



2020 Technology & Innovation Research

Final Report, May 2020



Table of Contents

Key Findings

Research Objectives

Methodology

Respondent Mix

Industry Challenges

Current Market Solutions

Future Market Solutions

Appendix

Key Findings

- The research is representative of the USHBC member population, reflecting different viewpoints by role in the supply chain, varying levels of industry experience, geographic dispersion, and crop size.
- At an industry level, the top three drivers of change are changing consumer preferences, labor supply, and global competition.
- At a farm level, while there have been enhancements to existing tools and processes, there is still a significant opportunity for revolutionary change in the industry.
 - Drip irrigation/fertigation and optical sorting, as examples, have relatively high levels of usage and perceived value. These two areas represent arguably the most mainstream forms of technology and less of a need for disruptive innovation.
 - Insect trapping and mechanical harvesting, both with relatively high usage but low value, represent two areas which are more available to larger farms. These two areas have been a struggle to scale and identify cost efficiencies to bring value to smaller farms. They are also the most areas most in need of innovation, as stated by respondents.
 - Harvesting aids, satellite recognition, and blockchain each have low familiarity and thus low usage and low value in the industry. This could mean the technology is unproven, but more so it is a lack of education on existing tools and a lack of innovation inside of the industry which is holding them back from more widespread adoption.
- Since historically most innovation has come from the farm level, this will likely require more involvement and education from outside the industry in order to achieve the degree of efficiency to address the macro-level industry challenges.

Research Objectives

The primary objective of this research was to identify and prioritize the challenges and opportunities for enhanced value from technology and innovation.

The secondary objectives of this research were to ...

- Identify challenges related to scouting, pruning, harvesting, packing, and other aspects of field operations which are inefficient and/or costly for growers.
- Evaluate existing solutions and their ability to reduce or eliminate inefficiencies.
- Assess new technologies to address unmet needs and inefficiencies.
- Explore differences in each of the aforementioned areas by region, grower size, and other forms of segmentation which may be meaningful and actionable for the committee.
- Establish the industry priorities across multiple time horizons and investment levels.

Methodology

Investigative Phase

- Loyalty Research Center (“LRC”) initially reviewed background information on the history of the blueberry industry, the evolution of blueberry growers in North America, global environmental factors influencing the evolution the industry, and specifically the impact of technological innovations.
- LRC also interviewed members of the USHBC Innovation Committee in February 2020, to better understand the information requirements and desired research outcomes.
- The questionnaire was finalized with input from the staff in early March.

Assessment Phase

- LRC programmed and tested a mobile-optimized survey via the Qualtrics technology platform and provided a link USHBC/NABC for distribution to its member list.
- On March 16th, USHBC/NABC staff sent a pre-notification email to the member list and then hours later, sent the survey link provided by LRC.
 - Staff also sent 3 reminders over a three-week period.
 - The survey closed on April 14th.
- There were a total of 136 usable surveys from members.

Methodology

Overview of Statistical Analysis

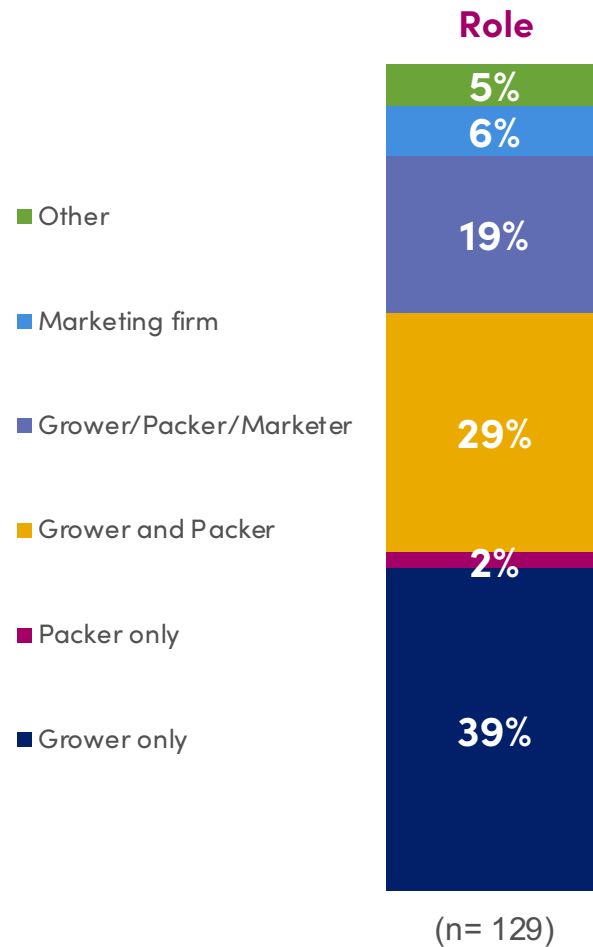
- Based on information provided by USHBC/NAC on the quantity and representativeness of the useable surveys, LRC has established an estimated confidence interval for the results presented in this report: 95% \pm 7%.
- 95% represents the accuracy of the results, while 7% represents the precision of the results. This means that if the survey were conducted 100 times, the aggregate percentage reported would be within 7%.

Deployment

- LRC conducted a working session (“reality check”) of the results with the USHBC and Qanopy project teams in early May 2020.
- Qanopy’s team will then be responsible for any further deployment of the information, including any final set of recommendations.

