FINAL PROJECT REPORT

Project Title: PNW Pear Rootstock Trial

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Other funding sources

Agency Name: NW Nursery Improvement Inst. supports the Tonasket trellis demonstration, $8,000.

Budget Summary of Total Project: Budget 1, WSU Cashmere & Tonasket Plots:

Item	Year 1: 2006	Year 2: 2007	Year 3: 2008
Salaries	2,667	3,468	**2,884**
Benefits	907	1,179	**981**
Wages	0	400	**0**
Benefits	0	44	**0**
Supplies	2000	400	**400**
Travel	1000	1800	**1575**
Miscellaneous	0	0	**0**
Total	6,574	7,291	**5,840**

Footnotes: 0.0769 FTE (four weeks) Technician (Tonasket & Cashmere sites).Travel is to plots.

Budget 2: Hood River Plot

Item	Year 1 2006	Year 2 2007	Year 3 2008
Salaries[1a]	2,688	2,768	**2,852**
Benefits	1,640	1,688	**1,740**
Wages[2]	514	605	**692**
Benefits	46	54	**62**
Supplies[3]	700	700	**700**
Travel[4]	200	200	**200**
Total	5,788	6,015	**6,246**

Footnotes:[1a] 0.1 FTE (5 weeks) Technician (Hood River site.)

Budget History:

Projects by Site	Year 1: 2006	Year 2: 2007	Year 3: 2008
Cashmere	7,618	7,291	5,840
and Tonasket			
Hood River	5,788	6,015	6,246
Year Total:	13,406	13,306	12,086
3-Year Total:			**$38,398**

Original Objectives:

The pear scions/rootstocks will be evaluated on the following: 1. survival, 2. suckering, 3. vegetative growth potential (trunk size and tree diameter), 4. yield, and 5. fruit size.

Impact of This Work:
There were at least four significant outcomes to this project:

1. A number of potential rootstocks, including some that was being sold commercially in Washington and Oregon, were shown to be inferior due to disease or cold injury susceptibility, yield, fruit size, the production of thorny root suckers, or a combination of these attributes. Early release of this negative data resulted in the cessation of production and sales of a poorly-tested rootstocks that in the Bosc trial presently lag behind the standard OHxF 87 as much as $20,000 per acre in gross receipts. No one will ever know how many acres of thorny roots-suckered, smaller-fruited, low production rootstocks would've been planted in the absence of this trial. Each 50 acres planted would have reduced gross returns by up to $1,000,000 in the first seven years of their production.

2. The OHxF 87 performed well enough in the Golden Russet Bosc trial to become the current industry standard semi-dwarfing rootstock until something better comes along. These data have encouraged the nursery industry to pursue better methods of propagating this rootstock, and they are making it much more available to Pacific Northwest pear growers.

3. Bartlett on Pyro 2-33 appears superior to Bartlett on OHxF 87. The lower fruit set is adequate for good production, but leads to much faster fruit thinning, the fruit is consistently larger, and the compact trees are similar in size. The Pyro 2-33 remains free of diseases, such as pear decline, produces no root suckers, and seems to tolerate cold winter temperatures. This root did not out-perform OHxF 87 in Bosc or D'Anjou trials.

4. Pear horticultural field tours centered on these trials have markedly increased recently, and some "traditional" pear growers have started changing their growing practices as a result.

Extension (Outreach) of the data and horticultural information developed trough this project:

1. Presentations to horticultural meetings: Four, to a total Washington audience of 1150.
2. Web page and trial reports: about 800-900 "unique viewers" per year.
3. Reported to NC-140 North American rootstock working group by Steve Castagnoli, A summary to NC-140 of these rootstock trials is planned by Todd Einhorn.
4. Pear horticulture orchard tours: six, posters at WSHA meetings: two.

