Tree Spacing for Satsuma

Trifoliate orange 15’ x 20’ = 145 trees/acre

Swingle 20’ x 25’ = 87 trees/acre

Flying Dragon 10’ x 17’ = 256 trees/acre or 8’ x 15’ = 363 trees/acre

Advantages of close spacing include increased yield per acre and frost protection efficiency


Leafminer

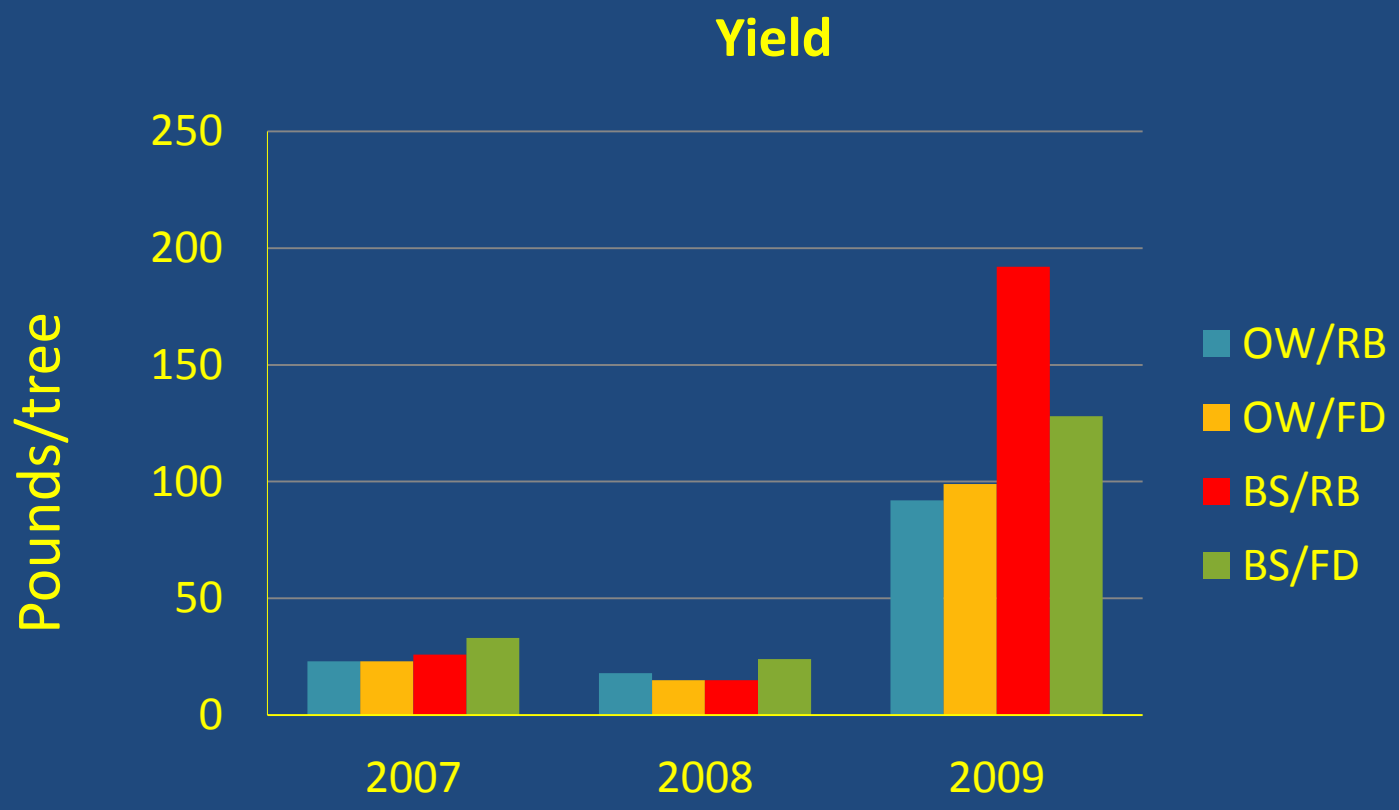
Irrigation requirements

- Young trees: 5 to 10 gallons every 1 or 2 days.
- Mature trees: 50 to 100 gallons every week.

Owari Satsuma

Brown Select Satsuma

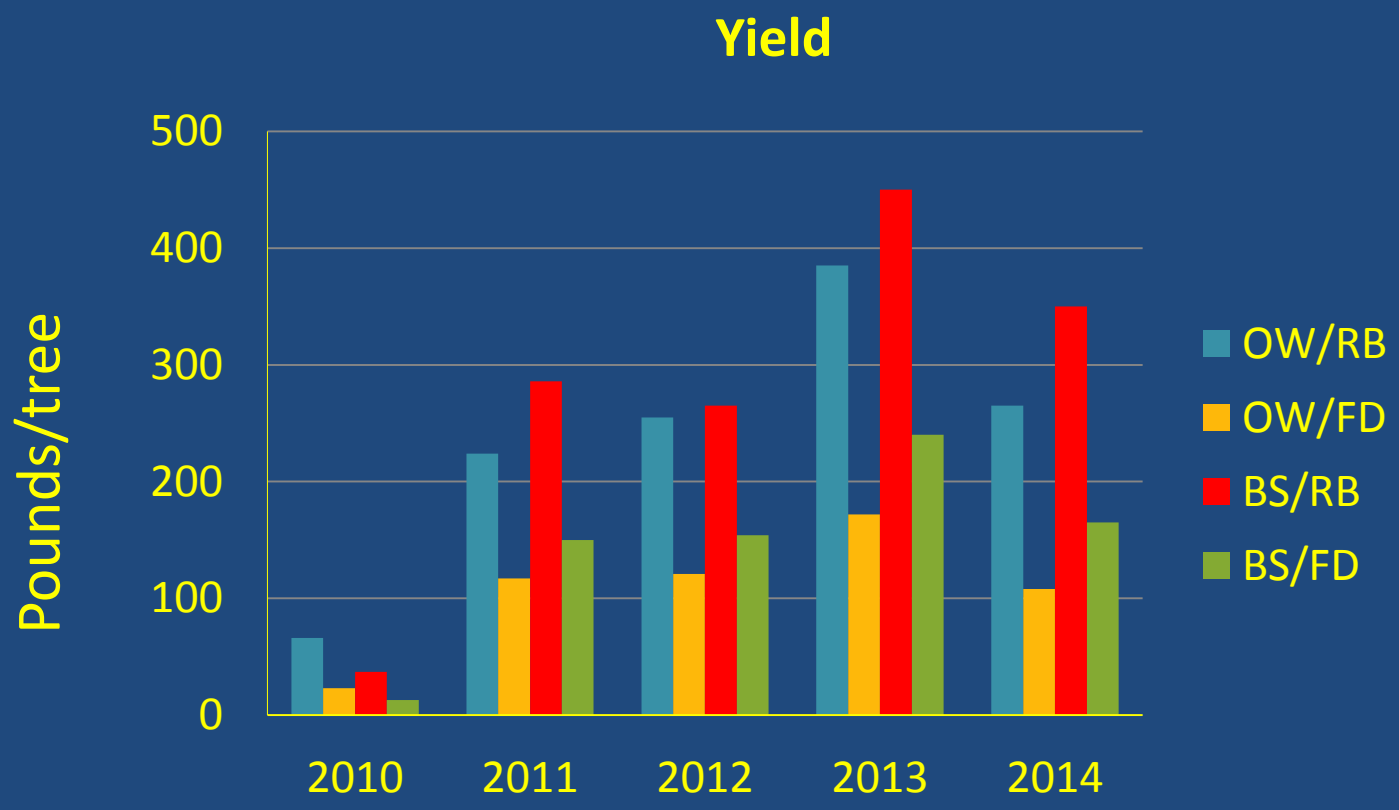
Xie Shan Satsuma


Yield
Pounds/tree
250
200
150
100
50
0
2007
2008
2009
OW/RB
OW/FD
BS/RB
BS/FD

Yield (pounds/tree)

Statistics	**2007**	**2008**	**2009**
Scion	NS	NS	* * *
Rootstock	NS	NS	* *
Scion*Rootstock	NS	NS	NS

