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Biodiversity Enhancement and Pest Management in New Zealand Horticulture: Grower Survey Findings

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Report Prepared for A Lighter Touch

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Key Points

A Lighter Touch and Lincoln University undertook a survey to better understand biodiversity-enhancing activities and pest-management practices in New Zealand horticultural systems. The survey had two purposes: to provide empirical evidence for a cost-benefit model of biodiversity enhancement, and to generate broader grower-informed insights for A Lighter Touch's biodiversity-focused communication, engagement, and extension work. The survey was administered online using Qualtrics and recruited respondents through Cinta and sector communication channels, including the A Lighter Touch and Horticulture New Zealand newsletters. Respondents were screened to ensure they were familiar with, or responsible for, pest-management decisions for a horticultural enterprise. The achieved sample was 94 respondents and should be interpreted as a practical grower survey rather than a statistically representative census of New Zealand horticulture. The main findings are:

- **Biodiversity-enhancing activities are already common in the respondent sample**. The survey shows a base of existing practice that future extension and engagement can build from. Current activity is strongest for practices that fit within existing farm and orchard systems, including reduced soil disturbance, cover crops or permanent groundcover, hedgerows, shelterbelts, and maintaining native or natural habitat near production areas.

- **Biodiversity enhancement is closely connected to lighter-touch pest management.** Many respondents reported using softer or more selective spray products, targeted or threshold-based spraying, reduced use of broad-spectrum insecticides or pesticides, rotation of pesticide modes of action, and biopesticide products. This suggests that biodiversity enhancement should not be framed only as habitat planting, but also as part of integrated pest-management decision-making.

- **Grower motivations are strongly practical**. Biodiversity-enhancing activities were commonly linked to crop production and quality, soil and water management, reduced spray use, reduced pest pressure, market or certification expectations, environmental stewardship, and business resilience. Environmental stewardship matters, but it sits alongside commercial and operational motivations.

- **Future adoption potential appears strongest for practices that can be integrated into existing production and pest-management systems.** These include biopesticide products, softer or more selective spray products, reduced use of broad-spectrum insecticides or pesticides, cover crops or permanent groundcover, and maintaining native or natural habitat near production areas.

- **The main barriers to wider adoption are cost, production risk, uncertainty about benefits, lack of clear technical guidance, and difficulty fitting practices into existing operations**. These barriers suggest that lack of interest is not the main issue; growers need confidence that biodiversity-enhancing practices will work in commercial production settings without creating unacceptable risk.

- **The support most likely to encourage adoption includes financial assistance, commercial demonstration, clear evidence of production or cost-saving benefits**, market or certification recognition, practical guidance, and access to suitable products. Awareness-raising alone is unlikely to be sufficient.

- **Many growers are already using monitoring-informed pest-management decisions, and beneficial insects influence spray decisions for most respondents.** This provides a strong basis for linking biodiversity enhancement to IPM, beneficial insects, spray-risk reduction, and more selective pest-management approaches.

Overall, the findings suggest that biodiversity enhancement is positioned as part of a resilient, productive, and lower-impact horticultural system, rather than as a separate environmental add-on.

1. Introduction

This report presents findings from a grower survey undertaken by A Lighter Touch and Lincoln University to better understand biodiversity enhancement and pest-management practices in New Zealand horticultural systems. The survey forms part of the wider research programme examining the commercial implications of investing in biodiversity-enhancing activities on orchards and farms.

The survey had two related purposes. First, it was designed to provide empirical evidence to inform the development of the cost-benefit model of biodiversity enhancement in horticulture. In this respect, the survey collected information on current practices, spray decision-making, spray frequency and costs, perceived benefits, barriers to adoption, and support needs. These data help identify the relevant cost and benefit pathways represented in the modelling framework.

Second, the survey was intended to generate broader insights for A Lighter Touch's biodiversity-focused work programme. The findings provide a grower-informed picture of which biodiversity-enhancing activities are currently being used, which activities growers may be willing to expand or adopt, what benefits matter most to them, and what practical constraints may limit uptake. These insights are relevant not only for model development, but also for wider industry communication, extension, and engagement around biodiversity-enhancing practices.

For the purposes of the survey, biodiversity-enhancing activities were defined as practical actions that increase habitat, beneficial organisms, soil biological activity, vegetation diversity, or ecological function within or around horticultural production areas. Examples include flower strips, inter-row vegetation, cover crops, hedgerows, shelterbelts, riparian or buffer plantings, reduced soil disturbance, selective spraying, reduced use of broad-spectrum insecticides, and monitoring-based pest decisions.

The results reported here should therefore be read both as evidence supporting the economic modelling component of the research programme and as a standalone source of grower insight into biodiversity enhancement in horticulture. Together, the findings help clarify current practice, future adoption potential, perceived benefits, and the practical barriers that need to be addressed if biodiversity-enhancing and lighter-touch pest-management approaches are to become more widely adopted.

2. Survey design and sample

The survey was designed as a short online questionnaire for horticultural growers and other respondents familiar with pest-management decisions. Respondents were screened to ensure they were familiar with, or responsible for, pest management decisions for a horticultural enterprise. The survey collected evidence on biodiversity enhancement and pest-management practices in horticultural systems. It covered both current practices and future adoption possibilities, with a particular focus on activities that may support beneficial insects, soil health, water quality, habitat provision, production resilience, and more selective or monitoring-based pest management.

The questionnaire collected information across several areas:

- farm and crop context;
- biodiversity-enhancing activities currently used;
- reasons for undertaking biodiversity-enhancing activities;
- benefits that would motivate further adoption;
- pest-management and spray decision-making;
- spray frequency and spray costs;
- barriers to adoption;
- support needs;
- and the perceived importance of biodiversity enhancement for future business resilience.

This scope reflects the dual purpose of the survey. The findings provide practical input into the wider cost-benefit modelling work, while also generating broader grower-facing insights for A Lighter Touch's biodiversity-enhancing activities and communication programme.

The survey was administered online using Qualtrics and was designed to take approximately 10 minutes to complete. Survey recruitment used a mixed approach. Respondents were recruited through Cinta, a New Zealand research and insights company with experience in agricultural and horticultural research, and through sector communication channels, including the A Lighter Touch newsletter and the Horticulture New Zealand newsletter.

The achieved sample of 94 respondents should be interpreted as a practical grower survey rather than a statistically representative census of New Zealand horticulture. The results are therefore most useful for identifying observed patterns in the sample, grower priorities, perceived benefits and barriers, and variables relevant to the biodiversity enhancement cost-benefit model.

For percentages based on the full sample of 94 respondents, the approximate maximum sampling margin of error is ±8 percentage points at the 90% confidence level, assuming a simple random sample and a proportion near 50%. This should be treated as an indicative benchmark only, because the survey used mixed recruitment channels and was not designed as a statistically representative probability sample of New Zealand horticulture. Reported percentages are therefore best interpreted as descriptive patterns within the achieved respondent sample rather than precise population estimates. Margins of error would be larger for subgroup results or questions answered by fewer respondents.

