EVALUATION OF POTENTIAL NEW, SIZE CONTROLLING ROOTSTOCKS FOR EUROPEAN PEARS

Rachel Elkins

University of California Cooperative Extension

Lake & Mendocino Counties

NC-140 REGIONAL RESEARCH PROJECT

- Cooperative testing of rootstocks for apple, cherry, peach, pear, and plum.
- USDA (Hatch Act), North Central Regional Research Association (Multi-State Research Activities); now NIFA
- ***Uniform, replicated trials***: field performance, propagation, breeding/acquisition, physiological stress

NC-140 PEAR TRIAL OBJECTIVES

- Evaluate potential precocious, size-controlling rootstocks for varying locations.
- Evaluate for size, vigor, growth habit, productivity, compatibility with major varieties, susceptibility to diseases and pests, propensity to sucker, etc.
- Select the best potential candidates for future increased propagation and industry use.

NC-140 PROCEDURES

- Randomized Complete Block, 10 single tree replicates per rootstock
- Trials also established in the Northwest in 2005 and 2006
- Rootstock and cultivar selections varied by site, depending on availability and investigator preference
- Data collected 2005-2012: TCSA, height, no. flower clusters (up to 2010), no. fruit, yield, yield efficiency, no. suckers, and % survival

Bartlett: Row 4, August 21, 2012, Talmage, California (8th leaf)

TREE SURVIVAL

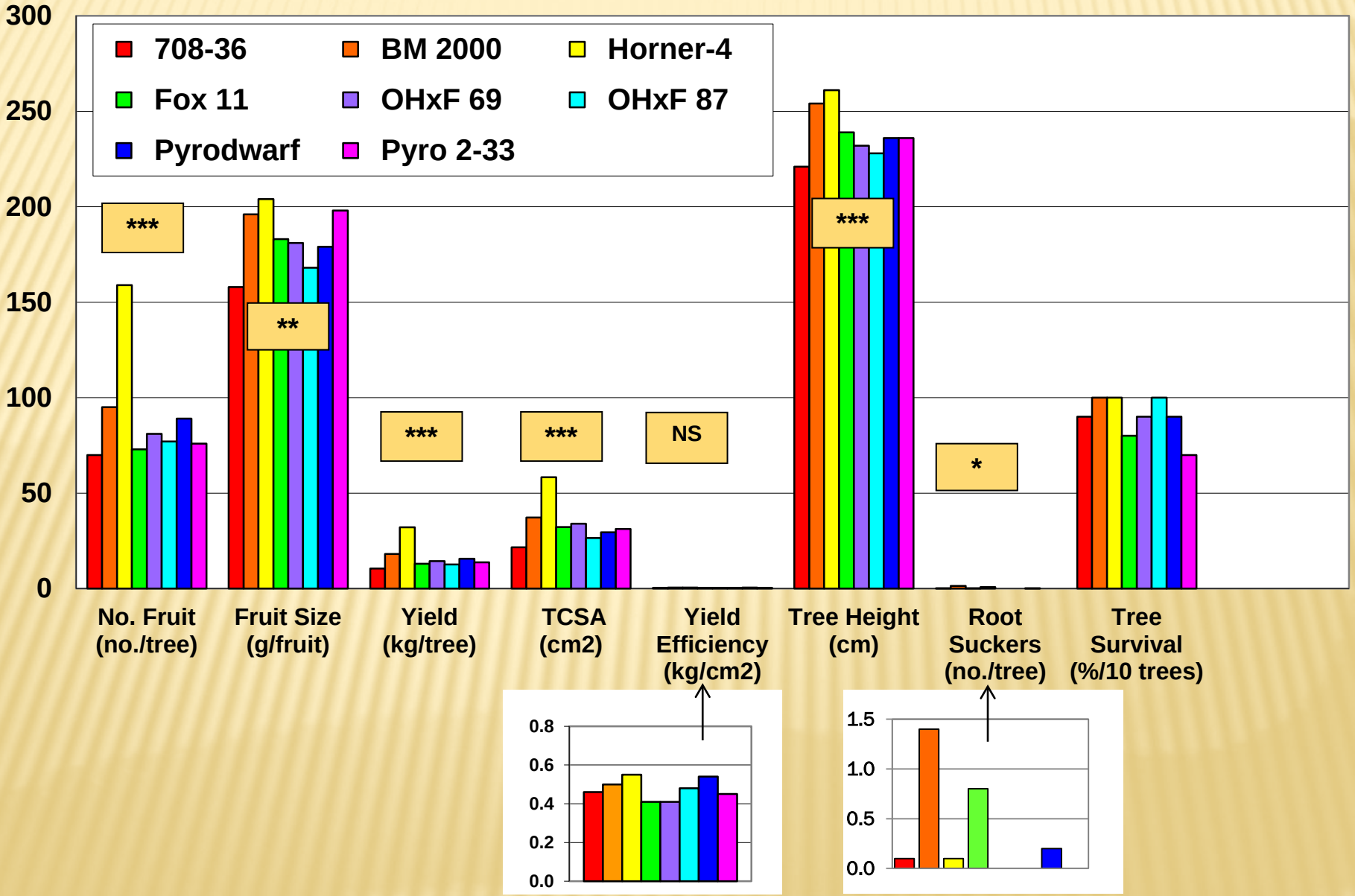
Planted April 20-21, 2005; evaluated fall 2012

