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Evaluation protocols for the economic impacts of implementation of practices and systems

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1. BACKGROUND AND INTRODUCTION

1.1 BACKGROUND

Integrated Pest Management (IPM) is a comprehensive and science-based approach to pest control that aims to manage pest populations and protect crops from pest damage in an economically and ecologically sustainable manner.[1] IPM prioritises non-chemical methods whenever possible, resorting to chemical treatments only when necessary and based on rigorous pest monitoring and established threshold values[2,3]. Pest control is achieved through a combination of biological controls (e.g., natural predators), cultural practices (e.g., crop rotation), and, when necessary as a last resort, chemical controls.[4] We will use the term IPM-based practice to refer to any action that falls under one of the eight principles, from prevention to evaluation of the action taken, including practices for the rational use of pesticides.

In the European Union, the adoption of IPM has been formalised through the Sustainable Use of Pesticides Directive (2009/128/EC) (SUD)[5], which requires Member States to promote the implementation of IPM principles among professional pesticide users. Since 2014, Member States have been expected to ensure that professional pesticide users apply the general principles of IPM as part of their crop protection strategies, as set out in Annex III of the Sustainable Use Directive. However, implementation levels vary across Member States, and monitoring data on actual uptake remains limited.

Despite significant efforts at both national and EU levels to reduce pesticide usage, EU pesticide sales increased by 2.7% in 2021, reaching a total of 355,175 tonnes, compared to the previous year.[6] The product composition was dominated by fungicides and bactericides, which made up 44% of sales, followed by herbicides at 34%, and insecticides at 14%. Spain and France emerged as the largest markets, accounting for 21% and 20% of total sales, respectively, while Germany and Italy each held 14%. Compared to 2011, 11 out of 16 countries reported a decrease in pesticide sales in 2021, with Czechia, Denmark, and Portugal experiencing the most significant reductions. Conversely, Latvia and Austria saw substantial increases in sales during this period.

In 2022, the European Commission (EC) proposed a new Regulation on the Sustainable Use of Plant Protection Products aligning with the EU's broader sustainability goals. The proposal includes targets to reduce the use and risk of chemical pesticides by 50% by 2030, in line with the EU's Farm to Fork and Biodiversity strategies. This was, however, withdrawn in 2024 due to the rejection of the proposal by the European Parliament and lack of progress with discussions in the Council. Thus, the SUD (2009/128/EC) remains applicable.

On the one hand, available research points to the environmental and social benefits of IPM. For example, by reducing the reliance on chemical pesticides and promoting more efficient, environmentally friendly pest management strategies, farmers can achieve better crop yields, improved quality, and long-term profitability while the direct costs of implementation are mainly borne by pesticide users, particularly farmers.[7,8,9] On the

[1] Dara, S. K. (2019). The New Integrated Pest Management Paradigm for the Modern Age. Available at: https://academic.oup.com/jipm/article/10/1/12/5480541

[2] Dara, S. K. (2019). The New Integrated Pest Management Paradigm for the Modern Age. Available at: https://academic.oup.com/jipm/article/10/1/12/5480541

[3] European Commission (2023). Farmer's Toolbox for Integrated Pest Management. Available at: https://agriculture.ec.europa.eu/system/files/2023-02/leaflet-pilot-project-farmers-ipm-toolbox_en.pdf

[4] Marinko, Jurij; Ivanovska, Aneta; Marzidovšek, Martin; Ramsden, Mark; Debeljak, Marko (2023). Incentives and barriers to adoption of decision support systems in integrated pest management among farmers and farm advisors in Europe. Available at: https://www.tandfonline.com/doi/full/10.1080/09670874.2023.2244912

[5] https://food.ec.europa.eu/plants/pesticides/sustainable-use-pesticides_en

[6] Eurostat (2023). EU sales of pesticides rebounded in 2021. Available at: https://ec.europa.eu/eurostat/web/products-eurostat-news/w/DDN-20230510-1#:~:text=In%202021%2C%20355%20175%20tonnes%20of%20pesticides%20were,the%20medium-term%20annual%20average%20between%202011%20and%202021.

[7] DG Health and Food Safety (2022). Sustainable Use of pesticides Directive (SUD): Impact assessment of its planned revision (and key evaluation findings). Available at: https://food.ec.europa.eu/plants/pesticides/sustainable-use-pesticides/evaluation-and-impact-assessment_en

[8] European Commission (2023). Farmer's Toolbox for Integrated Pest Management.

[9] Deguine, J-P., et al. (2021). Integrated pest management: good intentions, hard realities. A review. Available at: Integrated pest management: good intentions, hard realities. A review | Agronomy for Sustainable Development

other hand, the private economic viability of IPM varies depend on the cropping system and technology used, which can act as a barrier to implementation.[10]

Despite the implementation challenges, the long-term benefits of IPM make it a valuable approach for sustainable agriculture in the longer term. IPM practices align with broader EU goals of reducing environmental and health risks associated with pesticide use while ensuring food security and agricultural sustainability.

1.2 INTRODUCTION TO THE PROJECT AND REPORT

In this context, the **Agrowise project** is a part of the EU "LIFE Program" and aims at developing "Recommendations for farm or crop specific guidelines: mitigating impact of pesticides while ensuring sustainable agriculture". Developed by a consortium of 10 research organisations from 8 EU countries, this project will contribute to achieve the EU Farm to Fork strategy objectives of a 50% reduction in chemical pesticide use by 2030.

This project contains **two strategic pillars** related to enhanced Integrated Pest Management (IPM) implementation: information on plant protection practices and information on policy instruments and their efficiency.

The **Work Package** (WP4) aims at defining the criteria to support the delivery of tangible recommendations for the Member States to define crop-specific guidelines.

This Report presents the outputs of Task 4 of WP4, which aims to establish a framework and protocols to evaluate the potential economic impacts of implementing IPM practices. The rest of this report is structured in two sections:

- Section 2 the evaluation framework, containing the theory of change and conclusions of the monitoring and evaluation (M&E) design; and
- Section 3, which sets out the proposed evaluation protocols, including for stakeholder engagement, data collection, verification, analysis and governance.

The appendices provide the underpinning details to the framework and M&E templates for implementation.

2. EVALUATION FRAMEWORK

This section presents an IPM evaluation framework developed to inform the proposed evaluation protocols, and comprises a theory of change of IPM practices, proposed evaluation questions, indicators and methods. The Appendices provide further detail.

[10] Barzman, M., et al. (2015). Eight principles of integrated pest management. Available at: Eight principles of integrated pest management | Agronomy for Sustainable Development

2.1 THEORY OF CHANGE

Following international best practice, the first step to establishing the evaluation framework was to establish a shared understanding of the overarching objectives, challenges, and strategies involved in reducing pesticide use while maintaining agricultural productivity. Following this, a Theory of Change (ToC) was developed based on a review of relevant academic literature, EU policy documents, and evaluation frameworks related to IPM and sustainable agriculture.[11][12][13][14] The ToC for overarching IPM-based practices outlines the necessary inputs, activities, expected outcomes, and long-term impacts, while also considering external factors that may influence the success of these strategies and the assumptions that underpin them.

Recognizing that IPM-based practices are diverse, high-level ToCs were developed for three different IPM typologies based on a review of available evidence, captured in Appendix 1. The findings were synthesized into an overarching ToC. This ToC underpins the design of the evaluation and will form the basis for the proposed evaluation protocols.

[11] EC (2009). *Directive 2009/128/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for Community action to achieve the sustainable use of pesticides (Text with EEA relevance).* Available at: Directive - 2009/128 - EN - EUR-Lex

[12] EC (2020). *Farm to fork strategy – For a fair, healthy and environmentally-friendly food system.* Available at: f2f_action-plan_2020_strategy-info_en.pdf

[13] Surendra K Dara (2019). *The New Integrated Pest Management Paradigm for the Modern Age*, https://doi.org/10.1093/jipm/pmz010

[14] Food and Agriculture Organization (FAO) of the United Nations (n.d.). Pest and Pesticide Management. Available at: Integrated Pest Management (IPM) | Pest and Pesticide Management | Food and Agriculture Organization of the United Nations | IPM and Pesticide Risk Reduction | Food and Agriculture Organization of the United Nations

Figure 1. IPM-based practices Theory of Change

ToC INDICATOR

INPUTS

- Financial resources (e.g., government grants, private sector support)
- Capacity-building resources (training materials, trainers, extension officers, researchers)
- Research evidence on pest biology, ecology, and control methods
- Stakeholder availability (farmers, policymakers, researchers, agronomists)
- Access to IPM tools (e.g., pest traps, resistant crop varieties, natural predators)
- Research & Development resources (e.g., pest-resistant crops)
- Technology & Infrastructure (e.g., pest monitoring systems)
- Monitoring and evaluation (M&E) frameworks to support adoption and impact measurement.
- Market research on consumer demand for low-pesticide, environmentally friendly products.

ACTIVITIES

- Training and capacity-building (e.g. workshops and training programs on IPM techniques)
- Development of IPM guidelines
- Designing and implementing demonstration projects on farms to showcase the benefits of adoption
- Stakeholder engagement and collaboration (e.g., facilitate partnerships among farmers, researchers & policymakers)
- Policy development (e.g., introduction of incentives and regulatory support for IPM adoption)
- Conducting pest monitoring and risk assessment (e.g., setting up traps)
- Carrying out M&E activities (e.g., establishing data-driven systems to track the adoption rates and economic impacts)
- Developing and launching websites to disseminate information on IPM-based practices.
- Facilitate partnerships between IPM farmers and buyers (e.g., retailers, processors) to strengthen market linkages.
- Support certification schemes and standards alignment for IPM-compliant crops.
- Public awareness campaigns to promote consumer demand for IPM-grown crops.

OUTPUTS

- Greater availability of educational resources and training materials for sustainable pest management.
- Increased farmer awareness and knowledge of IPM practices
- Adoption of IPM practices on farms in line with guidelines
- Development of local IPM networks and communities of practice
- Having several demonstration plots operational and accessible, which showcase how IPM-based practices can be implemented and their short-term results
- Improved pest surveillance
- Increased availability and accuracy of data on pest populations and pesticide use, and decision-making systems.
- Consumers recognize the benefits of IPM-grown crops, leading to higher demand and premium pricing..
- More have access to certification schemes, increasing the supply of IPM-grown crops with eco-labels or sustainability claims.
- Formalized agreements between farmers and buyers (e.g., retailers, food processors) for IPM-grown products.

OUTCOMES

Short-term outcomes (1-2 years)

- Increased farmer confidence in using non-chemical pest control strategies
- Reduced reliance on synthetic pesticides, and thus pesticide purchase costs
- Reduced pesticide-based pollution/ release of pollutants

Medium-term outcomes (3-5 years)

- Improved crop yields
- Widespread adoption of IPM practices across multiple farms and regions
- Improved market access for IPM-grown crops (e.g., organic or eco-labeling initiatives)
- Strengthened community resilience to pest outbreaks and climate variability
- Enhanced soil health and biodiversity
- Integration of IPM into national agricultural strategies

IMPACTS

- Changes in farm profitability depending on IPM effectiveness and implementation costs
- Long-term reduction in dependence on chemical pesticides
- Increased farm resilience to climate change
- Increased contribution to climate change mitigation (soil carbon sequestration)
- Healthier ecosystems with sustained biodiversity
- Reduced public health risks from pesticide exposure
- Shift towards agro-ecological / sustainable farming systems and more sustainable pest control
- Increased supply/ demand for low-pesticide, env. friendly agricultural products
- Improved food security

ASSUMPTIONS

- Adequate financial, institutional, and technological support enables training, policy development, and demonstration projects..
- Stakeholders (farmers, researchers, policymakers) are willing and able to engage.
- Market research informs certification schemes and buyer partnerships.

- Farmers and stakeholders apply training and engage with demonstration projects.
- Regulatory support and incentives drive IPM adoption.
- Partnerships between farmers, researchers, and policymakers lead to the development of robust IPM guidelines and best practices.
- Certification schemes and market linkages effectively connect IPM-grown crops to eco-labels.
- Demonstration plots effectively showcase benefits, encouraging uptake.

- Increased awareness and knowledge leads to widespread IPM adoption.
- Farmers experience tangible benefits, reinforcing continued use.
- Consumer demand for IPM-grown products drives better market access.
- Strong IPM networks support further adoption and evidence-based decision-making.

