

Blueberry Production Techniques

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**“Blueberry is a plant
looking for a place to
die”**

Dr. Bill Cline

University of South Carolina

Killing blueberry plants has been one of our specialties

- Planting in alkaline land
- Planting in heavy clay soil
- Planting in poorly prepared field: plow layer/hard pan
- Planting in weed infested land: bermuda grass, field bindweed, nut grass, Johnson grass, etc.
- Planting in hot weather/black plastic
- Applying too much water
- Applying too much fertilizer
- Over cropping on consecutive years (some cultivars)



pH management requires good planning and constant attention



Pre-plant Considerations

- Soil and water analysis
- Weed management, perennial weeds
- Soil amendments
- Incorporation of organic matter
- Variety availability and selection
- High tunnel production
- Organic production





SJV Soil-Reaction ranges
from neutral to moderately alkaline.....

Typical application, 3 to 5 tons per acre



The field must be flooded or sprinkled with sufficient water to incorporate the acid





**1000 lbs
Lime/Acre**



**No Soil
Amendments
Added**



Soil pH demonstration

Lbs./Plot

Treatment	Soil pH 2003	2003	2004	2005	2006	2007	Cum.
0.5 Ton CaCO ₃	7.1	4.1	30.1	57.6	40.85	110.35	243
Untreated	6.4	7.7	35.9	71.3	87.85	246.20	449
5 Tons H ₂ SO ₄	6.0	17.6	61.2	77.2	103.55	282.8	542
15 Tons H ₂ SO ₄	5.6	19.6	68.4	99.1	90.85	236.20	514

A large, conical pile of dark brown pine bark mulch dominates the foreground. The mulch is composed of irregular, chunky pieces of bark. In the background, a white pickup truck with a metal bed rack is parked on a gravel or dirt surface. To the right, a portion of a brown building is visible. The background is filled with a dense stand of tall, thin pine trees under a clear sky. The lighting suggests it's daytime, with shadows cast across the mulch.

Pine bark preplant incorporated
Topical applications every 24 mo.

High beds, rip between rows, Mulch application (bucket method),
Pre-irrigate before planting



