

PNW PEAR RESEARCH PRIORITIES FOR 2023

Fresh and Processed Pear Growers of Oregon & Washington



The task of the Pear Research Subcommittee (PRSC) is to solicit and support research on pears that can provide a favorable return on investment to the broader pear industry. The committee seeks research proposals that have clear, obtainable objectives. We encourage scientists to pursue other public and private sources of funding as appropriate, and to leverage pear grower funding to support applications for larger projects such as USDA Crop Protection, Sustainable Agricultural Research and Education (SARE), Organic Research Education Initiative (OREI), Specialty Crop Research Initiative (SCRI), or state Specialty Crop Block Grants (SCBG).

Pear industry stakeholders are clear in their desire for novel research projects which build upon previous knowledge and provide demonstrable value to the grower community. As such, we ask that **proposals include discussion of the project's potential return on investment (ROI)** in the near-, mid-, and/or long-term to the pear industry. In addition, impactful **proposals should include a plan for outreach** to ensure that those who would benefit from the project's outcomes, whether pear growers, consultants, packers, shippers, retailers, and/or other scientists, may fully realize and apply the benefits of the pear industry's investment in that specific research. Given the increasing production of organic pears, proposals should also **consider the specific needs of organic practices** whenever possible.

The economic viability of the PNW pear industry is predicated on our ability to deliver consistently positive eating experiences with high quality fruit that trigger repeat purchases from consumers, all within a sustainable production cost structure with adequate margins to allow pear growers and packers to reinvest in their operations. To that end, we have identified four key areas or "legs of the table" that can most improve grower returns; research proposals that address these needs are highly encouraged:

1. Clean fruit produced under stable, sustainable pest management programs with reduced inputs
2. Consistent, productive yields (50+ bins/acre in current standard blocks) of high-quality fruit
3. Consistent delivery of properly ripened, delicious fruit to consumer
4. Reduced warehouse and marketplace losses due to decay, shrinkage, and repacking

Research Priorities

We welcome all research proposals that address challenges to pear production, packing, and storage in the PNW; we have identified the following areas as our highest priorities and offer some detailed ideas under some headings not to be restrictive, but in hopes of attracting proposals which address some of the specific needs and concerns brought forward by our stakeholders. Numeric ratings next to specific topics reflect the relative importance of that issue to the PRSC (1=lowest, 10=highest).

CROP PROTECTION

Pear psylla (9.1 out of 10) – Sustainable best management practices (BMPs) to consistently produce clean fruit for harvest - How to enhance habitat for natural enemies (NEs) - What are threshold population densities for

NEs to boost psylla control? Cultural practices to reduce psylla pressure - Spray programs designed to preserve NEs - More options for organic systems – Better understanding of overwintering populations/why does psylla pressure vary between different growing districts? Better understanding of what makes trees more attractive or repellent to psylla (tree physiology) – Optimization of washing systems (use of soaps?) - Are there warehouse issues with removing particle films? Can predators be made more resistant to pesticides? Practical and economic impact of a coordinated regional scouting program – Does patchwork application of particle films reduce efficacy? Should dormant oils (spring and postharvest) be revisited for better control? How can financial barriers to transitioning to softer IPM programs due to decreased packouts be softened for the grower?

Mites (6.7 out of 10) – Options/strategies for conventional and organic systems, esp. 2 spot and rust mites – Impacts of cultural practices on mite populations – Harmful effects of repeated oil or lime sulfur use on bud quality, tree health? – Does use of particle films (rates, timings) flare mites or harm NE populations? Organic product mechanisms and length of efficacy - Broader look at essential oils (i.e. Cinnerate), what are the intended and unintended consequences of use?

Fire blight (6.6 out of 10) – Alternative products for mid-season control and/or reduced preharvest intervals (PHIs) for existing products – Why are infections becoming more chronic than occasional? Need organic control options that don't russet fruit

Brown marmorated stink bug (6.0 out of 10) - Better understanding of pest phenology/life cycle - Alternate host habitat (oaks?) for potential suppression outside of orchards

Vertebrate pests (*New category, no ranking, but urgent priority in some areas*) – Effective management techniques for squirrels, deer, bears, turkeys

POSTHARVEST/ FRUIT QUALITY

Decay control (8.4 out of 10) – Need systemic understanding of areas for resource investment to produce highest ROI – Need universal standards to measure/monitor PH losses, esp. late in the marketing season - Best methods for PH fungicide applications (drench vs. fogging vs. aerosol) – Need to reduce repacks