- Reduced pesticide use results in long-term environmental and health benefits.
- Farmers experience sustained economic benefits from improved productivity, market access, and cost savings associated with reduced pesticide dependence.
- IPM contributes to climate change mitigation and biodiversity.
- The shift toward agro-ecological and sustainable farming systems is supported by long-term policy commitments and consumer demand.
- A shift to sustainable farming improves food security.

EXTERNAL FACTORS

Biophysical & Environmental Factors (Natural Conditions):
- Climate variability and extreme weather (affects pest dynamics and crop resilience).
- Landscape and biodiversity (availability of natural predators for pest control).
- Soil health and ecosystem conditions (influence IPM effectiveness).

Economic and Market Factors
- Consumer demand for IPM-grown crops (drives market incentives).
- Access to financial support (subsidies, insurance, investment in IPM tools).
- Supply chain infrastructure (availability of IPM-compliant buyers, processors, and distributors).

Social and Behavioural Factors
- Farmer perceptions and risk tolerance (willingness to adopt IPM).
- Knowledge and cultural norms (traditional reliance on chemical pesticides).
- Community engagement and peer influence (adoption spreads through networks).

Policy and Institutional Factors
- National regulations and incentives (subsidies, restrictions on synthetic pesticides).
- Certification schemes and eco-labeling standards (affect market access).
- Institutional support (extension services, research funding, training availability).

2.2 EVALUATION QUESTIONS

This evaluation protocols will seek to collect and analyse the necessary evidence that can help confirm or reject the hypotheses outlined in the Theory of Change. In other words, they will seek to answer a set of **'evaluation questions'** that can facilitate the completion of the economic impact and/or Value-for-Money (VfM) evaluations of the IPM-based practices and systems. Thus, we have reviewed and developed a list of questions to understand the impacts and VfM of IPM-based practices.

IPM-based practices aim to reduce the use of chemical pesticides while maintaining or improving agricultural productivity and profitability. More specifically:

- The **impacts** of IPM-based practices result primarily from their uptake and sustained implementation by farmers. These include economic impacts (borne primarily by farmers), as well as broader environmental and health impacts at the societal level. Therefore, evidence of impact must be collected from or with the help of the farmers and stakeholders involved in the adoption of IPM. Where relevant, secondary data and literature may be used to estimate societal-level environmental and health benefits.
- The **VfM** of IPM-based practices considers the extent to which the intended net benefits (e.g., reduced pesticide use, improved environmental outcomes, maintained or increased profitability) are achieved relative to the costs of implementation (e.g., training, monitoring, one-off and recurring costs).

Although this evaluation protocol focuses primarily on economic outcomes, IPM is fundamentally designed to reduce the environmental footprint of crop production. Several environmental benefits are widely associated with the adoption of IPM-based practices, which help justify and contextualise their promotion through public support schemes. These benefits include:

- Reduced chemical pollution of soil and water through lower pesticide and fertiliser usage.
- Improved biodiversity, particularly in beneficial insect populations (e.g., pollinators, natural pest predators).
- Lower greenhouse gas emissions where mechanical weeding or precision technologies replace broad-spectrum spraying.
- Enhanced soil health through rotations and non-chemical methods that preserve microbial activity.

These potential environmental impacts are closely aligned with the EU Green Deal, Farm to Fork, and Biodiversity Strategies. While they are not directly measured in this evaluation, they represent important externalities that underpin the rationale for supporting IPM and should be considered when interpreting the value-for-money of these practices more broadly.

A longlist of higher-level evaluation questions was developed drawing on international best practice guidelines, such as the UK Magenta Book[15] and the Better Regulation Guidelines (BRG) and Toolbox[16]. This is presented in the Table below and more specific and detailed questions against each of these are outlined in Appendix 2.

Table 2: High-level evaluation questions

Type of evaluation	Evaluation questions grouped by theme
Impact	• Delivery: Did the implementation of IPM-based of practices achieve the expected outcomes? • Impact: Did the intervention cause the difference? To what extent have different groups been economically impacted in different ways, how, and why? • External factors: How has the context influenced the economic outcome? • Lessons learned: What generalizable lessons have we learned about the economic impacts of IPM?
Value-for-money	• Value-for-Money: Was this a good use of resources?

[15] UK HMT (2020). Central government guidance on evaluation. Available at: https://www.gov.uk/government/publications/the-magenta-book

[16] European Commission (2021). Better Regulation Guidelines. Available at: https://commission.europa.eu/law/law-making-process/better-regulation/better-regulation-guidelines-and-toolbox_en

More detailed and specific evaluation questions can be useful to frame the evaluation design and protocols. However, it is proportionate, and in this case necessary, to shortlist and consolidate a longlist of specific questions into a set of key questions. Thus, eight, more specific questions were prioritised and are proposed to underpin the protocols to evaluate the economic impact of IPM-based practices and systems, with a primary focus on farm-level outcomes and the economic implications for farmers.

Table 3. Shortlist of evaluation questions focusing on economic impacts at the farm level

Theme	Shortlist of evaluation questions
Outcomes	• **#1** To what extent has the adoption of IPM-based practices impacted crop yields (in terms of quality and quantity)? • **#2** To what extent has the implementation of IPM-based practices reduced reliance in synthetic pesticides and, therefore, input costs (e.g., pesticides, fertilizers, or other inputs), and costs overall?
Impacts	• **#3** To what extent has the adoption of IPM-based practices impacted farm profitability? • **#4** To what extent have IPM-based practices contributed to stable or increased farm incomes over time? • **#5** How have the experienced economic benefits or challenges in adopting IPM differed according to scale of farming operation?
Value-for-money	• **#6** How do the long-term economic benefits compare to the initial costs of adopting IPM-based practices?
External factors	• **#7** How much of the economic benefits (or losses) can be attributed to external factors such as government subsidies, market demand, or climatic variations? • **#8** How do variations in farm size, crop type, and regional climate affect the likelihood of economic success in IPM adoption?

Answering these shortlisted questions will allow for a proportionate assessment of the potential economic impact of implementing IPM-based practices and systems. They have therefore been used to frame the rest of the framework (i.e., indicators and methods) and evaluation protocols.

2.3 EVALUATION INDICATORS

To support the development of data collection protocols, the table below maps the evaluation questions by type, with a list of priority indicators that capture core data requirements for impact and economic evaluation, whilst taking into consideration the extent to which data collection would be practical and the proposed evaluation methods could be implemented (which are covered in the following Section 2.4).

These selected indicators result from a prioritisation exercise against the longlist of indicators. This process involved determining which indicators most effectively provide measurable evidence pertinent to the evaluation question. The chosen indicators must meet key suitability criteria, such as relevance, validity, reliability, and practicality.

Table 4. List of priority evaluation indicators and data requirements

Theme	Shortlisted Evaluation Questions	Priority indicators for data collection, performance monitoring and/or modelling	Data sources, collection and analytical methods
Outcome	**#1** To what extent has the adoption of IPM-based practices impacted crop yields (in terms of quality and quantity)?	Reported changes in yield quantity (e.g., % change in tonnes/hectare) after adopting IPM. Reported changes in crop quality, such as visual grading, consumer acceptance, or compliance with residue limits. Comparison of yield performance before and after IPM adoption, or between IPM and conventional farms (where possible).	Self-reporting by farmers through performance monitoring. Expert interviews: For contextual interpretation of impacts by crop and region. Farm Accountancy Data Network (FADN) data (if IPM uptake can be reasonably identified), perhaps in selected case study countries: Trends in yields across time and farm types. Literature and case studies: On yield effects of specific IPM practices or technologies.
	#2 To what extent has the implementation of IPM-based practices reduced reliance in synthetic pesticides and, therefore, input costs (e.g., pesticides, fertilizers, or other inputs), and costs overall?	Change in pesticide expenditure (% change before vs. after IPM adoption). One-off (implementation) costs and recurring (maintenance) costs associated with IPM-based practices (units: €/hectare or €/farm/year)	Self-reporting by farmers through performance monitoring. Expert survey/interviews: To provide qualitative validation and contextual factors influencing input use. FADN data: On input expenditures over time (if linkable to IPM uptake), perhaps in selected case study countries . Scientific and technical literature: On the effectiveness of specific IPM practices in reducing pesticide/fertilizer use. Case studies: Demonstrating cost savings from IPM.
Impact	**#3** To what extent has the adoption of IPM-based practices impacted farm profitability?	Extent to which farm profitability has increased/decreased following adoption of IPM-based practices in the short, medium and long-term (units: €/hectare or €/farm/year)	Self-reporting by farmers through performance monitoring. A short survey to relevant experts and stakeholders, complemented with public sources and databases (e.g., FADN, FAOSTAT, etc.), will also be useful and necessary. *Where sufficient quantitative estimates are available from Evaluation Questions #1 and #2, a desktop modelling exercise can be performed to estimate the net effect on profitability*
	#4 To what extent have IPM-based practices contributed to stable or increased farm incomes over time?	Perceived change in net farm income since adopting IPM-based practices, as reported by farmers and/or experts. Qualitative assessment of income stability or volatility post-IPM adoption.	Self-reporting by farmers through performance monitoring. Expert survey/interviews: Insights into typical economic impacts of IPM on farm profitability and income variability. FADN data: Descriptive trends in farm income and input costs for relevant sectors or regions, where IPM adoption is known.

Theme	Shortlisted Evaluation Questions	Priority indicators for data collection, performance monitoring and/or modelling	Data sources, collection and analytical methods
		Where possible, comparison of income trends between IPM-adopting farms and non-IPM farms (using available secondary data such as FADN).	Literature review: Evidence from existing evaluations or case studies on economic outcomes of IPM.
	#5 How have smallholder farmers vs. large-scale producers experienced economic benefits or challenges in adopting IPM?	Perceived cost and benefit differences by farm size, including upfront (one-off) and recurring costs of IPM. Proportion of farmers in each group reporting positive/neutral/negative income effects after IPM adoption. Expert assessment of how farm size influences economic outcomes of IPM.	Self-reporting by farmers through performance monitoring. Expert survey/interviews: Views on typical economic experiences of smallholders vs. larger farms in implementing IPM. FADN data: Potential analysis of input use, yields, and incomes by farm size—if adoption status can be inferred or cross-referenced. Literature review: Findings from prior studies comparing IPM adoption costs and benefits by farm size.
VfM	**#6** How do the long-term economic benefits compare to the initial costs of adopting IPM-based practices?	Estimated initial investment costs (e.g., machinery, biocontrol products, decision support tools, training). Recurring maintenance or operational costs after adoption (e.g., monitoring, labour). Reported or modelled long-term economic gains, such as reduced pesticide costs, improved yields, or premium prices for low-residue crops.	Self-reporting by farmers through performance monitoring. Expert interviews: To estimate typical costs/returns for different IPM types and contextual factors. FADN data: Where available, to compare input costs and gross margins over time for adopters vs. non-adopters. Literature review: Meta-analysis or case studies documenting long-term IPM performance and cost-benefit dynamics.
External factors	**#7** How much of the economic benefits (or losses) can be attributed to external factors such as government subsidies, market demand, or climatic variations?	Perceived influence of external factors (e.g., subsidies, market demand, climate variability) on farm income and profitability.	Expert survey/interviews: Insights on key factors driving recent income changes, including how IPM fits within broader influences (e.g., CAP subsidies, energy/fertiliser prices, climatic shocks). Literature review: Evidence from existing evaluations or case studies on economic outcomes of IPM.
	#8 How do variations in farm size, crop type, and regional climate affect the likelihood of economic success in IPM adoption?	Reported income or cost-effectiveness of IPM by farm size, crop type, and region. Perceived ease/difficulty of implementing IPM under different climatic or agronomic conditions. Proportion of farms reporting economic success with IPM by context (e.g., vineyard in Mediterranean vs. wheat farm in Northern Europe).	Self-reporting by farmers through performance monitoring. Expert survey/interviews: Perspectives on how different contexts influence IPM performance and economic feasibility. FADN data: If feasible, analyse economic outcomes across different farm types/regions where IPM is adopted. Literature review: Studies evaluating IPM cost-effectiveness across varied farming systems and climates.

Theme	Shortlisted Evaluation Questions	Priority indicators for data collection, performance monitoring and/or modelling	Data sources, collection and analytical methods
		Expert judgement on context-specific drivers or barriers to IPM viability.	