Rootstock	Origin	Talmage[1] (Bartlett)	Talmage (GR Bosc)
708-36	UK	90	80
BM 2000	Australia	100	70
Fox 11	Italy	80	60
Horner 4	Hood River, OR	100	100
OHxF 69	Oregon	90	-
OHxF 87	Oregon	100	80
Pyro 2-33	Germany	70	80
Pyrodwarf	Germany	90	90

[1]Cole loam, drained, 5' x 10' spacing

Bartlett Harvest, August 21, 2012 (8TH leaf)
Talmage, Mendocino County

Effects of 2005 NC-140 Rootstocks Planting on tree growth, suckering, and harvest of 7-year-old (8th leaf) Bartlett Pear Trees, Talmage, Mendocino County, California, 2012



Bartlett Pears, Talmage, Mendocino County
August 2012 (8th leaf)

Horner 4 (8th leaf)

Pyrodwarf (8th leaf)

Bartlett Pears, Talmage, Mendocino County
August 2012 (8th leaf)

OHxF 69 (8th leaf)

OHxF 87 (8th leaf)

NC-140 Bartlett HARVEST, Talmage, 2012

	Firmness 8/30-31/2012 (kg of force)	Brix 8/30-31/2012 (degrees)
ROOTSTOCK		
708-36	*7.9 a*	15.1 ab
BM 2000	7.3 ab	13.7 b
Horner-4	6.9 b	13.7 b
Fox 11	7.4 ab	15.2 ab
OHxF 69	7.7 ab	*15.6 a*
OHxF 87	7.4 ab	15.0 ab
Pyrodwarf	7.6 ab	15.6 a
Pyro 2-33	7.6 ab	14.0 ab
ANOVA		
Rootstock	* (0.03)	** (0.01)
Block	** (0.01)	NS (0.63)

