



Beach Plum New Crop Development

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www.beachplum.cornell.edu

Acknowledgements



- **Arnold Arboretum of Harvard University's James R. Jewett Fund**
- **Massachusetts Department of Agriculture**

Cooperators

- **Barnstable County (UMass) Cooperative Extension**
- **Several farms in the Northeastern U.S.**

Beach Plum Biology

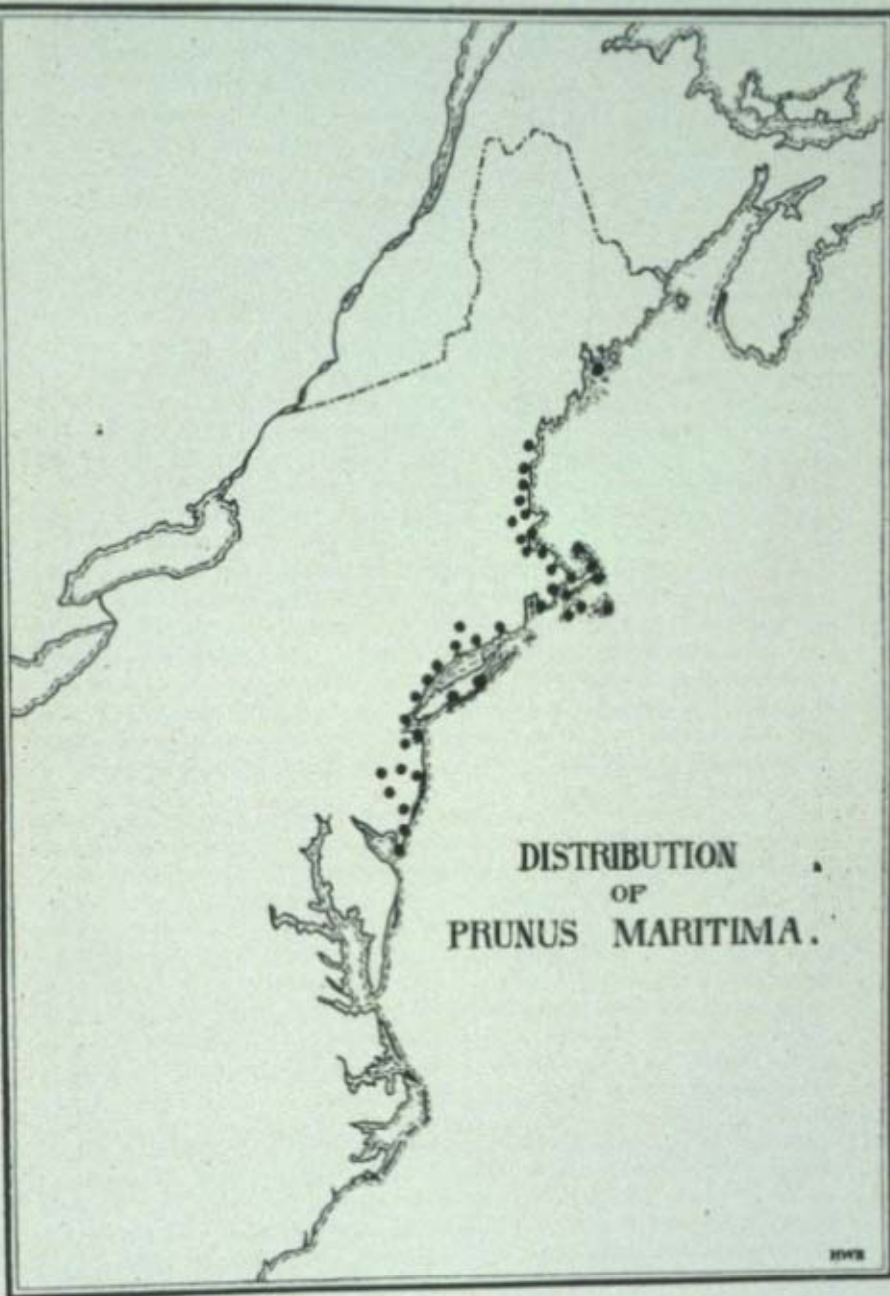
BEACH PLUM, *Prunus maritima* Marsh.