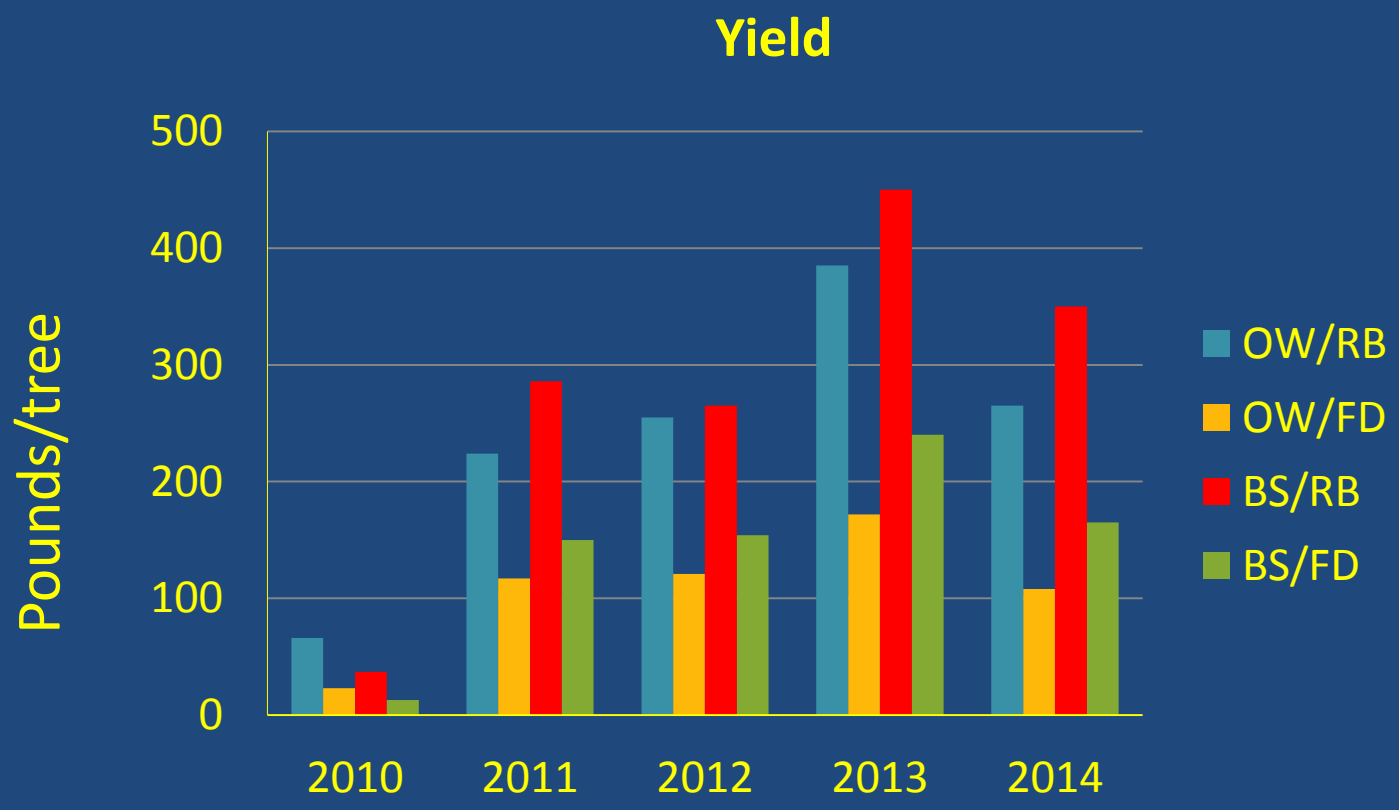
NS=not significant, * = *P* <0.05, ** = *P* <0.01, *** = *P* < 0.001

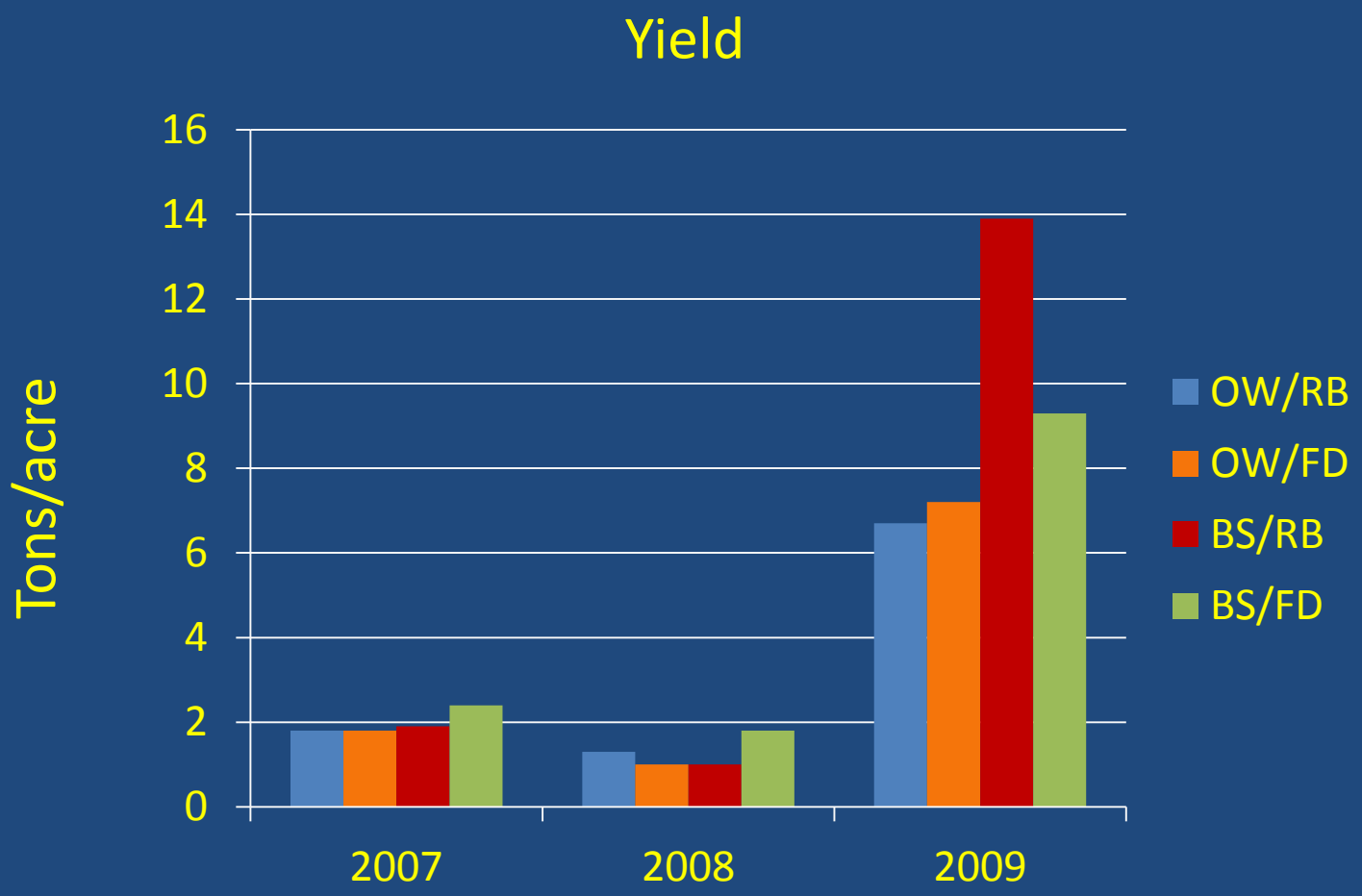

Yield
Pounds/tree
500
400
300
200
100
0
2010
2011
2012
2013
2014
OW/RB
OW/FD
BS/RB
BS/FD