3. Results

3.1 Respondent profile

The sample included a mix of horticultural production systems, with the largest group being vegetables and covered crops (Figure 1). These represented approximately one-third of respondents. Tree fruit and perennial fruit, kiwifruit, winegrapes, arable, berryfruit, and other horticulture made up the remainder of the sample. This spread gives the survey useful coverage across horticultural systems, although the sample should still be interpreted as a practical grower survey rather than a statistically representative industry census.

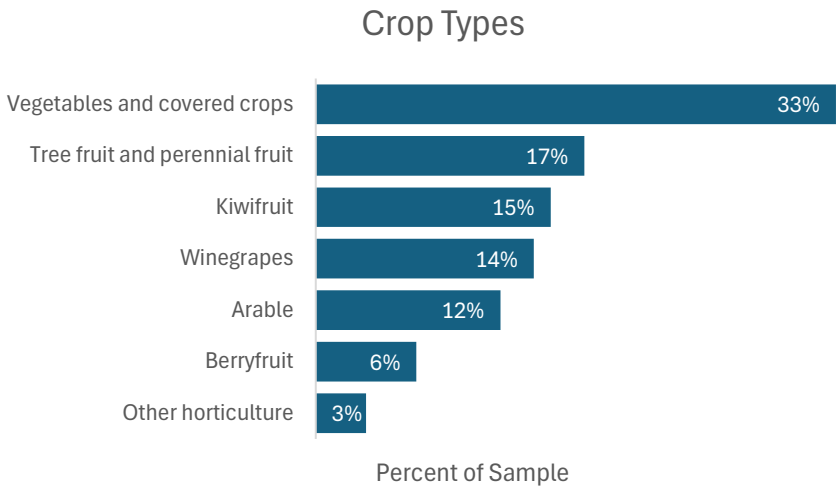


Figure 1 Crop Types

Most respondents were directly involved in business decision-making. Owner/operators made up the largest group, followed by managers (Figure 2). Only a small share identified as technical advisors, consultants, or other roles. This is useful for interpretation because the responses largely reflect people with direct operational responsibility rather than only external advisory perspectives.

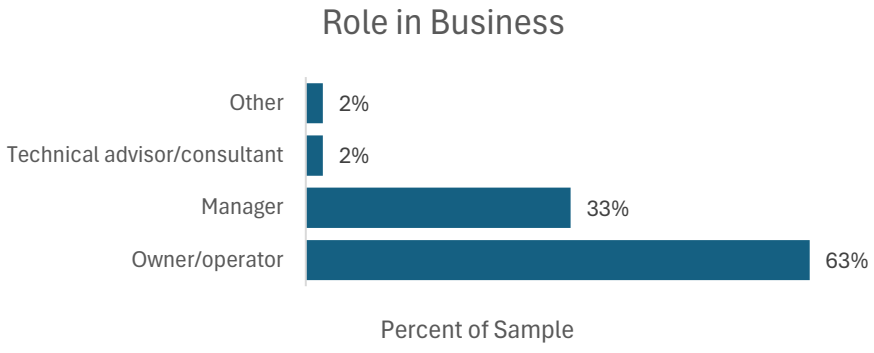


Figure 2 Role in Business

The production-system results show that conventional production was common, but many respondents also reported integrated pest management (Figure 3). Organic production was less common but still represented in the sample. Because respondents could select more than one production-system category, these results should be read as overlapping production-system characteristics rather than mutually exclusive groups.

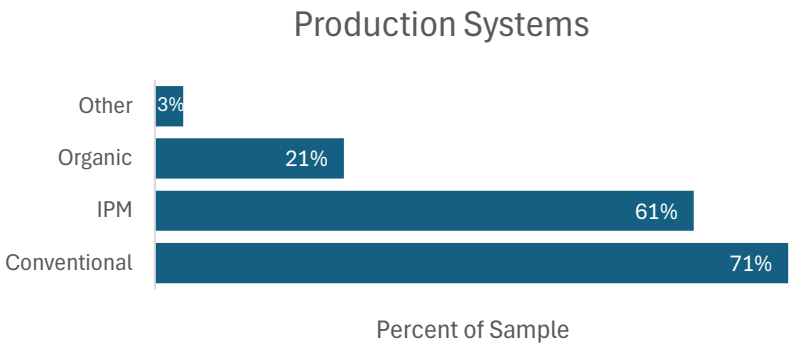


Figure 3 Production Systems

Respondents also varied substantially in the area of crop land they managed (Figure 4). The sample included many smaller operations, but also a meaningful number of larger holdings, including properties over 100 hectares and some over 500 hectares. This variation means averages for land area are likely to be influenced by large properties, so hectare-related results are better interpreted using distributions rather than simple means.

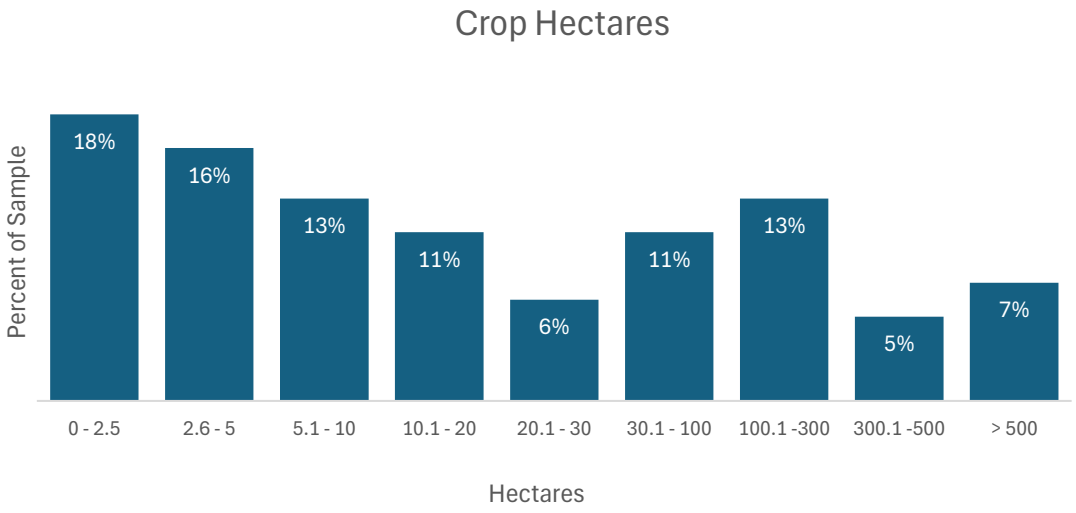


Figure 4 Distribution of Crop Hectares

The spatial distribution shown in Figure 4 is based on the IP address metadata recorded for the survey responses. These data provide an approximate indication of where respondents accessed the survey from, but they do not directly identify the physical location of the grower, orchard, or farm. Based on this metadata, responses were inferred across several broad New Zealand regions, with larger shares associated with Auckland, Canterbury, Bay of Plenty, Waikato, and the lower North Island/Wellington. A sizeable share of IP records could not be confidently assigned to a New Zealand region and is shown as uncertain. These uncertain records should not be interpreted as overseas respondents, as they may reflect ISP routing, privacy services, VPNs, mobile gateways, or corporate network infrastructure. The map should therefore be interpreted as an indicative check on the geographic spread of survey access points rather than a precise measure of respondent location.