There are at least **three** primary sources of evidence or methods for analysis to characterize the proposed list of indicators:

- Indicators that would require self-reporting and/or monitoring by farmers (or stakeholders working with farmers) receiving subsidies for implementing IPM-based practices (inputs, outputs, outcomes and impacts).
- Indicators that would require engagement with experts and relevant stakeholders via surveys and interviews to report their views and/or conclusions.
- Publicly available evidence, including established public databases such as Farm Accountancy Data Network (FADN), FAOSTAT, Eurostat, and others, and existing literature on the potential economic impacts of implementing IPM-based practices.

Data should be collected ahead of the project (or IPM intervention) starting, during and after the IPM intervention have been delivered. The proposed evaluation methods are explored in more detail in the following section.

2.4 EVALUATION METHODS

The evaluation protocols must also set out how the data collected will be used to evaluate the economic impact and value-for-money (VfM) of implementing IPM-based practices—essentially, how the data will be used to answer the evaluation questions. In particular:

1. What outcomes and impacts (against the baseline) are delivered or facilitated by the implementation of IPM-based practices, and the extent to which these can be attributed to these practices (impact evaluation);
2. Whether the adoption of IPM practices delivers a net positive economic return relative to its costs from the perspective of participating farmers (value-for-money evaluation, using a cost-benefit analysis approach).

A longlist of evaluation methods considered were based on established evaluation frameworks, and international best practice guidance such as the UK HMT Magenta Book[17] and BRG and toolbox[18]. Based on this, it is proposed that:

- Self-reporting by farmers via Excel templates may be used to gather structured data on financial and/or economic outcomes at a farm or farm-group level, including baseline and follow-up indicators (e.g., yields, input costs, revenue, etc.).
- Structured surveys and targeted interviews with agricultural advisors, experts, and implementing organisations, may be carried out to gather both quantitative and qualitative insights. Interviews with selected farmers may be used to develop illustrative case studies. A separate farmer survey is not currently planned but could be considered if further insight into behavioural drivers, perceived effectiveness, or satisfaction is required.
- Economic and quasi-experimental methods may be proposed for the impact and VfM evaluations, acknowledging trade-offs between robustness and feasibility given available resources and data.

A key challenge for impact and VfM evaluations is the difficulty of isolating the influence of IPM-based practices in a complex context in which other external factors also affect farm-level outcomes (e.g., weather, market fluctuations, policy changes). This complexity is further heightened by regional variability in farming systems, levels of practice uptake, and the scale of implementation.

In response to these challenges, a mix of evaluation methods is proposed:

Firstly, it is recommended that the **impact evaluations are conducted every two years**, aligning with the time needed to observe at least shorter-term economic outcomes beyond seasonal fluctuations. This biennial schedule will allow for collation of sufficient implementation data to assess trends and provides sufficient time for observable effects to materialise —such as yield changes, reduced input use, or improved income stability. Interim monitoring of key indicators will still occur annually through farmer-submitted templates and ongoing stakeholder engagement.

[17] The Magenta Book - GOV.UK
[18] Better regulation: guidelines and toolbox

Secondly, it is recommended that the **impact evaluation** relies on:

- Before-and-after analysis at the farm level, using the primary data collected via Excel templates from farmers for baseline (pre-subsidy) and follow-up (post-implementation) periods.
- Ex-ante modelling, particularly in cases where post-implementation data is not yet available. This approach will rely on economic baseline data (e.g., FADN) combined with expected changes estimated through stakeholder surveys, expert interviews, and literature findings.

These methods will allow evaluators to assess or estimate the impact of IPM practices on key economic indicators, such as yield, input costs, profitability, and risk exposure, with disaggregation by farm size, crop type, region, and other relevant variables. Case studies may be developed for selected farm types or regions to illustrate variation in outcomes. The methodological steps and templates proposed for this are outlined in Appendix 3: Evaluation Methods and Appendix 4: Templates.

Thirdly, it is recommended that a **value-for-money evaluation is carried out using a combination of cost-benefit analysis (CBA) and qualitative insights gathered from surveys and interviews**. The CBA approach will assess whether the economic benefits (e.g., increased yields, reduced input costs) outweigh the costs of implementing the IPM practices. This may involve quantifying and monetising impacts at the farm level where sufficient data is available.

Where full quantitative data is not available, qualitative assessments of the economic rationale for adopting IPM practices—based on farmer and expert perspectives—will complement the analysis. Key dimensions such as cost-effectiveness, implementation burden, and perceived risks or trade-offs will be explored.

This combined approach—before-and-after analysis, ex-ante modelling, and CBA—can achieve conclusions about impact and value-for-money are proportionate, evidence-based, and grounded in the specific realities of IPM adoption.

In summary, this evaluation protocol recommends that:

- **Impact evaluations** of IPM-based practices are conducted every two years using before-and-after analysis, supported by ex-ante modelling approaches where necessary.
- **VfM evaluations** are conducted using cost-benefit analysis, supplemented with qualitative data from surveys and interviews to capture broader implementation insights.

The ‘Appendix 3: Evaluation Methods’ provides a detailed outline of the proposed evaluation methods for this M&E framework as well as their limitations. The ‘Appendix 4: Templates’ also includes suggested templates that could be used to implement these methods, for consideration and use if deemed appropriate.

The following section presents the evaluation protocols for implementing this evaluation framework and recommendations.

3. EVALUATION PROTOCOL

This section sets out the proposed evaluation protocol, comprising five main protocols or steps, provides a practical outline of how the evaluation can be carried out by Teagasc and Agrowise partners (or a delegated party) in accordance with international best practices.

3.1 STAKEHOLDER ENGAGEMENT PROTOCOL

Stakeholder engagement will be key to obtaining information and insights critical to the evaluation of the economic impacts and value-for-money of IPM-based practices. This protocol sets out a structured approach to stakeholder engagement, comprising (i) stakeholder identification, (ii) engagement planning, and (iii) documentation and reporting.

It is designed to achieve consistency, transparency, and effective use of stakeholder knowledge across all stages of the evaluation.

3.1.1 Stakeholder identification

Stakeholders should be identified by the evaluation implementing bodies drawing on their knowledge of national and regional agricultural contexts, farmer support schemes, and relevant technical expertise.

Stakeholder groups should include, but not be limited to:

- **Farmers** that are implementing specific IPM-based practices that go beyond minimum compliance (and might be beneficiaries of subsidies or public support). These individuals will be critical for the collection of baseline and post-implementation data.
- **Supply chain actors** that support farmers implement IPM-based practices, such as seed, biopesticides and equipment vendors, cooperatives, etc.
- **Technical experts and advisors**, including agronomists, researchers, and farm consultants with expertise in IPM techniques, crop production, or farm-level economics.
- **Policy and programme stakeholders**, such as representatives of funding bodies, administrative authorities responsible for IPM implementation, and national agricultural policy institutions.
- **Other relevant actors**, where appropriate, including food processors, certification bodies, and buyers engaged with IPM-compliant supply chains.

A bespoke stakeholder mapping exercise should be conducted before implementing an IPM project and any evaluation work to identify and confirm the specific, local and relevant stakeholders based on their relevance, potential contribution, and the type of engagement required. This should include an assessment of access channels (e.g. through advisory services, farmer networks, or institutional links).

3.1.2 Engagement planning

Once stakeholders have been identified, an engagement plan should be developed, setting out who will be engaged, how, and at what stages. Our proposal for engagement methods or platforms are:

- **Networks or forums:** Drawing on existing or setting up networks or forums of key stakeholders, such as farmers or 'implementers' of IPM practices, local and public authorities, and supply chain actors.
- **Formal/financial relationships:** Building on formal/financial relationships with farmers (e.g., beneficiaries of subsidies or public support) and other key actors to establish an agreement for structured farm-level data-sharing before and after implementation of IPM-based practices.
- **Semi-structured interviews and focus groups:** Interviewing or organising focus group(s) with a sample of key stakeholders—such as selected experts, advisors, or policymakers. Interviews be semi-structured and follow a shared topic guide and explore more in-depth perspectives on implementation challenges, contextual factors, and expected economic effects. Focus group(s) can offer a forum to sharing experiences and evidence collectively, focussing on the implementation of IPM practices, and key impacts, benefits and costs.
- **Broad or targeted surveying:** Issuing periodic surveys, broad or targeted to relevant stakeholder representatives, with support from market research firms or through existing networks and forums for distribution.
- **Follow-up and feedback mechanisms:** Inviting stakeholders to provide feedback on initial findings or draft conclusions and facilitating feedback loops will improve engagement. Thus, a mechanism or platform should be established to facilitate this, such as feedback forms, discussion groups, or validation workshops, depending on capacity and timing.

All engagement activities should secure informed consent, explain the intended use of the information collected, guarantee data confidentiality, and following ethical research principles.

3.1.3 Documentation and reporting

For transparency, accountability and supporting the analysis, all stakeholder engagement activities should be documented in a way that preserves the anonymity of participants:

- **Stakeholder log** could be maintained, listing engaged individuals or organisations (where consent is given), the type of engagement, and key dates.
- **Summary records** could be kept for each activity (e.g., number of farmer templates received, survey responses collected, interviews completed), along with any notable data quality or coverage issues.
- **Anonymised summaries** or transcripts could be prepared and stored securely, for qualitative engagements (interviews).

- **Synthesis of stakeholder insights** could be included in reporting outputs, clearly distinguishing between evidence types (e.g., quantitative survey results vs. qualitative interview themes) and levels of confidence or representativeness.
- **Stakeholder engagement synopses** could be shared across relevant networks, forums or engagement platforms to encourage transparency and feedback loops.

Effective and structured stakeholder engagement will be essential to achieve an evaluation that is grounded in real-world experiences, reflects expert knowledge, and captures diverse perspectives across the farming and policy landscape. The insights gathered through this engagement will be instrumental in shaping robust conclusions on the economic impacts and value for money of IPM-based practices.

3.2 DATA COLLECTION PROTOCOL

IPM principles have been a legal requirement for all EU farmers since 2014, this evaluation framework and protocols focus on more advanced or incentivised practices that go beyond minimum compliance—such as the use of decision support systems (DSS), biological control methods, or precision application techniques.

This protocol aims to generate robust, context-specific evidence on the economic impacts of IPM adoption across different farm types and regions from primary sources (through stakeholder engagement) and secondary sources.

- Primary data collection focuses on real-world evidence from farmers receiving support to implement specific IPM practices that go beyond minimum compliance, enabling a farm-level analysis of economic outcomes.
- Secondary data collection, meanwhile, helps establish baselines, contextualise findings, and support ex-ante analysis where post-implementation data are not yet available.

Secondary sources, such as FADN, FAOSTAT, etc., do not typically provide the necessary granularity at the farm level, particularly in relation to the type, timing, and intensity of specific IPM interventions. Thus, the two strands are designed to provide a comprehensive evidence base to inform the evaluation, ensuring it captures both observed and anticipated economic outcomes of IPM adoption, across a range of farm sizes, systems, and geographies.

3.2.1 Primary data collection protocol

This protocol outlines a tailored approach for collecting primary data **directly from farmers,** especially beneficiaries of subsidies or support schemes aimed at promoting the adoption of specific IPM-based practices. critical opportunity to gather comparative, real-world information on the economic implications of adopting IPM practices both before and after implementation.

The proposed protocol is structured around two key reporting packs provided to farmers: a Start Pack and an Ongoing Monitoring Pack.

- **Start pack – Baseline data collection:** This pack is designed to capture a detailed snapshot of each farm's economic and operational conditions **prior to the adoption of a specific IPM-based practice**. The aim is to establish a baseline against which changes can later be measured. It will include an Excel-based template accompanied by clear guidance to support the accurate and consistent reporting of baseline data.

  Farmers will be asked to report on a defined set of variables, including crop yields (e.g., tons per hectare), input costs (e.g., expenditure on pesticides, fertilizers, and other inputs), and other factors influencing economic performance such as labour use or machinery costs. Context variables — such as farm size, type of farming, and location — will also be collected to allow for disaggregation and comparability across diverse farming contexts.

  Recognising that many farmers will have adopted baseline IPM practices some time ago, the focus will be on the timing of the specific practice under evaluation, rather than on general IPM compliance. To facilitate meaningful baseline data collection, guidance material will provide definitions, examples, and data-entry instructions. This will help ensure that farmers understand the purpose of the data, how to report it accurately, and how their data will contribute to the broader evaluation effort.
- **Ongoing monitoring pack – Post implementation data collection:** Following the implementation of the selected IPM-based practice, the second pack — the Ongoing Monitoring Pack — will be used

to capture changes in the same set of variables over time. This will support an ex-post assessment of impacts by comparing "before" and "after" data for the same farm. The pack will take the form of a monitoring template, with instructions and data-entry fields tailored to align with those in the Start Pack to ensure comparability and continuity.

