Executive Summary: WTFRC Apples Technology Roadmap 2024-2026

The Washington Tree Fruit Research Commission (WTFRC), founded in 1969, represents tree fruit producers in Washington state, including apple, cherry, pear, and stone fruit growers and packers. Today, the industry is facing numerous challenges - from climate pressures to increasing costs to macroeconomic uncertainties - and recognizes that technology will be key to thriving in an increasingly complex and uncertain future.

This report, focused on apples, presents a technology roadmap for the next two years of research, development, and extension activities. Through deep engagement with over 100 stakeholders across the industry, and in line with the principles shown below, three high priority areas have been selected across three different timelines to impact: Irrigation (near-term), Crop Load Management (mid-term), and Harvest Labor (long-term). Within each area, the existing technology landscape is described, and strategies and example activities have been identified for focus and action in the next two years, and prioritized across the roadmap (i.e., overall priorities).

Selection Principle	Details
Mission alignment.	Alignment to the WTFRC mission to "inspire strategies and promote collaborative science-based solutions to foster economic security and sustainability for Washington tree fruit growers"
Balance timeframes to impact.	Focus on near-term (2 year) strategies that will move the needle for growers, including groundwork that needs to be laid today to tackle mid- (3-5 year) and long-term (5-10 year) priorities.
Overcome barriers.	Target specific barriers to technology adoption, as identified via desktop research and interviews.
Leverage strengths.	Focus on WTFRC strengths (i.e., don't suggest things WTFRC is not well placed to take on).
Encourage diverse partners and broad thinking.	Specify outcomes and provide example (but not prescriptive) activities to encourage "out of the box" thinking and attract a diverse range of traditional (i.e., researcher) and non-traditional partners.

Technology Roadmap

Priority Area	Strategy	End Goal	Priority
Irrigation	Create and improve incentives for new and existing irrigation service providers to support advanced irrigation technologies.	Eliminate real and perceived service gaps that can limit growers from investing in advanced irrigation technologies.	2
	Increase the availability of third-party data showing the effectiveness of irrigation technologies.	Increase confidence in the effectiveness of existing and emerging irrigation technologies.	2
	Develop a local evidence base for how irrigation technologies can enable the use of non-traditional irrigation techniques that improve fruit yield and/or quality.	Improve apple yield and quality through innovative irrigation techniques.	1
	Document and share irrigation technology strategies that growers are using to reduce costs.	Motivate adoption of irrigation tech by appealing to cost-saving opportunities, and leveraging social proof.	3
	Build capacity and capabilities for the effective use of irrigation technologies.	Improve the confidence and skills of operators across all levels of orchard operations related to effective use and optimal utilization of irrigation technologies.	2
Crop Load Mgmt	Incentivize research on the precision application of plant growth regulators.	Improve the effectiveness of existing chemical thinning tools to reduce labor and input costs.	2
	Advance the availability and effectiveness of crop load modeling tools, with special emphasis on early season prediction.	Farmers have access to high quality data around crop load management as early in the season as possible.	1
	Incentivize research and development work in pruning technology.	Increase the amount of technologists creating tools to advance pruning efficiency.	1
	Advance awareness of, and evidence for, the value of tech-enabled crop load management tools.	Increase crop load management tool exploration and adoption among growers.	3

Harvest Labor	Lower the costs of developing commercially viable mechanical/autonomous apple harvesting solutions.	Increase the amount of collaborations between technology developers, academic researchers, and commercial R&D providers to reduce duplication of efforts in the development of harvest labor solutions.	1
	Educate vendors and developers to ensure harvest labor solutions are designed to work within the operational and financial constraints of existing systems.	Vendors come to market not just with technology that works, but that is also affordable and easily integrated into apple orchards	2
	Help Washington apple growers get "robot ready."	WA apple growers are able to take advantage of emerging harvest labor solutions with minimal negative commercial impacts / trade-offs.	3
	Update WTFRC's RFP processes to efficiently engage the appropriate experts in vetting new research and commercialization proposals.	Ensure that limited resources for harvest labor solutions are appropriately and efficiently distributed, based on a range of required lenses for evaluating technologies (e.g., technical, industry, commercial, etc.) and development teams.	2