

PNW PEAR RESEARCH PRIORITIES FOR 2024

Fresh and Processed Pear Growers of Oregon & Washington

The aim 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 PRSC 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 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 in sizes and grades to maximize flexibility for warehouses to pack, store, and ship fruit in profitable formats
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 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).

POSTHARVEST/ FRUIT QUALITY

Decay control (8.5 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 – Orchard sanitation/preharvest practice effects on PH decay – Resistance management of fungicides

Postharvest physiology (7.3 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 2023 crop: impact of unusual season on fruit and its storability (i.e., short growing season, compressed onset of maturity across growing districts, warm nights, etc.) – Is Bartlett maturity model still relevant? – Plastic vs. wood bins: effect on storage, humidity, temperature pulldown? – Maturity-based sorting & packaging

Eating quality (6.3 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

Scald control (6.3 out of 10) - Impact of warmer summers – New options for control?

Scuffing prevention (6.0 out of 10) - Understanding cuticle development and how it pertains to scuffing & storage - New packaging or postharvest application of cuticle-enhancing materials – Postharvest humidity effects on scuffing?

Sanitation/food safety (6.0 out of 10)

HORTICULTURE

Crop load management (6.2 out of 10) – How to consistently 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 – Focus areas for greatest ROI to grower? Chemical thinning of Bartlett and maybe Bosc

Orchard systems (6.2 out of 10) – Evaluation of orchard systems in blocks using older rootstocks

Irrigation (6.0 out of 10) – Optimal irrigation frequency & soil moisture levels for various soils – Best monitoring methods? – Unintended consequences of constant overhead irrigation? Effect of drying soils (early vs. mid vs. late season) on fruit size & quality and tree health in summer and winter pears

Fertility/nutrition (6.0 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 finish (6.0 out of 10) - How to improve fruit finish in cold, wet springs – Reduction of spray marking throughout the growing season.

Pollen (6.0 out of 10) - Pollen sources (S-alleles, bloom timing) – Efficacy of supplemental pollen strategies – Effects of particle films on pollination – Viability of commercial pollen products – Best management practices for honeybee hives (density, placement, etc.)

Pruning strategies (5.7 out of 10) – Reducing pest habitat in treetops - Impacts of pruning timings – How to boost production in old trees? Promoting light penetration & consistent cropping – Long vs. short pruning

Tree stress/inconsistency within blocks (5.5 out of 10) – Role of nutrition, irrigation

Fruit disorders (i.e., cork, greening) (5.0 out of 10) – Role of nutrition, irrigation, crop load (esp. for cork) in disorder incidence

GENETICS

Pest genomics (8.5 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?

Rootstock genetics/breeding (7.8 out of 10) – Need dwarfing/semi-dwarfing rootstocks to transform orchard systems and make them more grower and labor friendly – Increased precocity & yields

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.)

Variety genetics/breeding (7.3 out of 10) – Investing in new varieties with better ripening/eating qualities may be better solution than trying to fix current varieties – Self-fertile varieties – Pest & disease resistant varieties

TECHNOLOGY

Application technologies (6.0 out of 10) – Do some spray products lose efficacy in rapid-drying conditions?

Labor assist technologies (6.0 out of 10)

Field sensor technologies (5.7 out of 10) - Which commercial sensors demonstrate ROI in pear blocks?

Orchard automation technologies (5.7 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)

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 transitions to softer IPM programs be improved/expedited? Why is psylla control so variable from year to year with similar management programs? Are particle films suppressing NE populations?

Mites (7.2 out of 10) – Need options/strategies for conventional and organic systems, esp. 2 spot and rust mites (esp. organic) – Impacts of cultural practices on mite populations – Harmful effects of repeated use of oil, lime sulfur, and other miticides on bud quality, tree health, fruit finish? 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 (6.9 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 – What are current trends in spread/population numbers? What are effective NEs? What are threshold levels for economic damage to crop? What are effective parasitism rates?

Vertebrate pests (6.0 out of 10) – *Urgent need* for management techniques for rodents, esp. CA ground squirrels, but also voles, mice, and gophers – Strategies for resident populations of larger animals, namely deer & turkeys

Codling moth (New category, no ranking, lower priority) – How well does apple CM phenology model match with pear systems? Does overhead washing reduce efficacy of CM management? Softer spray products - Mating disruption/puffer efficacy

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
– Can apple crop estimation technology and models be adapted to pear?