Farmers will be asked to report on the same key indicators at **regular intervals (e.g., end of season or annually),** such as updated input costs, crop yields, and overall profitability. The template may also include optional sections for farmers to qualitatively describe any observed effects, challenges, or unexpected outcomes from adopting IPM practices.

Where complete "after" data is not available — for example, if the practices are newly implemented — the collected information can still be used to support ex-ante assessments, drawing on stakeholder estimates and qualitative evidence to infer likely impacts.

In addition, other stakeholder engagement approaches are also recommended to complement these data gathering exercises, such as surveys and interviews, e.g., of experts and researchers in the field of IPM and agricultural economics. These approaches can be used to address data gaps and sense-check and contextualise the data submitted by farmers. Expert insights will be especially valuable in cases where complete post-implementation data from farmers is unavailable or limited, allowing for triangulation and more robust modelling. 'Appendix 4: Templates' provides the topic guides that will be used for these stakeholder interviews, structured to elicit informed, experience-based responses on the likely economic implications of IPM adoption.

3.2.2 Secondary data collection protocol

This protocol defines how publicly available datasets and relevant literature can be used to support economic impact evaluation of IPM-based practices, particularly by building a reliable baseline and generating context-specific insights on their economic impacts.

To establish a robust economic baseline, data can be collected from FADN[19], a harmonised dataset capturing structural and economic information on commercial farms across EU Member States. FADN is particularly valuable in this context due to its disaggregation by type of farming, farm size, region (NUTS 1 or NUTS 2 depending on country), and economic indicators relevant to farm performance.

Variables to be extracted include:

- Crop yield (tons per hectare), disaggregated by region, farm type and size. These data provide a baseline measure of productivity against which changes due to IPM practices can be inferred or modelled.
- Input costs per hectare (€/ha), particularly costs related to pesticides, fertilizers, seeds, and energy. This allows for comparison with anticipated or reported changes under IPM.
- Farm profitability (€/ha) defined as farm income minus total costs.

This structured dataset will allow the evaluation team to characterise the pre-intervention situation of the target population, especially in the case of farmers receiving support for IPM adoption. It will also enable stratification by farm size, region, and production system, which is essential for exploring variation in potential outcomes.

If FADN data availability is limited at the desired granularity or for specific regions or crops, supplementary data may be gathered from FAOSTAT, Eurostat, national statistical agencies, or research institutes.

In parallel to structured data collection, a targeted literature review will be conducted to gather empirical evidence and expert assessments on the potential economic impacts of IPM-based practices. This is especially important for supporting the ex-ante component of the evaluation, where post-implementation data from supported farmers may be limited or unavailable.

The review will focus on three key economic dimensions:

- Changes in crop yields (in terms of quantity and quality), linked to the implementation of IPM practices. This includes potential increases or decreases in yield quantity and quality, as well as any variability observed in the short vs. long term.
- Impacts on production costs, covering both:

[19] European Commission | Agri-food data portal | FADN Database

    - Cost savings through reduced use of synthetic pesticides, fertilizers, and other chemical inputs.
    - Additional costs stemming from IPM adoption, such as investments in mechanical equipment, alternative pest control materials, staff training, advisory services, or the additional time and labour required to monitor and manage pests using non-chemical methods.
- Overall profitability effects, incorporating:
    - Gross margins and cost-benefit ratios.
    - Shifts in output prices, particularly in cases where IPM-compliant products command price premiums due to environmental, health, or certification-related factors (e.g., eco-labels, local quality schemes, or retail contracts with sustainability requirements).
- Differences between small and large farms, particularly in terms of cost structures, capacity to absorb risks, and scalability of IPM practices. This will help evaluate whether farm size influences the economic viability of IPM adoption.
- External factors affecting economic outcomes, such as weather variability, market prices, regulatory changes, or pest outbreaks, which may mediate the observed or expected economic impact of IPM.
- Long-term benefits vs. short-term costs of IPM adoption, based on longitudinal studies or case-based evidence.

To ensure methodological consistency and reproducibility, a series of standardised search strings will guide the literature review. These may include:

- “economic impact” AND “integrated pest management” OR “IPM” AND “crop yield”
- “IPM implementation costs” OR “IPM labour costs” OR “IPM transition costs”
- “integrated pest management” AND “cost savings” OR “input costs” OR “pesticide use reduction”
- “IPM adoption” AND “farm profitability” OR “gross margin” OR “price premium”
- “IPM products” AND “market price” OR “value chain” OR “consumer willingness to pay”
- “non-chemical pest management” AND “economic evaluation” OR “benefit-cost ratio”
- "IPM" AND "farm size" OR "small farms" OR "large farms" AND "economic impact"
- "external factors" AND "IPM" AND "economic outcomes" OR "farm income" OR "climate variability"
- "IPM" AND "long-term benefits" OR "case study" OR "return on investment"

Academic sources will include Scopus, Web of Science, and Google Scholar. Grey literature searches will cover reports from EU-funded projects (e.g., Horizon 2020, LIFE), publications from European institutions (DG AGRI, EEA, JRC), international bodies (FAO, OECD), and relevant national research institutes or extension services. This will also include outputs from the Agrowise Task 3.4, led by USAMV, which focuses on identifying and synthesising IPM-relevant practices and evidence across Member States.

The literature review will prioritise studies conducted in EU Member States or regions with similar agricultural structures and climate conditions. However, relevant international studies may be included where they offer transferable insights into costs, market access, or production systems.

Given the evolving nature of farming practices and market conditions, it is recommended that a literature review is undertaken every 2-3 years to maintain its relevance and utility for any evaluation activities. This periodicity would strike a balance between maintaining up-to-date insights and managing resource constraints. This timeframe allows for the integration of new empirical evidence as more farms adopt IPM-based practices, while also accounting for potential shifts in economic variables such as input prices, subsidies, or consumer demand. Additionally, recurring literature reviews would help track the development of emerging technologies or methodologies in IPM, ensuring that the evaluation framework remains responsive and grounded in the latest scientific and practical advancements.

The results of the secondary research can compiled into a **structured evidence matrix**, summarising the main findings of each study alongside key contextual variables (e.g., crop, region, farm size). These insights will be used to:

- Inform the design and scope of expert stakeholder interviews;
- Serve as a reference for validating or contextualising data submitted by supported farmers;
- Support the assessment of economic outcomes or impacts of IPM-based practices.

3.3 DATA VALIDATION PROTOCOL

Data collected — whether through primary collection (e.g. self-reported by farmers, stakeholder surveys and interviews) or secondary sources (e.g. FADN, literature review, etc.) — must be subject to a validation and assurance process. This is important to ensure that subsequent analyses and conclusions are grounded in accurate, complete, and reliable information. The data verification protocol includes three elements: data cleansing, verification and validation.

3.3.1 Data cleansing

Data cleansing involves identifying and correcting anomalies, missing values, and inconsistencies in the dataset. The cleansing process will involve:

- **Outlier detection:** Statistical screening for extreme values in key indicators (e.g. yields, cost components, profitability). Detected outliers will be flagged and investigated for potential data entry errors or legitimate deviations (e.g. due to specific farm practices).
- **Logical consistency checks:** Ensuring coherence between related variables (e.g. total input costs should equal the sum of cost categories; farm profitability should reflect revenue minus total costs).
- **Treatment of missing data:** Systematic approaches will be applied depending on the type and pattern of missing data. These may include imputation using group averages (e.g. by crop type and region), Cumulative Average Growth Rates (CAGR), or exclusion from specific parts of the analysis with justification.

Cleansing procedures should be documented and applied consistently across the dataset(s).

3.3.2 Data verification

Data verification seeks to check the veracity, accuracy and coherence of the data collected. Verification procedures vary by data source:

- **Primary data (farmer submissions via templates, etc.):** Farmers will complete structured Excel templates — one prior to implementing specific IPM-based practices that go beyond minimum requirements (baseline) and one following the implementation of IPM-based practices (submitted once per season/year). These templates will include pre-defined fields with dropdown menus, numeric formatting, and embedded validation rules (e.g. required fields, plausible value ranges) to reduce the likelihood of entry errors. Accompanying guidance will be provided to farmers to support correct and coherent data entry across submissions. Fields such as input quantities, costs, and yields will need to be checked for logical coherence and completeness.
- **Primary data (stakeholder survey, interviews, etc.):** Surveys can use closed and scaled questions (e.g. Likert scales, percentage estimates, confidence ranges) and built-in logic checks to ensure completeness and consistency of responses. Interviewers will use a common topic guide (see Appendix 4), and interview notes will be cross-checked with recordings or transcripts, where available, to ensure accuracy and completeness. Where available, external references (e.g., from secondary sources) can be used to check and validate responses upon analysis of information shared through surveys, interviews or other approaches.
- **Secondary data (literature, etc.):** Official harmonised datasets such as FADN will be used as external references for checks and validations, as these sources maintain consistent definitions and data collection protocols across EU Member States. Where supplementary sources are used (e.g. Eurostat, national databases), metadata and documentation will be reviewed to ensure alignment in variables and methodologies.

3.3.3 Data validation

Data validation is the final assurance step, confirming the quality and credibility of the cleaned and verified data. This will involve:

- **Cross-checks across sources:** Where possible, key figures reported by farmers (e.g. input costs, yields) and/or relevant stakeholders (e.g., researchers, experts, etc.) will be compared to secondary benchmarks from FADN and literature sources to detect discrepancies or confirm plausibility.

- **Triangulation of qualitative and quantitative data**: Insights from stakeholder interviews will be cross-referenced with findings from the literature review and data submitted by farmers to strengthen the reliability of assumptions, especially for the ex-ante component.
- **Internal consistency reviews**: A peer review or quality control step will be implemented, where a second team member reviews a sample of the dataset and applied procedures to ensure fidelity to the verification protocol.

These combined steps will ensure that the dataset underpinning the analysis is robust, internally consistent, and fit for purpose — enabling credible impact and value for money assessments of IPM-based practices.

3.4 ANALYSIS AND EVALUATION PROTOCOL

This protocol outlines the approach that will be followed to assess the economic impacts and value for money (VfM) of implementing IPM-based practices. The evaluation will combine evidence from primary data submitted by supported farmers, expert interviews, and secondary sources (including FADN and literature), as described in the data collection protocols.

3.4.1 Impact evaluation

The impact evaluation, with an economic focus, will explore whether, and to what extent, the adoption of IPM-based practices influences core economic indicators, including productivity (crop yield), input costs, farm profitability, and income stability. Two complementary approaches will be used:

- Ex-post assessment, where data from supported farmers will be available for both baseline (pre-implementation) and post-implementation periods. In such cases, before-and-after comparisons will be conducted at the farm level, using data reported through the primary collection templates. Where possible, difference-in-difference comparisons may be pursued, provided a suitable control group or counterfactual can be established.
- Ex-ante assessment, where full post-implementation data is unavailable or incomplete. In these instances, the analysis will rely on modelling based on baseline economic data (e.g., from FADN) and expert-informed assumptions about expected impacts of IPM-based practices. Stakeholder interviews and literature review findings will be used to estimate potential changes in key variables such as input cost savings, implementation costs, yield changes, and price effects.

The robustness of the ex-ante estimates will be enhanced by cross-validating assumptions with evidence from studies conducted in comparable agricultural contexts and by aligning modelling assumptions with expert insights gathered through structured interviews.

Disaggregation will be applied where possible, particularly by:

- Crop type
- Farm size
- Farming system
- Specific IPM-practice
- Region

This will allow the evaluation to explore variability in outcomes and potential distributional effects.

3.4.2 VfM evaluation

The VfM evaluation will draw from the evidence generated through the impact assessment to determine whether the adoption of IPM-based practices is economically viable and attractive from the perspective of farmers, i.e., assessing whether the benefits of IPM adoption outweigh the associated costs.[20]

This assessment will consider a range of financial indicators, drawing on both observed data (ex-post) and modelled estimates (ex-ante), including:

[20] While the traditional 3E's framework (Economy, Efficiency, Effectiveness) is more commonly applied in evaluations of public programmes, this assessment draws on similar principles—particularly focusing on the effectiveness and efficiency of IPM-based practices from the perspective of farm-level economic performance—using cost-benefit analysis as the primary method.

- Implementation and maintenance costs, including investments in new equipment, labour requirements, advisory services, monitoring tools, and training.
- Productivity effects, in the form of changes in crop yields or quality.
- Cost savings, such as reductions in chemical inputs (e.g. pesticides, fertilizers), energy use, or other operational costs.
- Overall profitability effects, combining gross margin estimates and potential price premiums for IPM-compliant or eco-certified products.

