

**Research Grant Proposal for 2022
State Horticultural Association of Pennsylvania**

Title: Rootstock and Cultivar Evaluations

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Duration of Project: 2022 – 2026 (continuing)

Justification: Rootstocks are the primary method used to control tree size to allow for increased tree density. Initial higher density translates into greater early yields and a faster return on investment. One of the solutions to increasing orchard productivity across tree fruit crops is the use of rootstocks to control vigor and increase floral precocity. While the use of yield efficient size-controlling rootstocks has been dramatically increased in apples and to some extent in cherries, it still lags in pears and peaches. The ongoing thrust of the NC-140 regional research project and in-state research projects has been to keep the Mid-Atlantic fruit industry competitive and up to date on the latest technology in rootstocks and cultivars.

Orchard intensification is a proven method to achieve high fruit quality and hasten growers' return on investment in apple production; however, the primary peach production system is low density open vase, and this system hasn't changed significantly in over 150 years. The key missing factor needed for increasing peach planting density is size-controlling rootstocks. Further study of new stone fruit rootstocks is needed to determine how well trees on these rootstocks survive and perform under our conditions, and what the productivity and final tree size of each will be at full maturity.

Objectives:

1. Evaluation of established tree fruit rootstock plantings, including 2014 Honeycrisp and Fuji trials, the 2017-18 Honeycrisp trial, and 2019 Gala trial at Rock Springs, and the 2017 NC140 peach and 2018 apple rootstock trials at FREC

2. To evaluate new European pear cultivars, for their fruit quality and production characteristics under Pennsylvania conditions.

Procedures:

Rootstock Trials: (Table 1)

Peaches: An NC-140 peach rootstock trial was planted at FREC in 2017 to evaluate the performance of 8 rootstocks with the cultivar Cresthaven. Multiple four-tree plots were planted at 6 ft. by 17 ft., and trained to perpendicular V. The rootstocks will be evaluated for survival, adaptation to the climate, tree size control, yield, fruit quality, and freedom from physiological defects, such as root suckers. This trial includes the most recent introductions from Europe and three promising new releases from the breeding program at UC Davis: Controller 6, Controller 7, and Controller 8.

Apples: Rootstock trials covered by this proposal are summarized in Table 1. The 2014 NC-140 uniform rootstock trial of Aztec Fuji and Honeycrisp on Vineland 1, 5, 6, 7, G.214, G.890, G.969, M.9T337 and M.26 will be continued for one final season of research. In 2017 a planting of Honeycrisp on NZ.1, NZ.5, G.41 and G.890 rootstocks was established. The NZ rootstocks were developed to have resistance to *Phytophthora sp.*, woolly apple aphid, fire blight and tolerance to water logging with a range of tree sizes. In 2018, additional plots of Royal Red Honeycrisp on NZ.2, G.41 and G.890 were added.

A uniform NC-140 apple rootstock planting was established at Rock Springs in 2019 growing season. The scion cultivar is Buckeye Gala on ten rootstocks.

Two new Cornell-Geneva rootstock trials were established at FREC in 2018. Both with Gala, the first consisting of 11 fully dwarfing rootstocks (Bud. 9 to M. 9 size), and the second consisting of 7 rootstocks in the M.26 size category. A planting of Buckeye Gala on G.11, G.935, G.41 and B.9 was planted at FREC in 2020.

Cultivar Studies:

In 2016, a trial of fire blight resistant European pear cultivars was planted, with Harrow Sweet, Harrow Crisp, Sunrise, US446, US69426-038, US84907-069, US84907-140, US84907-144, US84907-160, and US84907-166, compared to Golden Russet Bosc and Bartlett as commercial standards. All trees are on the precocious, fire blight-resistant OHxF87 rootstock and trained on a 4-wire trellis to bi-axis at 4' x 12' spacing. The trees will be assessed for their growth and productivity, and the fruit will be evaluated for time of maturity, storage, size, and sensory characteristics.

Budget:

Salaries (Category I)	
Schupp, James Rawlinson (Investigator)	0
Smith, Donald Edwin (Technician)	\$690.00 (total incl. fringe 35.31%)
Total Salaries	\$690.00
Wages (Category III)	\$9340.00
Fringe (Category III: 7.98%):	\$744.00
Supplies:	\$1500.00
Plot fees (Rock Springs):	\$300.00
Travel:	\$1000.00
Total:	\$13,574.00

Budget Justification:

Salaries - \$510

This salary support will provide funding for Don Smith to scout the field plots once a week during the growing season and provide recommendations for the farm crew to conduct pest management and groundcover management and to maintain the plots.

Wages-\$9,340.00

Horticulture wage payroll assistants (TBD) will assist with maintenance of research plots, applying treatments and collecting and analyzing data. They will assist with data collection, data entry and analysis, and preparation of reports.

Fringe Benefits - \$924.00

FY23 – PROVISIONAL RATES

Fringe benefits are computed using the **provisional** rates of **35.31%** applicable to **Category I Salaries**, **11.26%** applicable to **Category II Graduate Assistants**, **7.98%** applicable to **Category III Salaries and Wages**, **0.35%** applicable to **Category IV Student Wages**, and **24.78%** for **Category V, Postdoctoral Scholars and Fellows**, for fiscal year 2023 (**July 1, 2022, through June 30, 2023**). If this proposal is funded, the rates quoted above shall, at the time of funding, be subject to adjustment for any period subsequent to June 30, 2023, if superseding Government approved rates have been established. Fringe benefit rates are negotiated and approved by the Office of Naval Research, Penn State's cognizant federal agency.

Supplies - \$1,500

Agricultural chemicals are needed to support the plots at Rock Springs. Miscellaneous supplies, such as flagging, tags, markers, bags, and batteries are needed for identifying plots and for collecting data in both field plots and laboratory procedures.

Plot fees – \$300

Rock Springs research plots are assessed a plot fee of \$300 per acre, with a minimum assessment of 1 acre.

Travel - \$1,000

Travel support is needed to allow the Investigator to travel from his base in Biglerville to Rock Springs to direct the farm crew regarding dormant pruning, to take measurements and collect data during the growing season, and to manage the harvest of four research plots comprised of three varieties with three separate and distinct harvest dates. Five travel dates, including three with overnight accommodations are budgeted, based upon estimates of mileage of 126 miles one way and per diem of \$152.00.

Table 1. Ongoing rootstock plantings at FREC and HRF for 2022

Year Planted	Location*	Cultivars	Rootstocks
2014	RS	Aztec Fuji	M.26, M.9T337, V.1, V.5, V.6, V.7, G.214
2014	RS	Honeycrisp	M.26, M.9T337, V.1, V.5, V.6, V.7, G.890, G.969
2017	FREC	Cresthaven	MP-29, Densipac, Nanopac, Controller 6, Controller 7, Controller 8, Guardian®, Lovell
2017	RS	Royal Red & MN B42 Honeycrisp	IFO# 1, IFO# 5, G.41, G.890
2018	RS	Royal Red Honeycrisp	IFO#2, G.41, G.890
2018	FREC	Gala (dwarf)	Bud 9, CG 3010, CG 3902, CG 4002, CG 4011, CG 4013, CG 4288, CG 4809, G. 41, G. 814, G. 202
2018	FREC	Gala (M. 26 class)	CG 4292, CG 5008, CG 5030, CG 5257, G.210, G.222, G.935
2019	RS	Buckeye Gala	IFO#5, G.41, G.11, G.214, G.4814, G.969, B.10

*RS: Hort. Research Farm, Rock Springs, FREC: Fruit Research & Extension Center, Biglerville