Plants set slightly above soil surface





Beds too low







Frost Protection





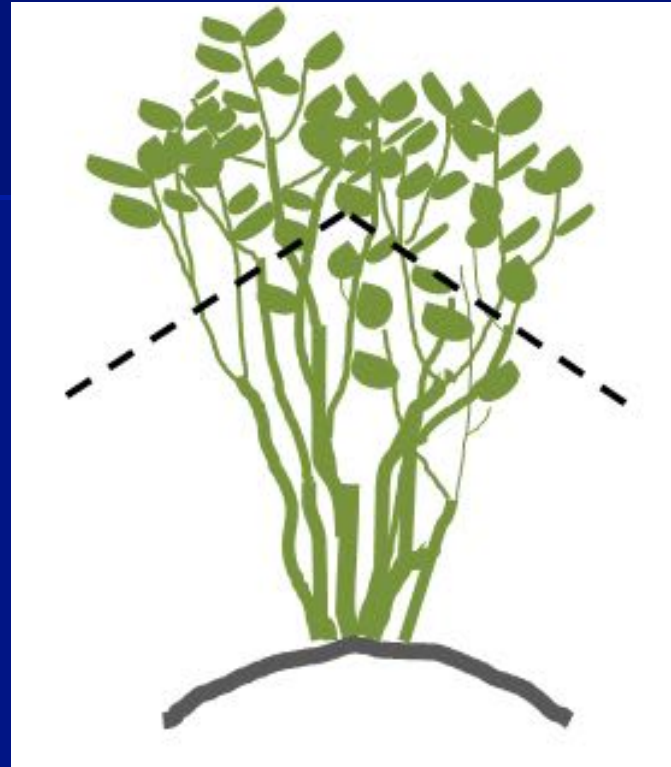


Note: Furrow between rows for drainage



Summer hedging and topping

**Summer Hedging
Immediately after
Harvest on
Southern
Highbush**

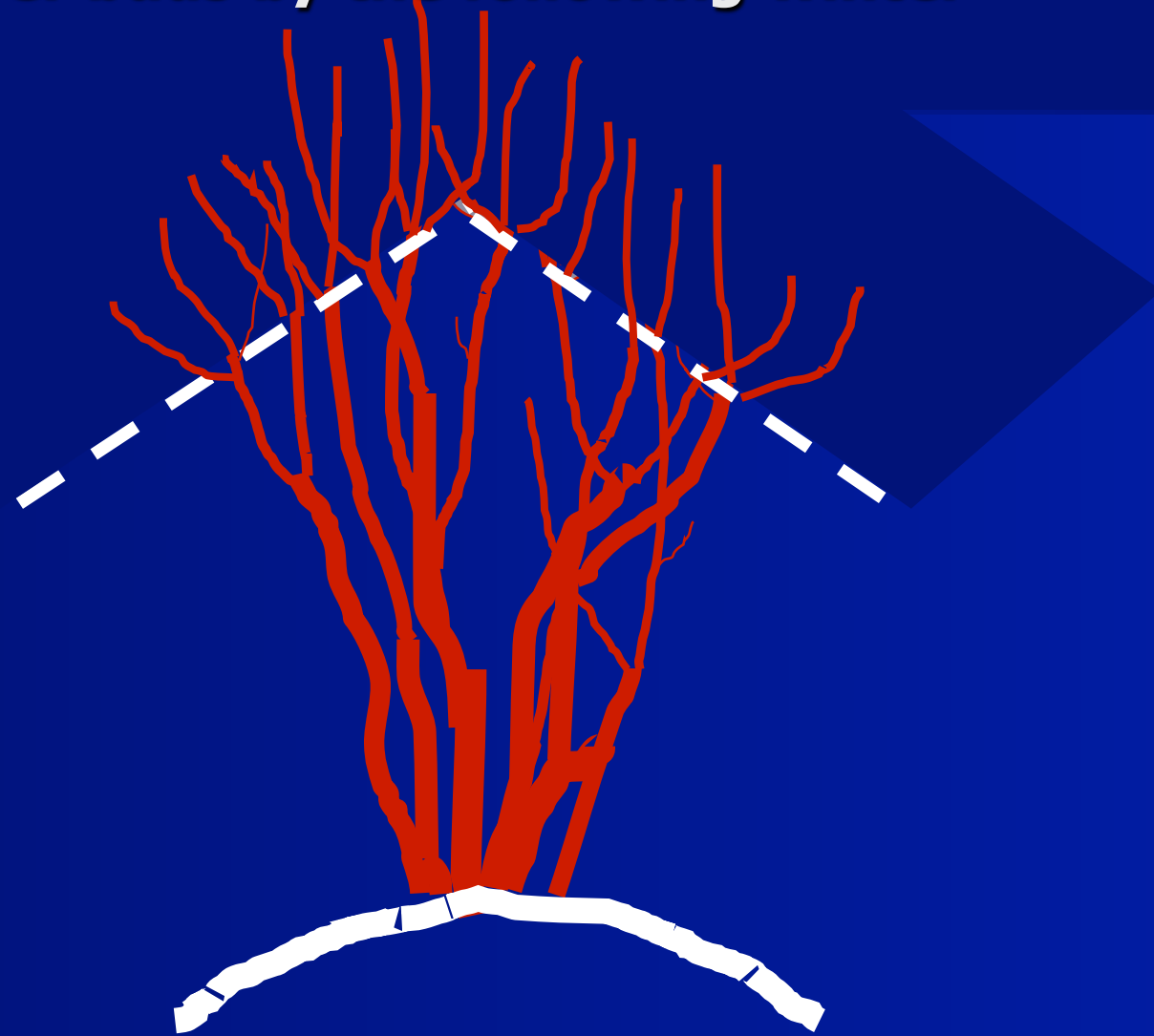


**36-48 inches
“Housetop”
angled cut**

**Only for regions with
Long growing seasons
NC, GA, FL, etc.**

Courtesy of Bill Cline, N.C. State University

Regrowth above the mow cut has time to produce new flower buds by the following winter



Courtesy of Bill Cline, N.C. State University



Plastic Culture for early production











Many agricultural water sources contain high levels of bicarbonates. Water acidification is often required.