Introduction and Justification
Most pear orchards in the USA have rootstocks that induce high vegetative vigor. While many of these orchards are quite old relative to other tree fruit orchards, the well-managed pear orchard continues to produce good yields of high quality fruit. Too many do not, because high tree vigor brings multiple problems, such as inefficient use of labor, difficult insect and post-harvest disease management, and fruit quality problems related to low fruit calcium. Efforts to treat these symptoms of excessive vigor have cost a significant percentage of pear research dollars for decades, but the problems seem to remain. Excessive tree vigor costs growers far more in increased pruning, suckering, thinning and harvest labor costs, additional sprays, and crop loss in the packinghouse. There has been very little obvious economic reason to change existing pear orchard systems, or even

plant significant acreages of new pears. However, over the past two decades, it has become apparent to industry leaders that pear growers may be forced to replace the current 1950's style pear orchard with either another profitable fruit, or, if they decide to stay in pear production, to grow their next pear orchard with smaller, easier to manage trees. In order to make the switch to possible semi-intensive systems, it was obvious that dwarfing or semi-dwarfing rootstocks would be critical to the entire process, as they were to apple producers. While there had been efforts to create or test various pear rootstocks in the Pacific Northwest for several decades, and a few rootstocks in the Old Home x Farmingdale series had gained some recognition and use, there was general dissatisfaction with the speed and direction of the pear rootstock development and evaluation effort.

Overview:

In 2002, after several years of preliminary effort identifying, importing and propagating rootstock candidates from around the world (by Dr. Gene Milke, OSU, retired), a pear rootstock trial was established in four locations in the Pacific Northwest. Grower cooperators provided sites in Tonasket (Bosc) and Cashmere (D'Anjou), one trial was established on the TFRC property in the mid-Yakima Valley (Bartlett), and one was planted in Hood River at the OSU-MCAREC (D'Anjou). The Yakima Valley Bartlett trial suffered serious damage from fire blight in 2004, 2005 and again in 2007, and was suspended as having no value as a rootstock trial.

Seven rootstocks were included the first season, and an additional six were planted on these sites in 2005. In all cases, OHxF 87 was used as the standard "semi-dwarf," and there was hope that the other rootstocks would induce a smaller, more productive tree. The 2002 trees were planted 10 feet apart in the row and were trained as a free-standing central leader. This tree spacing was the standard for rootstock trials at the time, because it allowed each tree to behave relative to the influence of the rootstock, rather than to excessive containment pruning or the competition from the adjacent trees.

Most of the 7th leaf trees currently appear as if they would have been manageable as a tree wall system if planted at 6 – 7 feet in row and 13 – 15 foot row spacing, with support only in the first two seasons on sites with fine textured soils. Starting in the second season, lower scaffold limbs were spread to 45 – 50 degrees from vertical to induce fruitfulness, but to avoid vigorous suckering common with more horizontal or pendant scaffolds. The Boscs and Bartlett pollenizer trees began to produce significant crops long before the scaffolds were able to support the fruit weight, so most of the lower limbs have been supported to the trunk with bailer twine to prevent breakage. Pruning to stiffen lower scaffolds would reduce the need to support limbs, as the vegetative scaffolds would have less fruit to support. Early fruiting has a pronounced effect on tree vigor and size, so the twine stays.

In order to reduce limb spreading, followed by limb tying, the 2005 trees were planted at 6 foot row spacing, and are trained on a 4 wire upright trellis in the D'Anjou trial at Cashmere and the Bosc trial in Tonasket. The 2005 D'Anjou rootstock trial in Hood River was planted free-standing at the ten foot spacing standard of this trial, and may serve as a contrast of rootstock behavior on intensive vs. semi-intensive systems. Pruning and training has been directed or carried out by local experts, with the intention of bringing the trees into early production, while building a proper framework for the free-standing system.

Also in 2005, the author, who is not a horticultural person, became the default P.I. of this project, because the other original principle cooperating university faculty had retired or changed employers.