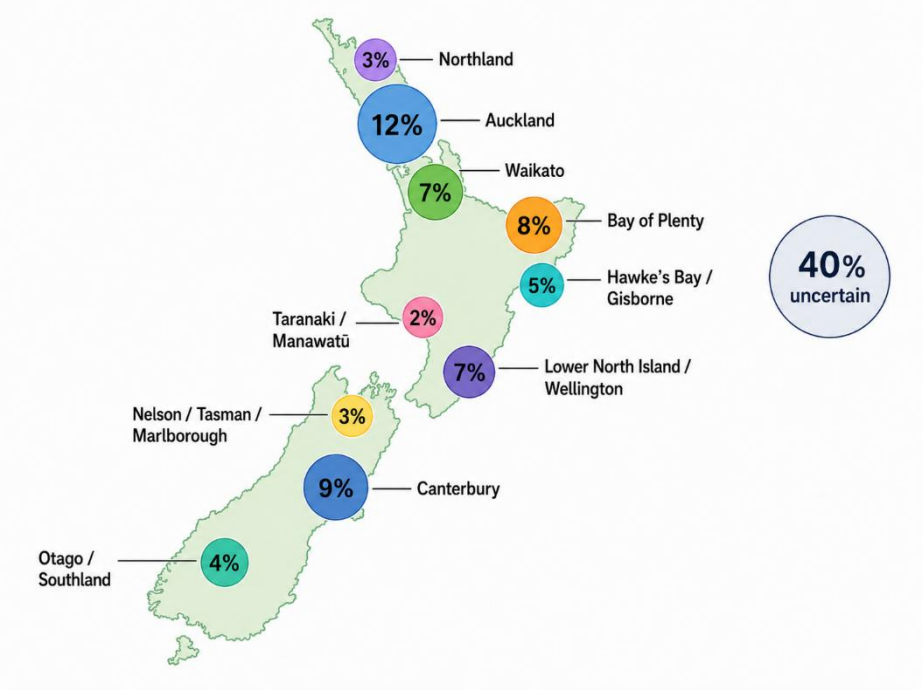


Figure 5 Indicative regional distribution of survey responses inferred from IP address metadata.

3.2 Current biodiversity-enhancing activities

Current use of biodiversity-enhancing activities was relatively widespread (Figure 6). The most commonly reported activity was reduced soil disturbance, followed by cover crops, green manures, or permanent groundcover. Hedgerows, shelterbelts, flowering edge plantings, and maintaining native or natural habitat near production areas were also common. These results indicate that biodiversity enhancement is already present in many horticultural systems, especially through soil, groundcover, and habitat-related practices.

Other activities were less common but still reported by a substantial minority of respondents. Scout-based pest-management decisions, flower strips or wildflower strips, inter-row vegetation, and riparian or buffer plantings were each reported by around one-third of respondents or less. Only a very small share selected “none of these”, indicating that most respondents were already undertaking at least one biodiversity-enhancing activity.

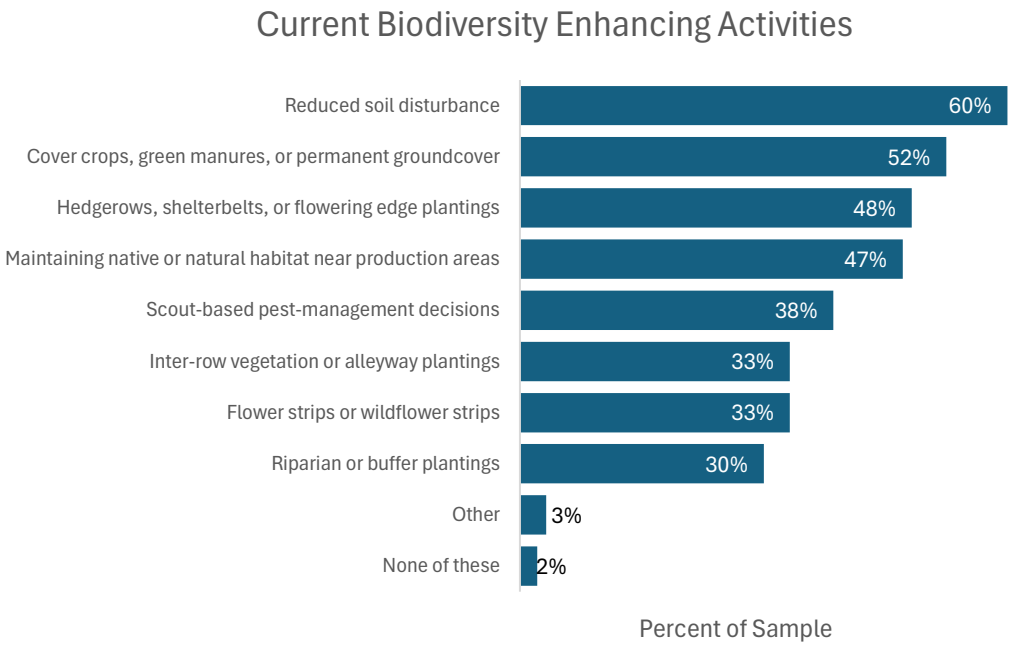


Figure 6 Current Biodiversity Enhancing Activities

Spray-related biodiversity and lighter-touch pest-management practices were also common (Figure 7). The most frequently reported spray-related practice was the use of more selective or softer spray products, followed by targeted or threshold-based spraying decisions and reduced or no use of broad-spectrum insecticides or pesticides. Rotation of pesticide modes of action and use of biopesticide spray products were also reported by a substantial share of respondents. These results suggest that biodiversity-enhancing activity is not limited to habitat or planting actions; it also includes changes in pest-management practice.