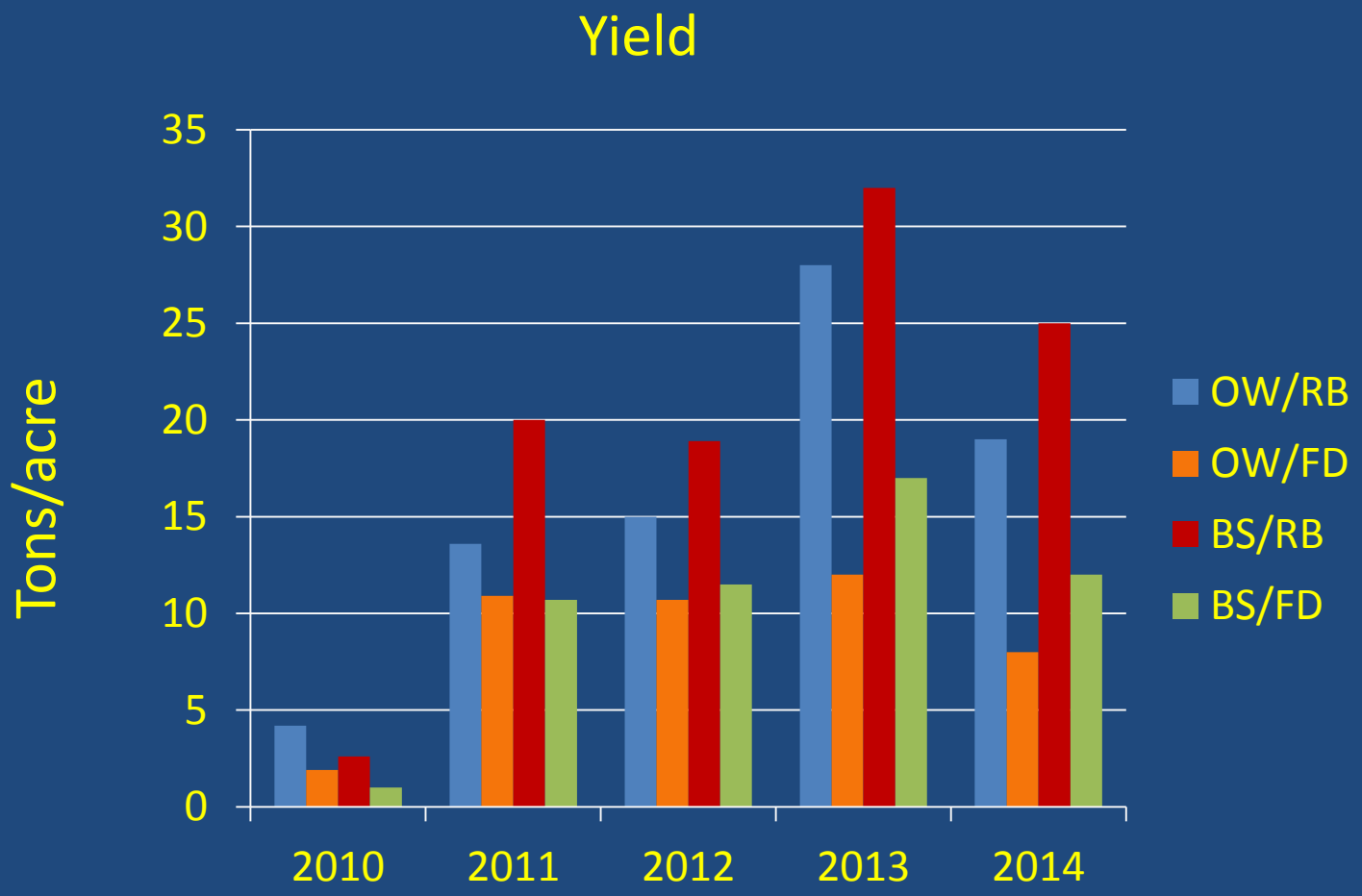
Yield (pounds/tree)

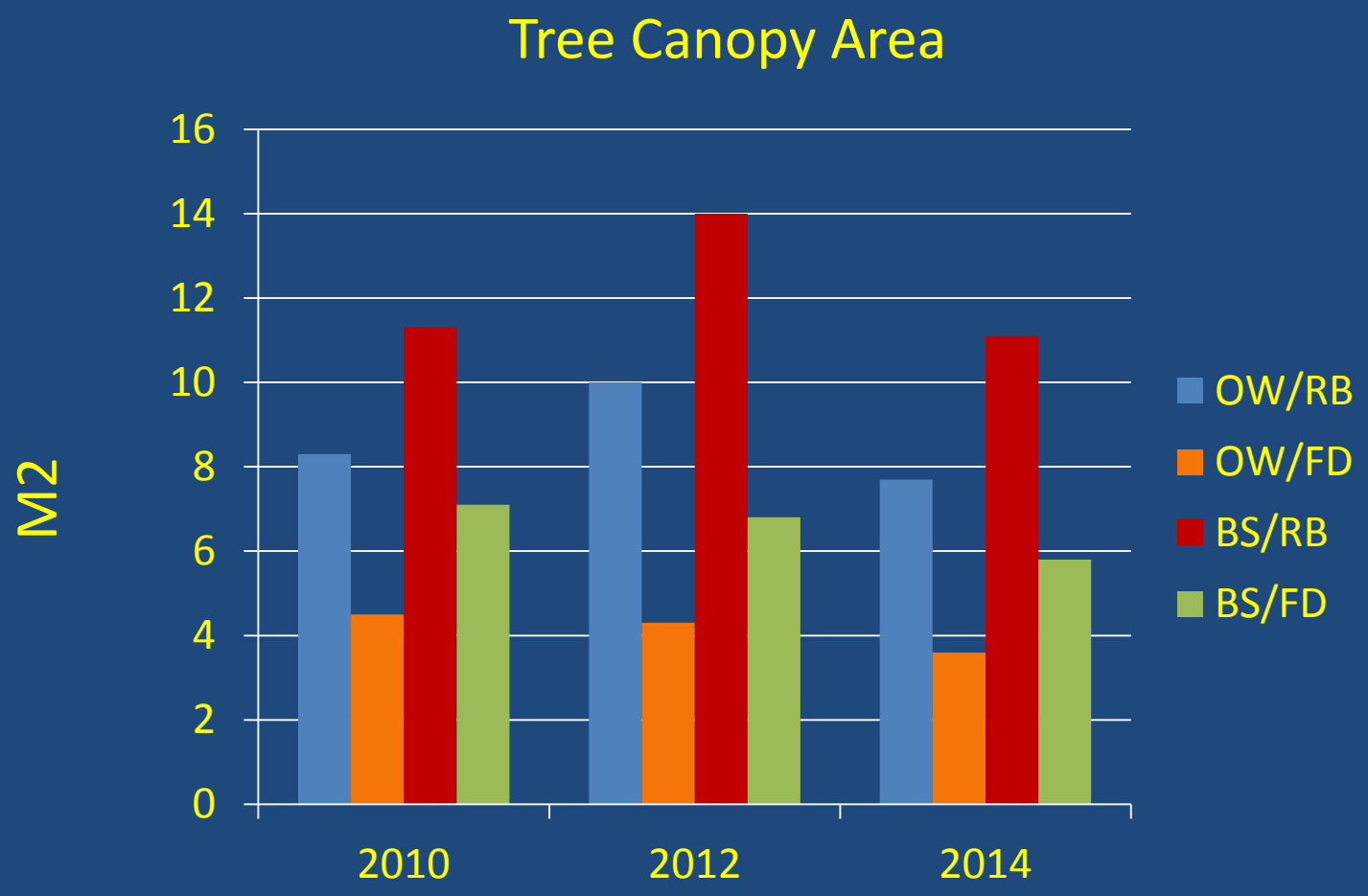
Statistics	**2010**	**2011**	**2012**	**2013**	**2014**
Scion	*	*	NS	**	* *
Rootstock	***	***	***	***	***
Scion*Root stock	NS	NS	NS	NS	NS

NS=not significant, * = P <0.05, ** = P <0.01, *** = P < 0.001


Yield
Pounds/tree
500
400
300
200
100
0
2010
2011
2012
2013
2014
OW/RB
OW/FD
BS/RB
BS/FD