Summary of Results and Discussion:

Of the four trial sites, only the Tonasket Golden Russet Boscs and Cashmere and Tonasket Bartlett pollenizers have produced consistent yields leading to consistent data, sometimes with better early

production than would be expected with standard rootstocks. While data was taken at other sites, and will be provided to anyone if deemed necessary, yields were generally disappointing, and will not be reported here. The best data, unhindered by frost, cold bloom times , poor pollenization, fire blight or herbicide damage, has been from the 2002 and 2005 Bosc Trials in Tonasket. There is somewhat limited, but complete data that was taken from the numerous Bartletts interplanted as pollenizers in the Cashmere and Tonasket trial sites. Fortunately, the rootstocks that were most interesting in the Bosc trial, good and poor performers, are also included in the Bartlett pollenizer results.

Survival of the tree:
Other than in the Yakima trial, most of the trees survived and are healthy to date. However, there are some significant exceptions. Having Asian pear in the heritage of the rootstock usually leads to a high chance of phytoplasma-induced "pear decline" disease. Although the percentage of the plot trees that died was variable, the 708-36 rootstock appears unacceptably prone to this disease. The BU-2 and BU-3 in the 2005 trial also appear to be affected by pear decline at the Cashmere D'Anjou site. Temperatures of -10F or lower in the second winter at the Tonasket Bosc trial killed three of ten rootstocks in both Fox 11 and Fox 16. No winter damage has been observed on these or any other rootstock since that incidence, but the temperatures have been no colder than about -4F since then.

Trunk and vegetative growth:
The 2002 plot tree vigor and resulting size occurred in the following descending order, reported as a percentage comparison of the cross sectional area of the trunk, with the OHxF 87 trunk as 100:

Bosc- OHxF 87 (100), Pyrodwarf (91), OHxF 40 (82), Pyro 2-33 (73), Fox 11 (73), Fox 16 (64), and 708-36 (57). For data, see Tables 1 and 3-1.

After the first three seasons, when production increased significantly in the Bosc trial, foliage on the 708-36 rooted trees was inadequate to support the fruit load. The other rootstocks had adequate vigor, and none have produced an excess of "sucker" growth on the upper surfaces of scaffolds, especially after significant fruit production started. These rootstocks may induce trees with far more vegetative vigor and greater ultimate size than the trees in these plots when planted on sites with deep, high quality soils.

While trees on Pyro 2-33 produced 58% more fruit than those on Pyrodwarf, the trunk and tree size were almost identical.

Data supports the previously reported concept that yield and tree size are not closely correlated with currently available pear rootstocks.

	OHxF 87	Pyro-dwarf	OHxF 40	Pyro 2-33	Fox 11	Fox 16	708-36	Winter Nellis
Tonasket Bosc	94	86	77	73	69	60	54	-
Cashmere D'Anjou	117	99	115	97	89	80	83	-
Hood River D'Anjou	89	91	89	85	85	-	85	89
Tonasket Bartlett	-	62	-	63	-	-	-	-
Cashmere Bartlett	69	68	-	68	-	-	-	-

Table 1. Seventh season tree trunk size expressed as square centimeters, cross sectional area. Example: A 90 sq. cm. tree trunk has a diameter of 4.36 inches. Note: Growth of Boscs and Bartletts occurred with significant fruit yields in year 5, 6 and 7. Growth of Hood River D'Anjou occurred with low to modest yields in years 5 and 6. The growth of the Cashmere D'Anjou trees has not been restrained by significant fruit production.

Root suckering:
No significant suckering was observed on any rootstock other than Pyrodwarf. Pyrodwarf has developed numerous, large and seriously thorny suckers, obvious by their third season of growth.

Yields and Efficiency:
Relative total yields, adjusted to tree size, reported as a percentage of the standard OHxF 87:
Bosc: OHxF 87 (100), Pyro 2-33 (70), OHxF 40 (70), 708-36 (55), Fox 11 (54), Fox 16 (44), and Pyrodwarf (43). See Tables 3-1 and 3-2 for actual yield per tree and extrapolated yields per acre.
Cashmere Bartletts: OHxF 87 (100), Pyro 2-33 (124), Pyrodwarf (80). See Table 1-2.