Where sufficient data is available, these elements will be integrated into a simplified cost-benefit analysis framework to estimate:

- Net Benefits per hectare (i.e. benefits minus costs of IPM adoption),
- Break-even points, or the minimum yield or price gains required to justify the investment,

This analysis will be tailored by crop type, farm size, and production system, recognising that the economic case for IPM adoption can vary significantly across contexts.

In cases where only partial data is available (e.g. only cost data, or only assumptions from the literature), qualitative assessments of VfM will be developed, triangulating:

- Stakeholder insights (on costs, risk perceptions, or barriers to adoption),
- Findings from the literature review,
- FADN-derived baselines for key economic variables.

Overall, this evaluation protocol aims to characterise the financial trade-offs and potential incentives for farmers to adopt IPM-based practices, providing evidence to inform policy and practical recommendations for the farming community.

3.5 GOVERNANCE PROTOCOL

The governance protocol defines the project structure, roles and responsibilities, outlines communication processes, and sets expectations for performance monitoring and quality assurance for an effective evaluation.

3.5.1 Project structure, roles and responsibilities

The Agrowise consortium is composed of national research organisations across Europe.[21] Each partner organisation will serve as a country lead, responsible for the implementation of the evaluation protocol in their respective country.

Each country lead will:

- Identify and engage relevant stakeholders (e.g., farmers receiving subsidies for IPM-based practices, experts);
- Distribute and collect the Excel-based data templates from farmers (baseline and monitoring templates);
- Administer surveys and conduct stakeholder interviews;
- Check the data collection follows the protocols defined in the M&E framework.

Every country lead will designate at least one point of contact who will serve as the main liaison for coordination, reporting, and communication with the overall Agrowise M&E coordination team.

The evaluation activities will be centrally coordinated by the M&E team within Agrowise, which will consolidate inputs from all country leads and oversee cross-country consistency and harmonization, and will be responsible for the evaluation.

The Agrowise management team will be responsible for the quality assurance of the evaluation, consulting with relevant experts and stakeholders as needed.

[21] Partner institutes - AGROWISE

The Table below provides an overview of the recommended division of roles and responsibilities across the consortium.

Table 5 Roles and responsibilities for the proposed evaluation protocol

M&E activities	Roles and responsibilities
Stakeholder identification and engagement	Each country lead will be responsible for identifying and engaging with relevant stakeholders in their country.
M&E preparations and requests	The Agrowise M&E Coordination Team will provide the Start Pack, Ongoing Monitoring Pack, survey and topic guides to the Country Leads. Country Leads will distribute the Start Pack and Ongoing Monitoring Pack to the identified farmers.
Data monitoring and collection	Farmers will self-report on a defined set of variables and indicators, providing a detailed snapshot of each farm's economic and operational conditions before and after implementing IPM-based practices. Country Leaders will collect the Excel-based data templates from farmers in their countries and conduct surveys and stakeholder interviews, ensuring that data collection follows the protocols defined in the M&E framework. The Agrowise M&E Coordination Team will consolidate inputs from all country leads and oversee cross-country consistency and harmonisation.
Analysis and evaluation	The Agrowise M&E Coordination Team will be responsible for analysing and evaluating the potential economic impact of implementing IPM-based practices.
Validation and quality assurance	Country leads are responsible for first-level validation and cleaning of the data collected in their jurisdiction, following the data verification protocol. The central M&E team will conduct a second-level review of submitted data to check for completeness, consistency, and comparability across countries. The Agrowise management team (and relevant experts and stakeholders) will be responsible for the quality assurance of the evaluation.

3.5.2 Communication plan

A structured communication plan is essential to ensure smooth coordination between the central M&E team and country leads, enable proactive problem-solving, and support consistency in the implementation of the evaluation across countries. The communication plan includes the following components:

- **Periodic coordination calls:** Periodic virtual meetings will be held with all country leads and the central M&E team, for example, every month or quarter as useful. These meetings will be used to:
  - Monitor progress across countries;
  - Flag and address operational or methodological issues;
  - Share learnings and good practices;
  - Plan and align upcoming activities.

  A tailored agenda will be prepared and shared in advance. Minutes will be circulated after each call, including action points and responsibilities.
- **Quarterly written progress reports:** Each country lead will submit a quarterly report summarising:
  - Data collection and stakeholder engagement activities conducted;
  - Response rates and template returns;
  - Issues encountered and how they were addressed;
  - Planned activities for the following quarter.

  The central M&E team will consolidate and review these reports to ensure consistency and identify cross-cutting challenges or successes

- **Shared workspace and documentation:** A centralised digital workspace (e.g., Microsoft Teams, SharePoint, or a dedicated project platform) will be maintained for:
    - Hosting templates, guidance documents, and shared resources;
    - Uploading progress reports and data templates;
    - Managing shared calendars and scheduling coordination calls;
    - Facilitating asynchronous discussions via dedicated channels (e.g., country-specific or topic-specific threads).

3.5.3 Performance monitoring

The central M&E team will monitor performance through:

- Tracking indicators of progress, including number of stakeholders engaged, farmer templates returned, survey response rates, etc.;
- Flagging delays or issues via monthly updates during the monthly coordination calls;
- Providing technical support or reallocation of tasks if specific country leads face persistent implementation challenges.

Performance will be reviewed quarterly and discussed in coordination calls to agree on corrective actions if necessary.

3.5.4 Quality assurance framework

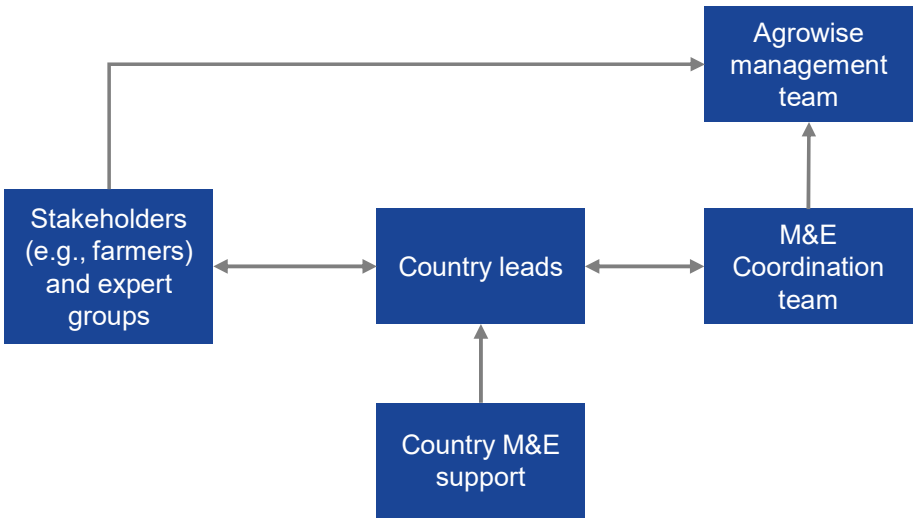
The governance protocol also includes a multi-tiered quality assurance framework:

- Country leads are responsible for first-level validation and cleaning of the data collected in their jurisdiction, following the data verification protocol;
- The central M&E team will conduct a second-level review of submitted data to check for completeness, consistency, and comparability across countries;
- In cases where inconsistencies or gaps are identified, feedback loops will be triggered, allowing for clarification or re-submission from the relevant country lead;
- Templates, protocols, and guidance documents will be standardised and shared consortium-wide to facilitate uniform implementation.

Finally, conclusions and recommendations from the evaluation activities will be synthesised by the M&E coordination team and validated in consultation with country leads and, where appropriate, Agrowise's internal and external advisory bodies.

The diagram below presents a visual summary of the proposed governance structure, highlighting key actors and the relationships between local implementation, coordination, and quality assurance.

Figure 6. Governance structure and engagement



4. GENERAL CONCLUSION

This document presents a structured evaluation protocol for assessing the potential economic impacts of implementing IPM-based practices, with a primary focus on farm-level costs, gross margins, and environmental externalities. The protocol is grounded in robust indicators, triangulated data sources, and a consistent modelling approach. To validate and test the practical applicability of the protocol, three case studies were developed in France, Ireland, and Croatia. These were selected to reflect different production systems (arable, cereal, and orchard farming), levels of pesticide dependency, and types of IPM intervention.

The French case study draws on large-scale farm-level data to assess the viability of pesticide reduction without yield loss across a representative arable sample. The Irish case study models various pest interaction and IPM adoption scenarios for cereal crops under future regulatory conditions. The Croatian case study explores the cost-effectiveness of mating disruption in fruit orchards using local farm trial data. Together, these pilots confirm the feasibility of the evaluation protocol across a range of agronomic and institutional contexts, while highlighting the importance of context-specific modelling and reliable data for sound impact assessments.

APPENDICES

APPENDIX 1: THEORIES OF CHANGE

Theories of Change (ToC) for the different typologies of IPM-based practices were developed at a high-level, following the principles set out in the HMT Magenta book, and based on insights and information from a literature review.

These ToC maps or logic models summarise the types of inputs that IPM-practices typically require (e.g., the investments, capacity building, etc.), and set out the evidence-based links or causal chains to the activities and outputs, outcomes, and impacts that could be attributable to these types of practices.

Having developed these ToC for three specific typologies of IPM-based practices, a detailed, horizontal IPM ToC map was developed as the basis for this evaluation protocol (see Section 2). The high-level ToC for the three specific typologies of IPM-based practices underpinning this horizontal map are shared below, in this Appendix.

Figure A-1 Theory of change for crop selection (including crop rotation) practices