Yield
Tons/acre
16
14
12
10
8
6
4
2
0
2007
2008
2009
OW/RB
OW/FD
BS/RB
BS/FD

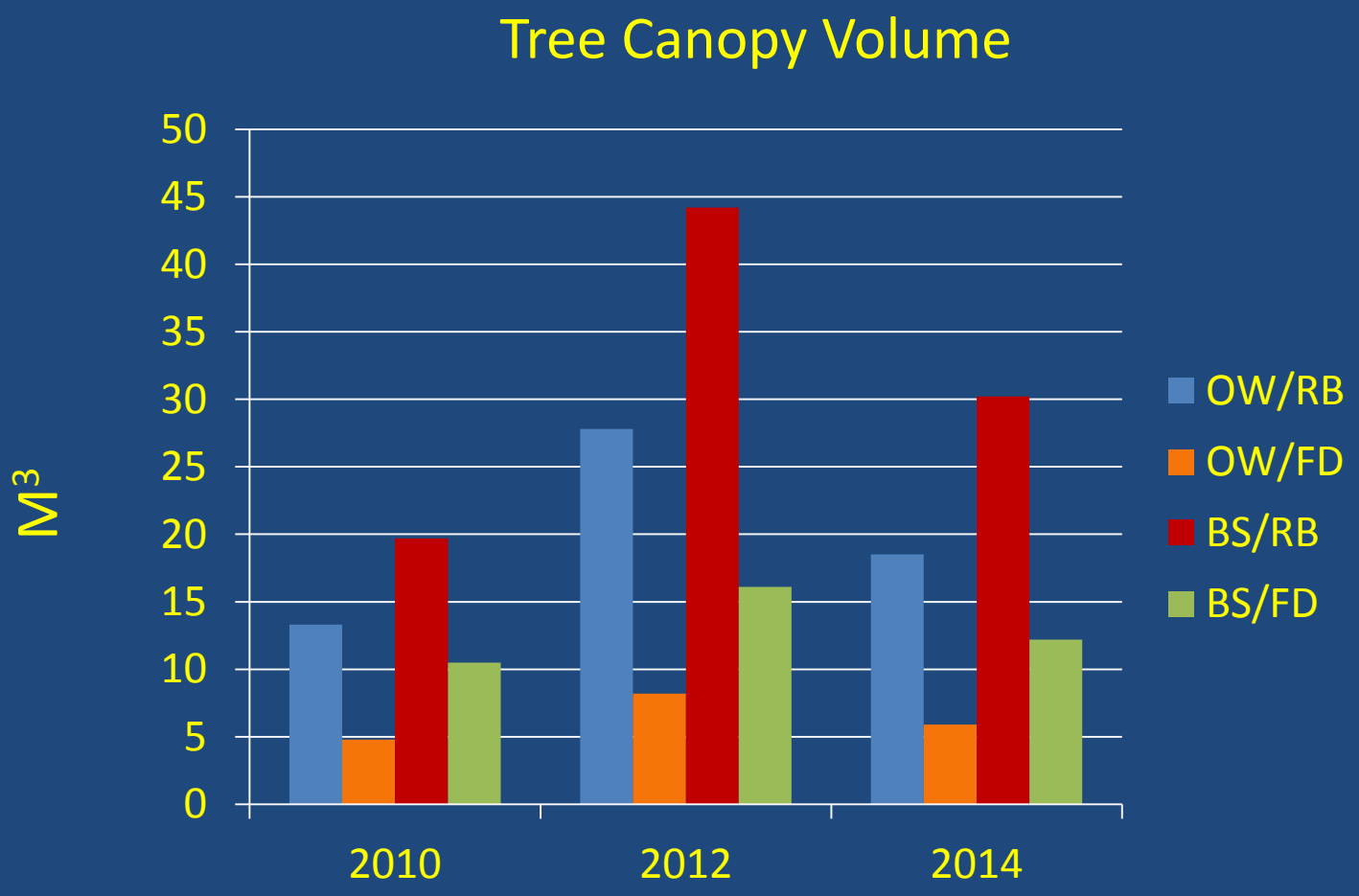

Yield
Tons/acre
35
30
25
20
15
10
5
0
2010
2011
2012
2013
2014
OW/RB
OW/FD
BS/RB
BS/FD


Tree Canopy Area
M2
16
14
12
10
8
6
4
2
0
2010
2012
2014
OW/RB
OW/FD
BS/RB
BS/FD

Tree Canopy Area (m^2)

Statistics	**2010**	**2012**	**2014**
Scion	***	***	* * *
Rootstock	***	***	***
Scion*Rootstock	NS	NS	NS

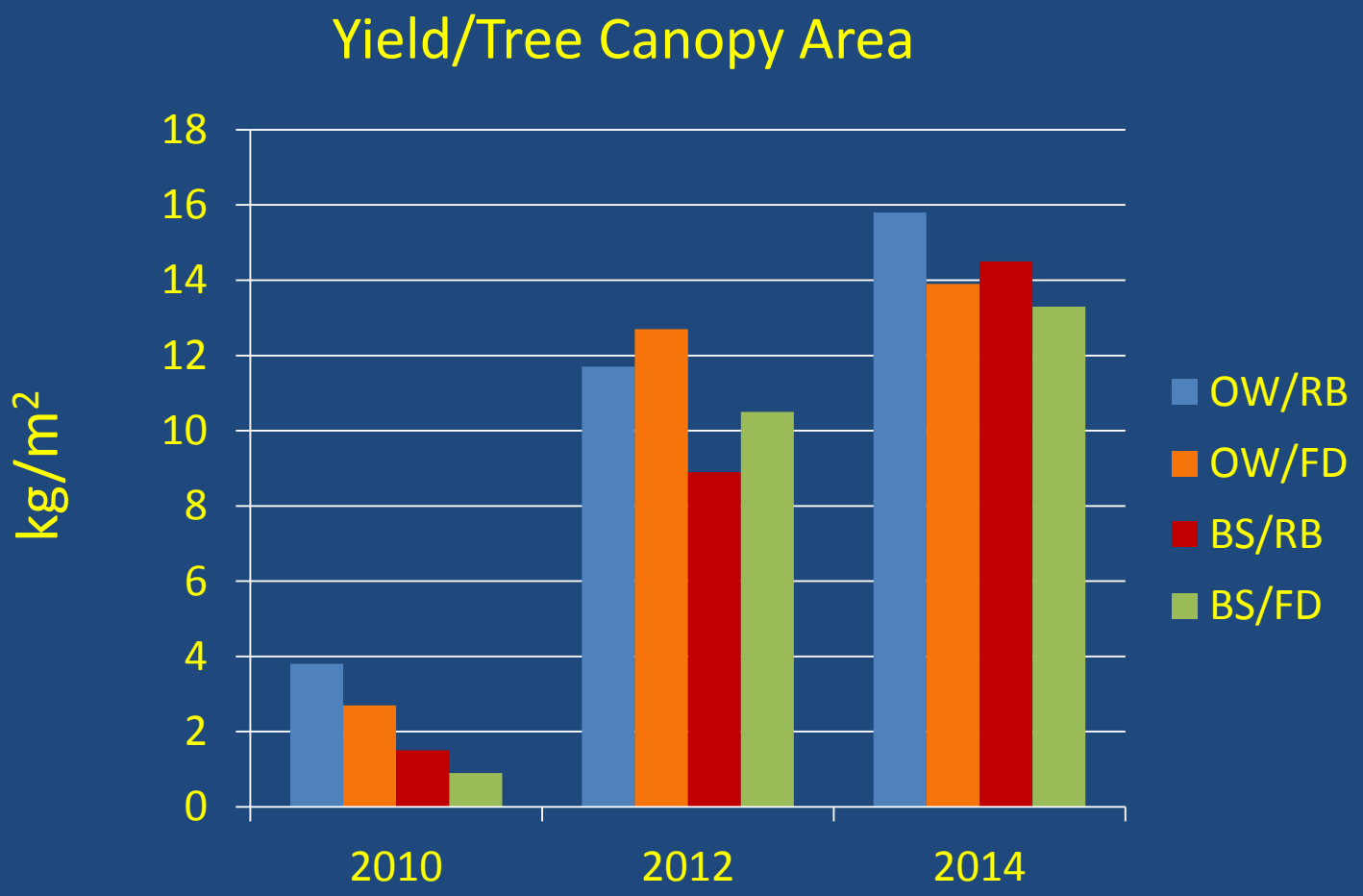
NS=not significant, * = P <0.05, ** = P <0.01, *** = P < 0.001


Tree Canopy Volume
M3
50
45
40
35
30
25
20
15
10
5
0
2010
2012
2014
OW/RB
OW/FD
BS/RB
BS/FD

Tree Canopy Volume (m^3)

Statistics	**2010**	**2012**	**2014**
Scion	***	***	* * *
Rootstock	***	***	***
Scion*Rootstock	NS	NS	NS