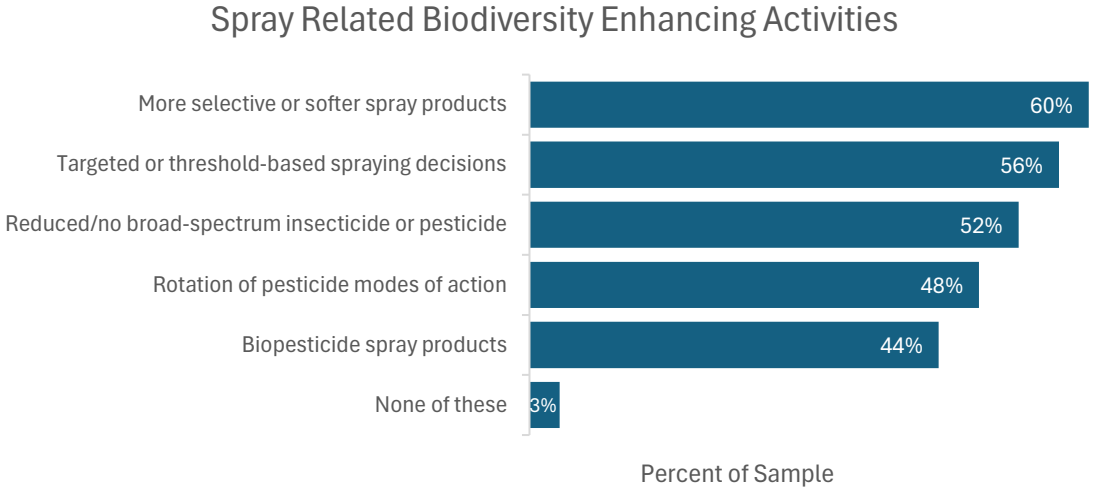


Figure 7 Spray Related Biodiversity Enhancing Activities

3.3 Motivations and expected benefits

Figures 8 to 12 report results from questions where respondents first selected the items that were relevant to them and then ranked their selected items. The figures show the percentage of respondents who selected each item and ranked it among their top three responses. These results therefore indicate the items that were both relevant to respondents and relatively highly prioritised.

The main reasons respondents currently undertake biodiversity-enhancing activities were strongly linked to production and environmental management (Figure 8). Improving crop production or quality and improving soil health or water management were the most common reasons. Environmental stewardship, reducing spray use, reducing pest pressure, and meeting market, buyer, or certification expectations were also important, but were less frequently ranked highly.

This pattern suggests that biodiversity enhancement is not being viewed by growers as a purely environmental action. Instead, respondents appear to connect biodiversity-enhancing practices with practical production outcomes, soil and water management, pest pressure, spray use, and market expectations. Environmental stewardship is important, but it sits alongside commercial and operational motivations.

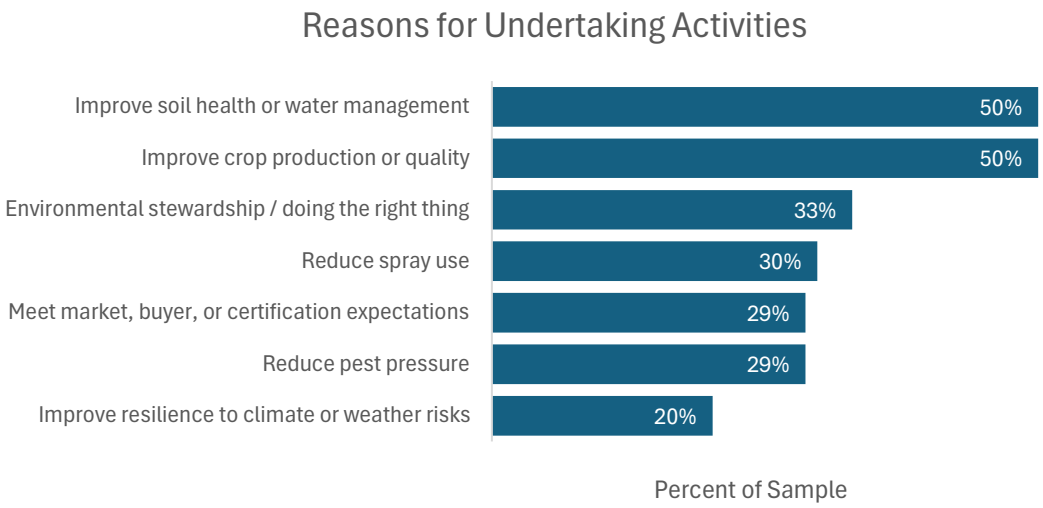


Figure 8 Reasons for Undertaking Activities

The benefits that would motivate further biodiversity enhancement also point toward practical business outcomes (Figure 9). Greater production stability or resilience was the most common benefit, followed by reduced spray costs and improved pollination, fruit set, yield, or crop quality. Reduced pesticide resistance risk and improved market access, certification, or consumer perception were also relevant. These results suggest that future adoption is more likely where biodiversity-enhancing activities can be linked to resilience, production performance, risk management, or cost savings.

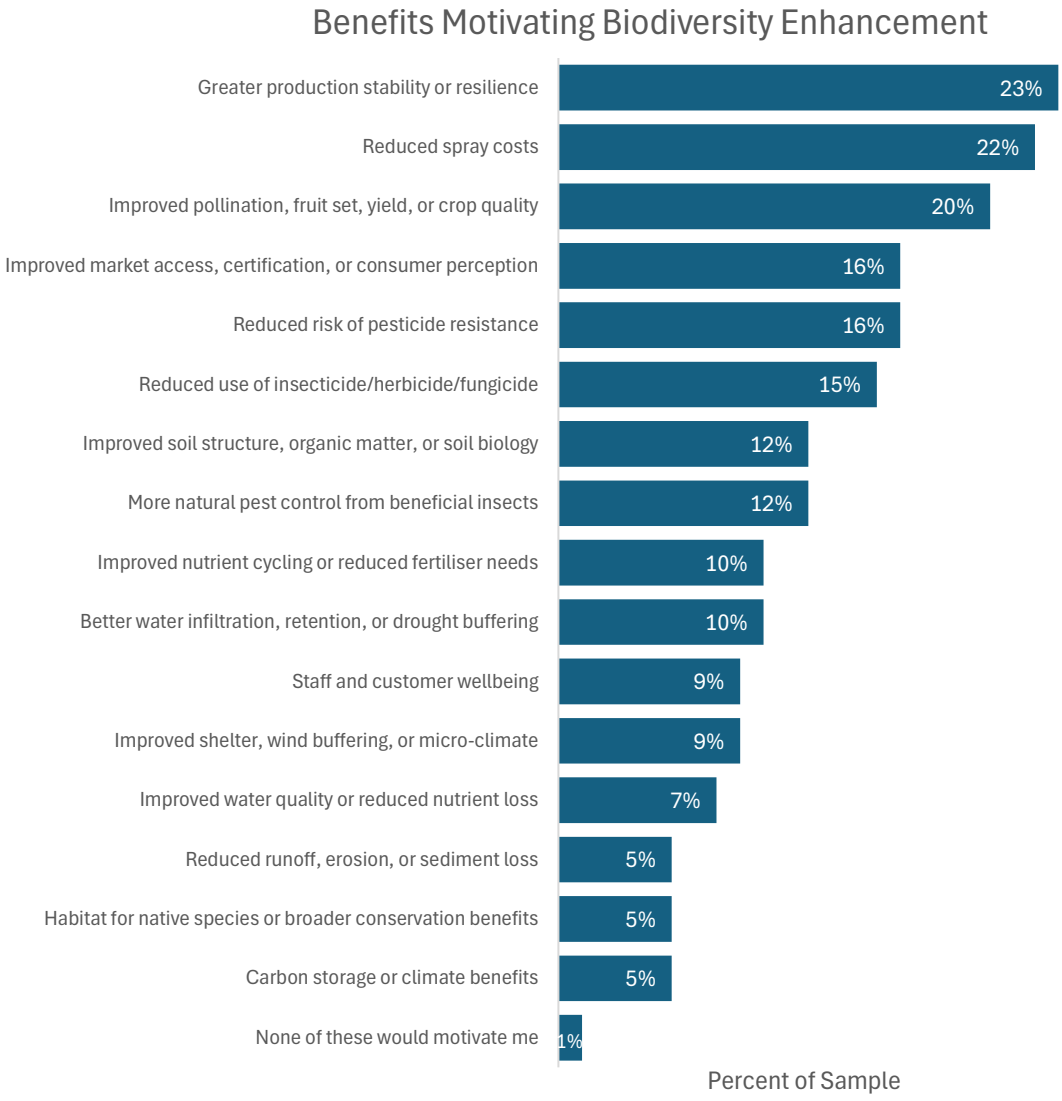


Figure 9 Benefits Motivating Biodiversity Enhancement

3.4 Future adoption potential

Respondents showed interest in starting, expanding, or committing more strongly to a range of biodiversity-enhancing activities over the next three to five years (Figure 10). The strongest future-adoption signal was for use of biopesticide spray products. Maintaining native or natural habitat near production areas, using more selective or softer spray products, reducing broad-spectrum insecticide or pesticide use, and cover crops or permanent groundcover were also among the more commonly selected future activities.

The pattern is important because several of the leading future activities are spray-related or can be incorporated within existing production systems. This suggests that near-term expansion may be more feasible where practices can be integrated into current pest-management and crop-management routines, rather than requiring major land-use change.

Some habitat-based activities also showed future interest, including native habitat, flower strips, hedgerows, and riparian or buffer plantings. However, these generally ranked below biopesticides and selective spray-related practices. This suggests that future biodiversity work may need to combine practical pest-management tools with habitat and planting options, rather than focusing on one pathway alone.

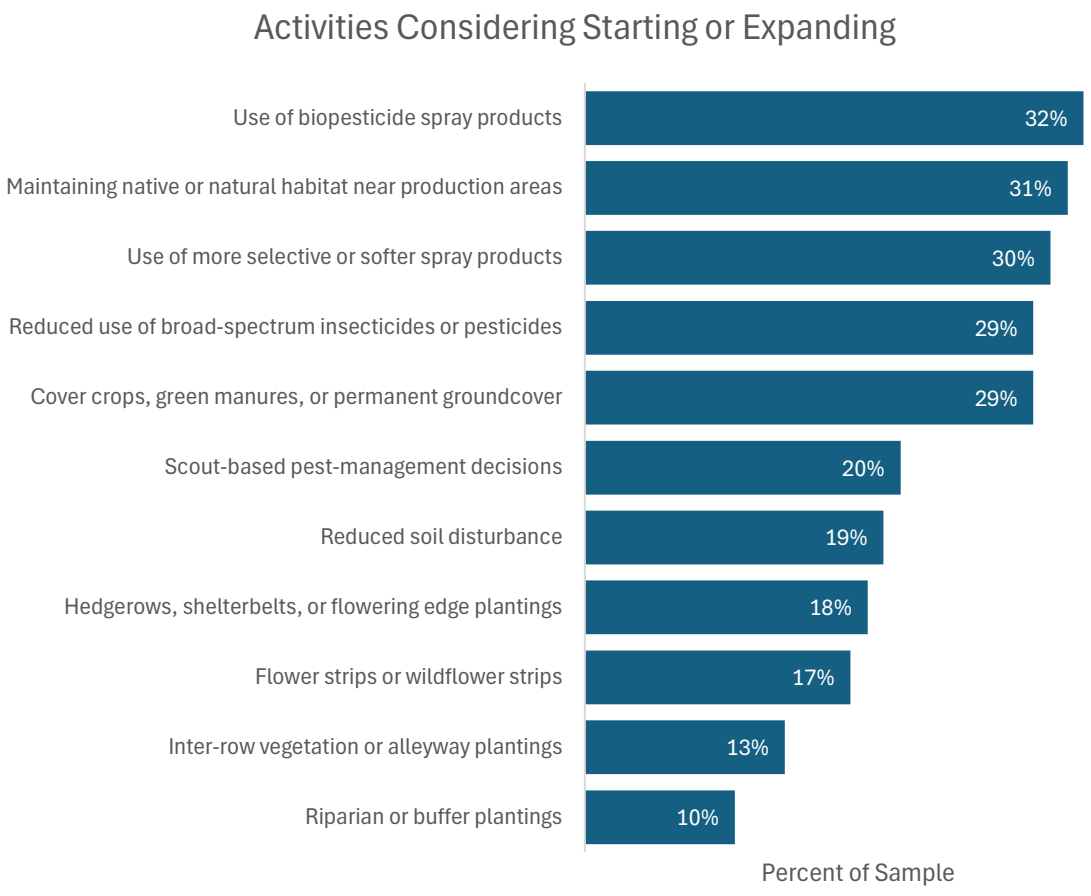


Figure 10 Activities Considering Starting or Expanding

3.5 Barriers and support needs

The leading barriers to adopting or expanding biodiversity-enhancing activities were financial, production-risk, and evidence-related (Figure 11). Lack of financial incentives or recognition was the most common barrier. Risk of crop loss, pest damage, or downgrading was also prominent, as was uncertainty about production or cost-saving benefits. These results suggest that the main barriers are not simply lack of interest. They relate to whether growers can justify the risk, cost, and operational change involved.

Several practical barriers also appeared in the results, including lack of technical advice or clear guidance, uncertainty about whether the activity will work, upfront establishment cost, and difficulty fitting practices into existing orchard or farm operations. These barriers point to the need for practical, crop-relevant guidance and evidence from commercial production settings.