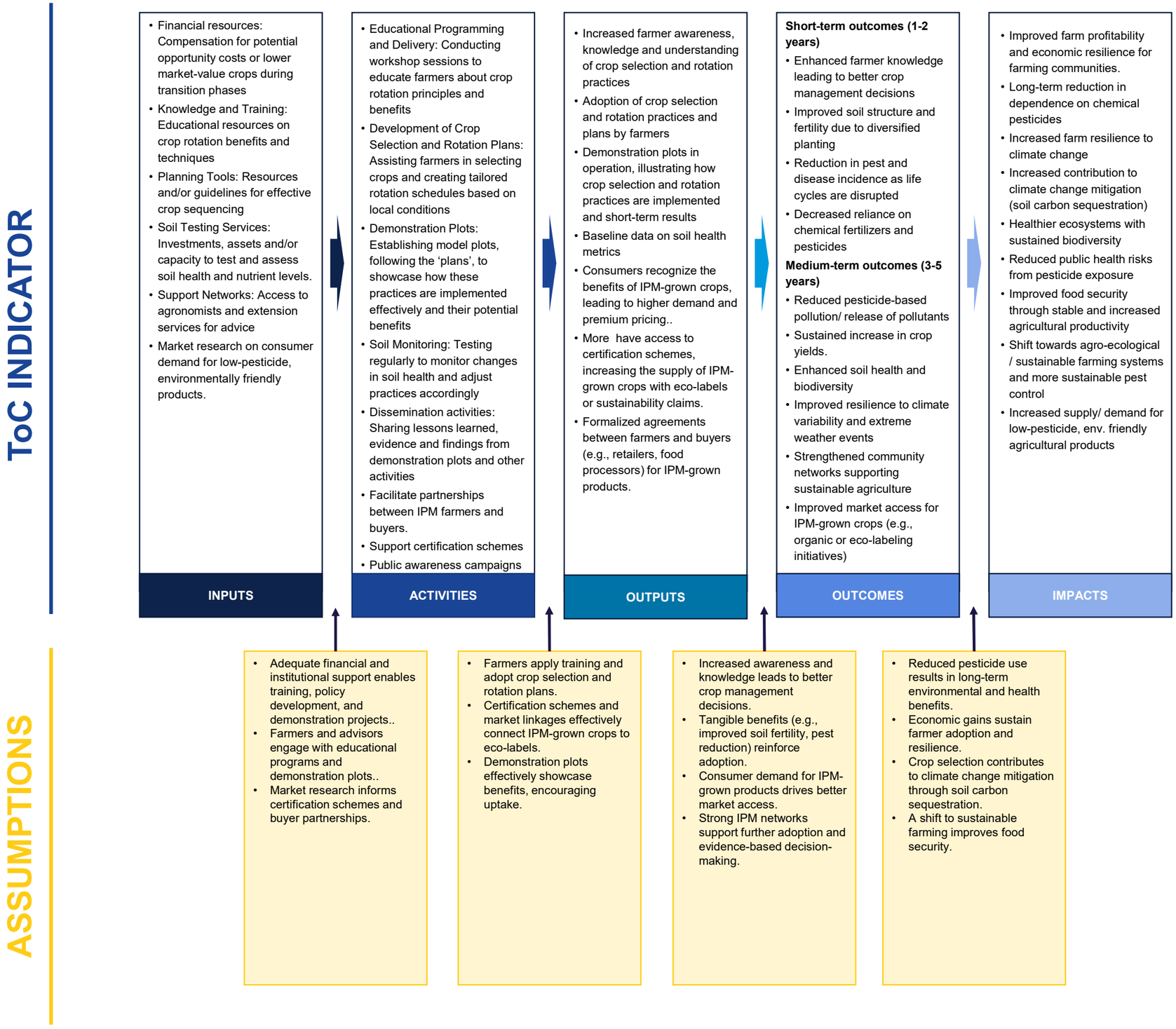


Figure A-2 Theory of change for Decision Support Systems (DSS) and thresholds

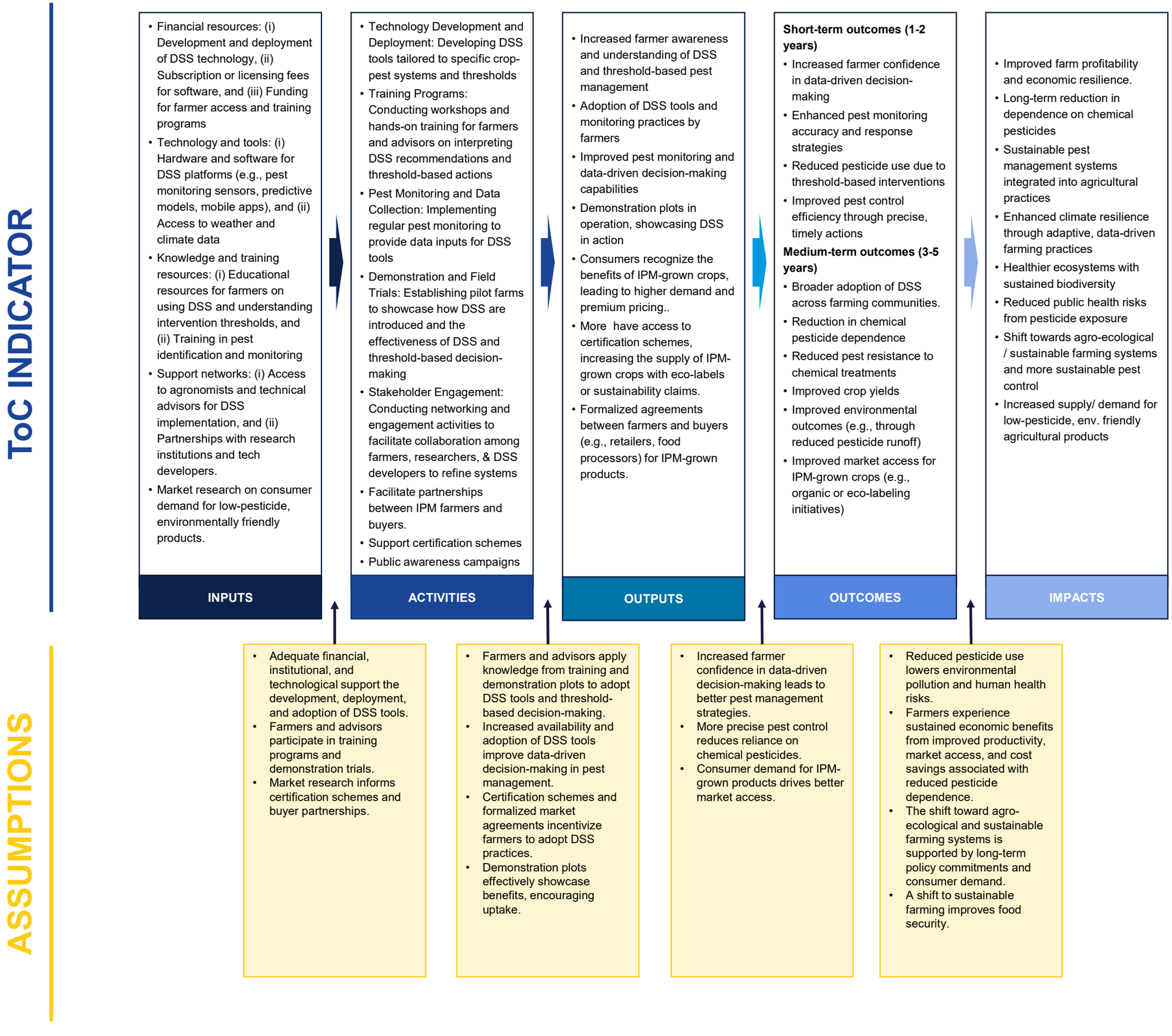


Figure A-3 Theory of change for reduce pesticide use practices

ToC INDICATOR

INPUTS

- Financial Resources: (i) Investment development of advanced spraying technologies, and (ii) Incentives to adopt precision spraying technology
- Technical Resources: Research on optimal spray application techniques and Precision spraying equipment (e.g., precision nozzles, variable-rate sprayers), etc.
- Knowledge and Training: (i) Educational programs for farmers on optimal pesticide application techniques, and (ii) Best practices for adapting spraying technology and understanding pest resistance
- Support Networks: (i) Partnerships with technology providers, and (ii) Farmer networks for knowledge sharing
- Monitoring and Evaluation Systems: Frameworks to track pesticide use, efficiency, and environmental impact
- Market research on consumer demand for low-pesticide, environmentally friendly products.

ACTIVITIES

- Technology Development and Deployment: Promoting the adoption of precision spraying technologies and conduct field trials to validate the efficiency
- Farmer Training: Conducting workshops and field demonstrations on precision pesticide application and provide training.
- On-Farm Monitoring: Implementing real-time pest monitoring, using sensors & assessing pesticide application efficiency
- Demonstration and Field Trials: Establishing pilot farms or plots showcasing how IPM-based practices can reduce pesticide use effectively
- Stakeholder Engagement: Promoting regulatory frameworks, engaging policymakers in discussions about incentives for adopting reduced pesticide practices and encouraging farmer-to-farmer learning initiative.
- Facilitate partnerships between IPM farmers and buyers.
- Support certification schemes
- Public awareness campaigns

OUTPUTS

- Greater availability of educational resources and training materials for sustainable pest management
- Increased awareness among farmers on optimized pesticide application techniques
- Improved knowledge and skills in targeted pesticide application and alternative pest control methods
- Increased adoption of precision spraying technology among farmers
- Reduced pesticide application rates while maintaining effective pest control
- Demonstration plots in operation, demonstrating effective reduced pesticide strategies
- Development of farmer networks promoting sustainable pest management
- Consumers recognize the benefits of IPM-grown crops, leading to higher demand and premium pricing..
- More have access to certification schemes, increasing the supply of IPM-grown crops with eco-labels or sustainability claims.
- Formalized agreements between farmers and buyers (e.g., retailers, food processors) for IPM-grown products.

OUTCOMES

Short-term outcomes (1-2 years)

- Increased farmer confidence in precision technologies.
- Reduction in pesticide use, and thus, pesticide purchase costs
- Improved pest control efficiency
- Enhanced data collection on pesticide use and pest resistance trends.

Medium-term outcomes (3-5 years)

- Improved crop yields
- Reduced pesticide residues in soil, water, and agricultural products.
- Decreased cases of pest resistance to chemical treatments.
- Expansion of reduced pesticide use practices
- Strengthened community resilience to pest outbreaks and climate variability
- Integration of IPM into relevant policy frameworks
- Improved market access for IPM-grown crops (e.g., organic or eco-labeling initiatives)

IMPACTS

- Economic Sustainability: Improved farm profitability and economic resilience
- Long-term reduction in dependence on chemical pesticides
- Healthier ecosystems with sustained biodiversity
- Enhanced resilience of agricultural systems to pest outbreaks and climate change
- Strengthened integration of sustainable IPM strategies into mainstream agricultural practices.
- Health & Safety Improvements: Lower health risks for farmers, farmworkers, and consumers due to reduced pesticide exposure.

ASSUMPTIONS

- Adequate financial, institutional, and technological support enables training, policy development, and demonstration projects..
- Stakeholders (farmers, researchers, policymakers) are willing and able to engage.
- Market research informs certification schemes and buyer partnerships.

- Farmers apply training and engage with demonstration projects.
- Certification schemes and market linkages effectively connect IPM-grown crops to eco-labels.
- Demonstration plots effectively showcase benefits, encouraging uptake.

- Increased awareness and knowledge leads to widespread adoption of strategies aimed at minimizing chemical pesticide applications.
- Farmers experience tangible benefits, reinforcing continued use.
- Consumer demand for IPM-grown products drives better market access.

- Reduced pesticide use results in long-term environmental and health benefits.
- Farmers experience sustained economic benefits from improved productivity, market access, and cost savings associated with reduced pesticide dependence.
- IPM contributes to healthier ecosystems and biodiversity.
- The shift toward agro-ecological and sustainable farming systems is supported by long-term policy commitments and consumer demand.
- A shift to sustainable farming improves food security.

APPENDIX 2: EVALUATION QUESTIONS

This Appendix contains the latest longlist of evaluation questions considered for the impact and VfM evaluation of the implementation of IPM-based practices. The final shortlist of evaluation questions can be seen in Section 2.2.

Table A-1: Longlist of high-level evaluation questions

Type of evaluation	Evaluation questions
Outcome	• To what extent has the adoption of IPM based practices impacted crop yields (in terms of quality and quantity)? • To what extent has the implementation of IPM-based practices reduced reliance in synthetic pesticides and, therefore, input costs (e.g., pesticides, fertilizers, or other inputs), and costs overall?
Impact	• To what extent has the adoption of IPM-based practices improved farm profitability? • To what extent have IPM-based practices contributed to stable or increased farm incomes over time? • To what extent has the adoption of IPM-based practices increased the demand for low-pesticide, environmentally friendly agricultural products? • How have smallholder farmers vs. large-scale producers experienced economic benefits or challenges in adopting IPM? • How has IPM adoption affected farmers' resilience to economic shocks (e.g., pest outbreaks or input price volatility)? • What are the opportunity costs of transitioning to IPM-based practices? • Has the adoption of IPM-based practices resulted in any unintended economic consequences (e.g., increased labour costs, market access barriers, technology adoption costs)?
Value-for-money	• How do the long-term economic benefits compare to the initial costs of adopting IPM-based practices? • What are the potential public health cost savings from reduced pesticide exposure? • How has IPM adoption affected employment opportunities in related agricultural services? • Are there measurable economic benefits for communities where IPM-based practices are widely adopted?
External factors	• How much of the economic benefits (or losses) can be attributed to external factors such as government subsidies, market demand, or climatic variations? • Have the economic outcomes been influenced by other external factors such as policy incentives, supply chain constraints, or variations in market conditions? • How do variations in farm size, crop type, and regional climate affect the likelihood of economic success in IPM adoption?

APPENDIX 3: EVALUATION METHODS

This appendix outlines the evaluation methods proposed to assess the economic impacts and value-for-money (VfM) of implementing Integrated Pest Management (IPM)-based practices. The approach is designed to be rigorous yet adaptable to the data constraints inherent in this evaluation and is based on a combination of ex-post (before-and-after) and ex-ante (predictive) methodologies.

The primary evaluation objectives are:

1. To assess the extent to which the adoption of IPM-based practices contributes to measurable economic outcomes at the farm level (impact evaluation).
2. To determine whether the economic benefits outweigh the costs of implementing IPM-based practices (value-for-money evaluation).

A longlist of evaluation methods was considered based on relevant literature and guidance, including the HMT Magenta Book. Following a review of feasibility and data availability, the following methods are proposed:

- Collection of structured data from farmers using standardised Excel templates (Start Pack and Ongoing Monitoring Pack) to enable before-and-after comparisons.
- Expert and stakeholder consultations through surveys and interviews to support an ex-ante modelling approach.
- Use of economic indicators to perform cost-benefit assessments of IPM adoption, supplemented by qualitative insights where data is incomplete.