Postharvest physiology (8.0 out of 10) – How can we extend the storage/marketing season and still deliver high quality fruit? Why do some pears store better than others? Need better tools for increasing organic postharvest handling – How best to use 1-MCP? Need models to predict ripening time for 1-MCP-treated fruit, including use on Bartlett for processed pears - How do room loading strategies affect storage? – Potential benefits of increased humidity in storage? Research on current 2022 crop: impact of unusual season on fruit and its storability (i.e., length of time on tree, spring cold, autumn heat, other environmental factors)

Eating quality (7.9 out of 10) – Need more consistent ripening (esp. for Anjou) to satisfy customer and increase consumption - Need universal metrics/standards to define good vs. bad fruit quality, esp. for early season Anjou's – Need improved traceability to track sources of "good" vs. "bad" fruit

Scuffing prevention (7.9 out of 10) - Understanding cuticle development and how it pertains to scuffing & storage - New packaging or postharvest application of cuticle-enhancing materials

Scald control (7.4 out of 10) - Impact of warmer summers

Fruit coatings (6.8 out of 10) – How to best use postharvest coatings/coverings to improve market appeal

Nutritional value (6.0 out of 10) – Study and promotion of health benefits of pears to help boost marketing

Sanitation/food safety (5.6 out of 10)

Value-added products (5.4 out of 10) – How to prevent browning of sliced pears – Other products that could “up-sell” culls and processors

Packaging (4.7 out of 10) – Economical, environmentally friendly packing options that protect fruit finish and quality

HORTICULTURE

Irrigation (7.3 out of 10) – Optimal irrigation frequency & soil moisture levels for various soils – Best monitoring methods?

Crop load management (7.2 out of 10) – How to produce 50+ bins/acre with 85% packouts in older blocks - Promoting fruit set (fertility, PGRs) – Organic options to prevent preharvest drop – Inexpensive techniques for accurate crop estimation within orchard blocks

Fertility/nutrition (7.2 out of 10) – Effects of various nutrients on tree vigor, fruit size & quality - Are calcium and oils compatible? Optimized fertilizer programs (products, rates, timings) and their impacts on production

Fruit disorders (i.e., cork, greening) (6.4 out of 10) – Role of nutrition, irrigation, crop load (esp. for cork) in disorder incidence

Pruning strategies (6.3 out of 10) – Reducing pest habitat in treetops - Impacts of pruning timings – How to boost production in old trees?

Fruit finish (6.0 out of 10) - How to improve fruit finish in cold, wet springs

Orchard systems (5.8 out of 10)

Irrigation (6.6 out of 10) – Unintended consequences of constant overhead irrigation?

Tree stress/inconsistency within blocks (5.0 out of 10) – Role of nutrition, irrigation

Pollen (*new category, no rating*) - Pollen sources (S-alleles, bloom timing) – Efficacy of supplemental pollen strategies

GENETICS

Pest genomics (7.8 out of 10) – Application of “omic” technologies to accelerate system improvement (tree, pest resistance, beneficials, diseases, ripening, fruit quality, etc.) – Can resistance mechanisms in pests be introduced/promoted in natural enemies?

Disease/disorder genomics (7.5 out of 10) – Application of “omic” technologies to accelerate system improvement (tree, pest resistance, beneficials, diseases, ripening, fruit quality, etc.)

Rootstock genetics/breeding (7.3 out of 10) – Need dwarfing/semi-dwarfing rootstocks to transform orchard systems and make them more grower and labor friendly – Increased precocity & yields

Variety genetics/breeding (7.2 out of 10) – Investing in new varieties with better ripening/eating qualities may be better solution than trying to fix current varieties

TECHNOLOGY

Application technologies (6.4 out of 10) – Do some spray products lose efficacy in rapid-drying conditions?

Field sensor technologies (6.1 out of 10)

Labor assist technologies (5.8 out of 10)

Orchard automation technologies (5.6 out of 10) – Opportunities to learn lessons from Dutch growers as they automate their orchards - Integration of ongoing work funded by WA apple industry to accelerate development and adoption of innovative technologies and solutions to benefit PNW pear industry in the following areas: precision sprayer technology, crop management and yield estimation (AI models for pear trees to identify flower clusters, fruits and their size, pests and diseases) - Cool data (non-destructive quality assessment of pear quality & economic analysis of collected information during production for storage) - Multifunctional robots (including harvest)

OTHER AREAS OF INTEREST

Support for outreach materials (i.e., pocket guides) (6.6 out of 10) – Independent, unbiased field validation of commercial products

Crop estimation (5.0 out of 10) – More accurate predictive models for entire industry crop size – Modeling of individual orchard crops (yield, size and grade distributions) to improve marketing strategies