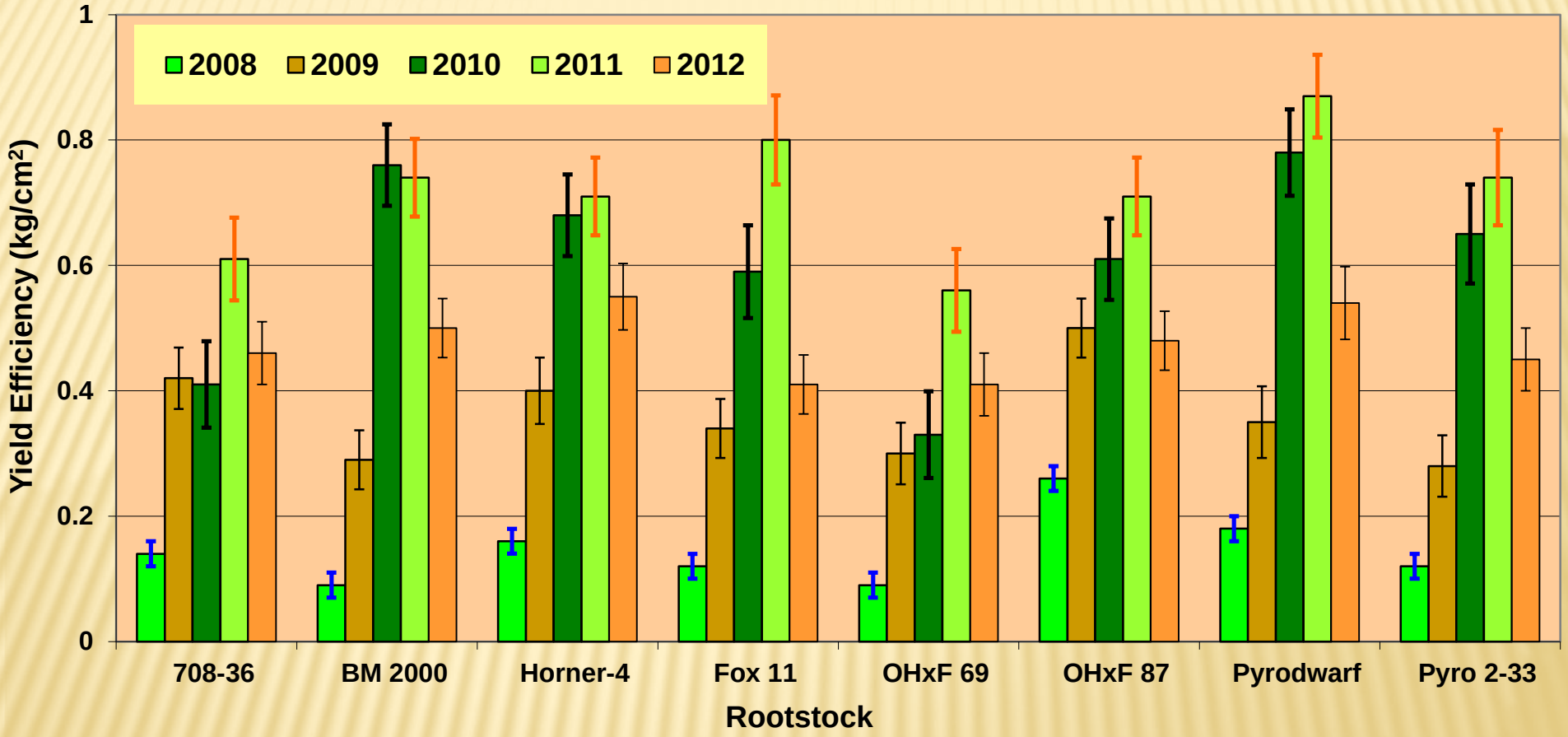
Harvest date: 8/21/2012

Bartlett, Talmage, Cumulative (2005-2012)

	Tree Survival (%)	Average Fruit Size (g)	Average Cumulative Yield (lb.)	2012 TCSA (cm^2)	Average Cumulative Yield Efficiency (kg/cm2)	Root Suckers[5] (cum. no./tree)
ROOTSTOCK						
708-36	90	159 c	82c	21.6 d	1.68 ab	0.3 ab
BM 2000	100	173 abc	142 b	34.2 b	1.75 ab	2.7 ab
Horner 4	100	189 a	252 a	58.3 a	1.97 a	0.2 ab
Fox 11	80	178 abc	122 bc	32.2 bc	1.75 ab	3.1 a
OHxF 69	90	157 c	108 bc	34.0 bc	1.40 b	1.9 ab
OHxF 87	100	161 c	113 bc	26.5 cd	1.95 a	0.3 ab
Pyrodwarf	90	162 bc	135 b	29.5 bcd	2.11 a	0.0 b
Pyro 2-33	70	185 ab	119 bc	31.2 bc	1.71 ab	0.0 b
ANOVA						
Rootstock	NS (0.28)	*** (<0.001)	*** (<0.001)	*** (<0.001)	** (0.003)	** (0.005)
Block	NS (0.56)	** (0.005)	** (0.002)	* (0.03)	NS (0.10)	NS (0.27)

Mean Yield Efficiency in Bartlett pears

Talmage, California, 2008 - 2012.



ANOVA	2008	2009	2010	2011	2012
Rootstock	***	*	***	*	NS
Block	NS	NS	NS	NS	NS

Each bar is mean ± standard error.

NC-140 GOLDEN RUSSET BOSC
Talmage, 2012

	Tree Survival 9/13/12 (%/ 10 trees)	No. Fruit 9/13/12 (no./tree)	Fruit Size 9/13/12 (g/fruit)	Root Suckers 10/12/12 (no./tree)
ROOTSTOCK				
708-36	80	57	141 c	0.2 ab
BM 2000	70	42	193 a	0.7 a
Horner-4	100	42	173 ab	0.2 ab
Fox 11	60	50	183 ab	0.0 b
OHxF 87	80	55	149 bc	0.0 b
Pyrodwarf	90	54	163 abc	0.0 b
Pyro 2-33	80	59	157 bc	0.0 b
ANOVA				
Rootstock (P-value)	-----	NS (0.68)	*** (<0.001)	NS (0.17)
Block (P-value)	-----	NS (0.64)	** (0.003)	NS (0.78)

GOLDEN RUSSET BOSC - 2012

	Yield 9/13/12 (lb/tree)	TCSA 10/12/12 (cm^2)	Yield Efficiency 10/12/12 (kg/cm^2)	Tree Height 10/12/12 (cm)
ROOTSTOCK				
708-36	17	34.5 b	0.24	245 ab
BM 2000	18	48.8 ab	0.18	253 ab
Horner-4	16	62.0 a	0.13	260 a
Fox 11	19	48.6 ab	0.20	248 ab
OHxF 87	18	37.9 b	0.23	228 b
Pyrodwarf	19	46.4 ab	0.20	241 ab
Pyro 2-33	20	42.4 b	0.23	233 b
ANOVA				
Rootstock (P-value)	NS (0.94)	** (0.002)	NS (0.15)	** (0.003)
Block (P-value)	NS (0.41)	* (0.02)	NS (0.29)	NS (0.32)