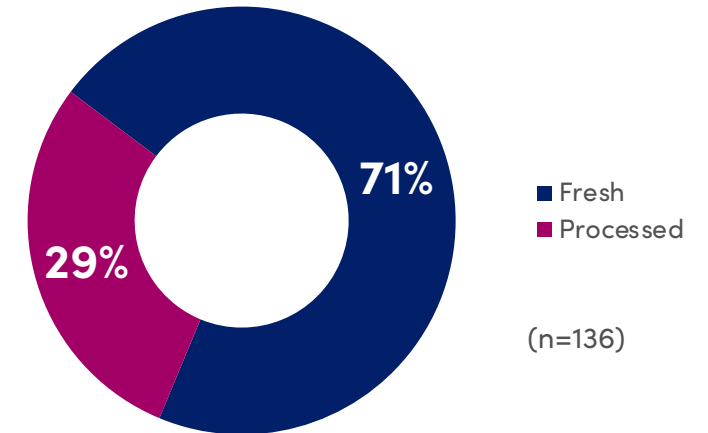
Respondent Mix

Respondent Mix

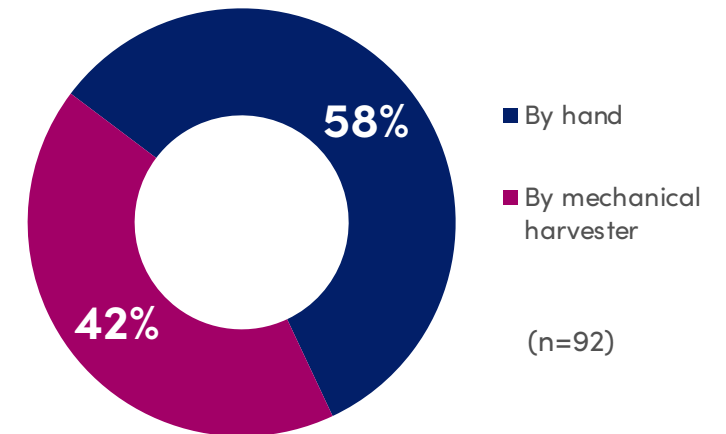


U-pick; research;
nursery; suppliers;
breeder

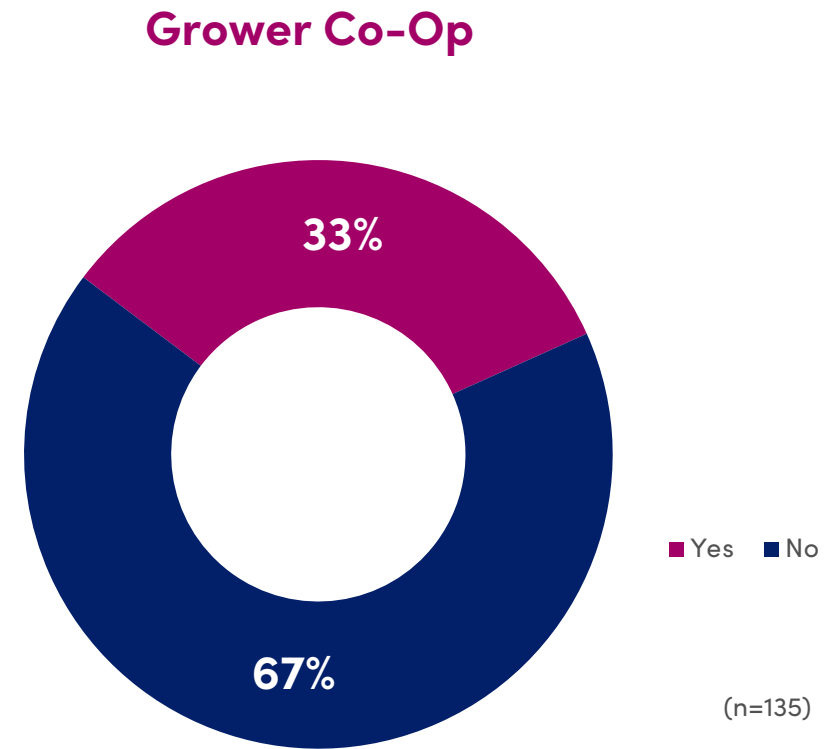
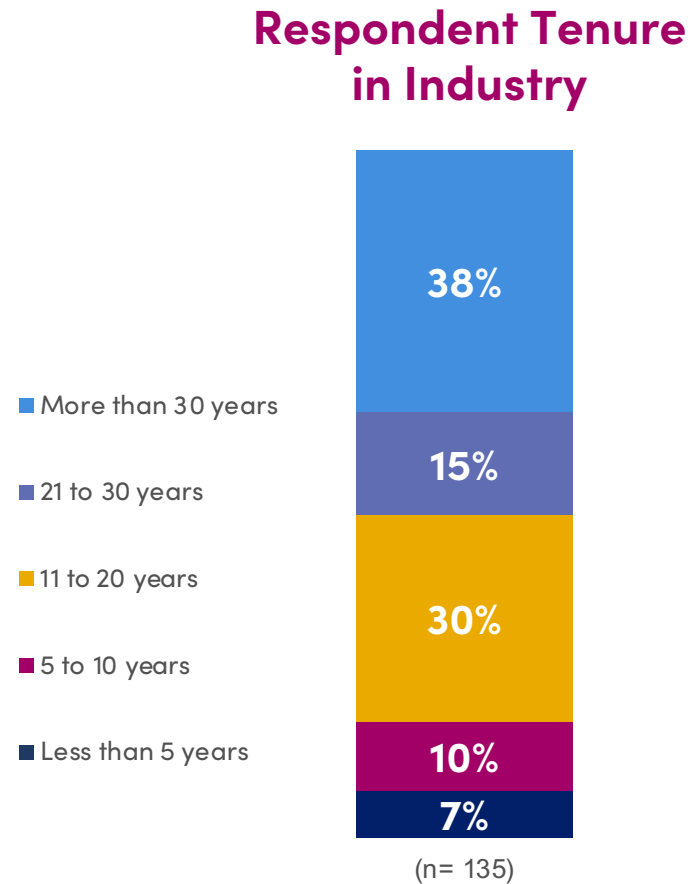
2019 Crop Was...



Harvested...

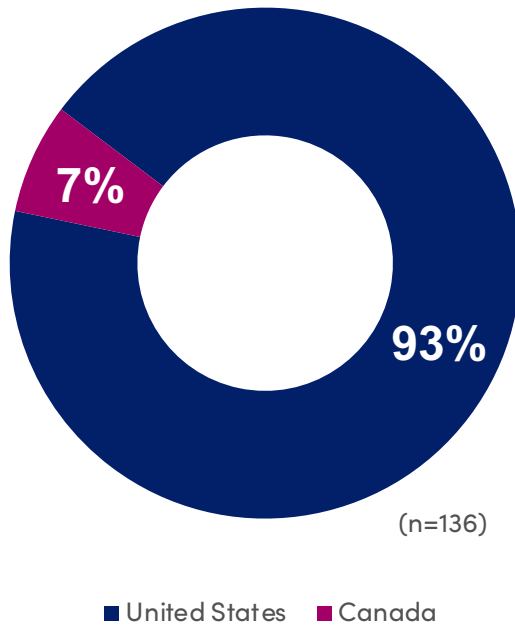


Respondent Mix

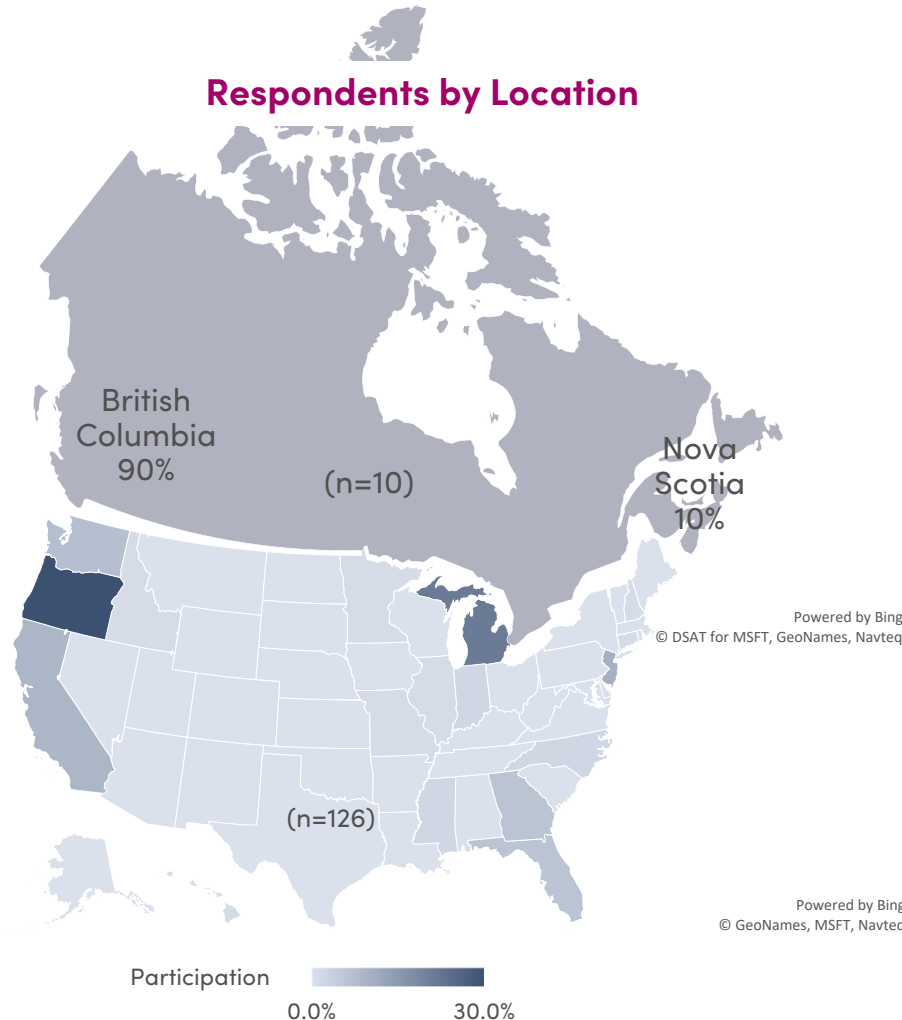


Respondent Mix: Geographic Dispersion

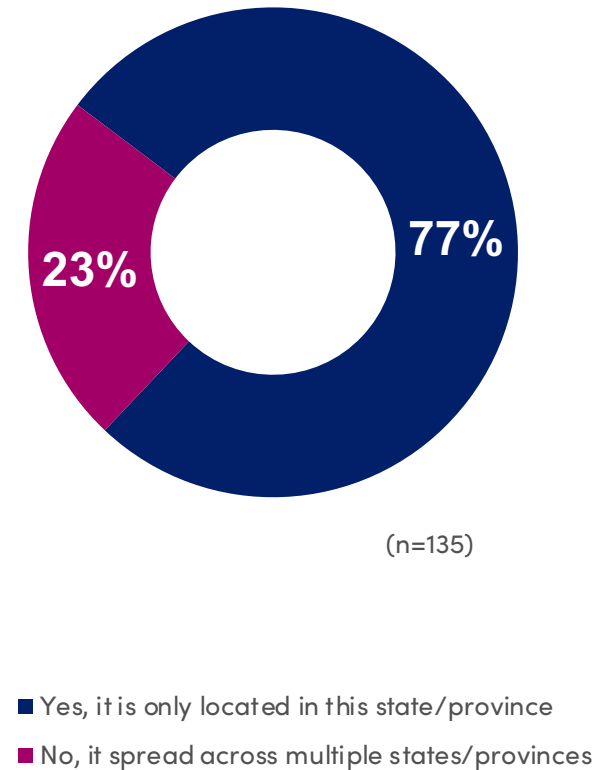
Majority of Crop Location



Respondents by Location



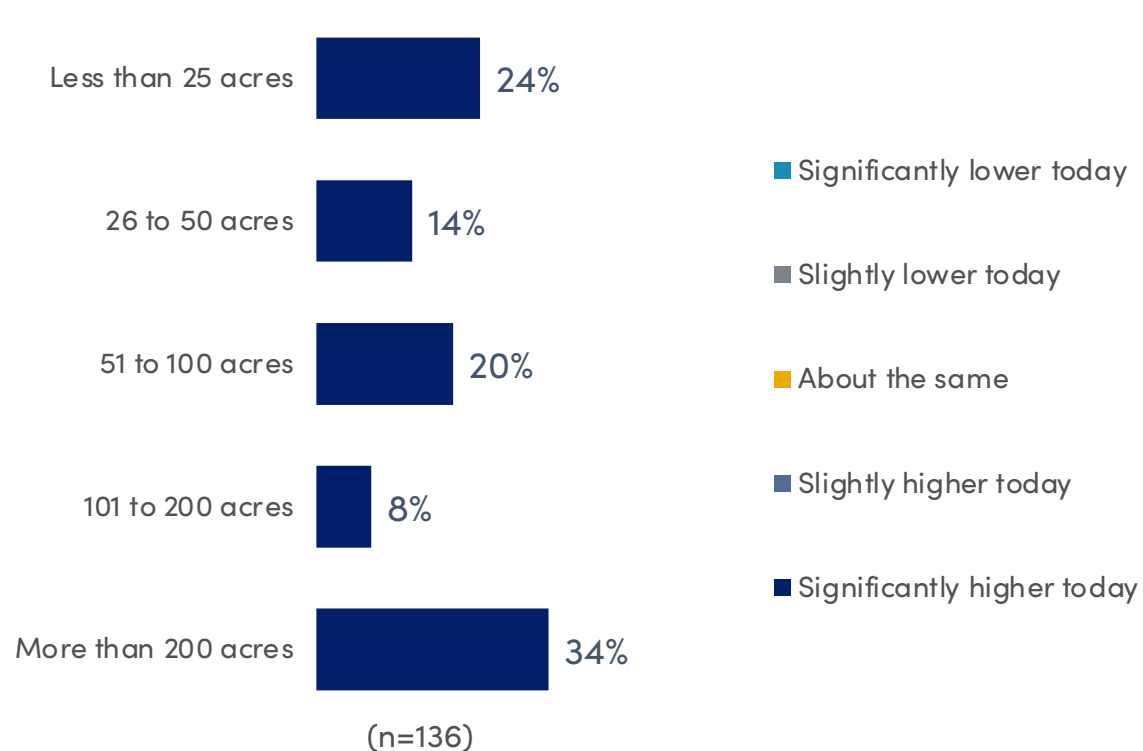
Single vs. Multiple Locations



- A3. Where is the majority of your crop located?
A4A. In which state is your crop primarily located?
A4B. In which province is your crop primarily located?
A5. As a follow up, is your crop located entirely in this state/province, or is it spread across multiple states/provinces?

