FINAL PROJECT REPORT

Project Title: Pear scion trials in the Pacific Northwest

PI:	Kate Evans	**Co-PI (2):**	Todd Einhorn
Organization:	WSU-TFREC	**Organization**:	OSU-MCAREC
Telephone:	509 663 8181 x 245	**Telephone**:	541 386 2030 x 13
Email:	kate_evans@wsu.edu	**Email**:	Todd.Einhorn@oregonstate.edu
Address:	1100 N. Western Ave	**Address**:	3005 Experiment Station Drive
City:	Wenatchee	**City**:	Hood River
State/Zip:	WA/98801	**State/Zip**:	OR/97031

Co-PI(3): Richard Bell
Organization: USDA-ARS
Telephone: 304 725 3451 x 353
Email: Richard.Bell@ars.usda.gov
Address: Appalachian Fruit Research Station
Address 2: 2217 Wiltshire Road
City: Kearneysville
State/Zip: WV/25430

Cooperators: Tim Smith, WSU; Rachel Elkins, CA; Tom Auvil, WTFRC; grower cooperators – Chuck Peters, Josh Koempel

Other funding sources: None

Total Project Funding: **Year 1:** $4,220 **Year 2:** $8,891 **Year 3:** $22,800

Budget History:

Budget 1 – Kate Evans (WSU)

Item	2012	2013	2014
Wages	0	1000	1,040
Benefits	0	149	180
Supplies	1350	0	0
Travel	500	500	1,000
Trees	0	0	5,000
Plot Fees	0	500	0
Total	1,850	2,149	7,220

Budget 2 – Todd Einhorn (OSU_MCAREC)

Item	2012	2013	2014
Wages	0	750	772
Benefits	0	518	534
Supplies	1350	0	0
Travel	0	250	250
Plot Fees	0	3104	3104
Total	1,350	4,622	4,660

Budget 3 – Tom Auvil (WTFRC)

Item	2012	2013	2014
Salaries & benefits	0	1000	5,150
Travel	0	120	620
Total	0	1,120	5,770

Budget 4 – Grower reimbursement (WTFRC)

Item	2012	2013	2014
Grower reimbursement	0	1000	5,150
Total	0	1000	5,150

Budget 5 – Richard Bell (USDA-ARS)

Item	2012	2013	2014
Supplies – Trees & Freight	1020	0	0
Total	1,020	0	0

OBJECTIVES

1. To test five new scion selections from the USDA-ARS pear breeding program in small scale replicated plantings in Washington and Oregon.
2. To test two new pear scions from Prevar, Australia, in medium scale plantings in Washington and Oregon.

SIGNIFICANT FINDINGS

- Randomized replicated plantings of the USDA-ARS pear scion selections were established in two sites in WA (Wenatchee Valley and Wapato) and one site in OR (MCAREC, Hood River). Trees are growing well and no mortality occurred at any of the sites.
- The two new Coregeo Australian scions ('Deliza' [ANP-0131] and 'Lanya' [ANP-0118]) have been planted at MCAREC, Hood River. Uniform, good growth accrued in the first season.
- 'Lanya' (ANP-0118) has been planted at the two Washington sites and additional trees of 'Deliza' (ANP-0131) have been budded for planting in 2016.

RESULTS & DISCUSSION

Objective 1:

The five new USDA-ARS scion selections were planted in two sites in Washington and one site in Oregon. Trees were planted in Wapato (Chuck Peters), in the Wenatchee Valley (Josh Koempel) and at MCAREC, Hood River. All trees are propagated on OH×F87 rootstock.

Trees in the Wenatchee Valley planting are spaced at roughly 3 ft in-row and 12 ft between rows in a randomized block design. They will be alternately angled to 70^{o} in about year 4. All the limbs will be tied down horizontally, with only a heading cut to stimulate branching about four times per growing season. The planting should end up looking like a V trellis but without the trellis. Trees in the Wapato planting are at 4 ft in-row and 12 ft between rows in a randomized complete block design ('d'Anjou' was added in an adjacent block). Again the trees are angled into V trellis.

In Hood River, Oregon, trees were established 5 ft in-row and 12 ft between rows in a randomized complete block design. Trees were left un-headed at planting. The few pre-existing limbs that exceeded half the size of the trunk were removed at planting with a 'Dutch' cut to encourage a new, flatter shoot and improve the uniformity of shoots. All remaining limbs were spread to widen branch angels (between 30-45 degrees). Trees were tied to the wire in spring of 2014 and trained to a 10° V whereby each tree was tipped in the opposite direction. Tree architecture is palmette, with each tree possessing a central leader and two primary scaffolds (originating from a similar point and opposite one another). Primary scaffolds were trained to the trellis wires at an angle of ~45 degrees from the horizontal to fill space. Throughout the season, large limbs were removed with a thinning cut (leaving a stub to generate a flatter, weaker limb) and all vertical limbs were pulled down to ~30-45 degree angles. Irrigation was provided at a frequency of two to three times per week for 4 hours per set. Urea was applied (side-dressed) at a rate of 10 lbs per acre every 10-14 days beginning June 1. There was no mortality and all trees of a rep grew uniformly; however, scion selections varied in their vigor and were significantly smaller than 'd'Anjou' and 'Bartlett' (Table 1).