Bartlett 2002 Planting Tonasket	2008 Pounds Fruit/ Acre, 7th Year	2005-08 Average Box Size 44 / Avr. Fr. Wt	2008 Average Box Size 44 / Avr. Fr. Wt.	2008 Average Fruit Weight (Grams)	Total Bins Fruit per A 04 - 08	2008 Lbs. Fruit per Tree	Trunk Cross Sec Area cm^2	2008 lbs. Fruit per cm^2 of Trunk (Efficiency)
Pyro 2-33	52,081	82	68	294	121	117	62	1.89
Pyrodwarf	32,767	100	80	250	77	74	60.2	1.23

Table 2-1. 2002 planting of Bartlett pear, Tonasket, (7^{th} season), yield per tree, extrapolated yield, fruit size, trunk size and fruiting efficiency. Yield estimates based on 444 trees per acre (7 x 14 ft). Note: the higher the box size number, the smaller the fruit.

Yield efficiency, which relates the amount of total fruit produced to the size of the trunk, reported as a percentage of the standard OHxF 87:
Bosc: OHxF 87 (100), Pyro 2-33 (94), 708-36 (88), OHxF 40 (84), Fox 11 (62), Fox 16 (59), and Pyrodwarf (48). See Table 3-1.

Cashmere Bartletts: OHxF 87 (100), Pyro 2-33 (126), Pyrodwarf (81). See Table 2-2.

Bartlett 2002 Planting Cashmere	**2008 Pounds Fruit/ Acre, 7th Year**	**2008 44 lb. Box/ Acre, 80% Packed**	**2008 Average Box Size**	**2008 % 100's and Larger**	**Total Bins Fruit /A 2004 - 2008**	**2008 Lbs. Fruit per Tree**	**Trunk Cross Sect. Area CM^2**	**2008 lbs. Fruit / CM^2 Trunk *Efficiency***
Pyro 2-33	32,614	593	80	94	67	84	65.8	1.28
Pyrodwarf	18,872	343	97	69	43	48	66.1	0.73
OHxF 87	27,690	503	79	96	54	71	66.8	1.06

Table 2-2. 2002 planting of Bartlett pear, Cashmere, (7^{th} season), yield, extrapolated yield, fruit size, trunk size and efficiency. Yields based on 390 trees per acre (7.5 x 15 ft.).

Bosc- 2002 Planting Tonasket	**2008 Pounds Fruit/ Acre, 7th Year**	**Calc. Trees Per Acre**	**2008 44 lb. Box/ Acre, 90% Packed**	**2008 Avr. Box Size**	**Avr. Box Size 06-08**	**Total Bins Fruit / A 04 -08**	**2008 Lbs. Fruit Tree**	**2008 Trunk Cross Sect. Area CM^2**	**2008 lbs. Fruit / CM^2 of Trunk**	**Total 04-08 lbs. Fruit / CM^2 of Trunk**
OHxF 87	47,952	444	981	68	71	**162**	108	94	1.15	4.10
Pyro 2-33	36,852	444	754	71	74	**113**	83	73	1.14	3.83
OHxF 40	27,528	444	563	74	76	**113**	62	77	0.81	3.45
708 - 36	22,145	515	453	69	80	**87**	43	54	0.80	3.62
Fox 11	31,415	515	643	68	72	**86**	61	69	0.88	2.56
Pyro-dwarf	26,196	444	536	72	79	**70**	59	86	0.69	1.97
Fox 16	25,750	515	527	63	67	**69**	50	60	0.83	2.43

Table 3-1. 2008 Data from 2002 planting of Golden Russet Bosc, (7^{th} season), yield, extrapolated yield, fruit size, trunk size and efficiency, in descending order of total yield. Planting space was calculated at 7 x 14 for the 444 trees / A, and 6.5 x 13 for the 515 trees / acre.