Bees are required for better fruit set





Important Blueberry Cultivars for California

- Public varieties: Snowchaser, Jewel, Emerald, Star, San Joaquin,
- Proprietary varieties: Spain, Australia, New Zealand & others

Cultivar: Misty







JEWEL







EMERALD







Cultivar: Oneal





STAR






SOUTH MOON
107





REVEILLE





LEGACY

108







Things to consider

- Variety field mix: evergreen/deciduous
- Field Mix:mature plants and young plants
- Irrigation interval
- Soil: planting in sand, silt,, clay?
- Soil:Water infiltration rates
- Soil: plow layers, hard pan
- Water applied for frost protection

Cultivar Comparison

Lbs per plot (7 plants)

	2007	2006	2005	2004	2003	Cum.
Jewel	123.11 a	142.92 a	44.58 b	62.02 a	55.66 a	428
Emerald	104.00 ab	98.02 b	56.96 a	49.60 ab	44.51 b	353
Legacy	89.66 b	77.38 c	65.42 a	49.50 ab	38.63 bc	321
Jubilee	45.79 c	41.43 de	28.67 c	41.63 bcd	34.66 c	192
Star	91.15 b	52.83 de	20.25 c	49.50 ab	32.01 cd	246
Southmoon	86.59 b	58.48 cd	25.05 c	29.80 d	24.92 de	225
Misty	59.13 c	43.08 de	39.09 b	51.18 ab	23.60 e	216
Sharpblue	43.68 c	33.15 e	24.97 c	31.40 cde	22.89 e	156
Oneal	51.45 c	38.33 de	20.30 c	18.90 e	8.85 f	138
<i>CV</i>	<i>22.95</i>	<i>21.07</i>	<i>18.43</i>	<i>22.44</i>	<i>22.44</i>	
<i>LSD</i>	<i>25.86</i>	<i>20.02</i>	<i>9.73</i>	<i>13.79</i>	<i>7.94</i>	

* Treatment means followed by different letters are significantly different ($P < 0.05$).

Parameters for Selected Cultivars

6/25/05

Cultivar	Firmness ¹ (lbs.)	Weight ² (g)	SSC (° Brix)
Southmoon	1.7	84.2	14.5
Oneil	1.3	55.7	11.8
Reveille	1.8	26.5	17.3
Misty	1.6	56.0	12.2
Star	1.6	77.1	12.9
Emerald	1.7	47.2	12.9
Jewel	1.2	50.6	14.0
Legacy	1.5	75.1	11.9

¹ Compression to a depth of 4mm

² Weight of 30 fruit harvested at random

UF breeding program

Jim Olmstead



- **Flavor**
- **Crisp texture**
- **Winter chilling requirement**
- **Soil adaptation**
- **Mechanical harvesting**

Irrigation Management Study (new)

- Dr. Larry Schwankl, University of California, Irrigation Specialist







**WATERMARK
MONITOR**

Blueberry 1-4

**IRRROMETER COMPANY, INC.
RIVERSIDE, CA**

WATERMARK MONITOR

INSTALLATION AND OPERATION INSTRUCTIONS

The Watermark Monitor automatically reads up to eight (8) sensors and stores the readings for collection and display by a computer. Watermark soil moisture, soil temperature, Irrrometer Model RSU (4-20mA transducer) pinch closure, voltage and 4-20mA sensors can be read and recorded.

SENSOR INSTALLATION

Watermark soil moisture sensors must be "conditioned" prior to installation. The sensors should be soaked to saturation and then dried fully (dries and then soaked to saturation again prior to installation. The "conditioning" of the sensors ensures quick response to changing soil moisture content. If a sensor is only soaked and then installed, several irrigation cycles may pass before the sensor will respond accurately. Soak the sensor in a bucket of water for several hours to saturate them. Hang them up overnight to dry sufficiently. After "conditioning" they are ready for installation. Sensors MUST be installed in an active portion of the root zone of the plant to be monitored, either vertically or up to a 45° angle. Bore a 1/2" diameter access hole to the desired depth, then insert the sensor. Be certain to ensure a snug fit between the sensor and the minimum diameter hole. Backfill the hole firmly. The access hole can be made by inserting a 1/2" diameter bar (or 1/2" IPS pipe) to the desired depth, then attaching a handle, being careful not to disturb the soil surrounding the bar. In hard or rocky soil, a larger diameter hole can be made with a 3/4" diameter auger. The auger cuttings with water to create a slurry and pour into the hole. Then insert the sensor into the hole. Once the air has been removed, the sensor can be attached to 1/2" class PVC pipe with a PVC adhesive. The pipe becomes a conduit to protect the sensor wire. Use the top section of this pipe section should be capped or plugged or capped with a cap. Travel down to the sensor. Do a slight "wiggle" of the pipe just above the sensor to allow water to drain away. If the soil is very dry, the representative soil moisture sensor should be installed in the soil near a sensor can be used. Soak soil moisture sensor readings can be compensated by a single soil temperature sensor. Bore a 1/2" diameter hole in the soil and insert the sensor. Then backfill the hole with Irrrometer insulation, procedure for proper installation of RSU. The switch closure sensor is a pressure pipe with a 1/4" diameter hole that has an adjustable switch mounted to its face. The sensor should be installed into the irrigation pipe. The pressure range of the sensor should be selected so that the normal system pressure is in the middle of the range. The normal system pressure is the pressure in the pipe at the time the switch is closed. The normal system pressure is the pressure in the pipe at the time the switch is closed.

