Producing Small Fruit Berry Crops in Mild Winter Climates

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Small fruit "Berry" crops

- Blueberry
- Blackberry
- Raspberry
Blueberry nutraceutical value

BLUEBERRIES
A Handful of Health

Plump, juicy, and sweet, with vibrant colors ranging from deep purple-blue to blue-black and highlighted by a silvery sheen called a bloom, blueberries are one of nature’s great treasures. Though miniature in size, they are also proof that, when it comes to health benefits, good things really do come in small packages.

BLUEBERRIES ARE...

LOW IN FAT.
A one-cup serving contains only 80 calories and virtually no fat.

FULL OF DIETARY FIBER.
A handful of blueberries helps satisfy recommended daily fiber intake. Fiber helps keep the body regular, the heart healthy, and cholesterol in check.

FULL OF PHYTONUTRIENTS.
Research suggests that the phytonutrients in blueberries, called polyphenols, have antioxidant and anti-inflammatory properties that may help lessen the inflammatory process associated with chronic conditions such as cardiovascular disease, cancer, and other age-related diseases.

PACKED WITH VITAMIN C.
One serving delivers almost 25% of one’s daily requirement of vitamin C.

AN EXCELLENT SOURCE OF MANGANESE.
Manganese plays an important role in bone development and in converting proteins, carbohydrates, and fats into energy.

Vitamin C aids collagen formation and helps maintain healthy gums and capillaries and a healthy immune system.
NORTH AMERICAN BLUEBERRY CONSUMPTION

With blueberry production increasing to match rising levels of consumption, it’s clear that more Americans are discovering just how good these Little Blue Dynamos are.

Total

- 1995: 283 million lbs.
- 2000: 349 million lbs.
- 2005: 414 million lbs.
- 2010: 749 million lbs.
- 2011: 853 million lbs.

Per Capita

- 1995: 15.5 oz.
- 2000: 17.8 oz.
- 2005: 20.2 oz.
- 2010: 34.9 oz.
- 2011: 39.5 oz.
U.S. sales of small fruits - 2008

- Strawberry: 57.2%
- Blueberry: 24.7%
- Raspberry: 11.1%
- Blackberry: 5.5%
- Other: 1.4%
Consumer demand for small fruits - US

Subcategory Contribution to Total Berries
2004 vs 2008

- Blackberries: 4.0% (2004), 5.5% (2008)
- Blueberries: 20.9% (2004), 24.7% (2008)
- Currants: 0.1% (2004), 0.0% (2008)
- Other Berries: 1.7% (2004), 1.4% (2008)
- Raspberries: 9.6% (2004), 11.1% (2008)
- Strawberries: 63.8% (2004), 57.2% (2008)

source: FreshFacts- www.perishablesgroup.com
Environmental factors affecting production

- Temperature
- Moisture vs relative humidity
- Wind
- Soil environment
- Frost threat
Temperature

- Overall adaptation VS problems
- Frost, freeze threat
- Heat unit accumulation; timing
- Night VS day
- Soil temperature
- Fruit quality VS vegetative growth
Environmental factors affecting production

- Temperature
- Moisture VS relative humidity
- Wind
- Soil environment
- Frost threat
Moisture VS relative humidity

• Rainfall
  - soil moisture
  - salinity?
  - dust, mites, whitefly

• Relative humidity
  - disease incidence
  - fruit quality
Environmental factors affecting production

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Wind

- **Moisture loss**
  - evapotranspiration (ET)
  - irrigation management

- **Physical effects**
  - cane breakage
  - fruit scarring
  - sand, soil abrasion
  - manage protected structures
Environmental factors

- Temperature
- Moisture VS relative humidity
- Wind
- Soil environment
- Freeze threat
Soil environments

- Physical properties
- Chemical properties
- Biological properties
Environmental factors affecting production

- Temperature
- Moisture vs relative humidity
- Wind
- Soil environment
- Frost threat
Frost protection

• **Short-term losses**
  - flower, fruit abortion
  - fruit damage
  - loss of market, production, price

• **Plant little affected**

• **Protection**
  - irrigation ~ 3-4°F.
  - wind machines > air mixing ~2-3°F
Climates dictate environmental conditions

- **Macroclimate**
  - geographic positions > marine vs continental
  - latitude
  - altitude

- **Microclimate**
  - plant canopy
  - soil surface
  - soil environment
Macroclimates
Small fruit berry crops

- Small perennial shrubs or vines
Small fruit berry crops

• Small perennial shrubs or vines.

• Share many production and marketing characteristics with strawberry.

• Historically cultivated in temperate cold areas.
  > now also into subtropical areas of US,
  - Florida, California

also Spain, Portugal, Morocco and highland tropics in
Mexico and Central America
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Grown in open fields or "protected"
Blueberry

- Historically high chill reqt., E. US, low pH soils
- Breeding effort began in 1970 to breed early, low-chill varieties for SE US
- California initiated serious R&D in late 1990s; now > 8,000 acres
- Chile and Argentina over-planted > California, Florida now compete for transition and early market; some beginning from MX
Raspberry

- Historically, processing and machine harvest.
- Backyard and minor fresh crop until 1980s; CA production + exports from Chile, Central America.
- Driscoll's breeding since 1950's; creation of major industry in California beginning in 1990s.
- Now 2-3rd most important crop in Ventura and Watsonville and industry in excess $200 million.
- Based on intensive production in tunnels and shortened crop cycle.
Blackberry

- Followed raspberry, processed, machine harvest.
- Backyard / minor fresh crop until 1980s; CA production + exports from Chile, Central America.
- Breeding programs in Arkansas and Oregon; USDA > major berry companies now have own programs.
- Sweeter, firmer fruit have led to growing demand and very rapidly developing new industry.
- Mexico is major world supplier; US industry is strong around MX arrivals.
Production AND Fruit Quality
Berry crop environments

- Temperature
- Moisture VS. relative humidity
- Wind
- Soil environment

+ latitude, proximity to markets, labor, infrastructure?
Southern highbush varieties for early season

Fruit Yield (lb/plant)

Abundance
Biloxi
Blue Crisp
Camellia
Emerald
Jewel
Misty
Palmetto
Rebel
San Joaquin
Sapphire
Snowchaser
Springhigh
Star
Rabbiteye varieties for late season

![Graph showing fruit yield (lb/plant) for different varieties over time.]

- **Alapaha**
- **Ochlockonee**
- **Powder Blue**
- **Vernon**
Pruning primocane blackberries – Los Alamos, CA 2013

Fruit Yield (lb / acre)

Mow down time

- floricane (3 ft)
- 10-Jan
- 15-Feb
- 1-Apr
Organic Berry Production

• Growing demand in North America, Europe, Asia
  > more specialized market with premium prices

• Higher costs of production and more demanding management
  > specialized skills and special research needs

• Very different soil environment – nutrient availability

• Very different pest management regimes
  - managing weeds, insect pests are more challenging
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