Trunk diameters were recorded fall/winter 2014 and cross-sectional areas calculated (Table 1).

Table 1. Trunk cross-sectional area of scion selections following first year of growth at all three sites.

Scions	*Trunk cross-sectional area (cm^2)*		
	Wapato	Wenatchee Valley	MCAREC
US-69426-038	5.3	7.7ab	8.1 dc
US-71655-014	6.4	6.8ab	n/a
US-84907-069	5.1	4.5b	6.3 d
US-84907-078	6.4	8.6a	9.2 c
US-84907-166	4.7	6.3ab	9.8 bc
Anjou	1.6	5.8ab	11.6 ab
Bartlett	8.5	8.5a	12.3 a

Note: Each site mean analyzed independently;

Some of the selections started to fruit in 2014 but the overall volume of fruit was insufficient for more than basic observation (Table 2). No fruit was harvested in Hood River.

Table 2. Total and mean fruit weight (harvest 2014) from the Washington plantings.

Wapato

	total fruit weight (lb)	total fruit number	mean fruit weight (lb)
US-69426-038	0	0	0
US-71655-014	0.76	2	0.38
US-84907-069	1.49	4	0.37
US-84907-078	0	0	0
US-84907-166	0	0	0
Anjou	0	0	0
Bartlett	0	0	0

Wenatchee Valley

	total fruit weight (lb)	total fruit number	mean fruit weight (lb)
US-69426-038	0.88	3	0.29
US-71655-014	0	0	0
US-84907-069	0.72	1	0.72
US-84907-078	0	0	0
US-84907-166	11.03	27	0.41
Anjou	0	0	0
Bartlett	1.16	2	0.58

Objective 2:

The tree count from the nursery of the two new Coregeo Australian scions was lower than estimated: 'Deliza' [ANP-0131] 40 trees, and 'Lanya' [ANP-0118] 257 trees. The decision was taken that there were too few trees of ANP-0131 to distribute to all three sites so all 40 trees were planted at MCAREC, Hood River. A further order for the extra trees for the trial was placed with C&O nursery; trees should be available for planting in 2016. All trees are on OH×F87.

For 'Lanya' (ANP-0118), trees were distributed as follows: 100 trees to MCAREC, 78 trees to Josh Koempel's planting at Dryden and 79 trees to Chuck Peters at Wapato.

In Hood River, Oregon, trees were established 5 ft in-row and 12 ft between rows in a randomized complete block design. Trees were delayed-dormant headed when ~ 6 inches of new shoot growth had accumulated. Heading was performed to improve vigor given the weak, spindly starting material received from the nursery. The few, pre-existing limbs that exceeded half the size of the trunk were removed at heading with a 'Dutch' cut to encourage a new shoot and improve the uniformity of shoots. All remaining limbs were spread to widen branch angels (between 30-45 degrees). Trees were tied to wires in a 10° V as described above under Objective 1 in Hood River. Throughout the season limbs were trained to wires and overly-vigorous shoots were removed leaving a stub. Irrigation was provided at a frequency of three times per week for 3 hours per set. Urea was applied (side-dressed) at a rate of 10 lbs per acre every 10-14 days beginning June 1. Excellent, uniform tree growth was realized and cultivars did not significantly differ in trunk size after year one (Table 3).

All trees were planted in the same spacings and orchard systems as described for the USDA-ARS selections in Objective 1.

Table 3. Trunk size of two new Coregeo Australian scions: 'Deliza' [ANP-0131] and 'Lanya' [ANP-0118] measured fall of 2014 (year 1 in the orchard) at MCAREC.

	Trunk cross-sectional area (cm^2)
ANP-0118 ('Lanya')	14.6
ANP-0131 ('Deliza')	13.1
P>F	0.376

EXECUTIVE SUMMARY

Five new scion selections from the USDA-ARS program are now established in replicated trial plantings at two sites in Washington (Blewitt and Wapato) and at the MCAREC, Hood River, Oregon. These trees will enter their third leaf in 2015 and should begin producing sufficient fruit for evaluation.

Two new Coregeo Australian scions (‘Deliza’ [ANP-0131] and ‘Lanya’ [ANP-0118]) were also established, although ANP-0131 is only present in Oregon until additional trees can be propagated. All trees are on OH×F87 rootstock.

The next stage of this work will assess the precocity (bloom and fruit set), production, and fruit quality to determine the viability of these cultivars in the Pacific Northwest. We now propose to transition the leadership of the follow-on project to Dr. Todd Einhorn with collaboration with Dr. Yan Wang for post-harvest evaluation of the fruit.