Fruit size:
Average box size 2006 – 2008, in descending order:
Bosc: Fox 16 (67), OHxF 87 (71), Fox 11 (72), Pyro 2-33 (74), OHxF 40 (76), Pyrodwarf (78), and 708-36 (80).

Tonasket Bartletts: Pyro 2-33 (79), Pyrodwarf (94).
Cashmere Bartletts: Pyro 2-33 (86), OHxF 87 (94), Pyrodwarf (107).

While average fruit size is reported here, at least 400 individual fruit were weighed per rootstock each season to create a "box size" curve and to better calculate potential fruit economic value. The Bosc and Bartlett data support the following summary statements:

Fruit size summary: Average fruit size varied from one season to another, but the ranking of the various cultivars/rootstocks remained relatively consistent. (The Boscs in 2008 were picked relatively late in their harvest season, and were abnormally large.) The trees on Pyrodwarf bore fruit that was of acceptable commercial size on some seasons, but the fruit averaged significantly smaller than fruit produced on trees with other rootstocks in the more representative productive trials. The only exception to this was in comparison to the 708-36, which had Bosc fruit that was unusually small in the 6th leaf due to excessive fruit load. Pyrodwarf's fruit load, being consistently light, was probably not the cause of its relatively smaller fruit size. The Tonasket Bosc fruit was generally large by industry standards, and the Bartlett pollenizer fruit at that site tended to be moderate to large size. The Cashmere Bartletts trended small to medium, always smaller fruit in comparison to fruit from the same rootstock in Tonasket.

The fruit size did not correlate to tree size or fruit load. The only obvious situation where fruit load affected fruit size was with 708-36 in the sixth leaf, when a very heavy fruit set limited vegetative growth, leaf:fruit ratio was about 3:1, and the fruit was small and sunburned.

In the Bartletts, the Pyro 2-33 scattered fruit evenly throughout the tree, and required only light hand thinning. The Bartletts on OHxF 87 set much more fruit and required twice as many fruit to be removed. If left unthinned, the Bartletts on OHxF 87 would likely produce much higher yields, but of fruit of smaller average size.

Bosc-2002 Planting, Tonasket	**2004-05 Yield in Pounds per Acre 3rd+4th**	**2006 Yield In lbs. per Acre 5th Leaf**	**2007 Yield In lbs. per Acre 6th Leaf**	**2008 Yield In lbs. per Acre 7th Leaf**	**2006 Fruit Box Size (# Fruit / 44 lb. Box)**	**2007 Fruit Box Size**	**2008 Fruit Box Size**
OHxF 87	20,525	44,849	64,536	47,952	70	75	71
Pyro 2-33	8,636	29,002	49,253	36,852	76	75	74
OHxF 40	13,579	32,875	50,229	27,528	74	80	76
708 - 36	14,590	20,640	38,299	22,145	82	88	80
Fox 11	6,014	16,028	41,267	31,415	74	75	72
Fox 16	689	14,466	34,202	26,196	69	70	67
Pyrodwarf	4,631	12,598	33,575	25,750	86	75	78

Table 3-2. History of yearly extrapolated yield and average fruit size in 2002 planting of Golden Russet Bosc, in descending order of total yield.

Tonasket 2002 GR Bosc	OHxF87	Pyro 2-33	708-36	Fox 11	Fox 16	OHxF40	Pyro-dwarf
120 & -	0	0	0	0	0	1.0	0
110	0	0	0.9	0	0	2.8	0.7
100	0.8	1.1	2.8	2.0	0.7	3.4	2.7
90	3.4	11.3	7.6	7.8	2.1	7.9	10.8
80	15.8	19.1	15	12.9	7.9	18	21.3
70	29.0	31.7	37.1	28.1	20.9	26.4	33.1
60	33.9	20.9	26.4	34	38.7	25.6	26
50	10.7	11.7	10.3	15.3	21.4	10.7	11.7
40	3.0	0	0	0	3.6	2.5	0

Table 3-3. Tonasket 7th Year Bosc, percent of fruit by weight in each box size.