IMPACT EVALUATION

This section outlines, in more depth, the proposals for the impact evaluation of implementing IPM-based practices. The primary method proposed is before-and-after analysis, which will be conducted using quantitative data submitted directly by farmers through Excel-based templates. This approach will be pursued wherever sufficient data are available to construct robust case studies that demonstrate the economic effects of adopting specific IPM-based practices. In parallel, an ex-ante modelling approach will complement this analysis in cases where post-implementation data are not yet available. The ex-ante strand will rely on expert surveys, stakeholder interviews, and literature review findings to estimate likely impacts, ensuring the evaluation remains relevant and evidence-based despite any data limitations.

Before-and-after analysis

The principal method for the impact evaluation will be before-and-after analysis using primary data reported by farmers. These data will be gathered through the Excel-based Start Pack (baseline) and Ongoing Monitoring Pack (post-implementation). Having considered a range of options, their advantages and disadvantages, before-and-after analysis provides a practical and reasonable method for the quantification of how specific IPM-based practices have contributed to the observed outcomes and impacts mapped in the Theory of Change.

A relevant baseline will be established and identified for the selected indicators prior to the start of implementation of specific IPM-based practices and will continue to be collected seasonally or annually after implementation. Evidence collected through monitoring and reporting will be used to conduct before-and-after analyses and to determine the potential economic impact of these practices.

This analysis will be complemented by a survey and interviews with relevant stakeholders such as agronomists, researchers, farm consultants, and other agricultural experts.

The following subsections set out a proposal for how this method could be implemented, which are:

- Establishing a baseline (or counterfactual)
- Mapping the most significant and likely impacts
- Detailing the indicators and methods required to assess each of these significant and likely social costs and benefits

Establishing a baseline or counterfactual

To assess the impact (and value-for-money) of implementing IPM-based practices, it is necessary to establish the baseline or counterfactual. This baseline and counterfactual represent a version of what would have

happened in the absence of these practices and provide a benchmark against which to evaluate ex-post impacts.

A baseline or counterfactual scenario can be established in different ways, two of which have been selected as potentially relevant in the context of IPM: 1) establishing the pre-implementation status (for employing the before-and-after evaluation approach), or 2) identifying a comparable farm or control groups (for employing a differences-in-differences evaluation approach); each with the advantages and disadvantages set out in the Table below.

Approach	Advantages	Disadvantages	How this could be implemented
Establishing the pre-implementation status	• Allows for comparison between pre- and post-intervention status. • Relatively easy to implement	• Different external factors might affect the indicators under scope, biasing the estimates of an impact/VfM	Collect data on selected impact and VfM indicators before the IPM based practices are implemented. This could involve a survey, interviews, focus groups, or other data collection methods as relevant. Data will be used to establish baseline level for each indicator against which the post-implementation status will be compared.
Identification of a comparable farm or control group(s) that has not implemented these types of practices	• Theoretically, could allow for the isolation of impact that could be attributable to implementing IPM-based practices (if all else remains equal between the treatment and control group) • Not necessarily easy to implement, starting with the identification of a farm with similar conditions.	• Difficult to find a comparable farm or control group(s), which means that any selected farm might not be a reasonable counterfactual. • Different external factors might affect the indicators under scope, biasing the estimates of an impact/VfM.	Identify a comparable farm that is similar in terms of relevant characteristics such as size, location, climatology, baseline, trends, etc., and that it is not implementing IPM-based practices.

Based on this assessment, it is concluded that **establishing the pre-implementation status, despite its disadvantages, would be a more practical and preferrable approach for this evaluation protocol**. Identifying comparable farms or control groups can be complex and suffer from similar if not more pronounced limitations.

Mapping the most significant impacts

A key step in developing a reasonable, practical and robust before-and-after evaluation methodology is the upfront selection (or prioritisation) of the most significant impacts that are likely to result from the implementation of specific IPM-based practices. The applicable significant impacts will have indicators defined (see Section 2.3) that allow to establish the baseline or counterfactual for these impact categories against which to evaluate the observed economic effects of the implementation of IPM-based practices.

In this context, and based on the analysis presented in earlier sections, the Table below sets out the most significant impacts (costs and benefits), or proxies of said impacts, which have been identified as: 1) necessary for evaluating impacts and VfM of IPM-based practices, and 2) practical or feasible to quantify and monetise. In fact, the objective of this approach is to monetise the costs and benefits for a quantitative evaluation of impact and/or VfM (e.g., analysis of NPV of net benefits).

Specific impact category	Net cost/benefit
Productivity (changes in crop yields)	Could be a cost or a benefit
One-off (implementation) costs and recurring (maintenance) costs associated to IPM-based practices	Likely to be a cost
Input cost changes (e.g., change in pesticide expenditure)	Likely to be a benefit
Farm profitability	Could be a cost or a benefit
Farm income	Could be
Price premiums for IPM compliant products	Likely to be a benefit
Long-term economic benefits	Could be a cost or a benefit

These impacts (potential costs and benefits) are considered to capture the most significant effects of the implementation of IPM-based practices that would be quantifiable as part of any practical before-and-after analysis.

Detailing the priority indicators and methods to establish and quantify impacts

This section sets out the priority indicators and methods required to establish and quantify the potential economic impacts of implementing IPM based practices.

- **Changes in crop yields:** To estimate quantity changes in crop yields, it would be necessary to collect data on tonnes per hectare of crop yields before and after the implementation of IPM-based practices. This data will be collected from farmers via the Excel-based templates. Based on these data, changes can be estimated by comparing values reported before and after the implementation of IPM-based practices. Where appropriate, statistical methods (e.g. paired t-tests) can be used to assess whether the observed changes are statistically significant. Disaggregation by farm size and type will allow for the assessment of potential differences in economic benefits across different farm profiles.
- **One-off (implementation) and recurring (maintenance) costs of implementing IPM-based practices:** To estimate the changes in one-off and recurrent costs, it would be necessary to collect the capital and operating expenditures for the implementation of specific IPM-based practices. This data will also be reported by farmers using the Excel-based templates and will be analysed across farm sizes and types.
- **Changes in input costs per hectare:** To estimate reductions in input costs, data will be collected on expenditures related to synthetic pesticides, fertilizers, and other relevant inputs per hectare. Changes will be compared before and after implementation. Analysis will consider differences across farm size and type. Paired t-tests may be used to identify significant reductions.
- **Changes in farm profitability:** To estimate quantity changes in farm profitability, it would be necessary to collect data on this indicator before and after the implementation of IPM-based practices. Farmers will self-report profitability values via the templates, which will allow comparison of before and after data. Statistical significance testing may be employed where applicable. Results will also be analysed by farm size.
- **Changes in income (and income stability):** To estimate changes in farm income, it would be necessary to collect data on income before and after the implementation of IPM-based practices. This data will be collected from farmers via the Excel-based templates Based on these data, changes can be estimated by comparing values reported before and after the implementation of IPM-based practices. Where appropriate, statistical methods (e.g. paired t-tests) can be used to assess whether the observed changes are statistically significant Income stability can be approximated by comparing inter-annual variability in reported net farm income for those farms that have submitted multiple rounds of post-implementation data. Trends in income volatility may be identified by observing whether income becomes more stable after adopting IPM-based practices.

Ex-ante modelling

In cases where follow-up data is not yet available or coverage is limited, the evaluation will incorporate an ex-ante component to estimate the potential economic impacts of IPM-based practices. This will involve:

- Expert surveys collecting quantitative estimates of expected impacts (e.g., percentage change in input costs, yields, profitability, etc.);
- Stakeholder interviews providing qualitative insights, including context on implementation conditions, variation in effectiveness by region or crop, and capturing qualitative indicators not gathered from farmers.
- A targeted literature review to validate and benchmark expert assumptions with existing empirical evidence.

The modelling exercise will not rely solely on expert judgement. Instead, it will triangulate data from the three sources above to develop well-reasoned and documented economic scenarios.

Baseline values for key indicators will be derived from the FADN database, which provides regional and sectoral averages for variables such as yield, input costs, and income. While IPM is a mandatory requirement for all professional farmers under the Sustainable Use Directive since 2014, the main limitation of FADN in this context is that it does not contain information on the specific IPM-based practices implemented at farm level. As a result, the data cannot be disaggregated by type or intensity of IPM implementation, making it unsuitable for direct impact attribution. Nevertheless, FADN data serves as a reasonable proxy for economic baselines in conventional systems and can support ex-ante modelling.

While the Farm Accountancy Data Network (FADN) provides valuable economic data at the farm level across EU Member States, it has several important limitations that make it unsuitable on its own for evaluating the economic impact of Integrated Pest Management (IPM)-based practices — especially for practices implemented as part of support or subsidy schemes. The main reasons are:

- **FADN does not capture pest management approaches or specific IPM**-based **practices:** The dataset does not include variables detailing whether and how farmers implement pest management practices — for example, whether they use chemical pesticides, biological control, mechanical methods, or decision support systems (DSS). As such, it is not possible to isolate farms using specific IPM-based practices or to distinguish them from those following conventional or legally required minimum practices. This limits the ability to conduct any comparison across different levels or types of IPM adoption.
- **FADN does not provide information on the timing of IPM**-based **practice adoption**: Even if a farm is known to be using IPM-based practices, FADN does not indicate when these practices were adopted. This is particularly problematic because meaningful economic evaluation depends on comparing the farm's performance before and after adoption. For example, if a farm adopted a certain IPM practice in 2018, data from FADN would not flag that year as a point of intervention. This makes before-after comparisons impossible using FADN alone.
- **IPM principles have been a formal requirement since 2014, but this has led to mostly nominal or minimal compliance**[22][23]: Since 2014, the implementation of general IPM principles has been mandatory under the EU's Sustainable Use of Pesticides Directive. However, compliance is often formal rather than substantive. Many farmers may report adherence to IPM in principle, but in practice they may continue using conventional pest control methods with limited changes to inputs or management strategies. FADN does not capture this distinction between formal and meaningful compliance, which is crucial when trying to assess the impacts of genuinely improved or advanced IPM interventions.
- **Lack of linkage to support schemes or policy incentives for IPM adoption**: FADN does not systematically link farm data to participation in subsidy or support schemes that promote specific IPM-based practices. This makes it difficult to assess whether observed economic outcomes are related to policy-driven adoption of IPM, or to unrelated factors. Without knowing which farms are beneficiaries of targeted schemes, it is impossible to isolate treatment effects related to policy instruments.

The result of this modelling will be a set of scenario-based estimates of the economic impacts of adopting specific IPM-based practices. These scenarios can be used in both impact and VfM analyses, providing a fallback method when post-implementation data is missing or insufficient.

[22] Sawinska Z et al. (2020). *Agricultural Practice in Poland Before and After Mandatory IPM Implementation by the European Union.* Available at: Agricultural Practice in Poland Before and After Mandatory IPM Implementation by the European Union

[23] European Court of Auditors (2020). *Sustainable use of plant protection products: limited progress in measuring and reducing risks.* Available at: Special report: Pesticides

VALUE FOR MONEY EVALUATION

The VfM evaluation will rely primarily on cost-benefit analysis (CBA). This will be performed by drawing on cost and benefit data collected from farmer templates and expert input, complemented with insights from the targeted literature review. This triangulation of sources allows for a more robust and realistic appraisal of the economic case for implementing specific IPM-based practices. Key metrics will include:

- Benefit-Cost Ratio (BCR): This indicator compares the total expected benefits of implementing IPM-based practices to the total costs incurred. A BCR greater than 1.0 indicates that the benefits outweigh the costs, suggesting that the intervention represents good value for money.
- Net Present Value (NPV): The NPV represents the difference between the present value of benefits and the present value of costs over a defined time horizon. For this evaluation, the NPV will be estimated based on the costs (e.g., implementation and recurring costs) and benefits (e.g., input cost savings, yield increases, price premiums) reported by farmers or derived from expert-informed ex-ante modelling. Discounting will follow EU or national guidelines, ensuring consistency with public sector appraisal standards.

The resulting VfM estimates will be used to provide quantitative evidence of the extent to which the implementation of IPM-based practices may represent a cost-effective use of resources for farmers and contribute to sustainable agricultural outcomes. These estimates will also support the interpretation of observed impacts and help identify the conditions under which IPM adoption is more likely to yield net economic benefits.

Where quantitative data is incomplete, a complementary qualitative assessment will be performed. This will draw on stakeholder interviews and expert surveys to understand how farmers and practitioners perceive the value-for-money of adopting IPM, including:

- Economic feasibility of IPM for small vs. large farms;
- Perceived burden of upfront and recurring costs;
- Expected long-term benefits in profitability, resilience to market or climate shocks, and improved market access.