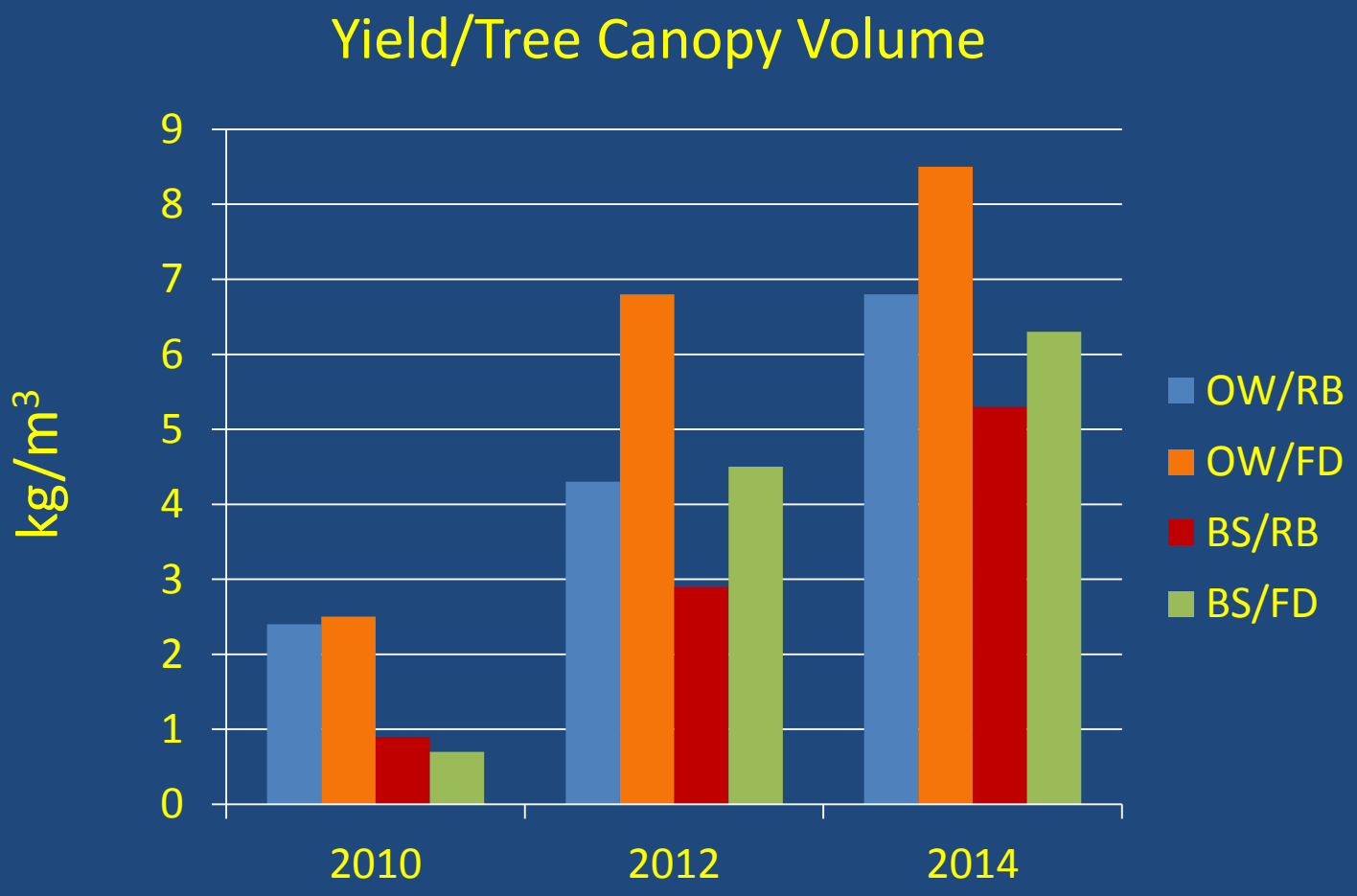
NS=not significant, * = P <0.05, ** = P <0.01, *** = P < 0.001


Yield/Tree Canopy Area
kg/m2
18
16
14
12
10
8
6
4
2
0
2010
2012
2014
OW/RB
OW/FD
BS/RB
BS/FD

Yield/Tree Canopy Area (lb/m^2)

Statistics	**2010**	**2012**	**2014**
Scion	**	NS	NS
Rootstock	NS	**	NS
Scion*Rootstock	NS	NS	NS

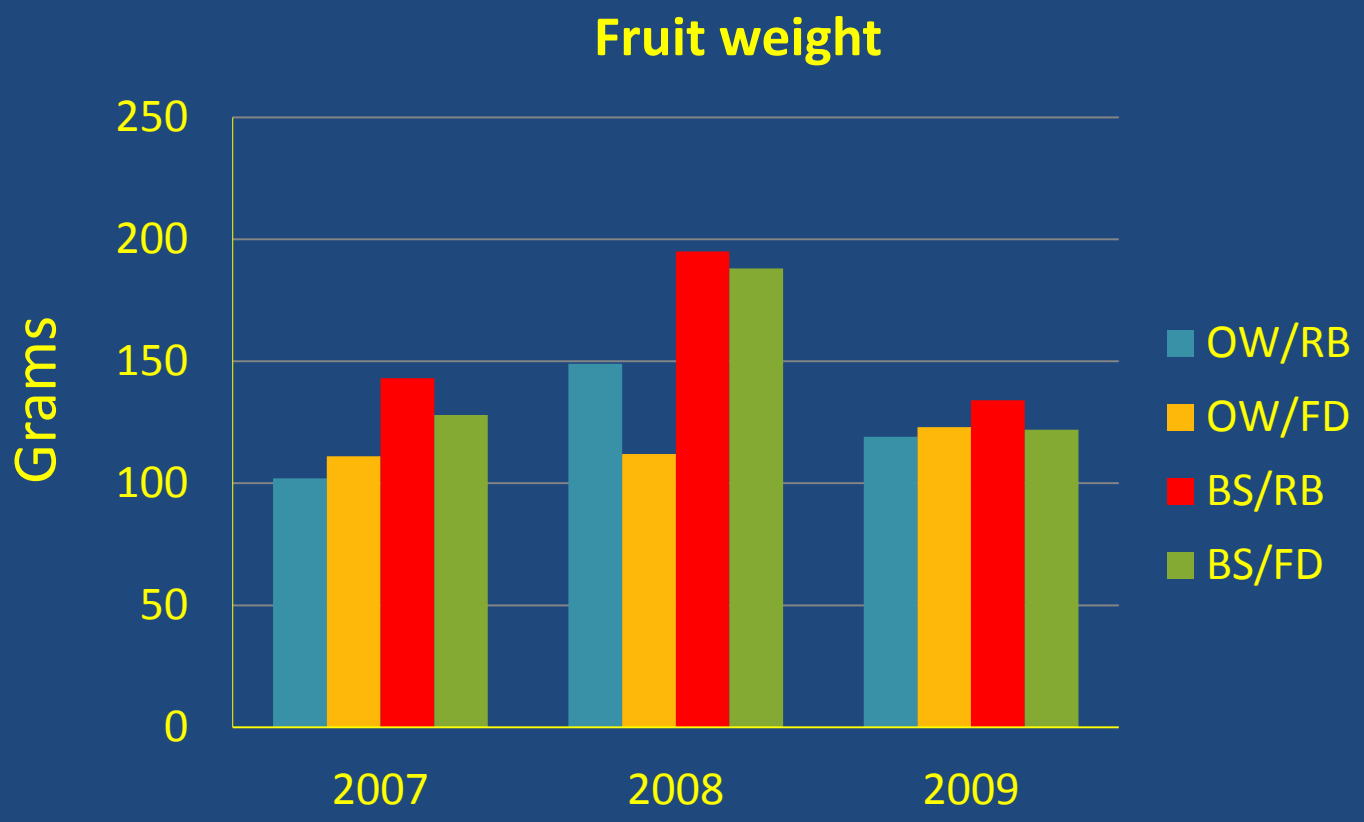
NS=not significant, * = P <0.05, ** = P <0.01, *** = P < 0.001


Yield/Tree Canopy Volume
kg/m3
9
8
7
6
5
4
3
2
1
0
2010
2012
2014
OW/RB
OW/FD
BS/RB
BS/FD

Yield/Tree Canopy Volume (lb/m^3)

Statistics	**2010**	**2012**	**2014**
Scion	**	***	**
Rootstock	NS	***	*
Scion*Rootstock	NS	NS	NS

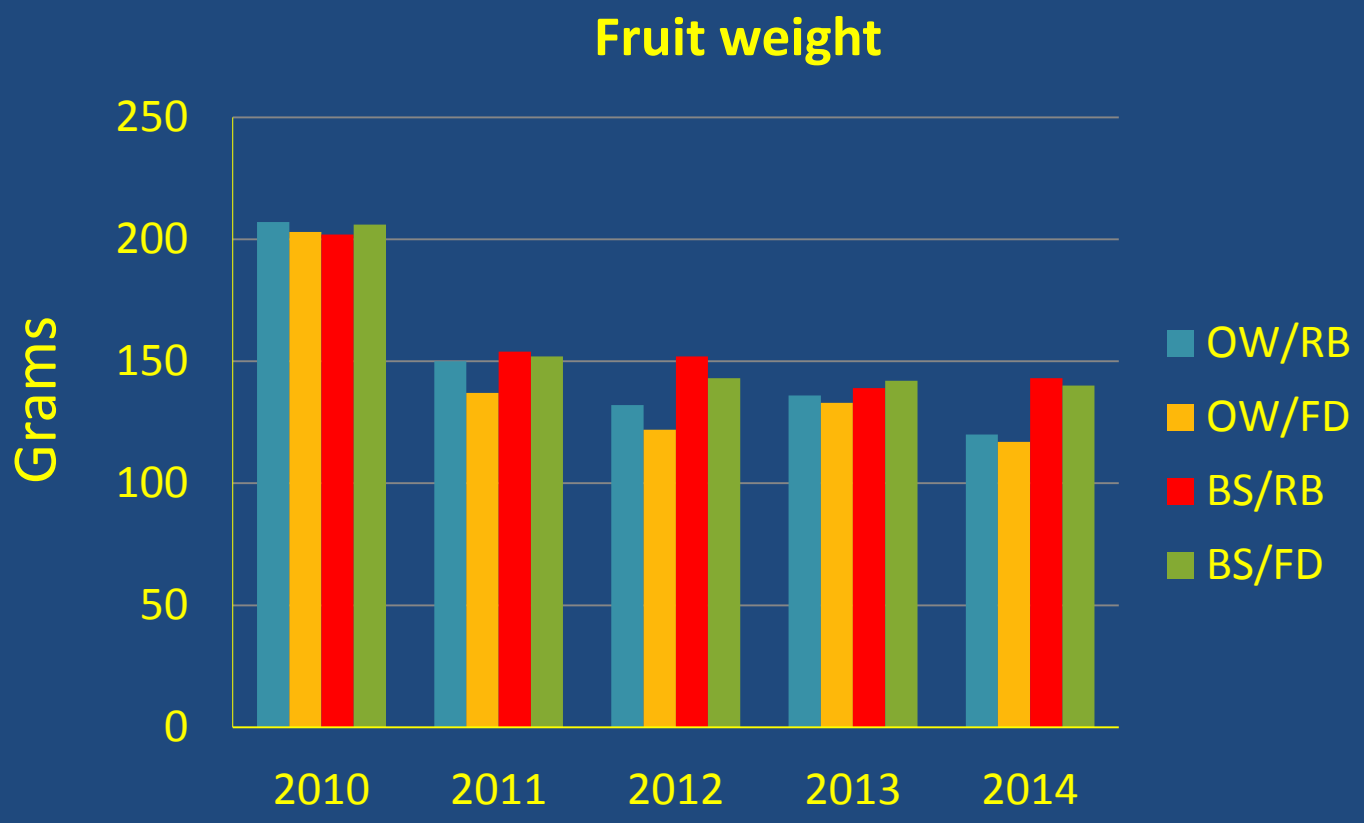
NS=not significant, * = P <0.05, ** = P <0.01, *** = P < 0.001


Fruit weight
Grams
250
200
150
100
50
0
2007
2008
2009
OW/RB
OW/FD
BS/RB
BS/FD

Fruit weight (g)

Statistics	**2007**	**2008**	**2009**
Scion	* * *	*	*
Rootstock	NS	NS	NS
Scion*Rootstock	NS	NS	* * *

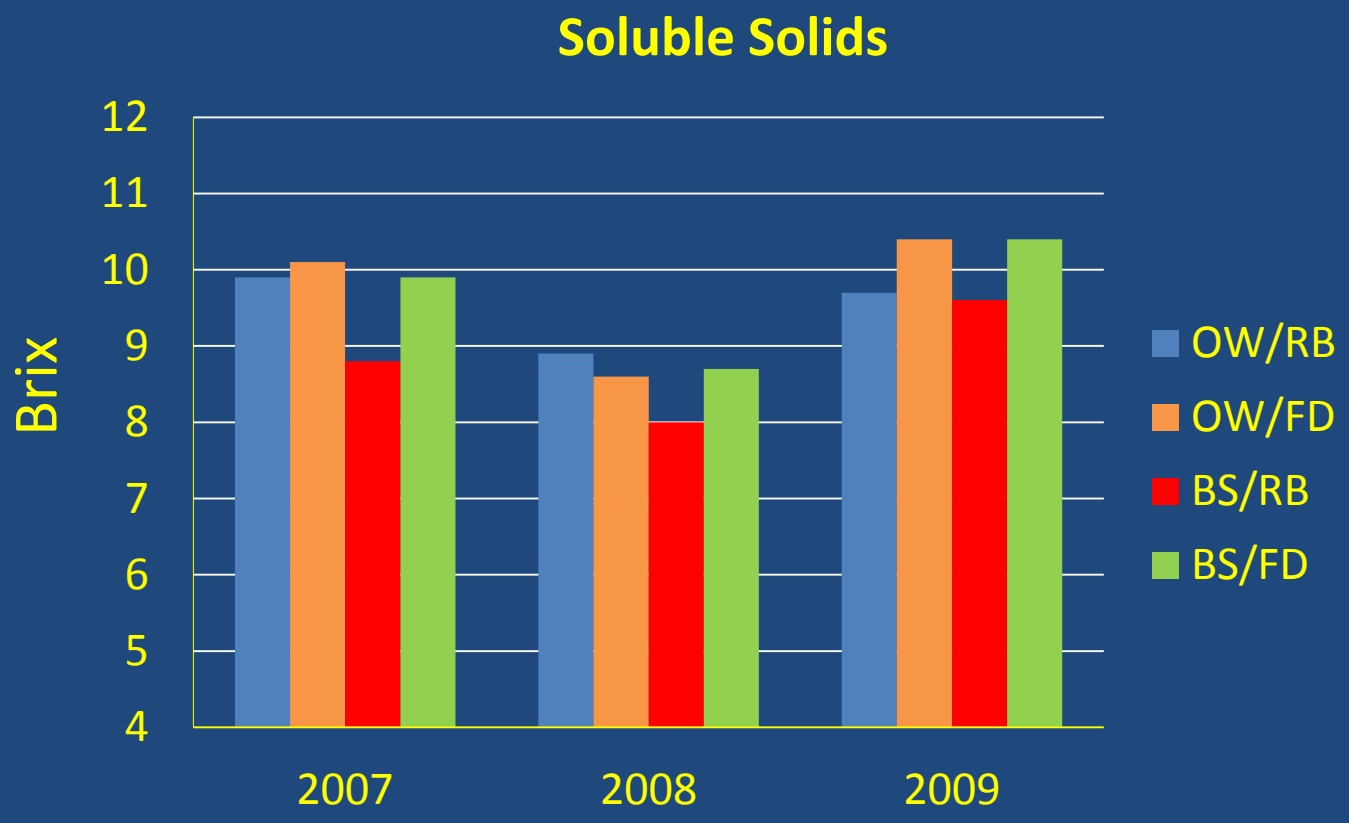
NS=not significant, * = *P* <0.05, ** = *P* <0.01, *** = *P* < 0.001


Fruit weight
Grams
250
200
150
100
50
0
2010
2011
2012
2013
2014
OW/RB
OW/FD
BS/RB
BS/FD

Fruit weight (g)

Statistics	**2010**	**2011**	**2012**	**2013**	**2014**
Scion	NS	*	**	NS	* *
Rootstock	NS	NS	NS	NS	NS
Scion*Root stock	NS	NS	NS	NS	NS

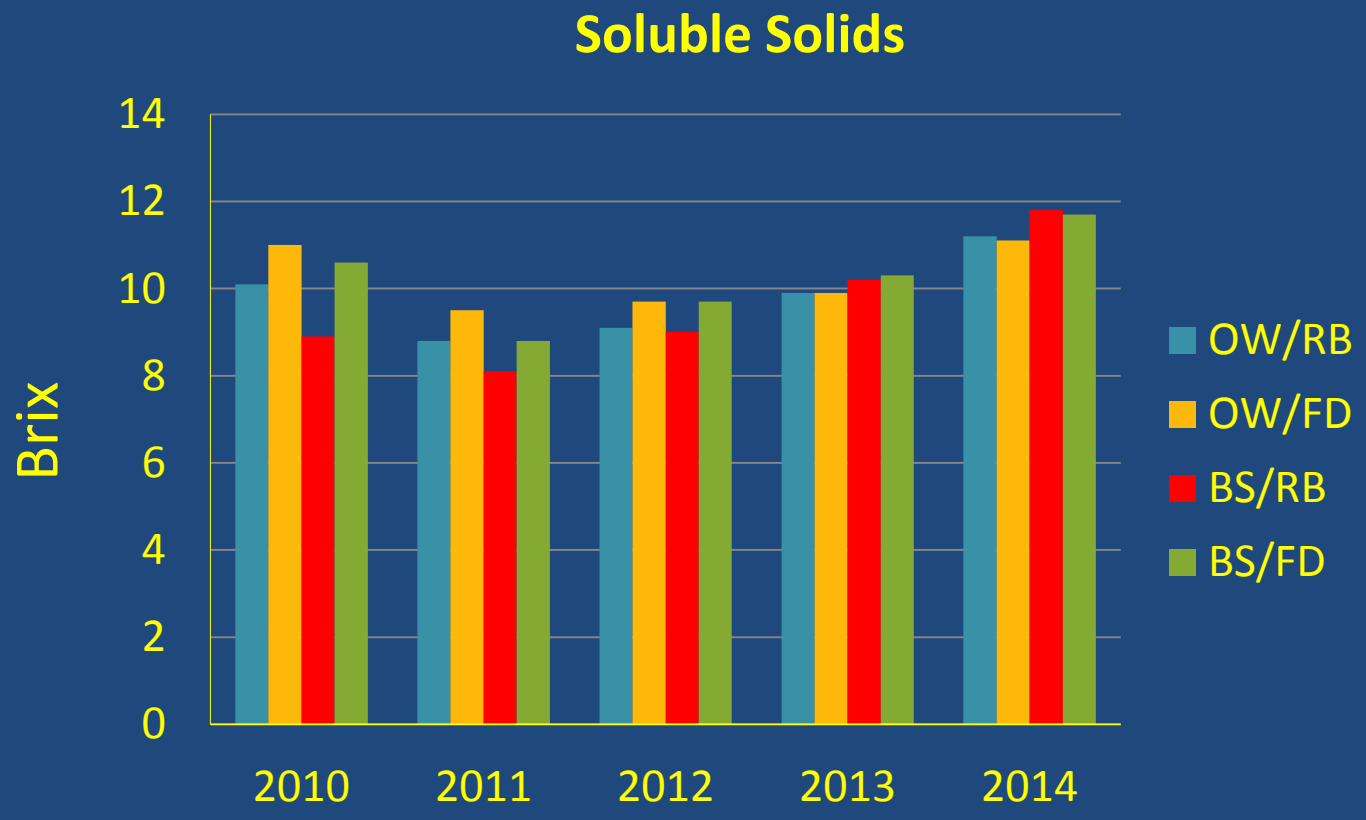
NS=not significant, * = P <0.05, ** = P <0.01, *** = P < 0.001


Soluble Solids
Brix
12
11
10
9
8
7
6
5
4
2007
2008
2009
OW/RB
OW/FD
BS/RB
BS/FD

Soluble Solids (Brix)

Statistics	**2007**	**2008**	**2009**
Scion	* * *	NS	NS
Rootstock	* * *	* * *	* * *
Scion*Rootstock	*	NS	NS

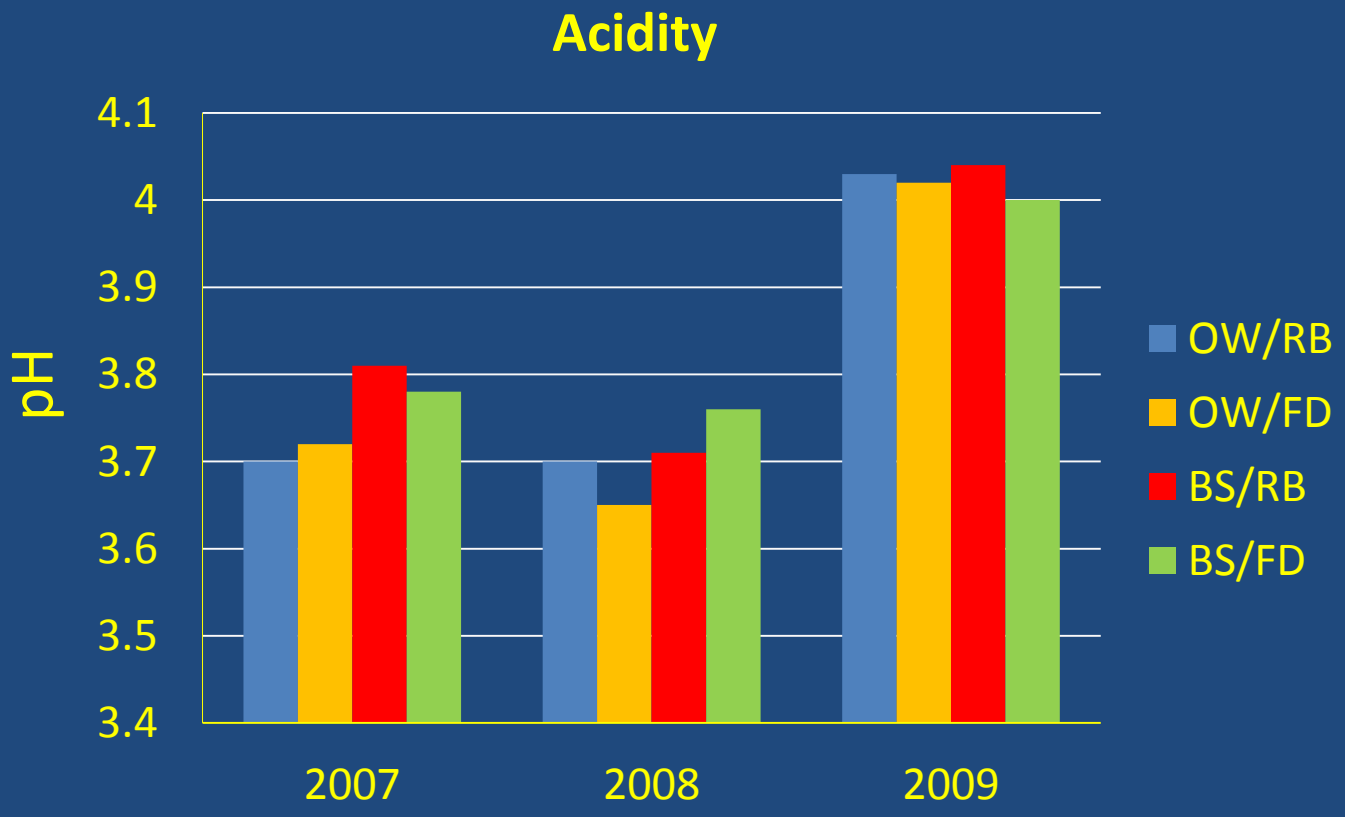
NS=not significant, * = P <0.05, ** = P <0.01, *** = P < 0.001


Soluble Solids
Brix
14
12
10
8
6
4
2
0
2010
2011
2012
2013
2014
OW/RB
OW/FD
BS/RB
BS/FD

Soluble Solids (Brix)

Statistics	**2010**	**2011**	**2012**	**2013**	**2014**
Scion	*	**	NS	NS	*
Rootstock	**	**	**	NS	NS
Scion*Root stock	NS	NS	NS	NS	NS

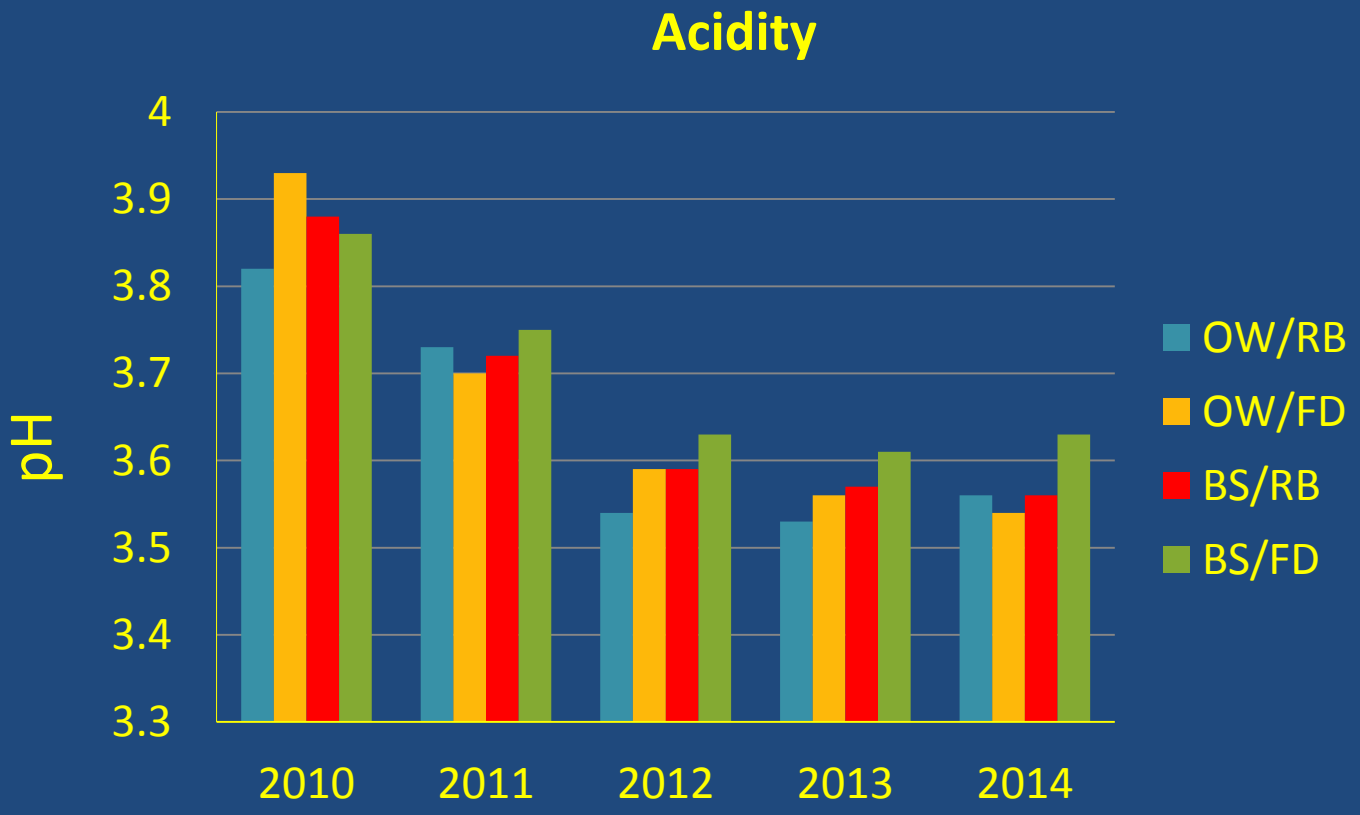
NS=not significant, * = P <0.05, ** = P <0.01, *** = P < 0.001


Acidity
pH
4.1
4
3.9
3.8
3.7
3.6
3.5
3.4
2007
2008
2009
OW/RB
OW/FD
BS/RB
BS/FD

Acidity (pH)

Statistics	**2007**	**2008**	**2009**
Scion	*	*	NS
Rootstock	NS	NS	NS
Scion*Rootstock	NS	NS	NS

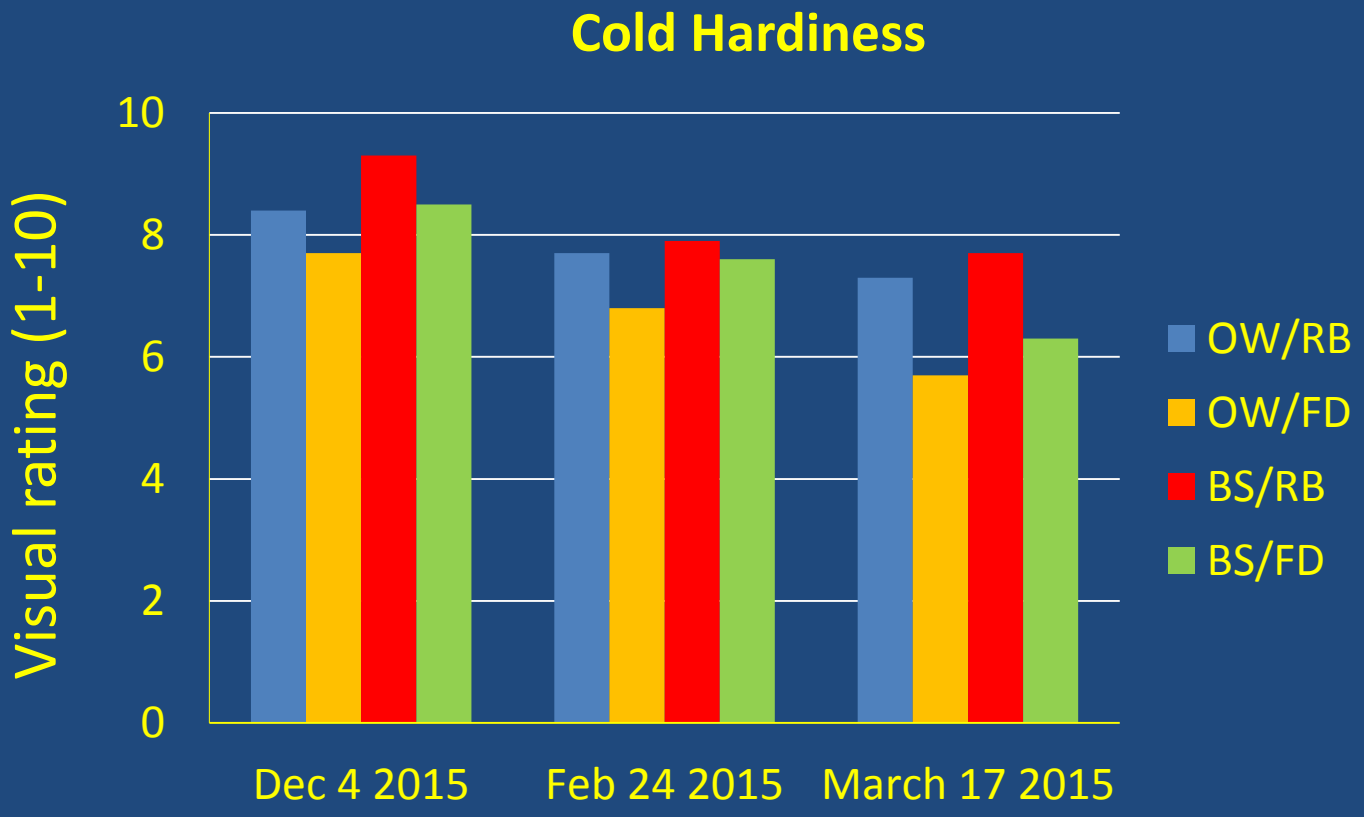
NS=not significant, * = P <0.05, ** = P <0.01, *** = P < 0.001


Acidity
pH
4
3.9
3.8
3.7
3.6
3.5
3.4
3.3
2010
2011
2012
2013
2014
OW/RB
OW/FD
BS/RB
BS/FD

Acidity (pH)

Statistics	**2010**	**2011**	**2012**	**2013**	**2014**
Scion	NS	NS	NS	NS	NS
Rootstock	NS	NS	NS	NS	NS
Scion*Root stock	NS	NS	NS	NS	NS

NS=not significant, * = P <0.05, ** = P <0.01, *** = P < 0.001


Cold Hardiness
Visual rating (1-10)
10
8
6
4
2
0
Dec 4 2015
Feb 24 2015
March 17 2015
OW/RB
OW/FD
BS/RB
BS/FD

Cold Hardiness

Statistics	**Dec. 4 2014**	**Feb. 23 2015**	**March 17 2015**
Scion	*	NS	NS
Rootstock	*	NS	NS
Scion*Rootstock	NS	NS	NS

NS=not significant, * = P <0.05, ** = P <0.01, *** = P < 0.001

Average tree size, yield and quality for mature trees (2009-2014).

Scion/Rootstock	Tree Canopy Area	Yield per Year		Fruit wt.	Soluble Solids	Fruit acidity
	(m^2)	(lbs/tree)	(tons/acre)	(g)	(Brix)	(pH)
'Brown Select'/ 'Flying Dragon'	6.6	143	10.4	151	10.3	3.75
'Brown Select'/ 'Rubidoux'	12.1	246	19.2	154	9.4	3.73
'Owari'/ 'Flying Dragon'	4.1	107	7.8	139	10.3	3.73
'Owari'/ 'Rubidoux'	8.7	218	15.8	144	9.8	3.70


Bumpy
Fruit
Syndrome