Rosaceae (Rose Family)

ORIGIN	Northeast U.S. coastal sand dunes .
HABIT	Sprawling shrub to small tree, with a large tap root system on coarse soils.
CULTURE	Tolerates coarse, low-nutrient, low water-holding soil, thrives on rich soil but not for wet sites or shade.
INTEREST	Profuse white bloom mid-May . Edible fruits (1.5-2.5 cm), purple (rarely-yellow) ripening in early Sept. in the Northeast U.S.
HARDINESS	USDA Plant Hardiness Zones 4-7 reported.
PROPAGATION	4 months cold moist stratification after seed is hydrated, softwood cuttings early in the season, or spring grafting.
SIMILAR SPECIES	Several species of plum are distributed across North America and have a similar history of wild collection <i>P. subcordata</i> , Oregon and California; <i>P. americana</i> , Central and Eastern U.S., <i>P. angustifolia</i> , Southern U.S.; <i>P. nigra</i> , Northern . U.S. and Canada.

Distribution map

Anderson and Ames'
1932 beach plum
distribution map from
the Arnold
Arboretum's *Bulletin
of Popular
Information*.



**“Its natural location is near the salt water,
along the coast and on islands.”**

**—William Prince, 1828, *A Short Treatise on
Horticulture*.**







Current Status

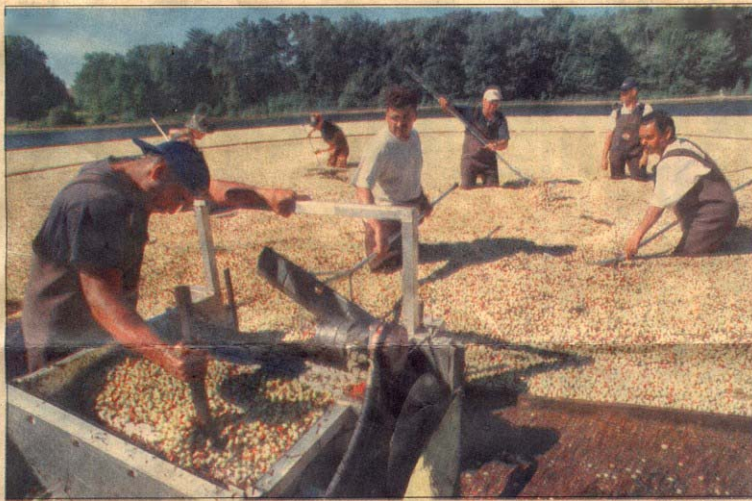


What is a new crop?

- New market niche--
clementines in a wood box.
- New production method--
“white”cranberries.
- Ethnic gone mainstream--
sun dried tomatoes.
- Different cultivars--
“Super sweet corn”
- New product--new age
juices: Snapple, Sobe, teas
- New identity-”dried plums
vs. prunes”



New Crops in the News



Associated Press photo

Workmen harvest white cranberries at the Beaton family bogs in Lakeville, which will be used for a new line of white cranberry juice products that the growers and owners of Ocean Spray hope will appeal to customers. White cranberries have a milder, less tart flavor.

Ocean Spray hopes white berries invigorate cranberry market

THE GLOBE AND MAIL
MONDAY, JUNE 7, 2004

Sweet, purplish saskatoons found too new for British tastes

Fruit that has been eaten by natives for centuries may be banned as 'novel' food

BY GRAEME SMITH

They're sweet, purplish, and resemble blueberries, but British scientists have tasted the saskatoons grown on Canada's prairies and declared them to be entirely unlike any other fruit in European supermarkets.

That opinion wouldn't normally bother the Canadian farmers who recently started exporting saskatoons to the United Kingdom. Novelty is a strong selling point in countries where nobody has heard about the small native fruit that Canadians have plucked from bushes for centuries.

In this case, however, the label of uniqueness means the shipments to Britain could be halted this week — at least temporarily — under a provision of new European rules intended primarily to regulate genetically modified foods.

Regulation Number 258/97 of the European Parliament "concerning novel foods and novel food ingredients" stipulates that anything that wasn't part of the European diet before 1997 must pass rigorous testing for safety and nutrition before reaching store shelves.

cause they're not even related to blueberries. Part of a large plant family that includes apples and plums, the saskatoon is also known as serviceberry, juneberry, shadbush or *petite poire*.

"Now it's a regulatory process, so the mechanism will have to run its course," said Gordon Pugh, deputy director of Agriculture and Agri-Food Canada's trade division for the Eastern Hemisphere.

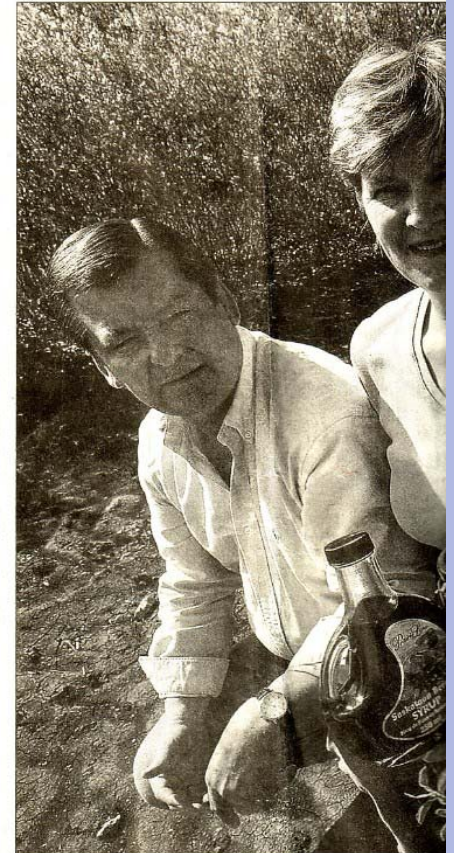
"It's really frustrating," Mr. Pugh said. "It seems so silly that this could be considered a novel food."

'It's really frustrating. It seems so silly that this could be considered a novel food.'

Gordon Pugh of Agriculture and Agri-Food Canada's trade division

The ruling affects only one exporter: Prairie Lane Saskatoons, a small company based in Petersfield, Man., 50 kilometres north of Winnipeg.

Owner John Ritz wouldn't say



John and Kim Ritz show off some of the saskatoons in their orchard, only company affected by the British decision to declare the fruit a

“I firmly believe that new plants
are the lifeblood of the
horticulture industry...”

Allan Armitage

The nursery /floriculture industry standard practice is to develop new plant material. The push is to get something different. New and different things tend to sell.

Why aren't new food crops a focus:

- Researchers are required to serve existing commodity groups which are often in trouble.
- Researchers are rewarded for focusing on one aspect of one crop--new crop development takes a generalist's approach.
- Farmers tend to identify themselves with one crop and are afraid to invest in untested systems.
- New crops take time and money. The goals and economies of farmers and researchers are usually only short term.

Who are trying new things?

- Small diversified farms often located near urban areas who do retailing or value added processing in addition to production.
- Organic farmers.
- Farmers who see traditional commodities becoming increasingly unprofitable.
- Those with an entrepreneurial spirit.

“Every new crop needs a champion...”

--Jules Janick (www.hort.purdue.edu/newcrop)

My Experience:

- Long term effort--beach plum since 1996.
- Worked with outreach and growers from day one.
- Treated new crop development as a serious venture.
- People do not know what to think of new crops--what category does this belong to...?
- Usually asked to speak last in the session at scientific conferences...guest lecturer in class the day before Thanksgiving...
- Been referred to as “the beach plum nut...”

Horticultural History

– Indigenous Use

– European Discovery

- 1524--John de Verrazano, a Florentine voyager, who recorded “damson trees” in the vicinity of what today is southern New York.
- 1600's--Probable colonist collection
- 1700's--European plums are just fine

--Other region's needs

- 1800's--Native plum development did not occur until settlers spread to the Prairie States and parts of the South where European plums did not thrive. Northeast natives had been passed over because European selections were available and thrived in the climate.
- 1890's--Luther Burbank (originally from Worcester County, Massachusetts) breed beach plum in Santa Rosa California. He crossed these improved varieties with a hybrid Japanese plum to produce what he called the 'Giant Maritima' but it was too soft to ship.

[Burbank's Success: Japanese *P. salicina* x Chinese *P. simonii* x *P. Americana*]

– Studies in Plant Variation

- 1901--Inspired by Darwin's, *Animals and Plants Under Domestication*, J. M. MacFarlane (U. Penn) set out to document plant variation.
- 1932--Edgar Anderson of the Arnold Arboretum with Oliver Ames (the pilot) published "Botanizing from an Airplane," in the Arnold's *Bulletin of Popular Information*.

What is the definition of a species?

Is a species more variable at the center of its distribution or at the periphery?

Are unusual forms found with greater frequency in one part of its range than in another?

– **Depression, frugality, nationalism**

- **Ruth Eldridge White (Mrs. Wilfrid O. White) 1940**

“...to add a drop in the dry old bucket of New England industry...”

“The development of an industry from this native product seemed a sensible practical idea to me. A great industry had been developed on the Cape through the Cranberry...Why shouldn't the beach plum make as important an industry as the cranberry? The flavor is certainly more appealing. That sweet bitterness comes from a life of hardship, I guess.”

- **James R. Jewett Prize at the Arnold Arboretum, 1940**

“render good service to Cape Cod by working for the development of the beach plum industry”

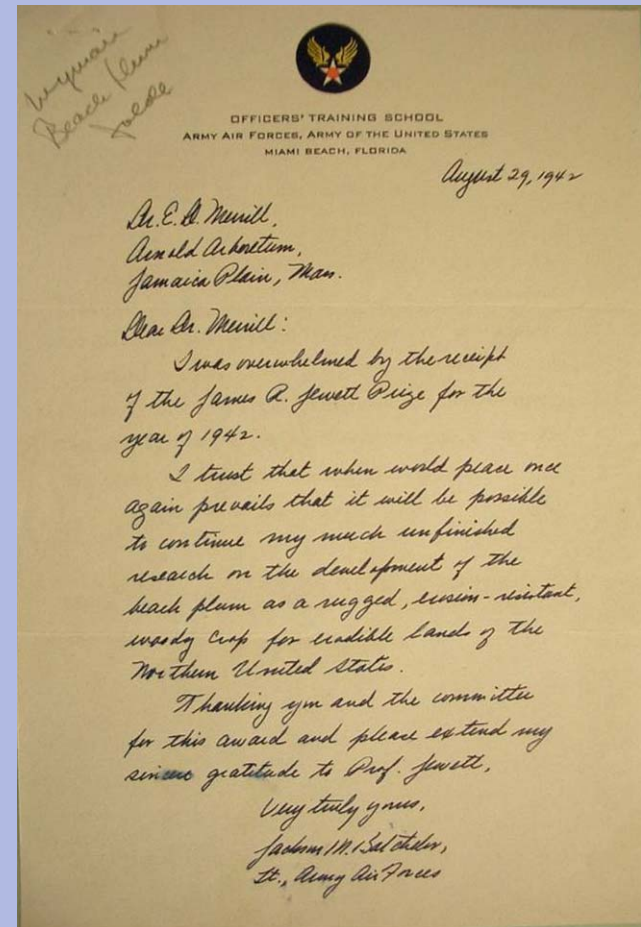
“these prizes be offered primarily for the scientific and empirical improvement of the beach plum (*Prunus maritima*), including however, the social significance of work with this native species or its products.”

- October 1941--Bertram Tomlinson (Barnstable County Extension Agent) established the Cape Cod Beach Plum Growers Association.
- December 1941--WWII
- 1952—State Grade Label
- 1950's—Priorities Shift
- 2000's--Sustainability/ new markets



*An Old Woman there is, who lives by the Sea.
A squatter all scraggy, and bent with the years
She heeds not the Wind and his masterful beating.
She turns a deaf ear to the Tide and his tears.*

—Ruth Eldridge White, 1940, The Beach Plum, *Bulletin of the Garden Club of America*



Research Components

Sustainable New Crop Development

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graph TD; A[Sustainable New Crop Development] --> B[Horticulture<br/>can we spray it?<br/>can we propagate it?<br/>can we pick?]; A --> C[Marketing/Economics<br/>who wants to buy it?<br/>cost of production?<br/>profitable?]; A --> D[Product Development<br/>health benefits?<br/>processing?<br/>quality variation?];
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Horticulture

can we spray it?
can we propagate it?
can we pick?

Marketing/Economics

who wants to buy it?
cost of production?
profitable?

Product Development

health benefits?
processing?
quality variation?

Horticulture



Coonamessett Farm, Falmouth, MA

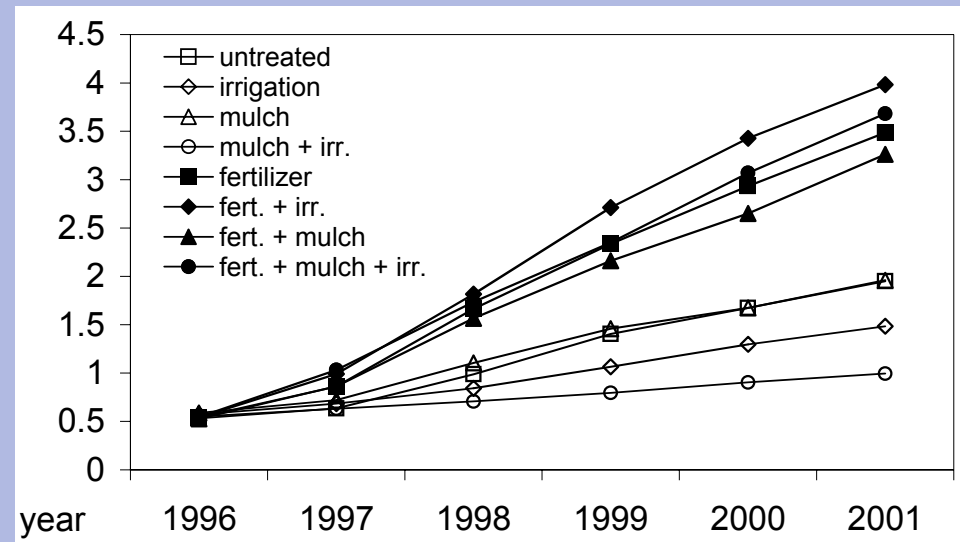
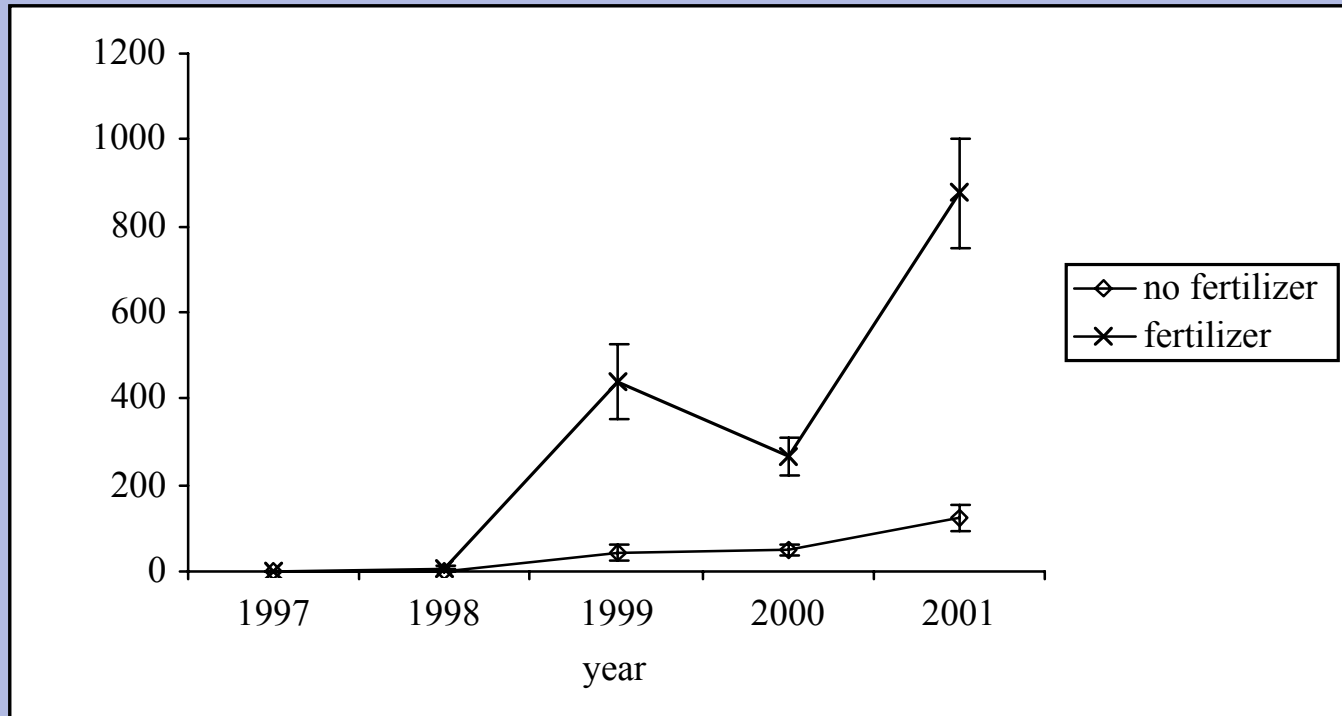


Figure 4. Mean trunk diameters by treatment over the course of the experiment.

Yield



BEACH PLUM MANAGEMENT SCHEDULE

Developed by Richard Uva, Cornell University, with Information provided by David Simser, Cape Cod Cooperative Extension

February	Beach plums may be pruned in late winter to early spring. Remove crossed, shaded, cracked, and down-pointing branches. Diseased branches with CANKERS and BLACK KNOT should be removed. Maintain an open canopy to facilitate light penetration and air circulation. Keep plants at a size where picking is practical. If biennial bearing is a problem, do your heavy pruning in years where you are expecting a heavy crop. The location of the fruit is toward the base of one-year-old wood and spur formation is uncommon. Peach also bears on annual wood and could serve as a model for pruning.
March	Spring clean up. Rake up leaves and remove mummified fruits to eliminate primary fungal inoculum to reduce the probability of BROWN ROT infestations. Apply lime if recommended by last August's soil and foliar nutrient analysis.
Late-April (white bud)	Consider applying control measures for BROWN ROT (blossom blight phase).
Early-May	Apply FERTILIZER. As nitrogen is mobile, especially in sandy soil, consider applying 1/2 of nitrogen on now and the other 1/2 on in late May or June.
Mid-May (Bloom)	Were pollinators present and active during BLOOM? Start to SCOUT FOR PESTS on a regular schedule. Prepare and activate the IRRIGATION system if using one.
Late-May (after bloom)	Consider applying control measures for BROWN ROT (blossom blight phase) and for PLUM CURCULIO/PLUM GOUGER.
June	Control small WEEDS now instead of big weeds in July.
Mid-June (shuck split)	Consider applying control measures for BROWN ROT and for PLUM CURCULIO/PLUM GOUGER. Fruit THINNING may be required to reduce excessive fruit loads and to reduce biennial bearing.
Late-June (green fruit)	Consider applying control measures for BROWN ROT and CATERPILLARS (if needed).
Early-August (1 st color)	Consider Applying control measures for BROWN ROT (fruit rot phase) as fruit begin to turn from green to yellow in early August. Collect soil and foliage samples for nutrient analysis at this time if desired.
Mid-August (pre-ripe)	Consider applying control measures for BROWN ROT (fruit rot phase) if needed.
Late-August (ripe)	Begin fruit HARVEST. Because most farms are growing seedling plants (which are all genetically different) there is wide variation in ripening time from plant to plant. Consider protection from BIRDS.
September	Remove fallen fruit and premature leaf drop from orchard floor.
October	Drain and WINTERIZE the irrigation system. Remove fallen fruit and leaf drop from the orchard floor. Protect plants from browsing/girdling—DEER, VOLES, MICE, etc.

Marketing Research

Beach plum goes
to the big apple!



Focus Group

- A focus group is a marketing research tool which gathers information from a small group of representative consumers.
- Qualitative method designed to gather ideas--not quantitative data or product testing.

Consumer Focus Groups

New York City on March 13, 2002

Wen-fei L. Uva Applied Economics and Management, Cornell University



Consumer Focus Group Conclusions:

- Market expansion potential exists for beach plum products among gourmet consumers in coastal metropolitan areas.
- Packaging with price is the primary marketing tool to communicate that beach plum products are gourmet, giftable and otherwise special.
- Gourmet jams and jellies are purchased from various independent stores or farm markets and not from supermarkets.
- Jams or jellies made with cultivated rather than wild beach plums will not impede consumers' interests in trying the product.
- Consumers' interests in beach plum presented market opportunities for new product development.

2003 Foodservice Industry Presentation Summary

Lead by Bob Weybright

NYSAES/AEM

- Present concept to potentially high margin market(s)
- Present to cutting edge operations and individuals
- Determine level of interest in fruit
- Identify price potential & price points
- Determine preferred method of purchase
- Identify potential uses, both traditional and non-traditional
- Learn preferred fruit forms
- Determine potential demand, in total and per site

Gourmet Chef Interviews

September of 2003

Robert Weybright of the New York State Agricultural Experiment Station



- 11 chef's
 - 3 bakers
 - 8 executive chef's
- 1 restaurant marketing firm
- 2 food industry advocate groups

Chef Interview Conclusions

- Excited about beach plum and the process of new crop development.
- Chefs expressed interest in high quality fresh as well as frozen fruit.
- Direct purchase preferences through grower contact and farmers' markets, secondarily through specialty purveyors.
- Concerns and challenges--maintaining a consistent seasonal supply, high fruit quality, adequate quantities and a viable delivery system.
- Cost and size of fruit was of concern especially for bakery use where the cost and feasibility of pitting will be an issue to deal with to serve this market.
- \$6.00 per pound was an easily obtained price for frozen/whole fruit.
- Fresh fruit must be clean and in consistent packing. Frozen fruit would need to be quick frozen (IQF) and stored sub-zero and be of the same quality as mentioned above for fresh fruit.

Fruit Quality and Processing

August 2001 wild collected fruit samples

New York State Experiment Station

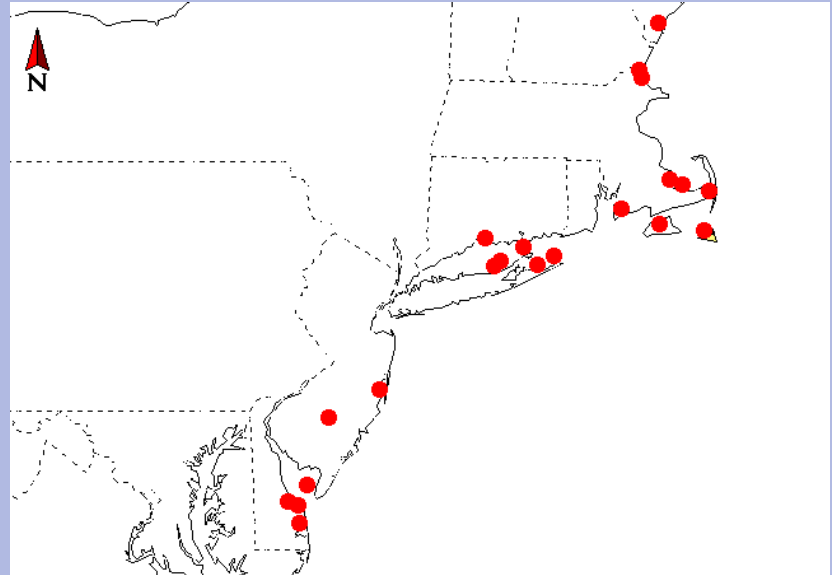
Department of Food Science



- fruit color varied in intensity, hue, and lightness
- pulp yield varied from a low of 81 to a high of 91%
- width ranged from 13.5 mm to 20.8 mm
- soluble solids (Brix) of juice samples ranged from 9.4 to 19.0
- acidity varied from 0.7 to 3.2 % (expressed as citric acid).
- pH values ranged from 3.1 to 4.1
- consistently high in phenolic content and acidity
- antioxidant capacity of water soluble substances fell between 87 and 397 mg per 100 g of fruit, indicating that the beach plums are very good source of antioxidants.

Plant Improvement and Fruit Quality—

- August of 2001
germplasm collection
across the native range
- seed and data from
several plants per site
were collected (142
plants in all)



1-year-old plants were distributed in April 2003

- Cornell University
- Western MD Research & Education Center
- University of Massachusetts
- Connecticut Agricultural Experiment Station
- 2 grower/collaborators

Future Plans-- to evaluate and select beach plum cultivars

- regular bearing
- good fruit quality
- yield well
- disease resistant

Grower Cooperators

Growers meet
with
processors,
researchers,
and industry
leaders on
farms.