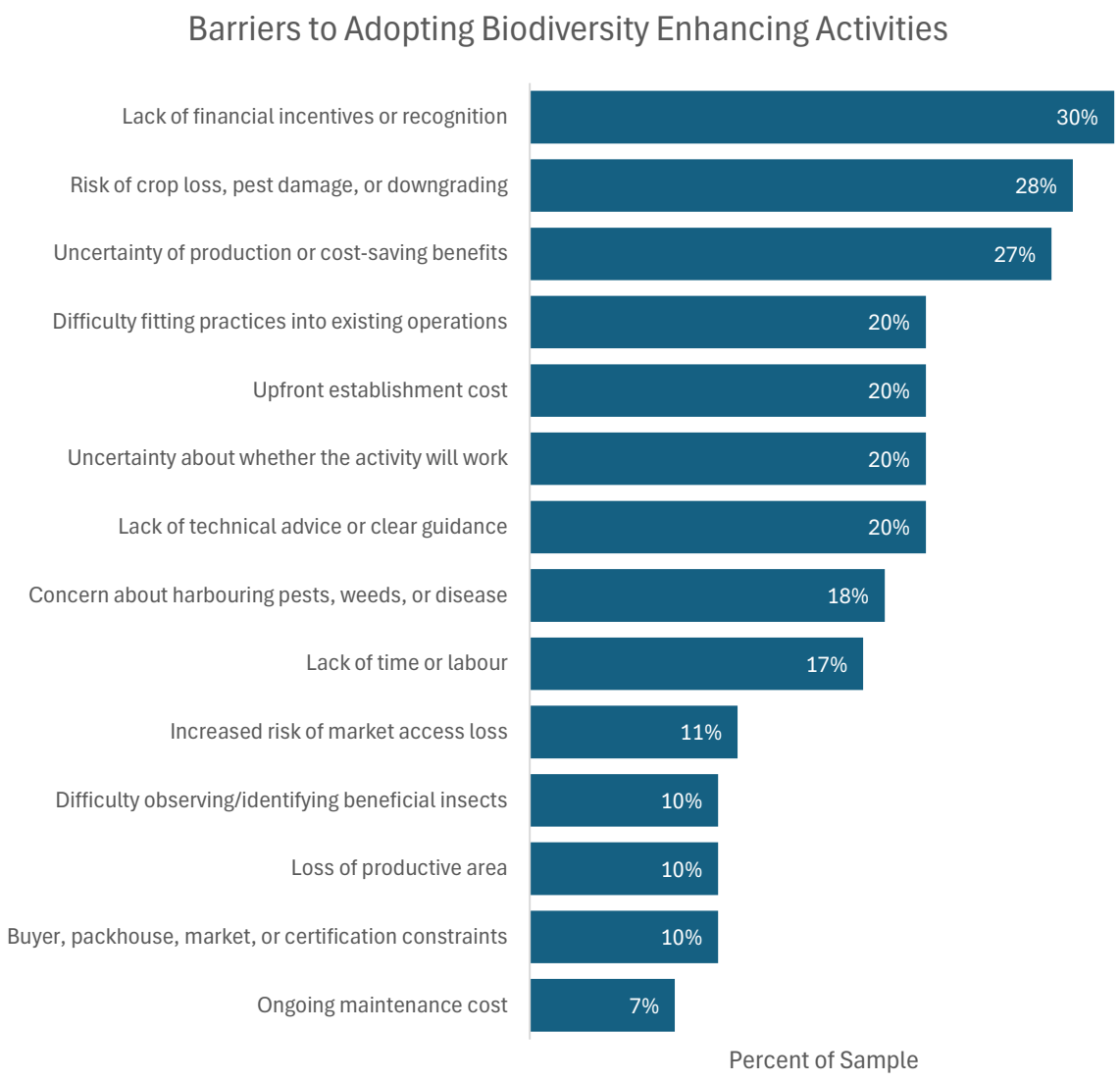


Figure 11 Barriers to Adopting Biodiversity Enhancing Activities

The support-needs results align closely with the reported barriers. Financial support for establishment or maintenance costs was the highest-ranked support need (Figure 12). Market recognition, certification, or a price premium; demonstration of results on commercial orchards or farms; and clear evidence of production or cost-saving benefits were

also strongly supported. This suggests that growers are looking for more than general encouragement. They want clear evidence, practical examples, financial support, and recognition for adopting practices that may involve cost or risk.

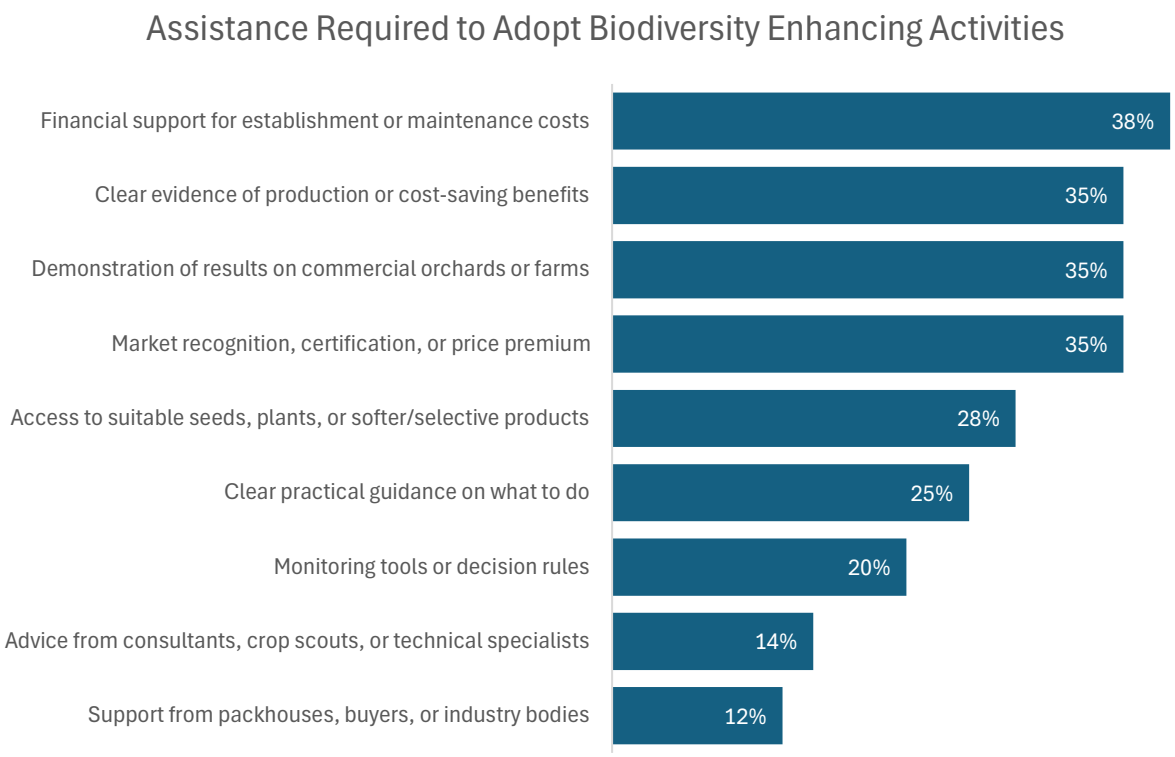


Figure 12 Assistance Required to Adopt Biodiversity Enhancing Activities

3.6 Biodiversity and business resilience

Most respondents considered biodiversity-enhancing activities to be at least moderately important for the future resilience of their business (Figure 13). Very important and extremely important responses together made up just over half of the sample, while a further substantial share rated biodiversity as moderately important. No respondents selected "not at all important".