These qualitative insights will help contextualise the CBA findings, especially where monetised data are insufficient or where broader economic benefits are difficult to quantify. Together, the CBA and qualitative assessment will offer a balanced view of VfM, supporting both evidence-based decision-making and a nuanced understanding of the economic implications of IPM adoption.

APPENDIX 4: TEMPLATES

Topic guides for interviews with experts

For interviewers: Please note that text highlighted in yellow will need to be tailored to your specific case/ interviewee. The aim will be for you to get through all the numbered questions. Probes are there to help you gather more insights concerning each question.

Introduction

My name is [NAME], and I'm calling from Agrowise.

We've arranged to speak today as part of our research on the economic impacts of Integrated Pest Management — or IPM — practices.

As mentioned in our previous communication, the interview should take around 45 to 60 minutes.

I'll begin by providing a bit of context and doing a few quick checks, before moving into the main part of the interview.

We're investigating the potential economic impact of implementing IPM-based practices across the EU. This work is part of a wider initiative to evaluate sustainable agricultural practices and provide evidence for future policy and support mechanisms.

As part of this evaluation, we're conducting expert interviews with agronomists, researchers, and representatives from farming and advisory organisations — like yourself — to gain a more detailed and nuanced understanding of the economic implications of adopting IPM-based practices.

To ensure we accurately capture your insights, we'd like to record this conversation. Please be assured that everything you share will be treated as confidential. You will not be named in any reports, and no comments will be attributed to you or your organisation unless you give explicit permission.

All information will be handled in accordance with the General Data Protection Regulation (GDPR) - Regulation (EU) 2016/679, and any identifiable data — including the recording — will be deleted at the end of the project.

Are you happy to proceed with the interview?

- IF NO, TRY TO RE-BOOK APPOINTMENT.
- IF YES, CONTINUE.

Expert background and context

1. Could you briefly describe your professional role and how it relates to IPM?
Please listen to response then ask sub-questions as relevant.
2. Which farming systems, crops, and regions are you most familiar with in terms of IPM adoption?
Please listen to response then ask sub-questions as relevant. 2a. Have you mostly worked with smallholder farms, large-scale operations, or a mix? 2b. Have you contributed to any cost-benefit analyses or economic assessments of IPM?

Economic impacts of implementing IPM-based practices

3. In your experience, how has the adoption of IPM-based practices affected crop yields — both in terms of quantity and quality — for the crops and regions you are most familiar with?

Please listen to response then ask sub-questions as relevant.

3a. Which specific IPM-based practices are you referring to when assessing changes in crop yields?

3b. For the crop types you are familiar with, would you say the impact on yield quantity has been generally positive, negative, or neutral? Can you provide approximate percentage changes or illustrative examples?

3c. Have you observed any consistent changes in crop quality (e.g., size, nutritional content, appearance, shelf life)? Are these improvements recognised or valued in the market?

3d. How do these impacts vary across:

- Crop types (e.g., cereals vs. vegetables)?
- Farm sizes or systems (e.g., smallholder vs. commercial farms)?
- Regions or agro-climatic zones?

3e. Are yield impacts immediate, or do they tend to materialise over time (e.g., short-, medium-, or long-term)? Please elaborate.

4. From your experience, to what extent has IPM contributed to farm income stability or increases?

Please listen to response then ask sub-questions as relevant.

4a. Are the income effects mostly due to yield increases, cost savings, or both?

4b. Have you observed any trade-offs in income (e.g. lower yields offset by lower input costs)?

4c. Are certain IPM-based practices more associated with positive yield impacts than others?

4d. Does the quality of crops (e.g., marketability, residues) change with IPM?

4e. How do these effects differ across different crop types or pest pressures?

5. What are the main cost components for farmers adopting IPM?

Please listen to response then ask sub-questions as relevant.

5a. What are the typical one-off implementation costs (e.g., training, equipment, planning)?

5b. What are the recurring operational costs (e.g., monitoring, mechanical tools, biocontrol agents)?

5c. How do input costs change with IPM adoption?

- For example, is there a reduction in synthetic pesticide use?
- Are there any new input costs (e.g., biopesticides, traps, monitoring equipment)?
- Do fertiliser use or other input needs also change with IPM?

5c. How do these costs vary by farm size or region?

5d. Do smallholders face specific cost-related barriers?

4e. Are any practices or technologies particularly cost-effective or cost-prohibitive?

6. Based on your experience, do the long-term economic benefits of IPM adoption typically outweigh the initial costs?

Please listen to response then ask sub-questions as relevant.

6a. How many seasons or years does it generally take to see positive returns?

6b. Are there cases where adoption was abandoned due to lack of returns?

6c. How do farmers typically measure “success” with IPM?

6d. Are there any significant differences between smallholder farms and large scale producers?

7. To what extent do external factors (policy, market, climate) shape the economic outcomes of IPM adoption?

Please listen to response then ask sub-questions as relevant.

7a. Are there key subsidies, incentives, or regulations that support or hinder adoption?

7b. How important is market demand for low-residue or sustainable products in driving profitability?

7c. How does climate variability (e.g. drought, floods) affect IPM effectiveness and returns?

7d. Are some practices more resilient to climatic fluctuations than others?

8. How do the economic outcomes of IPM vary across different farm sizes, crop types, and regions?

Please listen to response then ask sub-questions as relevant.

8a. Do smallholders or large farms tend to gain more economically from IPM? Why?

8b. Are there particular crop-pest combinations where IPM works especially well (or poorly)?

8c. Do regional infrastructure or advisory services play a role in determining success?

8d. Are any systems or regions more mature in terms of IPM adoption?

9. Are there any promising new practices or business models that could improve the economics of IPM?

10. Is there anything else you'd like to add that we haven't covered?

Thank you

That's it from us! Any questions from you?

Thank you so much for your help and contribution, which will be hugely important as we evaluate the potential economic impacts of implementing IPM-based practices. We really appreciate it.

Survey to experts

Context (internal drafting note)

Integrated Pest Management (IPM) refers to a combination of environmentally sensitive practices that reduce reliance on chemical pesticides while maintaining crop productivity. This study seeks to assess the potential economic impacts—such as changes in farm costs, yields, and profitability—of implementing IPM-based practices across different crops and regions in the EU.

The evaluation is being led by a consortium of European research organisations under the Agrowise umbrella. Each partner institution (e.g., Teagasc for Ireland, INRAE for France) will act as a country lead, responsible for identifying relevant national experts and supporting survey distribution and follow-up.

The survey targets agricultural economists, farm advisors, IPM researchers, and other domain experts across EU Member States. Country leads will identify and invite 5–10 experts per country, leading to a total expected sample size of approximately 50–80 expert respondents. Experts will be targeted via direct outreach from country leads, and the survey will be administered through a secure online platform.

The objective is to collect both qualitative insights and quantitative estimates to support ex-ante impact assessment of IPM-based practices, informing ongoing research and evidence-based decision-making. The survey will remain open for a period of 2–3 weeks, with optional follow-up interviews conducted with selected experts for clarification or deeper insights.

The following sections present the structure of the expert survey, including an introduction and five thematic parts.

Introduction to this survey

Hello!

As part of a European-wide study on the **potential economic impacts of implementing Integrated Pest Management IPM-based practices**, we are inviting you to take part in this expert survey. This research is coordinated by Agrowise, a consortium of leading European research organisations. Each participating country is led by a national research institute (e.g., Teagasc in Ireland, INRAE in France), responsible for identifying and engaging with relevant experts.

You have been selected to participate in this survey based on your expertise in agriculture, farm economics, crop production, or IPM-based practices. The information you provide will help us better understand how IPM-based practices may affect farm costs, crop yields, profitability, and other economic dimensions.

The survey consists of fewer than 30 short questions and should take around **15–20 minutes** to complete. Please try to complete it in one sitting.

All responses will be treated **confidentially**. Survey data will be anonymised and only used for research and analysis purposes. You will **not be personally identifiable** in any reports or published outputs.

Some questions may ask about your professional background or area of expertise. This information will help us ensure that results reflect diverse views across sectors, crops, and regions. Survey data will be securely stored by the research team and deleted within one year after the project's completion.

Please answer all questions to the best of your knowledge. There are no right or wrong answers, and your insights are highly valued.

If you have any questions or need assistance with the survey, please contact us at [to be confirmed].

Participation in this survey is voluntary.

Thank you in advance and know that your contribution matters!

1. Are you willing to continue with this survey?

Bullet selection

a. Yes

b. No

Logic: If answered "No…" to the above, please take the respondents to Part 6 Thank you. This engagement does not count as a response. If "Yes…" continue with the rest of the survey.

2. I consent to the use of any information collected for research purposes, so long as it is treated confidentially, aggregated and anonymised as described above [box].

Note: Box must be ticked to continue, otherwise, survey will be closed to Part 6 Thank you, and this engagement will not count as a response either.

Part 1: Background information

3. What is your professional role or area of expertise?

Multiple choice: Bullet list from which to tick one or more (not a drop down)

a. Agricultural economist
b. Agronomist
c. Farm advisor
d. Entomologist
e. Researcher (academic or applied)
f. Policy expert
g. Other [Text box]

4. How many years of experience do you have with IPM-related work?

Single choice: Bullet list from which to tick one (not a drop down)

a. Less than 2 years
b. 2 – 5 years
c. 6 – 10 years
d. More than 10 years

5. What is your primary country of work or research?

Drop down list or text entry

Part 2: Knowledge of IPM-based Practices

6. Which types of IPM-based practices are you most familiar with?

Multiple choice: Multiple choice: Bullet list from which to tick one or more (not a drop down)

a. Biological control
b. Mechanical/physical control
c. Decision Support Systems (DSS) and thresholds
d. Crop rotation or intercropping
e. Resistant/tolerant crop varieties
f. Reduced or selective pesticide use
g. Other [Text box]

7. In your view, which of these practices have the highest economic impact at farm level?

Ranked choice or multiple choice with open comment

a. [Same list as Q6]
b. Comment [Text box]

Part 3: Economic impact assessment

8. From your perspective, what are the main types of economic impacts (positive or negative) that farmers experience when adopting IPM-based practices?

Open text

9. Based on your knowledge and experience, what is the average percentage impact of the IPM-based practice(s) you are familiar with on crop yield?

Bullet list from which to tick one (not a drop down)

- ***Yield quantity***

	Arable crops (e.g., cereals, legumes, root/tuber crops)	**Horticultural crops (e.g., vegetables, fruit, etc.)**	**Other specialized crops (e.g., vineyards, olives, etc.)**	**Forage and grasslands (e.g., permanent grassland, temporary forage crops)**	**Mixed farming / agroforestry (e.g., rotations combining arable and horticultural, agroforestry systems)**
Short-term	a. Decrease > 20% b. Decrease 10-20% c. Decrease 0-10% d. No change e. Increase 0-10% f. Increase 10-20% g. Increase >20% h. Don't know / NA	a. Decrease > 20% b. Decrease 10-20% c. Decrease 0-10% d. No change e. Increase 0-10% f. Increase 10-20% g. Increase >20% h. Don't know / NA	a. Decrease > 20% b. Decrease 10-20% c. Decrease 0-10% d. No change e. Increase 0-10% f. Increase 10-20% g. Increase >20% h. Don't know / NA	a. Decrease > 20% b. Decrease 10-20% c. Decrease 0-10% d. No change e. Increase 0-10% f. Increase 10-20% g. Increase >20% h. Don't know / NA	a. Decrease > 20% b. Decrease 10-20% c. Decrease 0-10% d. No change e. Increase 0-10% f. Increase 10-20% g. Increase >20% h. Don't know / NA
Medium-term	*As above*	*As above*	*As above*	*As above*	*As above*
Long-term	*As above*	*As above*	*As above*	*As above*	*As above*

- ***Yield quality***

	Arable crops (e.g., cereals, legumes, root/tuber crops)	**Horticultural crops (e.g., vegetables, fruit, etc.)**	**Other specialized crops (e.g., vineyards, olives, etc.)**	**Forage and grasslands (e.g., permanent grassland, temporary forage crops)**	**Mixed farming / agroforestry (e.g., rotations combining arable and horticultural, agroforestry systems)**
Short-term	a. Decrease > 20% b. Decrease 10-20% c. Decrease 0-10% d. No change e. Increase 0-10% f. Increase 10-20% g. Increase >20% h. Don't know / NA	a. Decrease > 20% b. Decrease 10-20% c. Decrease 0-10% d. No change e. Increase 0-10% f. Increase 10-20% g. Increase >20% h. