

# CARROTS FOR WINTER SALES; VARIETIES, PLANTING DATES AND POST- HARVEST CARE

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Vegetable Extension Program



# Expanding Winter Harvest and Sales for New England Vegetable Crops

*3 year project (2010-2013) funded by USDA/Northeast SARE*



## Key Elements of Project

- Using low tunnels
- **Winter storage – infrastructure and crops**
- Winter farmers markets & marketing
- Farmer to Farmers exchange/educational programs
- Website



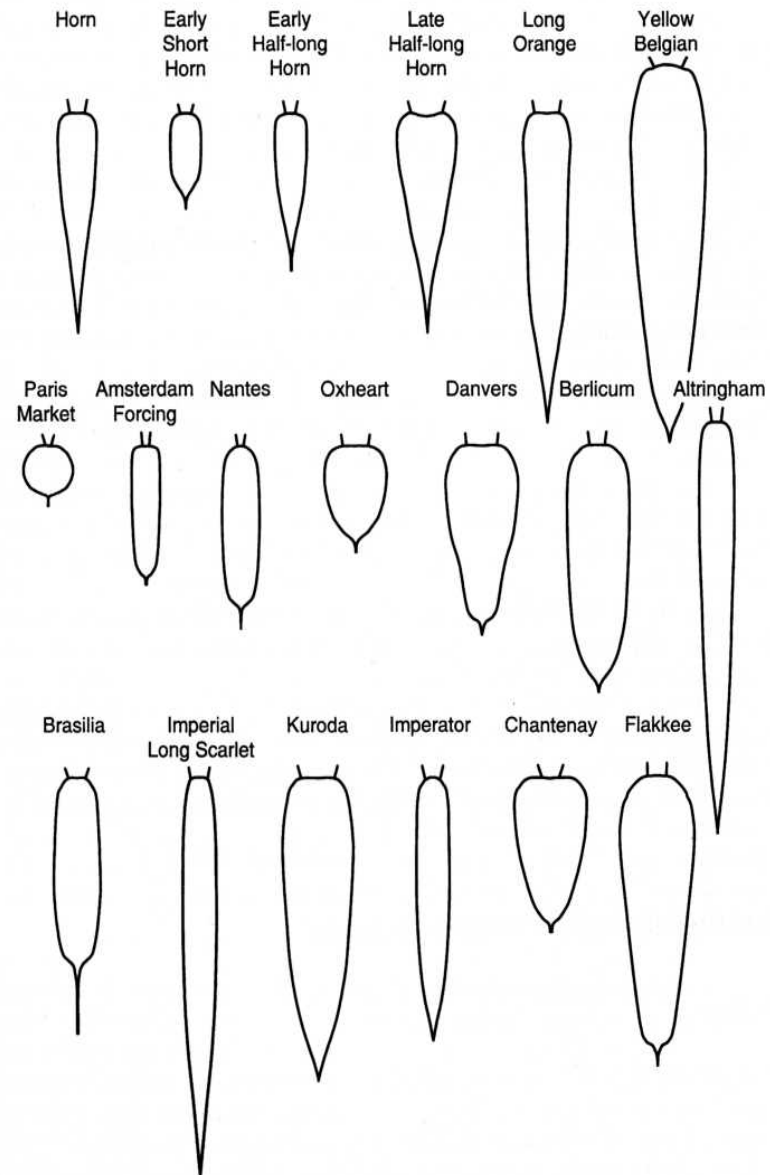
*central goal is to help farmers expand vegetable harvest and sales from December-April, and thereby increasing winter income*

# Why carrots?

- A pre-project survey ('09) confirmed winter production and marketing was increasing in New England in response to consumer demand.
- In follow up surveys carrot was the mostly commonly mentioned root crop.
- Variety, plant date and post harvest handling are major areas of need to increase crop quality at harvest and in storage.



Typical shapes of a diverse collection of carrot cultivars.



# Production statistics

Average price per pound, winter-hardy vegetable crops (all NE)						
	2008	2009	2010	2011	2012	5-year average
beets	\$ 1.20	\$ 1.20	\$ 1.45	\$ 1.50	\$ 1.60	\$ 1.39
cabbage	\$ 0.35	\$ 0.35	\$ 0.35	\$ 0.40	\$ 0.40	\$ 0.37
<b>carrot</b>	<b>\$ 1.00</b>	<b>\$ 1.10</b>	<b>\$ 1.20</b>	<b>\$ 1.50</b>	<b>\$ 1.15</b>	<b>\$ 1.19</b>
cauliflower	\$ 1.70	\$ 1.55	\$ 1.85	\$ 1.55	\$ 1.45	\$ 1.62
onion, dry	\$ 0.75	\$ 1.00	\$ 0.80	\$ 0.80	\$ 1.10	\$ 0.89
rutabaga	\$ 0.75	\$ 0.55	\$ 0.60	\$ 0.60	\$ 1.15	\$ 0.73
spinach	\$ 3.35	\$ 3.05	\$ 3.35	\$ 3.50	\$ 3.50	\$ 3.35

From New England Agricultural Statistics, USDA, New England Fruits and Vegetables 2012 Crop

# 2010 Variety Trial

Variety	Days to maturity	Seed source	Type
Canada	95	Bejo	Chantanay
Carson	90	Bejo	Chantanay
Bastia	85	Bejo	Flakee
Berlanda	86	Bejo	Berlikum
Bolero	75	Johnnys	Nantes
Sugarsnax	68	Johnnys	Imperator

Seeded June 28

Harvest dates;

September 29 (90 days), October 12 (104

days), October 27 (120 days),

November 10 (134 days).

Marketable = USDA Topped Carrots U.S. No.1 and U.S. No.2.

Unmarketable = too small, had insect damage, had splits or forking, were misshapen, or had excessive root growth.



Clean Seeder gear settings: R9, F14 Roller: X12



Carrots were thinned to 1" on July 28<sup>th</sup>

# 2010 Variety Trial

- At harvest measurements included; wholesale marketable weights, number of marketable carrots and culls and Brix score

All carrots were washed by hand in buckets and placed into storage at 32 degrees F and RH>95% in perforated plastic bags immediately after harvest.





Chantenay



Canada

95 Day  
Average Brix score: 7.62



Chantenay



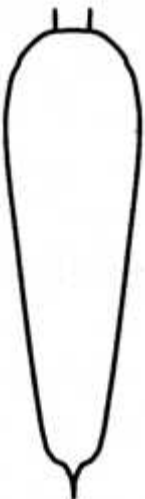
Carson

90 day  
Average Brix score: 8.03





Flakkee



# Bastia

85 day

Average Brix score: 8.03



# Berlanda

85 day

Average Brix score: 7.27

Berlicum





Nantes



# Bolero

75 day

Average Brix score: 7.89



Imperator

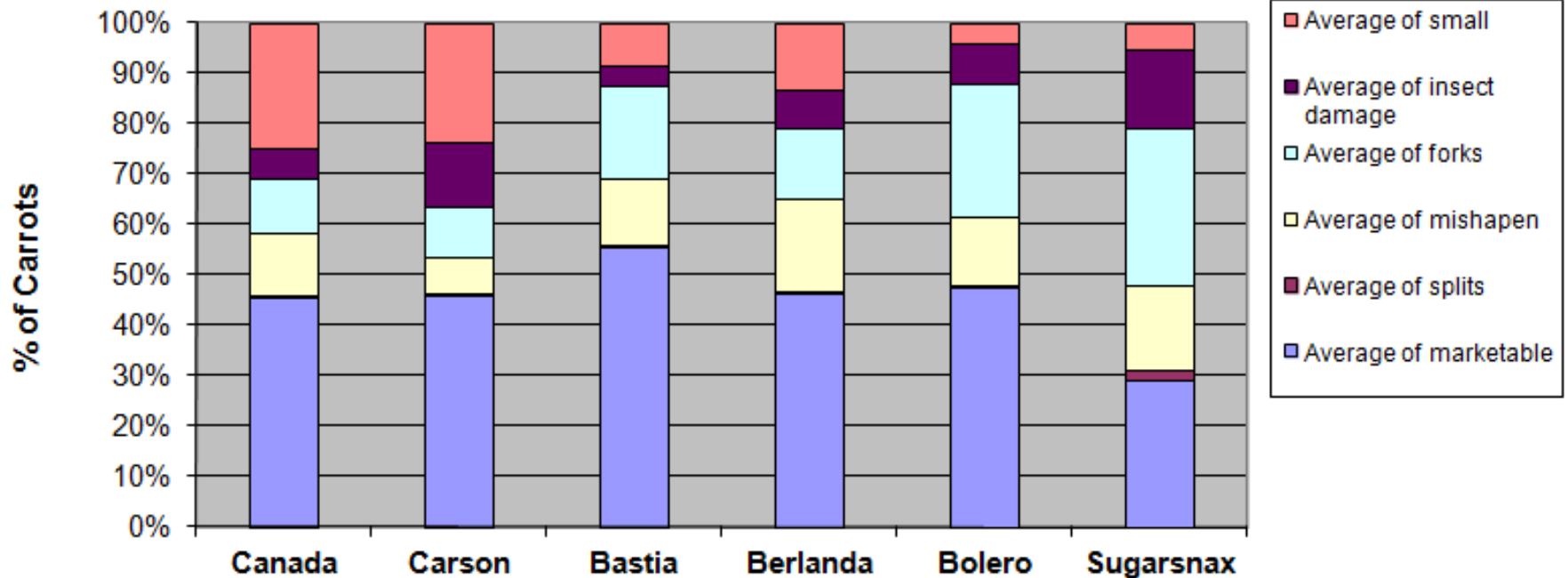


# Sugarsnax

68 day  
Average Brix score: 7.65

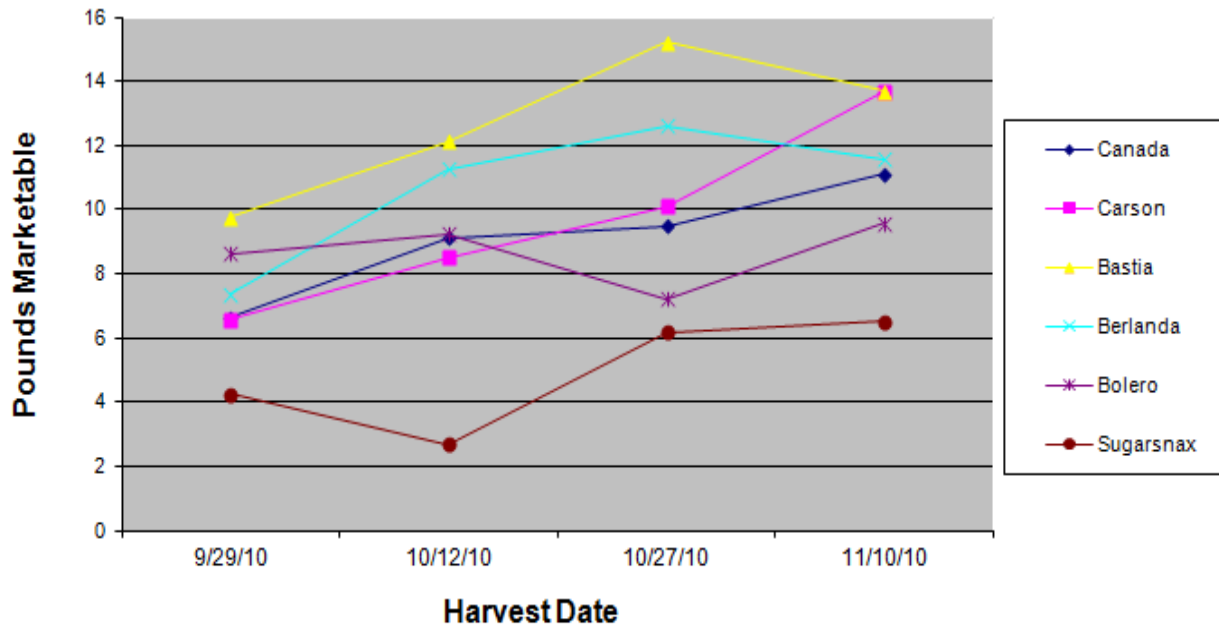
# Overall Harvest Results - 2010

Percent of Carrots (by number) in Each Grading Category  
Avg. of Four Harvest Dates

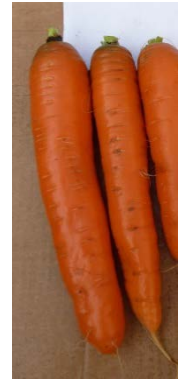


# Marketability - 2010

Weight (lb) of USDA-Grade Marketable Carrots by Cultivar and Harvest Date



Bastia – 54% of the total weight harvested was considered USDA US No. 1



Canada – 53% of the total weight harvested was considered USDA US No. 1



Carson – 53% of the total weight harvested was considered USDA US No. 1



# Brix as a measure of Quality



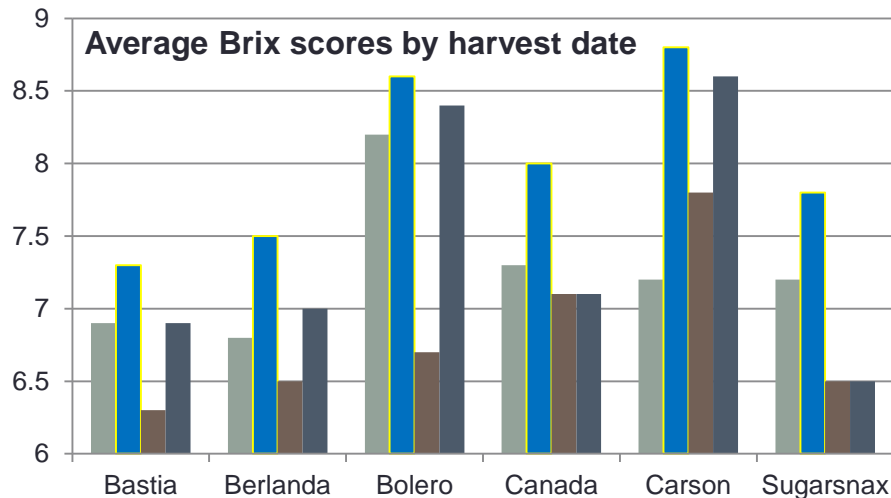
A value of 8-10 Soluble Solids (Brix) is optimal for carrots

Factors that influence Brix values

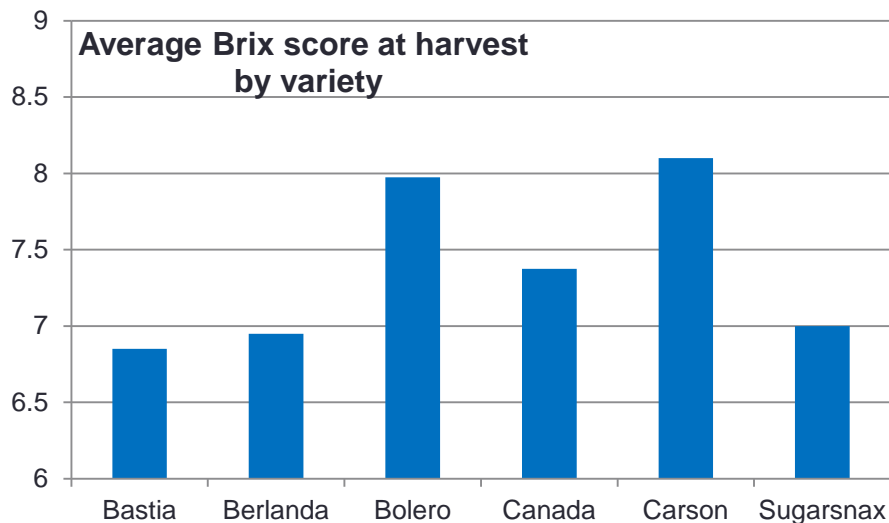
- variety
- maturity
- water
- fertility

Why do we use it?

- Objective inexpensive measurement
- Compare varieties, seasons, harvest dates
- Estimate of sugar content which influences customer acceptability



Brix scores varied over harvest and variety



Variety was most important factor influencing Brix at harvest in 2010

# Postharvest Care

- No more than brief periods below 30°F
- RH >95% (98-100%) in package and/or room
- Ideal T 32°F (0°C) for up to 7 months
- Permeable packaging
- No ethylene producers eg apples

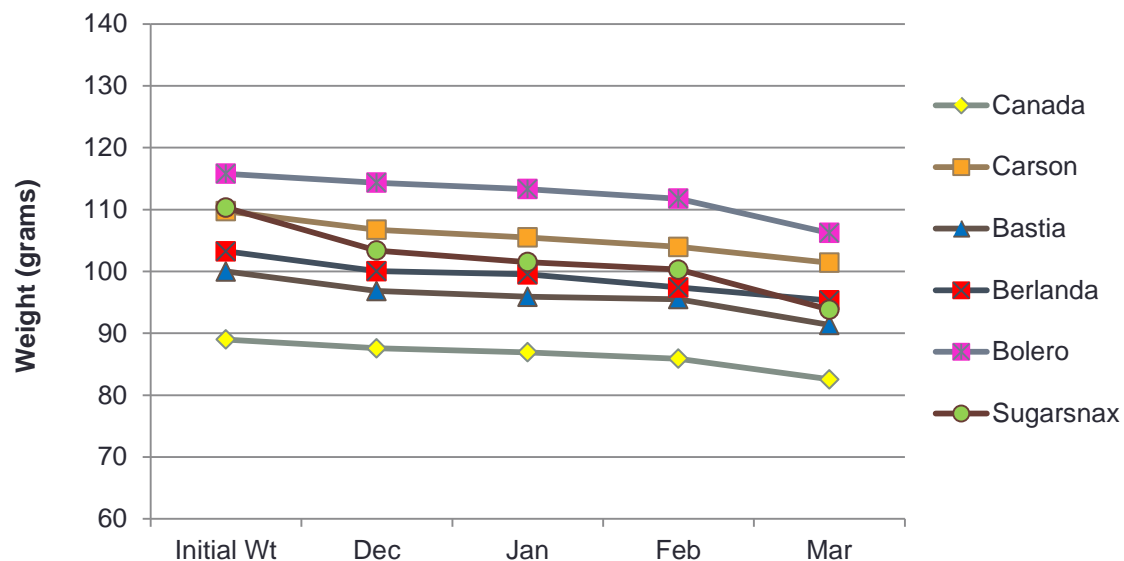




# In storage

## Water Loss in Storage

Harvest 1 - 2010



- Carrots were stored in perforated plastic bags at 32°F 95% RH
- Monthly Brix and water loss measurements were taken December – March
- No significant changes in Brix scores over time

For more details on what happened in storage see Ruth Hazzard's talk *From Field to Storage: High Quality Carrots* – 4:00 today!



# 2011 Variety Trail

Variety	Days to maturity	Seed source	Type
Berlanda	86	Seedway	Berlikum
Brest	90	Seedway	Berlikum
Bolero	85	Seedway	Flakee
Carson	90	Seedway	Chantenay
Deep Purple	80	Seedway, Johnny's	Nantes/Imperator
Florida	95	Seedway	Flakee

Seeded July 26th

Harvest dates;  
November 3 (98 days), November 14 (109 days), November 28 (123 days).

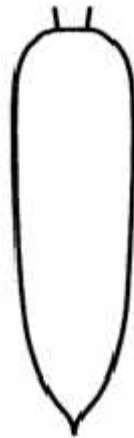
2011  
Same grading standards

Later plant and harvest dates, 3 new varieties, effect of washing on storage life





Berlicum



# Berlanda

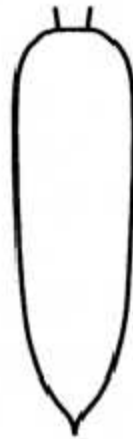
86 day



# Brest

90 day

Berlicum





Nantes



# Bolero

75 day, Nantes type



Chantenay



Carson

90 day



Imperator

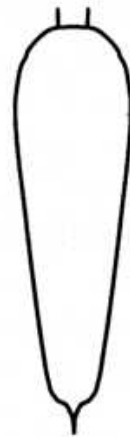


# Deep Purple

80 day



Flakkee



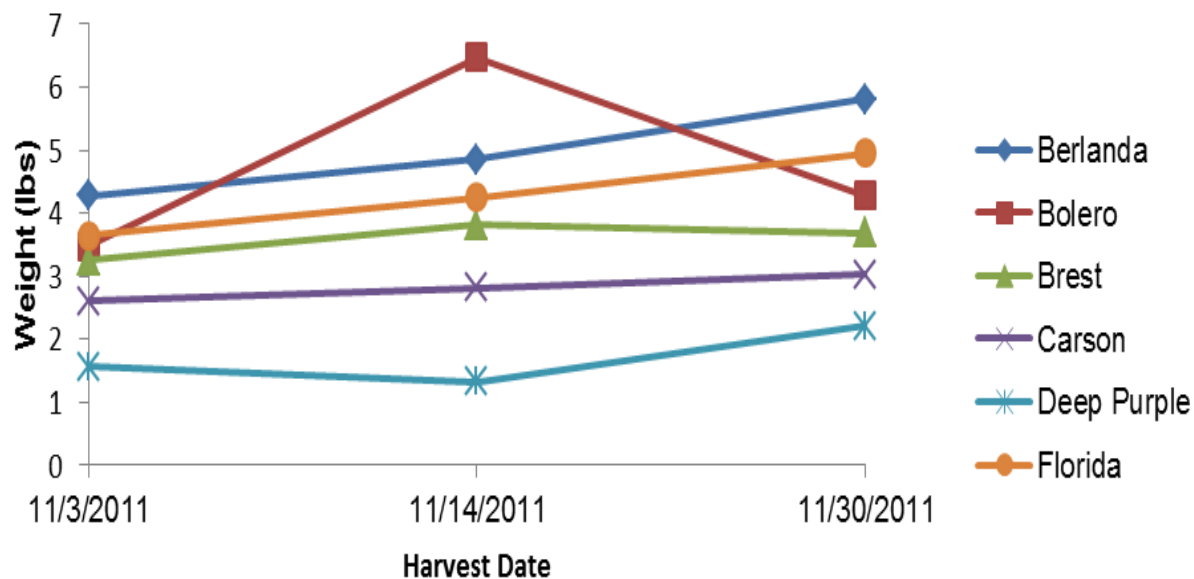
# Florida

95 Day



# Marketable Weight

USDA Marketable Weight by Harvest Date 2011  
(planted July 26)



Berlanda— 48% of the total weight harvested was considered USDA US No. 1



Bolero— 47% of the total weight harvested was considered USDA US No. 1

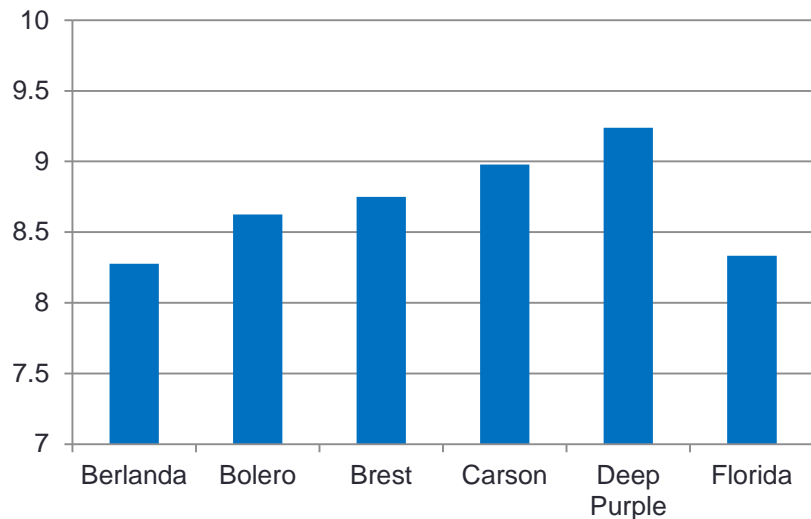


Florida— 46% of the total weight harvested was considered USDA US No. 1

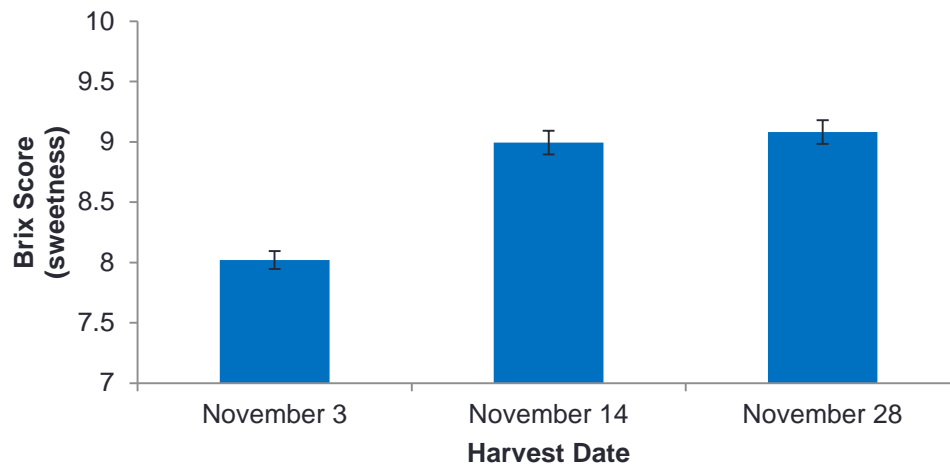


# Brix at Harvest

Average Brix score at harvest by variety

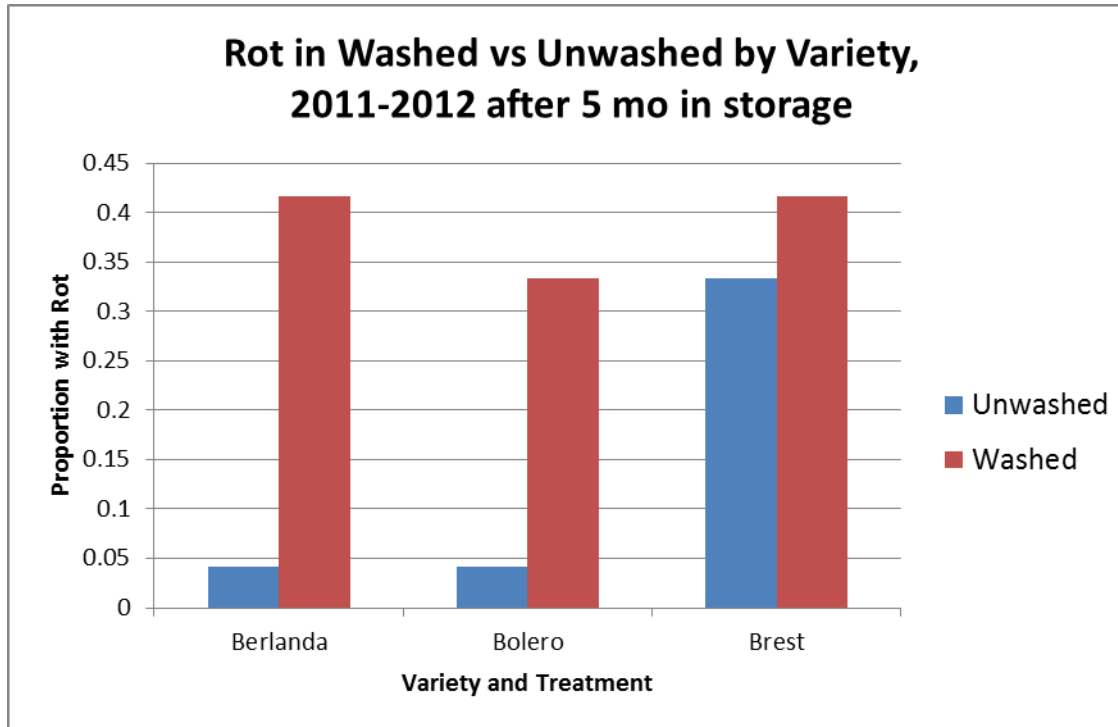


Overall Brix scores by harvest date



Variety and harvest date were significant factors on Brix scores in 2011

# To wash or not to Wash?



Rot was worse on **washed**  
Staining was *slightly* worse  
on **unwashed**



- 3 varieties
  - Berlanda
  - Bolero
  - Brest
- Stored Nov 14 to May 2
- In perforated plastic
- Rot = on root or at base of stem

# Conclusions

- There is a lot one can know about carrots!
- There are lots of varieties suitable for late fall harvest and long term storage. Know your markets.
- Variety has large effect on Brix score at harvest
- Brix values from storage trails were inconsistent – no significant increase or decrease in values seen
- Washed carrots have higher incidence of disease in long term storage

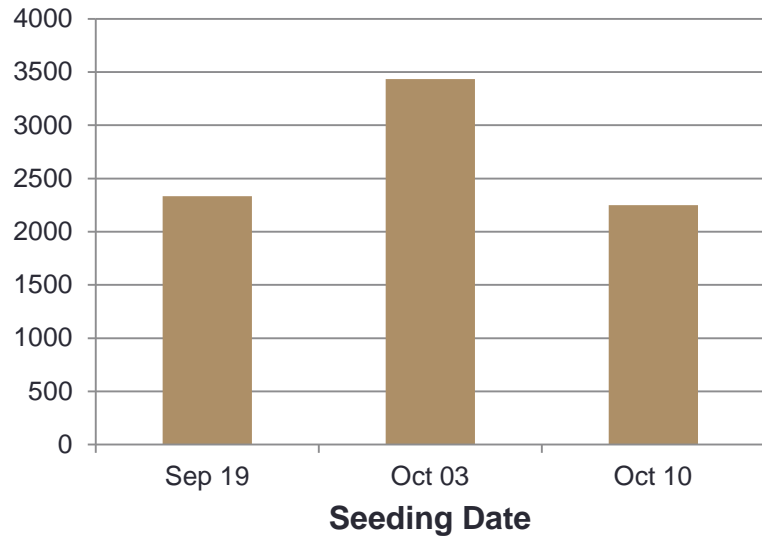
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*From New England  
Agricultural Statistics,  
USDA, New England  
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2012 Crop*

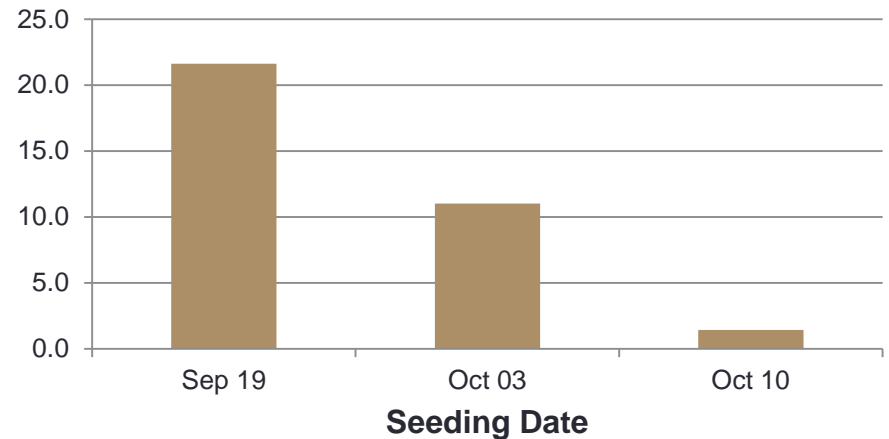
# Next Steps – Low Tunnels?

Evaluate the effect of different seeding dates on the marketable spring yield of carrots, beets, spinach, and kale

Carrots - Harvest Weight (g) on May 22



Carrots - Bolting (%)



More results posted at [www.umassvegetable.org](http://www.umassvegetable.org)

# Special thanks to

- Ruth Hazzard
- Becky Sideman
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- February 13, 2014. Storage Engineering and Design workshop.  
Farmers, Engineers. N. Connecticut
- March 6, 2014, Winter Growing and Marketing  
Publick House, Sturbridge, MA  
Logistics, Storage, Tunnels, and Marketing

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