GOLDEN RUSSET BOSC - 2012

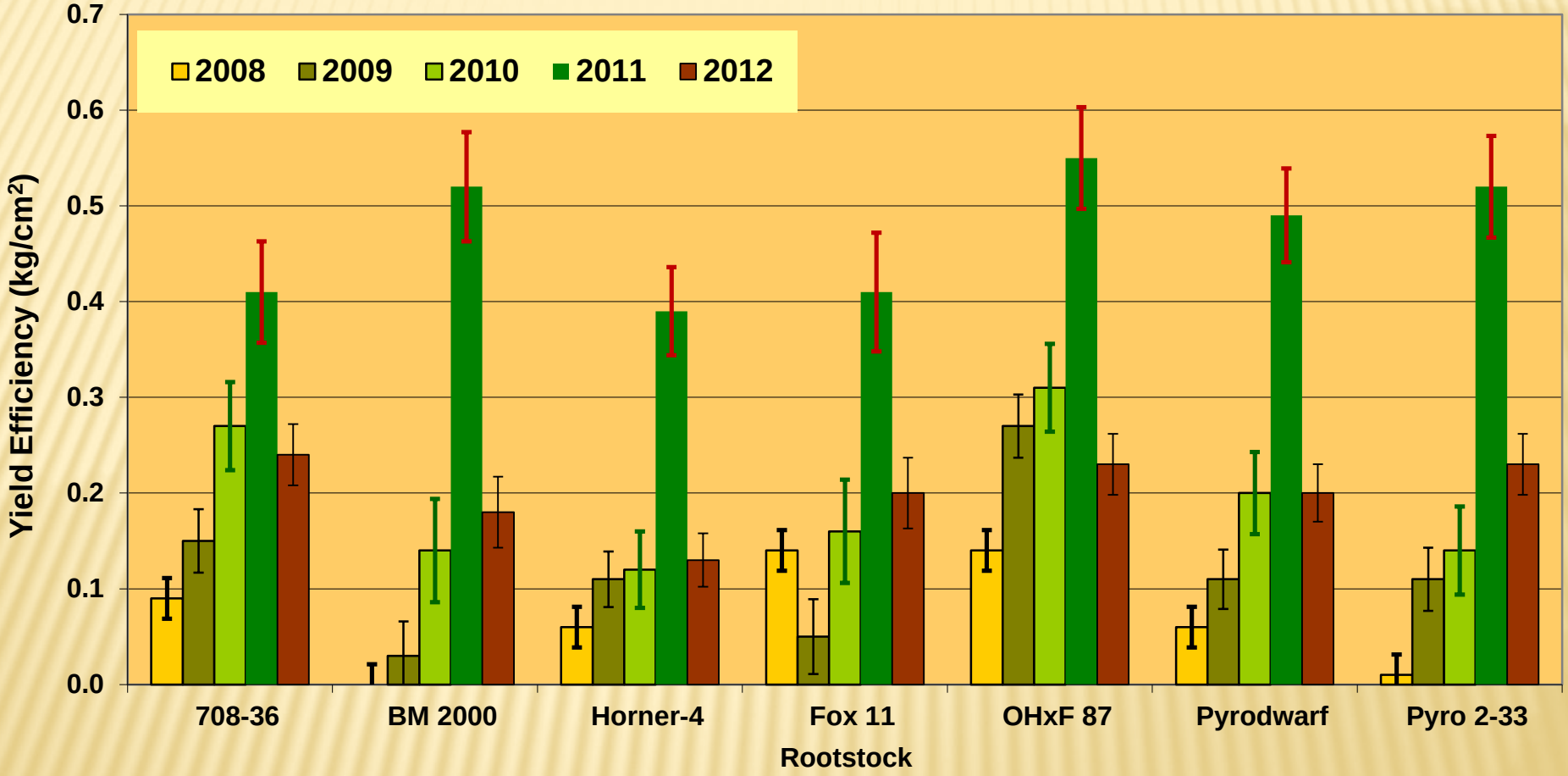
	Firmness 9/14/2012 (kg of force)	Brix 9/14/2012 (degrees)
ROOTSTOCK		
708-36	7.7 ab	14.3 ab
BM 2000	7.9 ab	14.6 ab
Horner-4	7.5 b	14.0 b
Fox 11	7.3 b	14.4 ab
OHxF 87	8.9 a	15.6 a
Pyrodwarf	7.7 ab	15.6 a
Pyro 2-33	7.0 b	15.3 ab
ANOVA		
Rootstock	** (0.01)	** (0.01)
Block	*** (0.001)	NS (0.07)

Harvest date: 9/13/2012

GOLDEN RUSSET BOSC – 2005-2012

	Tree Survival (%)	Average Fruit Size (g/fruit)	Average Cumulative Yield (lb.)	TCSA (2012) (cm^2)	Average Cumulative Yield Efficiency (kg/cm^2)	Root Suckers (Cum. no./tree)
ROOTSTOCK						
708-36	80	150	60	34.5 b	0.75 ab	0.4
BM 2000	70	140	34	48.8 ab	0.36 bc	1.5
Horner 4	100	169	43	62.0 a	0.33 c	1.5
Fox 11	60	157	49	48.6 ab	0.45 abc	0.3
OHxF 87	80	171	72	37.9 b	0.80 a	0.0
Pyrodwarf	90	172	51	46.4 ab	0.51 abc	0.0
Pyro 2-33	80	147	39	42.4 b	0.44 abc	0.0
ANOVA						
Rootstock	NS (0.41)	NS(0.35)	NS (0.21)	** (0.002)	*** (0.001)	NS (0.39)
Block	NS (0.43)	NS(0.12)	NS (0.71)	** (0.01)	NS (0.97)	NS (0.64)

GOLDEN RUSSET BOSC
YIELD EFFICIENCY 2008 - 2012



ANOVA	2008	2009	2010	2011	2012
Rootstock	NS	***	*	NS	NS
Block	NS	NS	NS	NS	NS

Each bar is mean ± standard error.