Tonasket 2002 GR Bosc -08	OHxF87	Pyro 2-33	OHxF40	Fox 11	708-36	Fox 16	Pyro-dwarf
120 & -	0	0	$39	0	0	0	0
110	0	0	138	0	$36	0	$32
100	$90	$95	220	$148	146	$43	163
90	461	1,177	615	693	476	156	786
80	2,250	2,091	1,472	1,204	987	615	1,629
70	4,173	3,505	2,181	2,649	2,465	1,643	2,558
60	4,678	2,217	2,028	3,074	1,683	2,918	1,927
50	1,771	1,162	980	1,296	615	1,766	812
$ / Acre	**$13,423**	**$10,247**	**$7,671**	**$9,062**	**$6,406**	**$7,139**	**$7,907**
$ / Acre 06+07+08	**$37,120**	**$27,700**	**$25,800**	**$23,270**	**$23,550**	**$18,790**	**$16,390**
Gross Re: OHxF 87	**(same)**	**- $9,420**	**- $11,320**	**- $13,850**	**- $13,570**	**-$18,330**	**- $20,730**

Table 3-4. Bosc plot, estimated yearly gross returns per acre: extrapolated yield per acre was assumed to be 90% packable. Fruit size data was used to estimate the number of boxes of each size fruit would be produced per acre. Those box numbers were multiplied by the average returns by box size reported each year (minus $9.70 per box packing charge), 2008 crop data current to December.

2005 Planted Section of the Rootstock Trial:
The 2005 planted trials have some rootstocks that were not included in 2000, such as BU-3, BU-6, BM 2000, and Horner 4. In Hood River, the D'Anjou scion is trained as a free-standing central leader, 10 feet apart in the row. In Cashmere, the D'Anjou trial is trained on an upright trellis, 6 feet apart in the row. In Tonasket, the Golden Russet Boscs are on a similar trellis, and had significant production in their 4th season (see Table 4).

Bosc- 2005 Planting Tonasket (on a trellis)	**2008 Pounds Fruit/ Acre, Fourth Year**	**2008 44 lb. Box/ Acre, 95% Packed**	**2008 Average Box Size 44 / Avr. Fr. Wt.**	**2008 Total 1100 lb. Bins Fruit / Acre**	**2007+ 2008 Total Bins Fruit / Acre**	**2008 Trunk Cross Sectional Area in CM^2**	**2008 Lbs. Fruit / Tree**	**2008 lbs. Fruit per CM^2 of Trunk (Efficiency)**
OHxF 87	14,780	319	68	13.4	20.1	30.1	24.4	0.81
Pyro 2-33	9,060	196	67	8.2	10.3	20.1	15.0	0.75
Pyrodwarf	9,238	199	78	8.4	12.7	29.3	11.3	0.39
BM 2000	9,937	215	87	9.0	12.1	29.7	16.4	0.55
Horner 4a	6,844	148	70	6.2	2.9	28.1	15.3	0.54
BU-3	2,334	50	62	2.1	3.4	11.0	3.9	0.35
Bartlett Horner 4a	10,231	209	75	9.3	12.6	20.2	16.8	0.83
2002 Bosc in 4th Leaf OHxF 87	*10,123*	*218*	*74*	*9.2*	*11.3*	*31.9*	*22.8*	*0.71*

Table 2-1. 2005 planting of Golden Russet Bosc pear, Tonasket, (4th season), 6 x 12 ft. on 4-wire upright trellis, ineptly trained. Yield, extrapolated yield, fruit size, trunk size and efficiency. Bartletts are pollenizers. Note comparison of 4th leaf results in the 2002 planted trial, lower row of table.