<u>CITY</u>	<u>STATE</u>	<u>Number of Plants</u>
El Dorado	KS	100
Nantucket	MA	10
Amherst	MA	20
Plymouth	MA	40
Brewster	MA	40
Brewster	MA	50
Cotuit	MA	100
Siasconset	MA	100
Wareham	MA	200
Cataumet	MA	200
Carver	MA	500
Mattapoisett	MA	500
Rochester	MA	800
West Gardiner	ME	30
Corrolla	NC	30
Westmoreland	NH	50
Cape May Ct. House	NJ	15
W. Cape May	NJ	250
Clinton Corners	NY	10
Appleton	NY	20
Ithaca	NY	20
Trumansburg	NY	25
Dryden	NY	40
Cutchoge	NY	100
Malone	NY	100
Liverpool	NY	100
Rome	NY	100
East Hampton	NY	200
Southampton	NY	200
New Paltz	NY	200
Riverhead	NY	400
Alburg	VT	40
		4590

Active Growers 2005

Double M Farm
Brad Morse
Rochester, MA



Brieremere Farms
Clark McCombe
Riverhead, NY



Long Term Goals

- **Integrate stakeholders into a self-directed consortium** to produce, process and market beach plum fruit with the potential for a sustainable regional market for high value products (2005).
- New sustainable fruit industry (2010).
- Release tested and improved cultivars to member of the consortium (2015).

Yield Potential-- Young Seed-grown Plants

3 year old planting

assume 1 pound per plant

at 800 plants per acre

800 pounds of fruit

5 year old planting

assume 1.5 pounds per plant

at 800 plants per acre

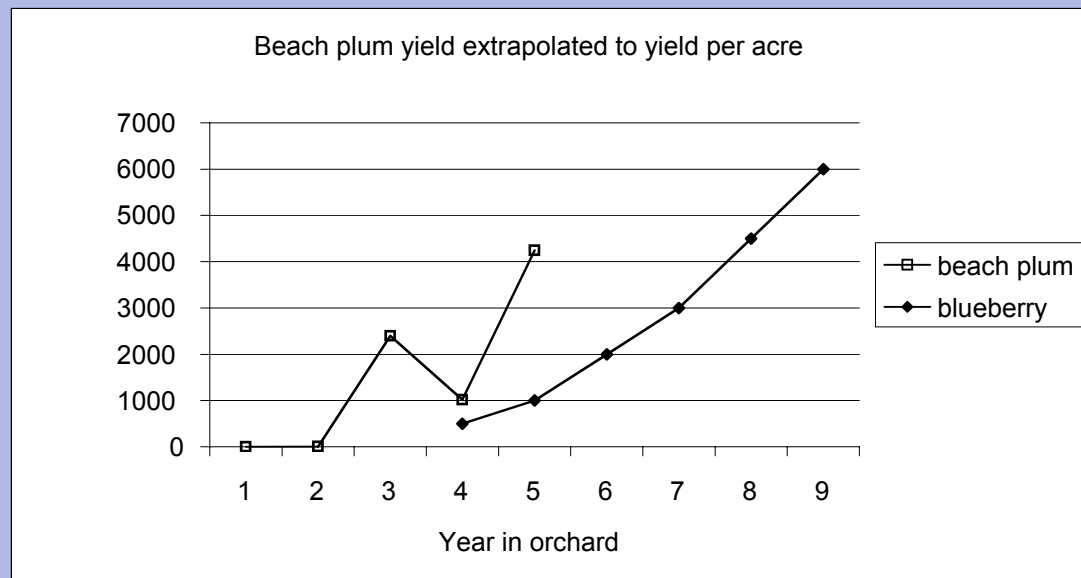
1200 pounds of fruit

Rutgers University Experiment Station
Cream Ridge, NJ
20 year old, wide-spaced planting
100 lbs + per tree



What is the crops ultimate potential?

YIELD OF THE 10 HIGHEST YIELDING PLANTS
EXTRAPOLATED TO POUNDS PER ACRE AND
COMPARED TO TYPICAL BLUEBERRY YIELDS.



Blueberry data from:

Pritts and Hancock, High bush blueberry production guide. NRAES #55.

Conclusions

- a wild collected fruit on the cusp of being agriculture
- beach plum is a stone fruit that can be easily cultured on orchard soil with adequate drainage
- goal is not mass production but a high value product
- growers not large fruit production specialists but diversified retail operation who want something new
- marketing most innovative part of project
- local market, heritage, “terroir” key to success

**“To the student, our native and domestic plum flora will long remain
the most inviting, perplexed and virgin field in American
pomology”**

—*L.H. Bailey, 1898, The Evolution of our Native Fruits*