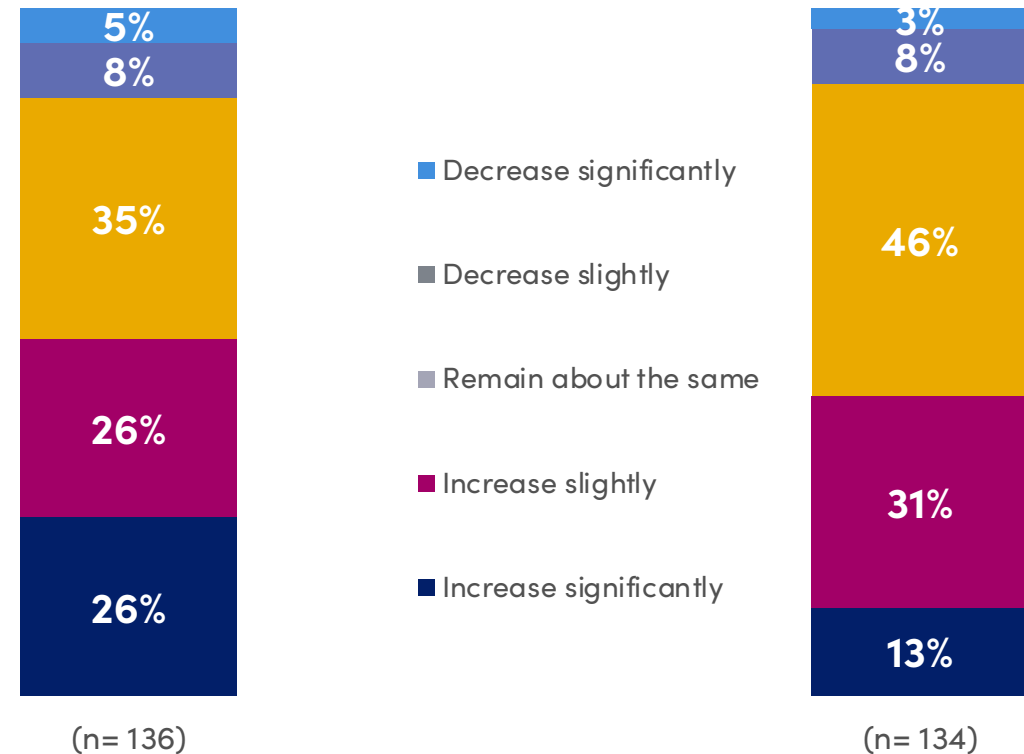
Respondent Mix: Total Blueberry Acreage

Compared to 5 Years Ago



- Significantly lower today
- Slightly lower today
- About the same
- Slightly higher today
- Significantly higher today

Over the Next 5 Years



- Decrease significantly
- Decrease slightly
- Remain about the same
- Increase slightly
- Increase significantly

Industry Challenges

Macroenvironmental Factors

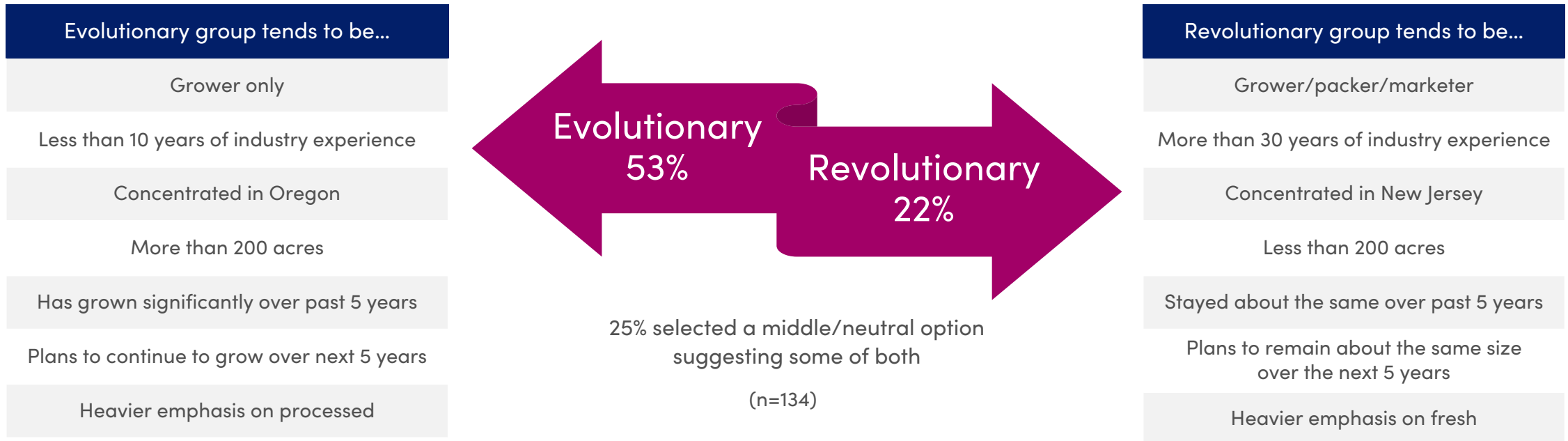
How Industry Issues are Driving the Need for Technology & Innovation

Five distinct segments emerged in terms of the importance of issues facing the industry.

	Total Respondents (n=136)	Consumer/Economy (n=47; 35%)	Labor Supply (n=46; 34%)	Global Competition (n=28; 21%)	Other (n=8; 6%)	Government Regulation (n=7; 5%)
Global competition	21	10	15	60	5	1
Labor supply	20	11	39	12	4	14
Government regulations	12	9	10	11	4	69
U.S. economy	8	14	6	2	0	5
Changing consumer preferences	7	15	3	1	0	4
Lack of/speed of technological innovation	7	9	8	3	3	2
Genetics/genetic modification	6	10	7	1	1	1
Other	6	2	1	3	79	1
U.S. dollar currency exchange rate	5	6	5	3	2	0
Climate/climate change	5	9	3	3	2	4
Global economy	3	4	3	1	0	0

