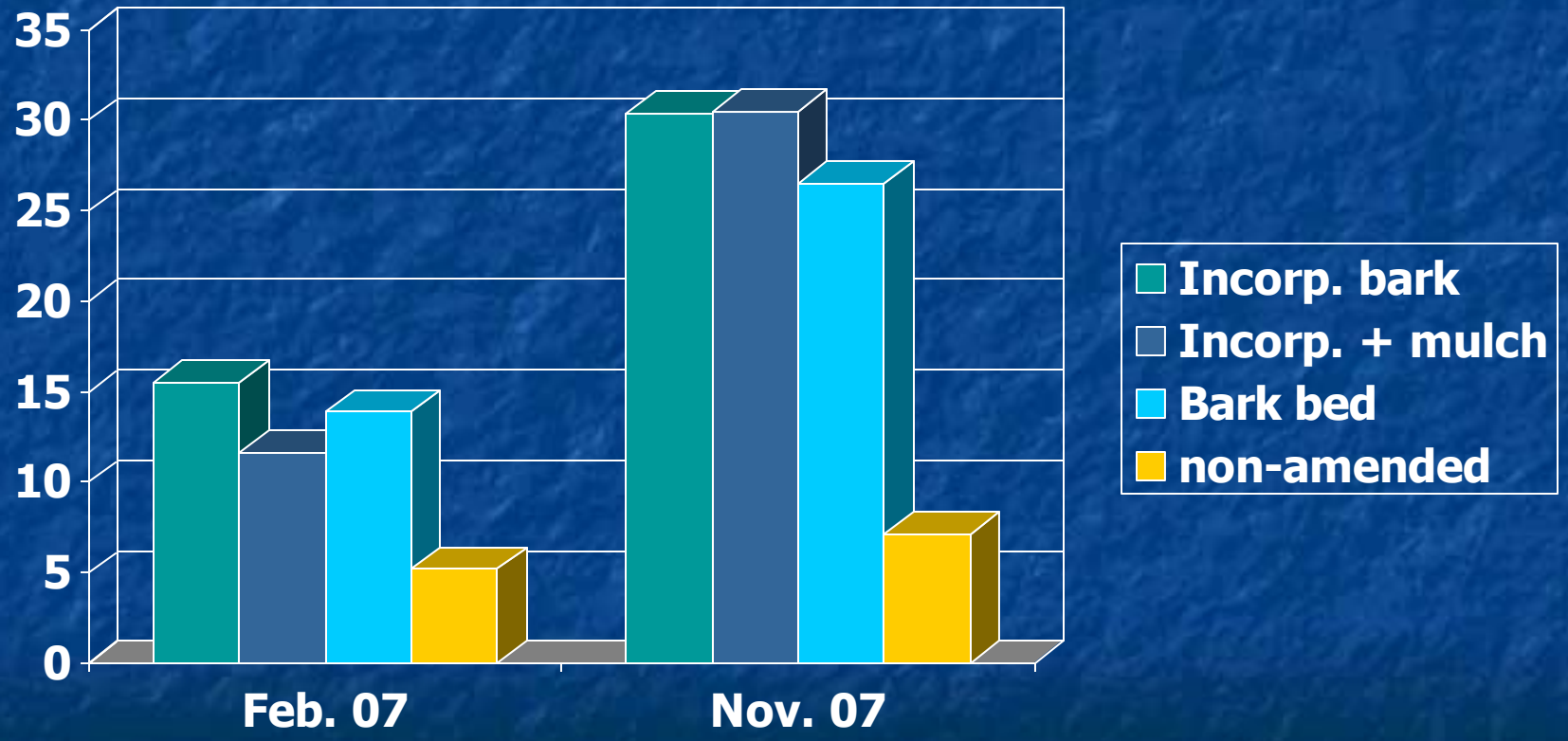
1. Non-amended soil
2. 3 inches of pine bark incorporated into the top 6 inches of soil.
3. 3 inches of pine bark incorporated; plus 3 inches of pine bark mulch.
4. 6-inch pine bark bed

Soil Management Experiment

Plant Science Research and Education Unit, Citra, Fla.

Pine bark bed, Dec. 2007

Canopy volume (ft^3) of 'Emerald' southern highbush blueberry



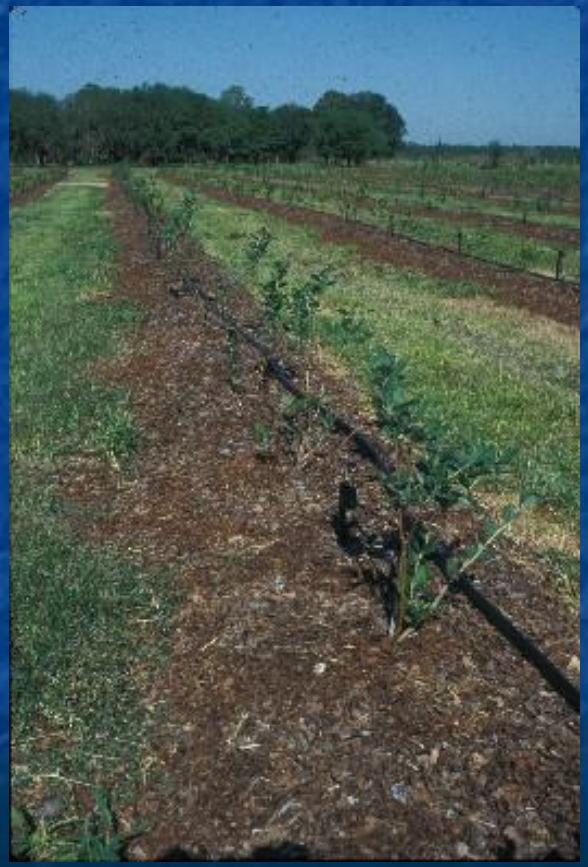
Preliminary conclusions and observations

- Plant growth after 2 years was not different among all pine bark treatments.
- Lateral movement of water from micro-sprinklers was limited in pine bark beds.
- Higher irrigation rates were needed on pine bark beds than in the bark incorporated treatments to thoroughly wet the root zones.

Blueberry irrigation

Blueberry irrigation

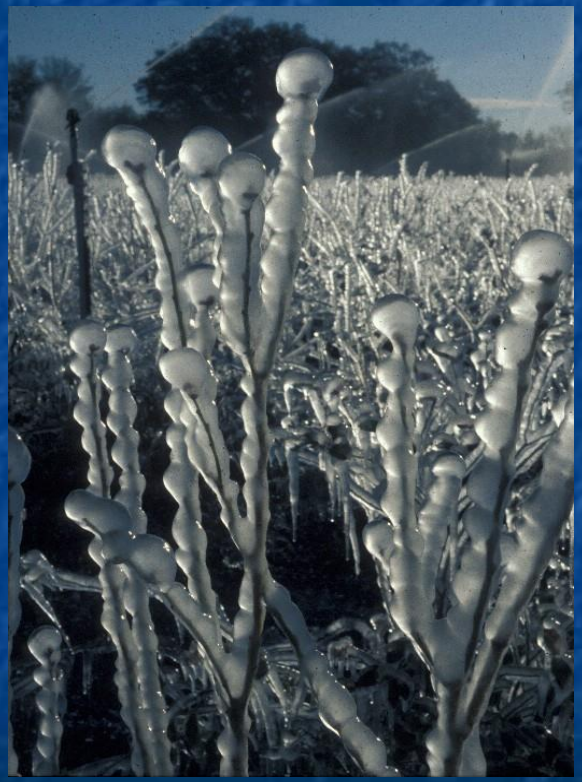
- Low-volume irrigation systems are becoming more common in new plantings
- Overhead irrigation is still needed for freeze protection.



Blueberry irrigation

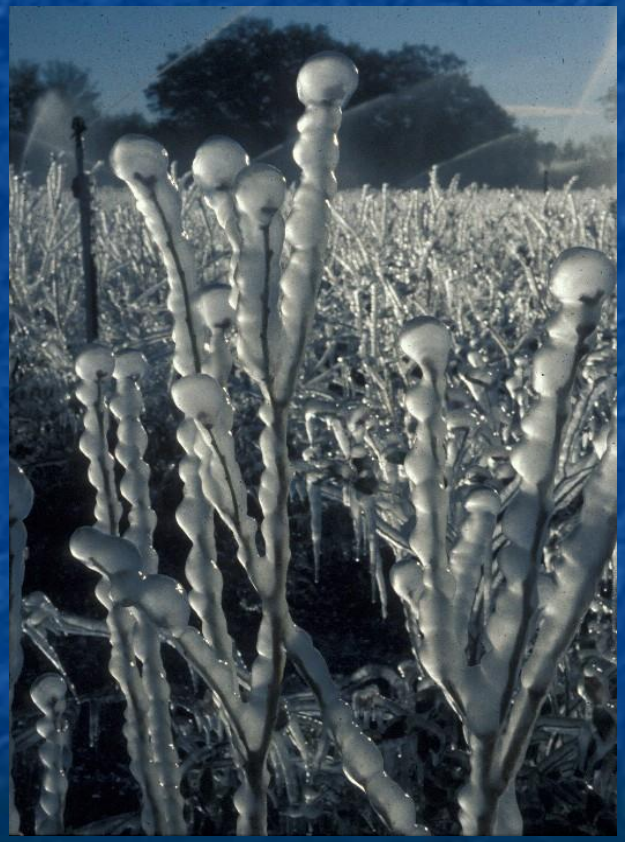
- Root zone coverage is critical in pine bark culture where lateral water movement is limited.

Freeze protection



Freeze protection

- Thorough coverage
- Continuous application
- Adequate application rates (0.3 inch/hour)
  - Minimum temperature
  - Crop development
  - Wind speed
  - Water vapor content of air



Pruning

- Definition - Pruning is the intentional removal of plant tissue to achieve a specific goal such as:
  - Balance roots and shoots of newly set plants
  - Stimulate annual growth
  - Develop proper plant shape and height
  - Reduce fruit load
  - Remove damaged or diseased wood

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

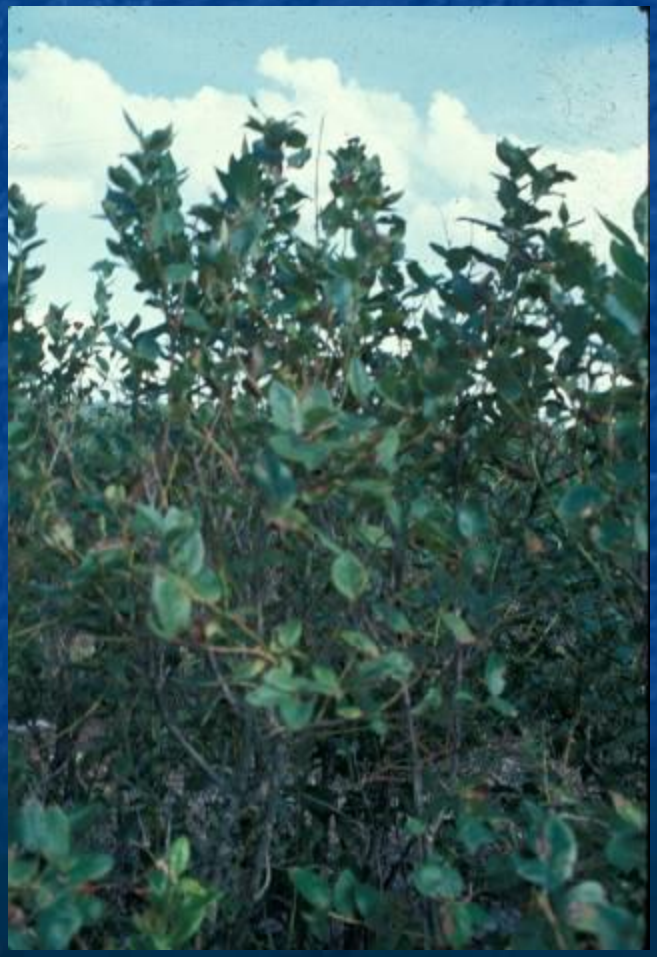
Blueberry Plant Establishment

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

Pruning blueberries in Florida

- Summer topping
  - Mechanical
- Dormant pruning
  - Cane renewal and detailed hand-pruning

Typical appearance of non-pruned blueberry plant during fall



Summer hedging and topping is used to stimulate a strong summer growth flush. This aids in controlling leaf spot diseases.

Not pruned

Pruned

Pruned

Major blueberry pests and diseases in Florida

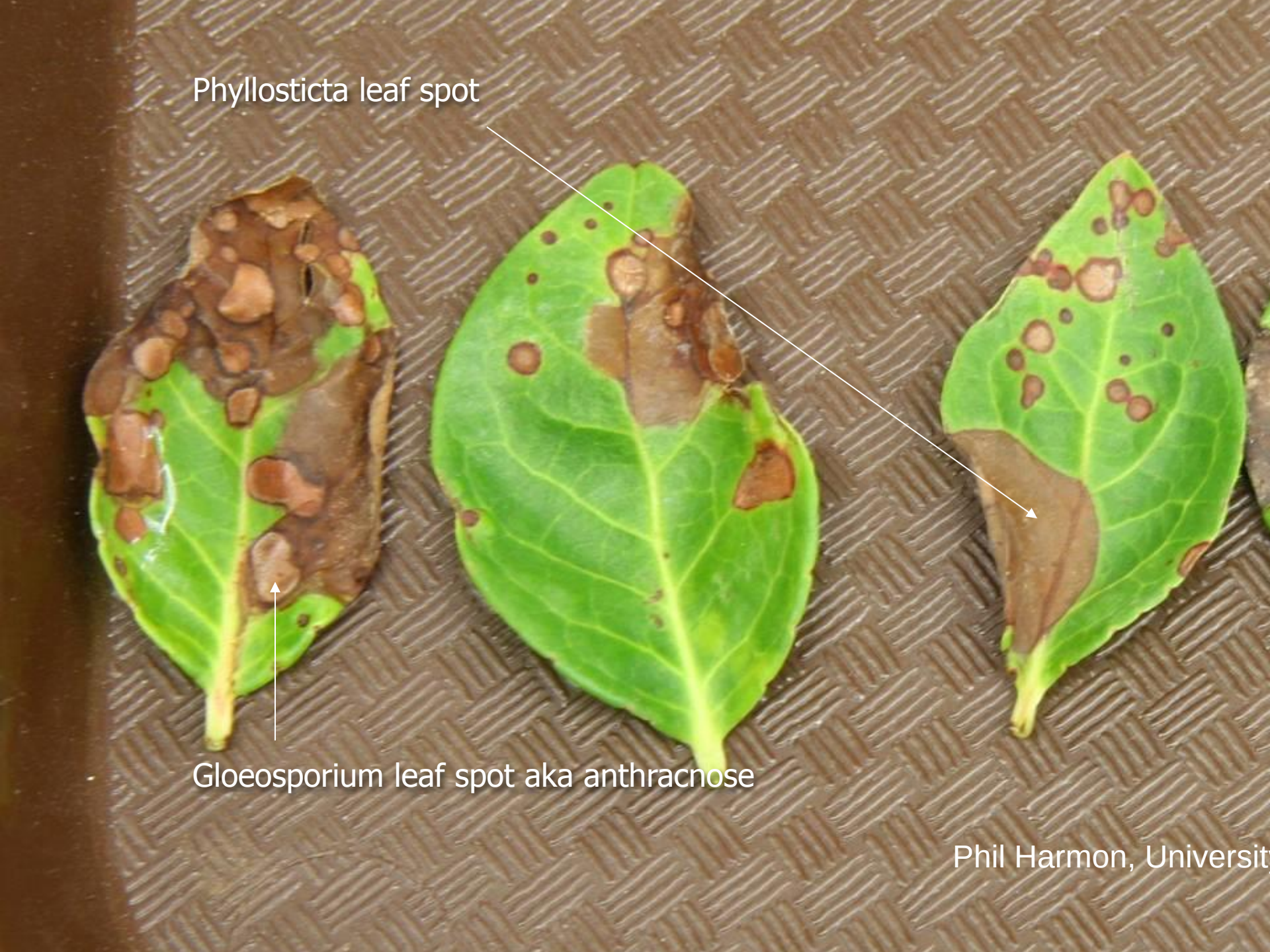
- Diseases
  - Blossom blight
  - Leaf spot diseases
  - Root rot
  - Stem blight
- Pests
  - Birds (cedar wax wings)
  - Blueberry gall midge
  - Thrips

blossom blight

Phil Harmon, University of Flori

Rust leaf spot

Phil Harmon, University of Florida


Phyllosticta leaf spot
Gloeosporium leaf spot aka anthracnose
Phil Harmon, Universit

root rot


This is a low spot in the field, and water was standing in the grass when the picture was taken.
Phil Harmon, University of Flo

Beds and ditches are often used to increase soil drainage


stem blight
Severe dieback up top
Roots look fairly healthy
Phil Harmon, University of Florida

Blueberry Pests

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

Conclusions

- Florida's blueberry industry continues to expand.
- Fruit are grown for the early-season fresh market.
- Early harvest during the lucrative market window of April – May is critical for profitability.
- Many inputs are needed to grow blueberries in Florida.
- Establishment and production costs are high.
- As of 2008, early-season berry prices have remained strong.
- Concerns for the future include labor availability and supply and demand issues.