This result is central to the interpretation of the survey. It suggests that many growers see biodiversity enhancement as relevant to future business performance, not only as an environmental or compliance issue. This supports the broader framing of biodiversity-enhancing activities as part of a resilience, risk-management, and production-system strategy.

At the same time, the presence of slightly important and moderately important responses shows that the strength of this belief varies across the sample. Future extension and communication should therefore avoid assuming that all growers already see biodiversity enhancement as a high-priority business issue. The case for adoption still needs to be made in practical and commercially credible terms.

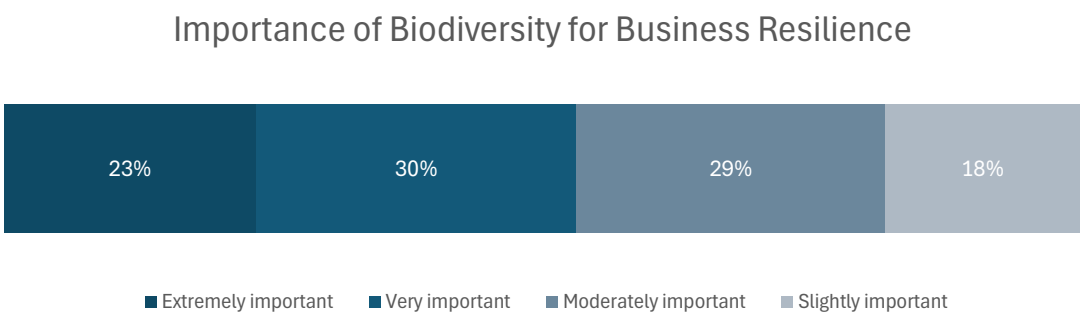


Figure 13 Importance of Biodiversity for Business Resilience

3.7 Pest-management decision-making

The spray decision-making results show that many respondents are already using either monitoring-based or mixed spray approaches (Figure 14). Mostly spraying when pest problems or monitoring information indicate a need was the most common category, followed by mostly regular calendar-based spraying and a mix of calendar-based and monitoring-based spraying. When the monitoring-based and mixed categories are considered together, the results suggest that need-based or monitoring-informed spray decisions are already common in the sample.

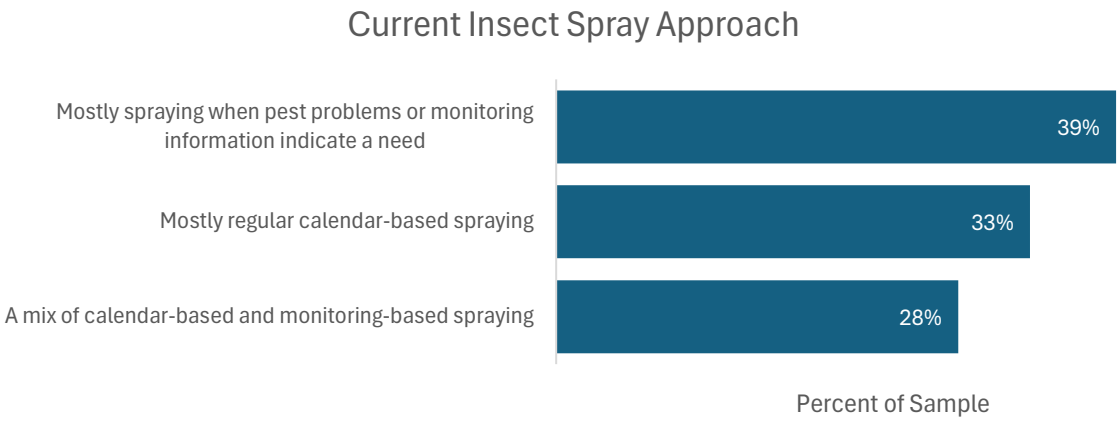


Figure 14 Current Insect Spray Approach

The spray-trigger results reinforce this. Monitoring or scouting results were the most common trigger for insect spray decisions, followed by visible pest presence or damage (Figure 15). Time since last spray and seasonal habit or routine were less common but still represented a meaningful share of responses. Consultant recommendations, packhouse or market requirements, and weather conditions were lower-frequency triggers.

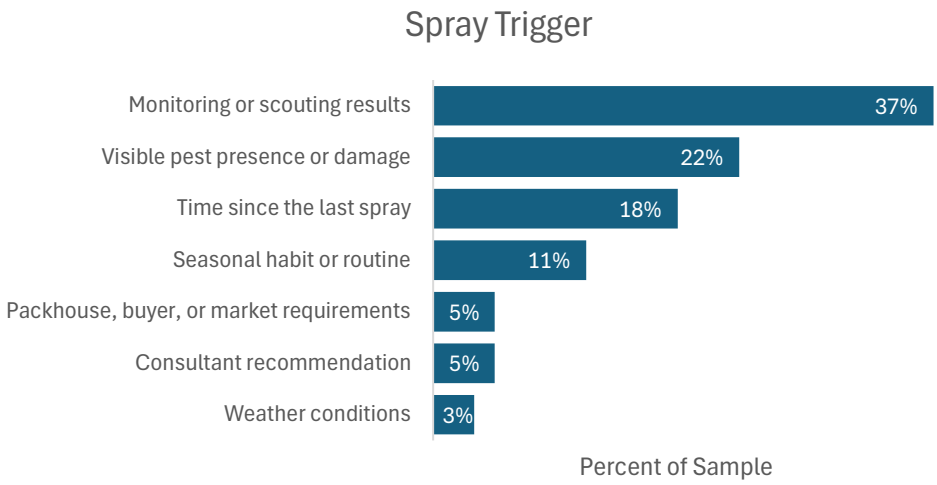


Figure 15 Spray Trigger

Beneficial insects also appear to influence spray decisions for many respondents (Figure 16). Most responses indicated that beneficial insects influence spray decisions either often or sometimes. A smaller share reported that beneficial insects rarely influence decisions, and only a small minority reported that they never do. This suggests that beneficial insects are already part of decision-making for many respondents, which is important for the wider goal of supporting lighter-touch pest-management systems.