IRRROMETER COMPANY

WATERMARK MONITOR

SERIAL PORT

PRESS BUTTON TO READ

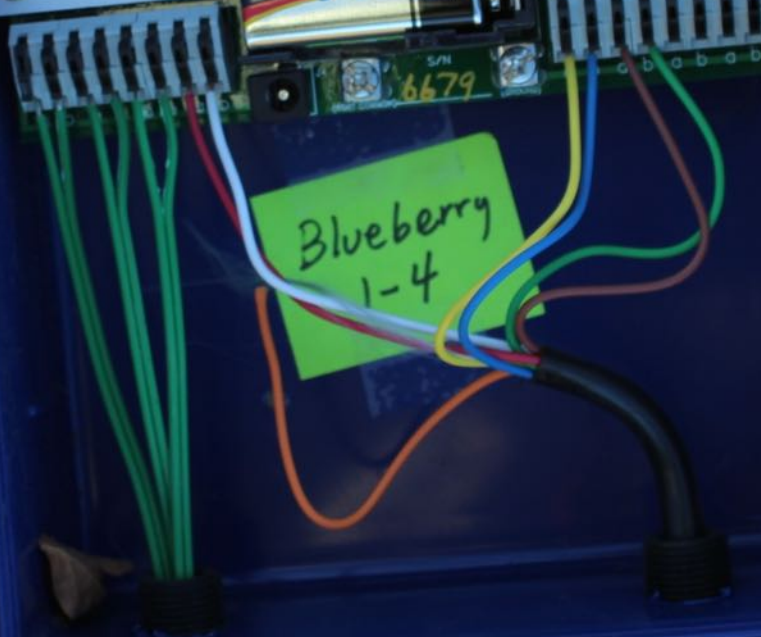
SHUTTLE PORT

SENSORS 1 2 3 4

SENSORS 5 6 7 8



Blueberry 1-4





Blueberry Irrigation Trial

Yield, lbs per plot

Volume	2112	2113
50% ET	41.7	49.3
75% ET	33.6	51.5
100% ET	30.4	53.2
125% ET	33.6	66.9
150% ET	--	64.3



50% ET
101



75% ET

102



100% ET
103




125% ET

104

Blueberry Irrigation Trial

Number of shoots per plot

Volume	2013
50% ET	3.3
75% ET	3.3
100% ET	3.8
125% ET	16.5



50% ET

201





125% ET

104



Blueberry Grafting Project

**University of Florida, University of Georgia, Oregon State
University, University of Calif.**

**Using *Vaccinium arboreum* (sparkleberry)
to increase
soil adaptation and mechanical harvest
efficiency of blueberry**

Rebecca Darnell
Horticultural Sciences Department
University of Florida
Gainesville, FL





*Vaccinium
arboreum*
“Sparkleberry”

- Native to the southeastern US
- Tree-like growth habit
- Deep root system – drought tolerant
- Tolerates low organic matter soil, pH up to 6.5
- N primarily in NO_3 form





Grafting Project Kearney Ag Center, Parlier

















Mainland, C. M. et. al., 1975. The Effect of Mechanical Harvesting on Yield, Quality of Fruit and Bush Damage on Highbush Blueberry. J.A.S.H.S. 100:129-134

- Machine harvesting reduced yields of marketable fruit by 19 to 44%
- 10 to 30% softer than hand harvested fruit
- Machine harvested fruit developed 11 to 41% more decay after 7 d storage at 70°F
- Sorting increased rots of mechanically harvested fruit by an additional 5 to 10%





Little Blue





U.S. Highbush Blueberry Council

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