Next Steps:
There is currently a flower bud set that may lead to great differences next year amongst the trellised trees in the 2005 planting. Some rootstocks in the 2005 trial are duplicates of those that performed well in the 2002 trial, so comparisons will be made between their production on wire vs. a free standing central leader training system. If carried to completion, the 2005 planting may be contrasted economically to the 2002 free-standing plot. It is possible that the trellis system, in this case, may be less profitable than the free-standing tight planted tree wall.

If no new 2005 trial rootstock stands out by the end of the 6th leaf (fall 2010), this trial may be terminated or greatly scaled back a year earlier than planned, with data taken in the 7th year only from the best performing two or three root/scion candidates. These data would be used to compare the economics of free standing vs. simple trellis systems for production of Bosc pears on this site.

Executive Summary: In 2002, a pear rootstock trial was set up in four locations in Washington and Oregon to look at the effect of various semi-dwarfing pair rootstocks produced by breeding programs from around the world. There were two compelling reasons for these trials: 1. It was apparent to many leaders of the industry that many of the problems faced by pear growers were due to large tree size and vigor. Insect management, fruit rot management, reduction of fruit calcium disorders, pruning thinning, and harvest; all were made much more difficult by large tree size induced by vigorous rootstocks. 2. Essentially all previous rootstock work had been done in Hood River, and there were some concerns that Hood River growing conditions did not reflect those of the Yakima Valley or the Wenatchee District. D'Anjou, Bartlett and Golden Russet Bosc were chosen as scion varieties due to their predominance in the industry. OHxF 87 rootstock was chosen as the trial standard, as it was the most common semi-dwarfing pear rootstock being used by the industry at that time. The other rootstocks came from German, English, USA and Italian rootstock breeding programs. For representative trial sites were selected: Hood River – D'Anjou, Yakima Valley – Bartlett, Cashmere – D'Anjou, and Tonasket – Bosc. Ten of each rootstocks/scion were planted at each trial site, in ten blocks of seven trees. Bartletts on two test semi-dwarfing rootstocks were used as pollenizers in all except the Yakima site, Bartlett on OHxF 87 were added to the Cashmere site.

The trees have grown well on all sites except for the Bartletts in Yakima, which were so affected by the fire blight during their first five seasons that horticultural data was meaningless. Fortunately, the pollenizer Bartlett trees in Cashmere and Tonasket have produced interesting results on what are likely the two most promising rootstocks, OHxF 87 and Pyro 2-33. D'Anjou yields have been disappointingly low at the Hood River site, and have been almost nonexistent at the Cashmere site. Had it not been for the very good production and high-quality data generated by the Tonasket Golden Russet Boscs, this trial would have been discontinued in 2006 or 2007. We continue to be encouraged by the results in Tonasket, but after seven seasons, we will discontinue taking yield and fruit size data from all but two of the 2002 planted rootstocks, OHxF 87 and Pyro 2-33.

Due to difficulties encountered in propagating the trees for the 2002 planting, four rootstocks were not placed in these trials until 2005. This portion of the project will be described more thoroughly in the proposal for the continuation of this project. Much more data was gathered than can fit into this report. See the author for more details.

Impact of This Work:
There were at least four significant outcomes to this project:

A number of potential rootstocks, including one that was being sold commercially in Washington and Oregon, were shown to be inferior due to disease or cold injury susceptibility, comparative yield, fruit size, the production of thorny root suckers, or a combination of these attributes.

The OHxF 87 performed well enough in the Golden Russet Bosc trial to become the industry standard semi-dwarfing rootstock until something better comes along. Nurseries responded by growing more.

Bartlett on Pyro 2-33 appears superior to Bartlett on OHxF 87, and especially to those on Pyrodwarf.

Some "traditional" pear growers have changed to semi-intensive planting systems due to horticultural field tours centered on these trials, others may soon follow.