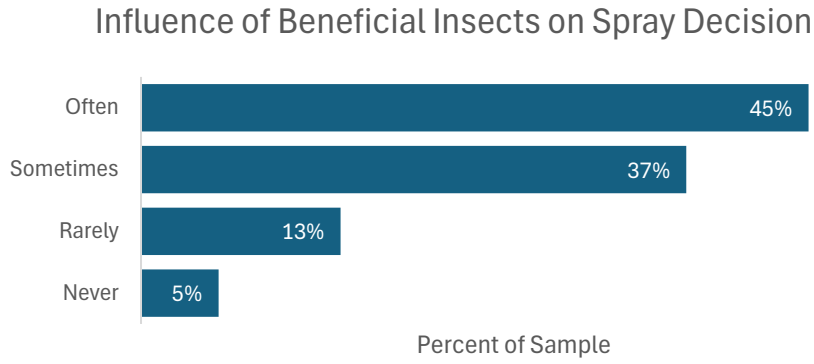


Figure 16 Influence of Beneficial Insects on Spray Decision

3.8 Spray frequency and cost

Spray frequency was concentrated around moderate numbers of insect sprays per season (Figure 17). The most common category was three to four sprays annually, followed by five to six sprays and one to two sprays. A smaller share reported seven to ten sprays, while only a small proportion reported more than ten sprays. This distribution suggests that most reported crop situations involve a relatively moderate number of insect spray applications, although there are some higher-spray cases.

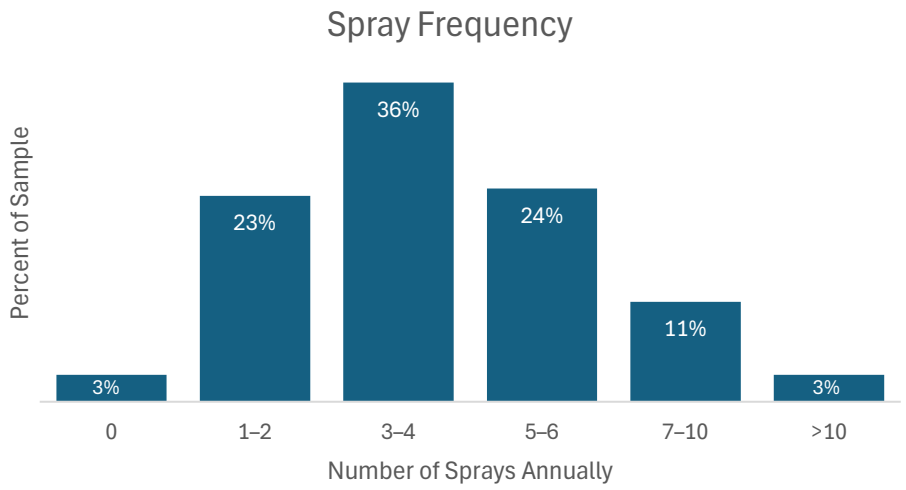


Figure 17 Spray Frequency

The spray-cost results show substantial variation in standardised spray costs (Figure 18). Responses were spread across the cost bands, with a meaningful share in the lower-cost categories as well as a noticeable share above $500 per hectare. This spread suggests considerable heterogeneity in production systems, crop types, spray programmes, and possibly how respondents interpreted and reported cost information.

Because spray-cost responses are highly variable, they should be interpreted cautiously. The distribution is more useful than a simple average, because a small number of high-cost responses can strongly affect the mean. For modelling and reporting purposes, median values and cost bands are likely to provide a more reliable picture than mean costs alone. The cost results are still useful because they show that insect spraying can represent a material cost, strengthening the relevance of practices that may reduce spray intensity, improve targeting, or support more selective pest-management approaches.

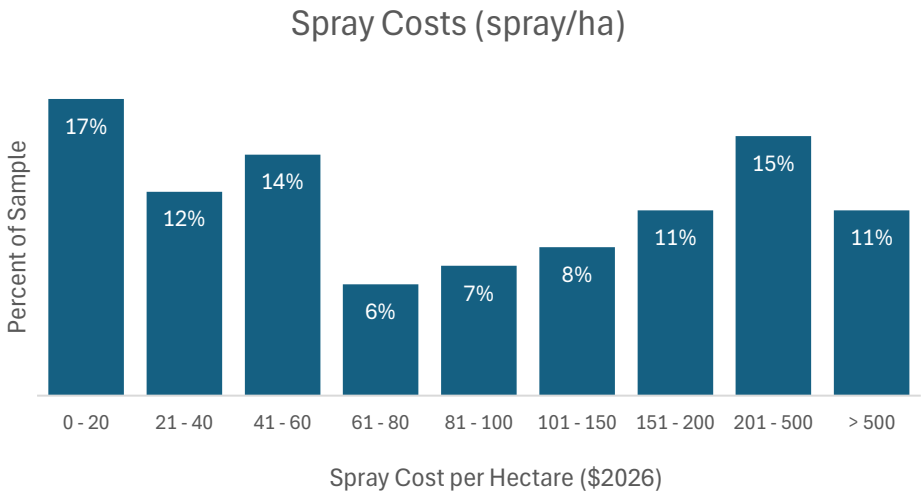


Figure 18 Spray Costs

4. Conclusion

The survey findings show that biodiversity-enhancing activities are already present across much of the respondent sample. Current activity is strongest around practices that fit within existing farm and orchard management, including reduced soil disturbance, cover crops or permanent groundcover, hedgerows, shelterbelts, native or natural habitat, and more selective or targeted spray practices. Growers also commonly linked biodiversity enhancement to practical outcomes such as crop production, soil and water management, reduced spray use, pest pressure, market expectations, and environmental stewardship.

Future adoption potential is evident, particularly for biopesticide spray products, softer or more selective spray products, reduced broad-spectrum insecticide use, cover crops, and maintaining native or natural habitat near production areas. However, wider uptake is conditional on addressing key barriers, including cost, production risk, uncertainty about benefits, lack of guidance, and limited financial or market recognition. The results suggest that adoption is unlikely to be driven by awareness alone; growers need credible evidence, practical guidance, commercial demonstration, and support that reduces implementation risk.

Overall, the survey provides useful evidence for both the cost-benefit modelling component of the research programme and A Lighter Touch's wider biodiversity-focused activities. The findings help identify relevant activity types, cost and benefit pathways, adoption conditions, and areas of uncertainty. The central implication is that biodiversity enhancement should be positioned as part of a resilient, productive, and lower-impact horticultural system, rather than as a separate environmental add-on.

5. Acknowledgements

The research team wishes to acknowledge the assistance and information provided by Nico Bordes, Brad Howlett and Eddie Dowle, BSI. As well as the assistance and grower management information from Esteban Ibanez, BSI, and Ben Harvey, FAR.