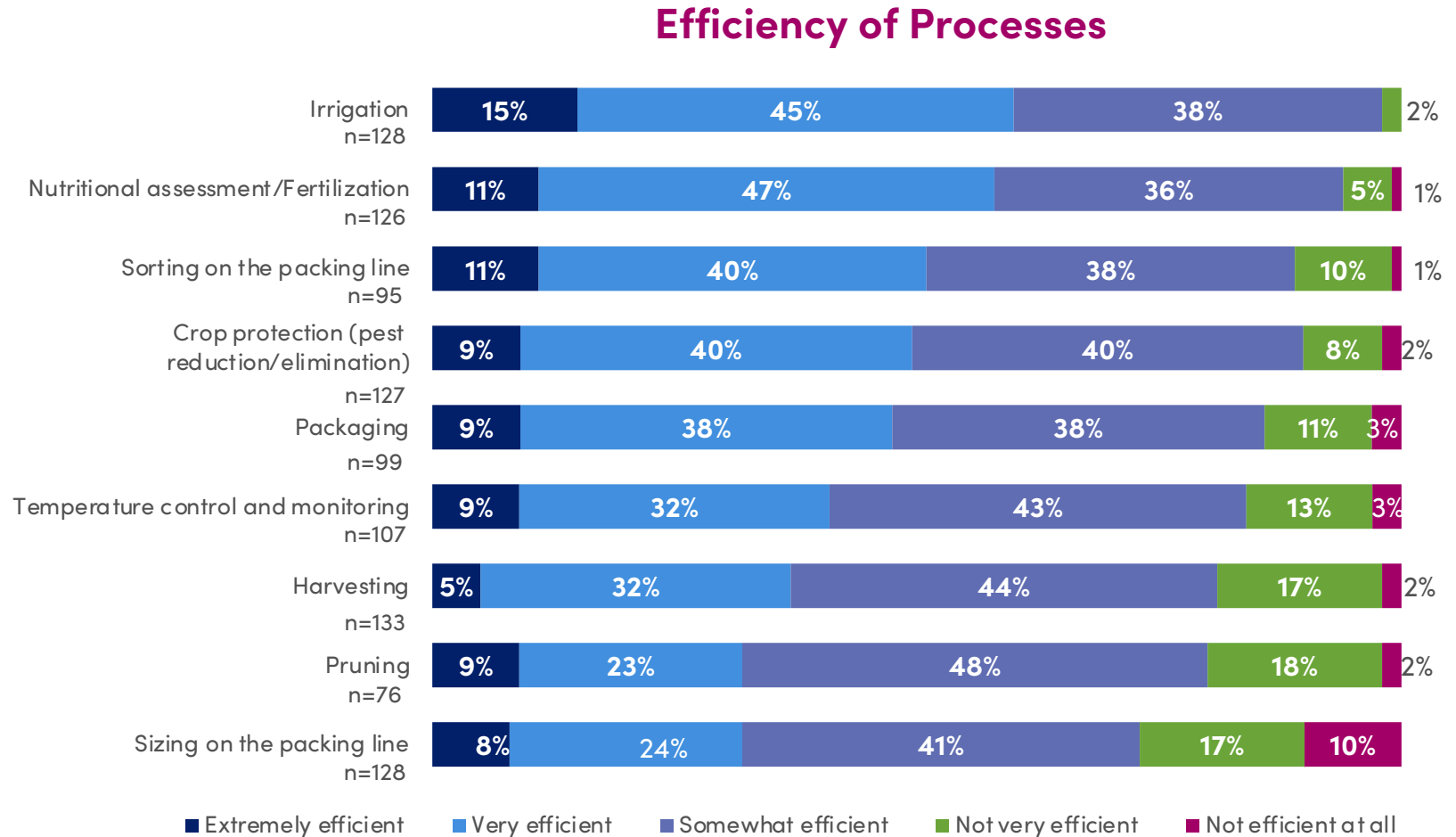
Imports;
consumer
demand;
pesticide use;
marketing

Industry Challenges: View of Industry's Integration of Technology



Industry Challenges: Efficiency of Current Processes

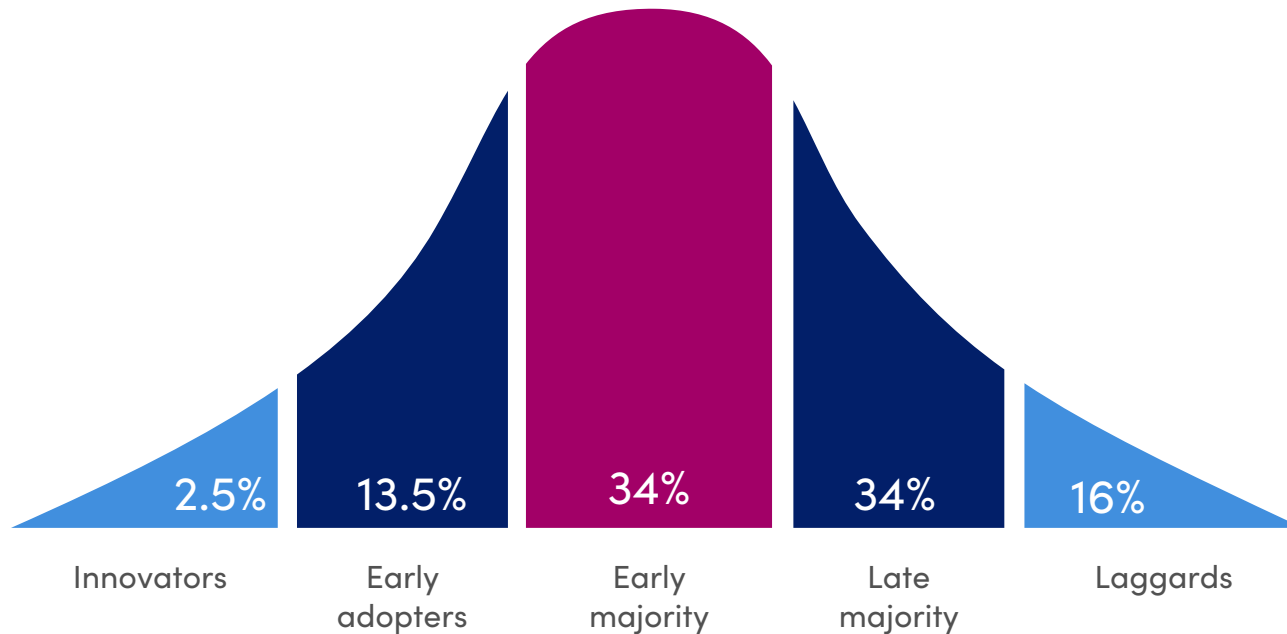
The view of “Somewhat efficient” for most existing processes is likely what is contributing to the stronger sense of Evolutionary change rather than Revolutionary change.



Current Market Solutions

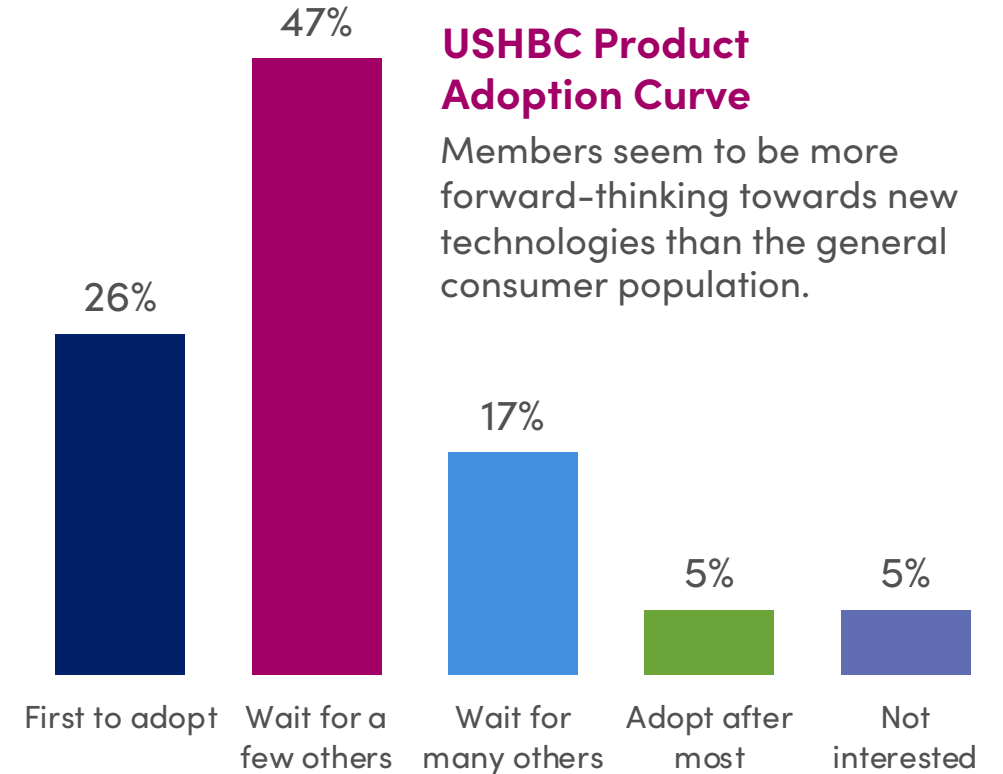
Current Market Solutions: Willingness to Adopt

Typical Product Adoption Curve



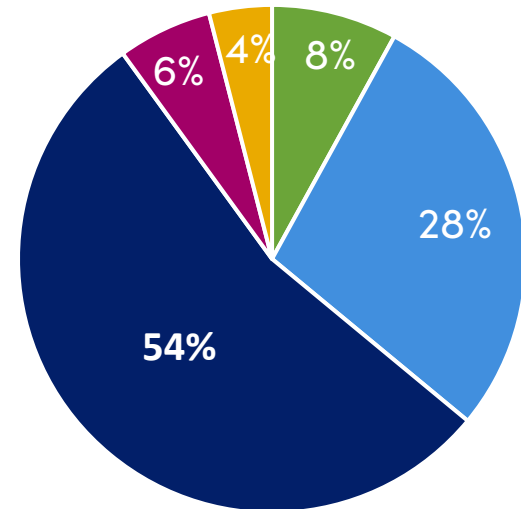
USHBC Product Adoption Curve

Members seem to be more forward-thinking towards new technologies than the general consumer population.



Current Market Solutions: Familiarity with Technology Usage

Familiarity with Technological Efficiencies



■ Extremely familiar
■ Very familiar
■ Somewhat familiar

■ Not very familiar
■ Not familiar at all

Least familiar group tends to be...

Grower only

Crop of less than 25 acres

Crop size about the same or smaller compared to 5 years ago

Crop size will remain about the same or smaller over next 5 years

Crop located in only one state/province

Do not belong to a grower co-op

Most familiar group tends to be...

Grower/packer/marketer

Crop of more than 200 acres

Crop size significantly larger compared to 5 years ago

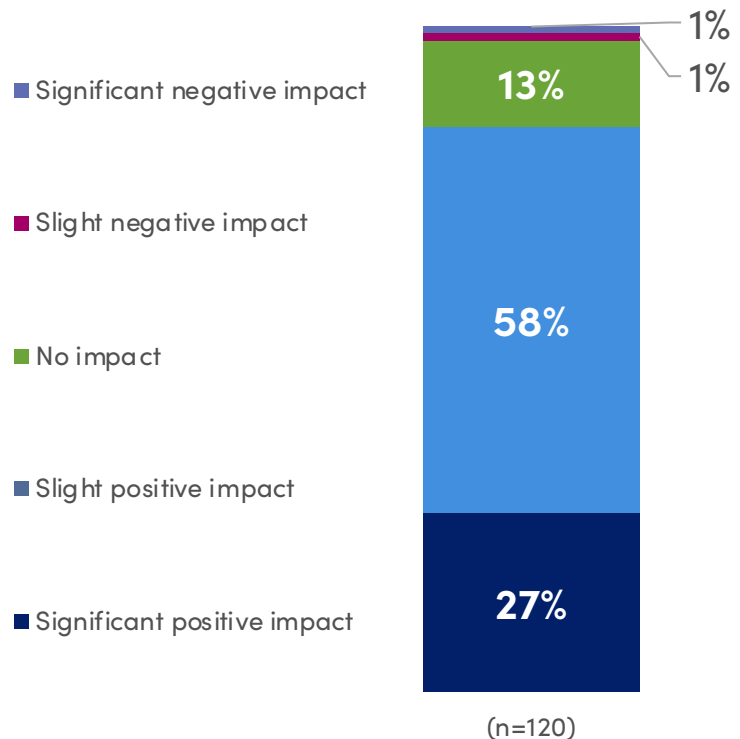
Crop size will continue to increase over the next 5 years

Crop located in multiple states/provinces

Belong to a grower co-op

Current Market Solutions: Impact on Supply Chain Efficiencies

Impact of Efficiencies over Past 5 Years

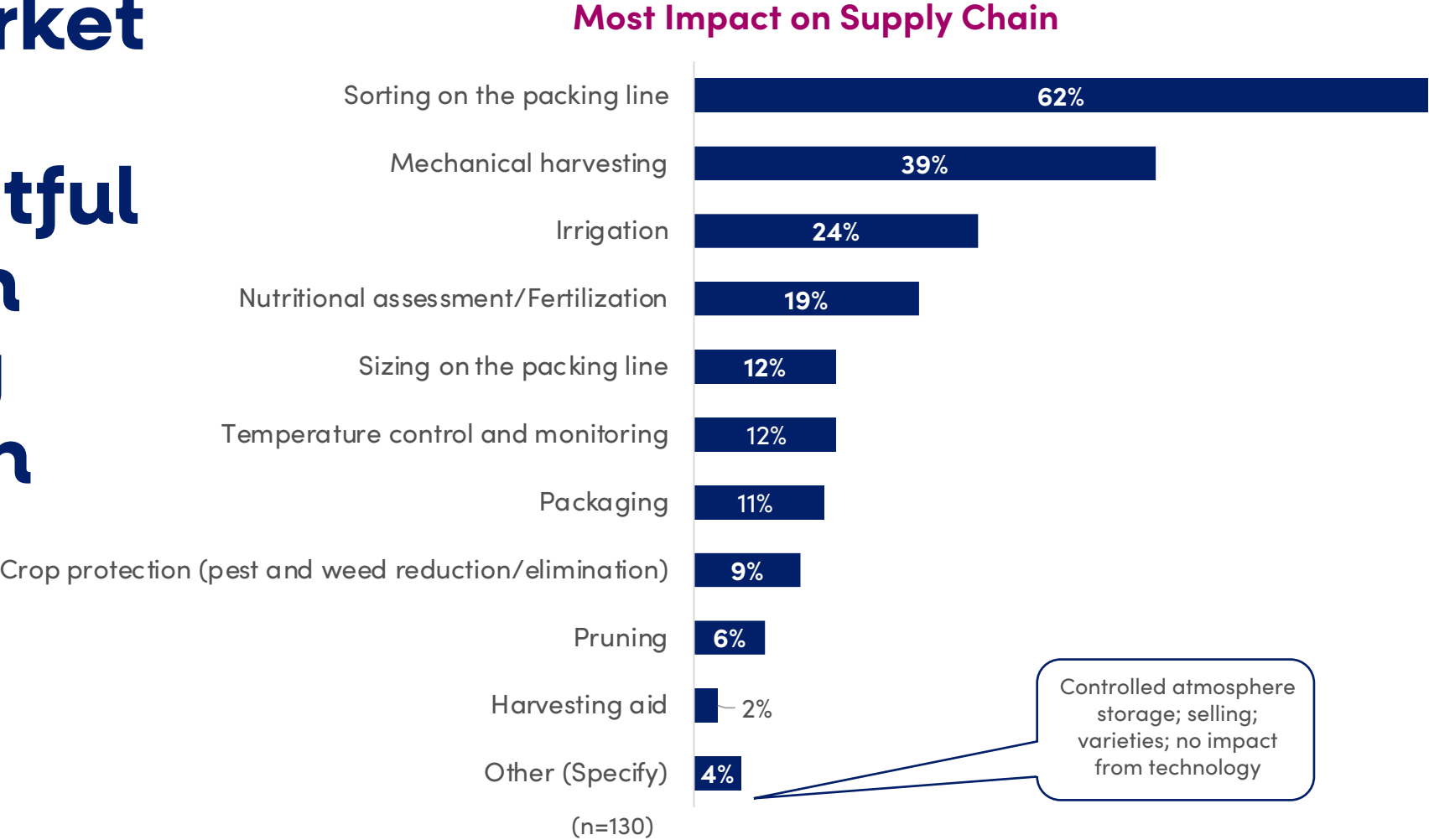


Examples of Efficiencies

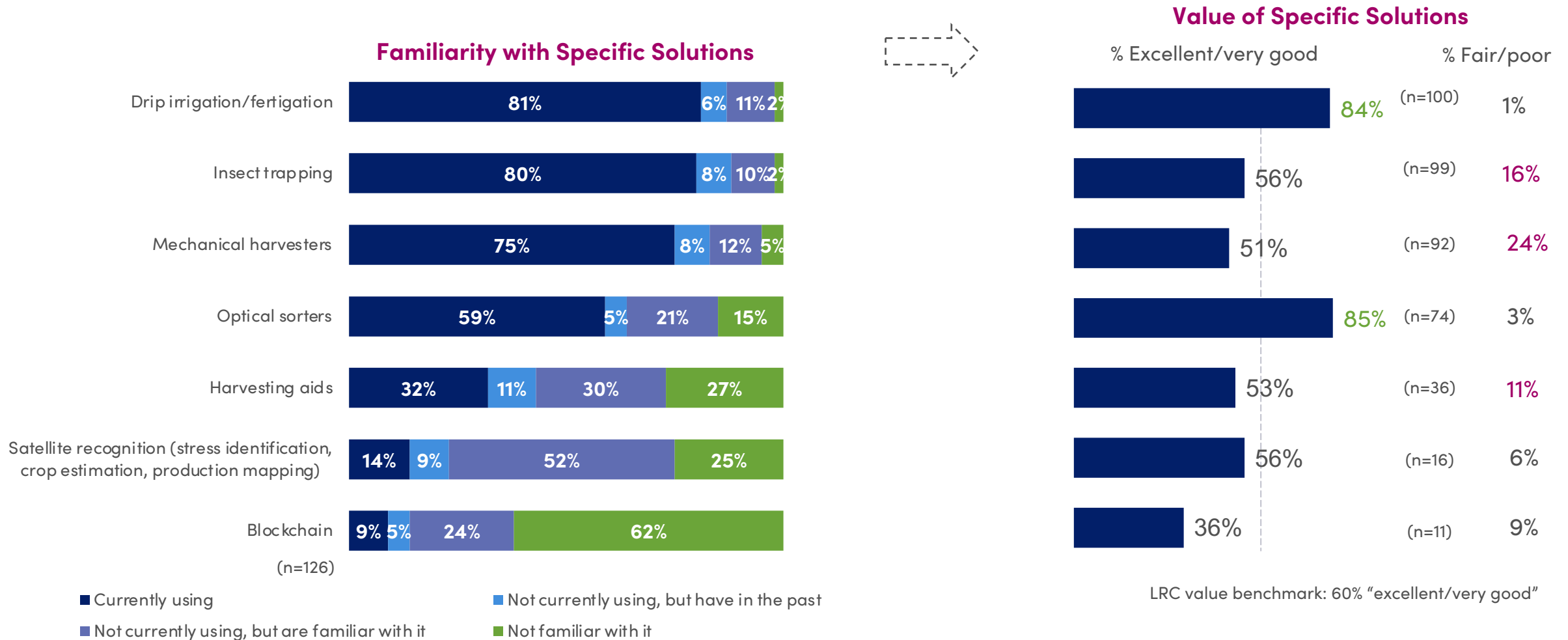
Positive Themes	Sample Comment	% Mentions
Color/soft sorters	"The new optical sorting machines improved the way we pack for specific markets at a reduced cost. We are now able to maximize income and minimize waste and costs."	47%
Mechanical harvesters	"Harvesting – still beating berries off the bush, but improved padding has made some positive impact on quality."	24%
Extended shelf life/better quality	"Optical sorting has increased quality and shipping/shelf life."	12% (n=99)

Negative Themes	Sample Comment	% Mentions
Automated packing	"Integrating our mechanical harvesting with temperature control systems to a fully automated packing facility that can fresh pack high quality machine harvested fruit."	50%
Affordability	"A small grower/packer has difficulty in being able to purchase the latest technologies."	50%
Controlled atmosphere storage	"Integrating our mechanical harvesting with temperature control systems to a fully automated packing facility that can fresh pack high quality machine harvested fruit."	50% (n=2)

Current Market Solutions: Most Impactful Advances in Technology & Innovation



Current Market Solutions: Overall Value Today



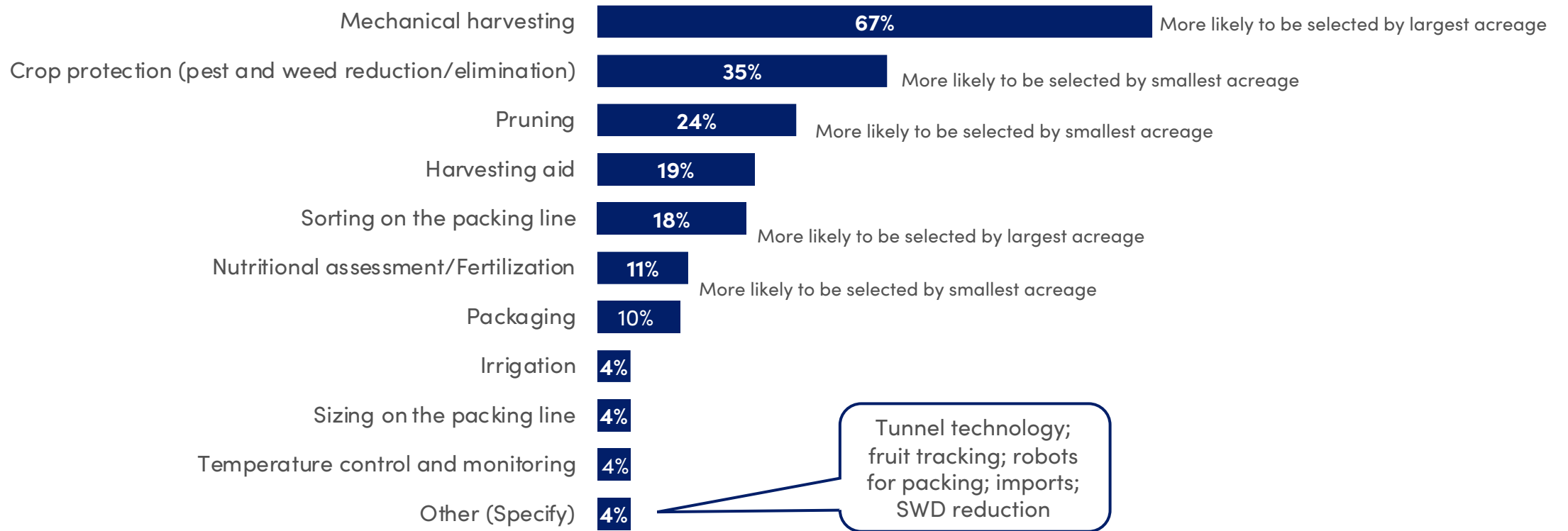
C5. How familiar are you with each of the following solutions?

C6. When considering the implementation cost compared to the return on investment, how would you rate the overall value of each of these solutions today?

Future Market Solutions

Future Market Solutions: Areas Where Technology and Innovation is Needed Most

Supply Chain Areas Technology Most Needed



Future Market Solutions: How to Enhance Existing Solutions

Theme	Sample Comment	% Mentions
Mechanical harvesting/pruning	"Machine harvesting system that does not cause fruit to become bruised and optical sorting system that can truly distinguish non-bruised blueberries from those that bruised. In addition, algorithm must be developed to sort fruit with no bruise, 1 to 10% of flesh with internal bruise damage, 6 to 10% with internal damage and so on. This allows fruit to be packaged for immediate sales, within 1 week of harvest, and those that can be cold stored for prolonged storage for distribution to distant markets."	39%
Pest control/weeds	"SWD control other than spraying broad spectrum pesticides. Also something other than netting the field."	21%
Reduce labor needs	"Anything to do with labor efficiencies that are reasonably priced where savings can be realized in a fairly short period of time."	10%
Robotics/drones	"Drones and field robots like burro to map fields down to the plant and have attachments to prune/weed/aid in harvest."	7%
Reduce imports	"Eliminating import blueberries during USA harvest window. Also barring (MARKETERS) from bringing in imported blueberries during USA harvest window!!!"	7%

(n=88)

Future Market Solutions: “Big Ideas”/ Revolutionary Change

Theme	Sample Comment	% Mentions
Robotics/drones	“Robotics applied to harvest (like in strawberries). Automatization in greenhouses and irrigation. Usage of drones for monitoring and sprayings. Mechanical harvesters. Wireless plantation monitoring systems combined with automatic irrigation systems. Monitoring systems combined with cellular phones.”	32%
Machine/optical harvesting	“I think that from the harvesting for fresh point of view, the Easy Harvester type of system, using the principles for low damage to fruit and modified hand harvesting, that can also be used in tunnels, is really the way forward, particularly when it is motorized for easy propulsion.”	22%
Pest control	“Pest trapping and monitoring can also use wireless monitoring which frees up management for other tasks.”	8%
Reduce imports	“I really wish we could put a contract to foreign countries on not bringing fruit into America during our picking season. If the brokers or retailers had to buy American first than they would. But right now there is nothing stopping them from buying cheaper fruit from imports. I wish we had a way to stop that.”	7%

(n=72)

Additional Comments

Theme	Sample Comment	% Mentions
Mechanical harvesting/ picking machines/robotics	"Picking machine technology needs improvement. Sanitation solutions need to coincide with picking machine technology. Our biggest fear is unsafe product from new picking machine technology."	18%
Enforce trade policies/ decrease imports	"Quit importing blueberries so consumers buy America growers fruit first."	14%
Labor reduction	"Labor reduction needs to be the focus for all new technology. Quality product is being provided but this needs to be done without so much hand labor."	10%
Cost concerns	"Just my opinion that the budget for this committee should be much bigger, we have a lot of labor challenges ahead in the ag industry. Promotion/health research wont matter if we don't have fruit harvested ready to promote."	10%
Positive comment about need for innovation	"Innovation is crucial in this time of reduced labor and demands industry investment."	6%

(n=50)

Appendix

Segment Insights

	Consumer	Global Comp	Labor Supply	Other	Gov't Regulation
Role	Grower	Grower	Grower/packer	Grower	Grower
Time in Industry	30+ years	0 – 20 years	11 – 20 years	11 – 20 years	30+ years
States	Oregon	Michigan	Oregon	California, Florida	New Jersey
Grower co-op	No	Mix	No	No	No
Acreage	Mix	Mid-sized (26 – 200 acres)	Large (200+ acres)	Mid-sized (26 – 200 acres)	Small (<25 acres)
Change in acreage (past 5 years)	Stayed about the same	Higher today	Higher today	Higher today	Lower today
Change in acreage (next 5 years)	Same to slight increase	Increase	Same to slight increase	Remain about the same	Remain about the same
Industry changes	Evolutionary	Balanced	Balanced	Evolutionary	Balanced
Least efficient areas	Pruning, sizing, temp control, packaging	Sizing	Pruning, harvesting, sizing	Sizing, temp control	Pruning, nutritional, crop protection, sorting, temp control, packaging
Most needed tech innovation	Mechanical harvesting, pruning, crop protection	Mechanical harvesting, crop protection	Mechanical harvesting, crop protection, sorting	Crop protection, mechanical harvesting, harvesting aid	Crop protection, pruning

Post-Survey Best Practices

- LRC typically recommends a working session with a small group of staff to “reality check” the findings, determine if any additional analyses are necessary to frame (or re-frame) the story, and work towards a more concise final presentation.
- Final presentations can be to a variety of audiences:
 - An executive-level or senior-staff level internal presentation (combination of strategic and tactical discussions);
 - Full staff (high-level summary of findings and/or deep dives into departments’ areas of interest)
 - Board of Directors/Trustees (a more strategic discussion);
 - Other association partners (strategic planning facilitators, marketing/communication/PR agencies, technology firms).
- Regardless of the final presentation structure, LRC recommends three pieces of communication be sent within 6 weeks of that final presentation:
 - High level summary of findings to all association staff – here’s what we learned, what we plan to do with it in the near-term and the long-term, and how you can be involved.
 - High level summary of findings to all members – thank you for participating, here’s what we learned (good, bad and ugly!), what we plan to do with the information, and when/how it may affect you.
 - Personal thank you to all participants – occasionally association clients will share a full executive summary report with this audience as a ‘thank you’ for their time in taking the survey.
- RC and its clients then work to establish an ongoing communication and monitoring cadence to ensure change efforts are progressing and are making a measurable impact on members.