NC-140 Bosc OHxF 87 (2-5-2013)

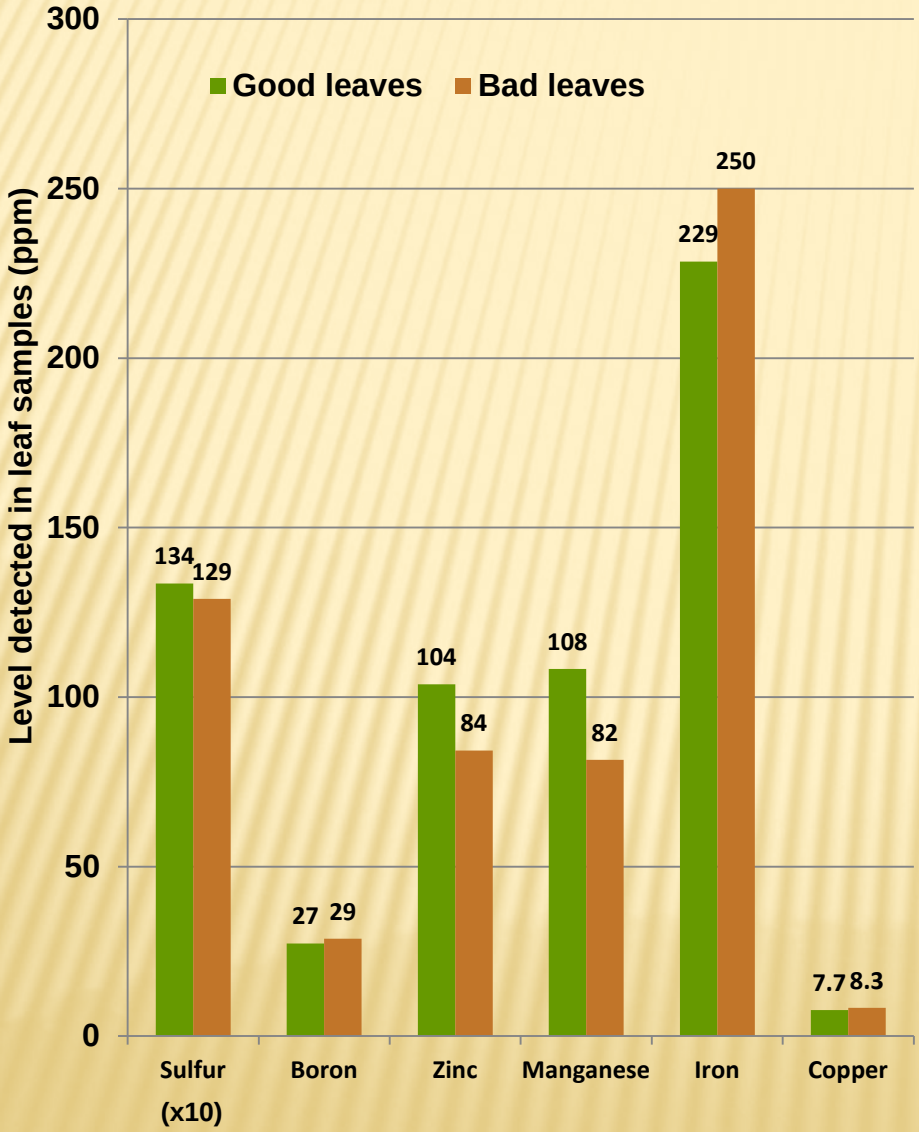
NC-140 Bosc Row (2-5-2013)

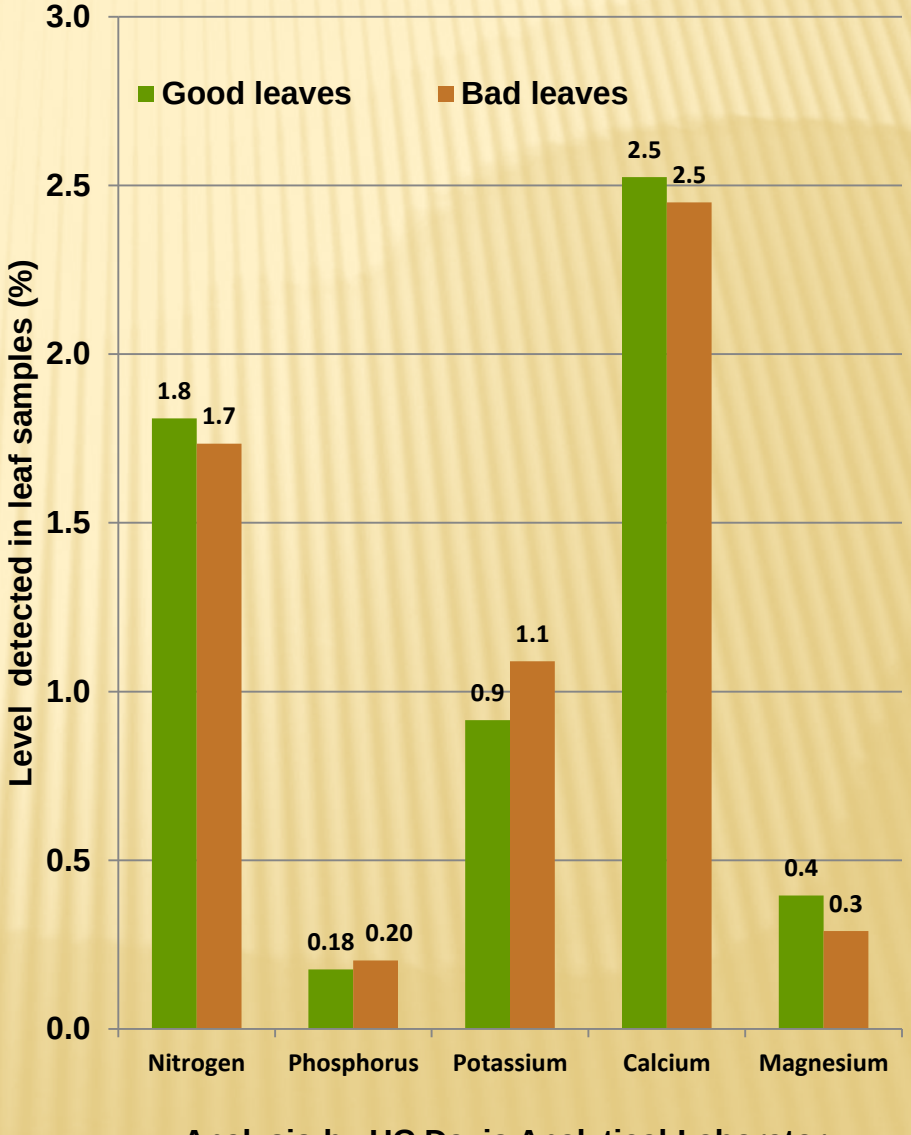
Bosc Pears, Talmage, Mendocino County
February 2013 (8th leaf)

Horner 4

Pyro 2-33

Analysis of Bosc Pear Leaves, Talmage, Mendocino County – (10-2-2012)





Analysis by UC Davis Analytical Laboratory

NEW 2012 TRIALS – NOT NC-140

- March: *Amelanchier* (serviceberry) *spp*. (A2, A7, A10); plus Quince Eline. Each w/6 cultivars, separate blocks:
  Bartlett, BPM, Comice, Forelle, Golden Russet Bosc, Super Red (5 single tree reps per block (20 trees))
- May: Bartlett on OHxF 69, 87 and 97. Design: RCB with five replicates (four trees each)
- Both trials: 4' x 20', north to south berms, microsprinklers, trained into "informal" perpendicular "V"
- Survival and growth data to commence winter 2012
- 2013: Systems trial, Hopland: Bartlett, 3 rootstocks, 3 systems, 3 spacings.

AMELANCHIER AND OHXF PLANTING MARYSVILLE, 2012

QUINCE ELINE VERSUS *AMELANCHIER*

ACKNOWLEDGEMENTS

- Chris and Matt Ruddick, Talmage, Mendocino County
- John Callis and Balthazar Teyes (Naumes), Marysville
- Chuck Fleck and John Ireland of Fowler Nurseries, Inc., Newcastle, CA
- Dave Weil (Tree Connection/Varieties Int'l)
- Steve Castagnoli, Todd Einhorn and Gene Mielke, Oregon State University
- Mike Brown, Nicole Gentry, Sarah Johnson, Jim Nosera, Gabriele O'Neill, Makaila Rodrigues, Becky Suenram, Carolyn Shaffer
- California Pear Advisory Board
- Travel expenses to the NC140 meetings are partially funded by Agricultural Experiment Station (Hatch Act) Regional Research funds through the UC Davis Department of Plant Sciences

THANK YOU!!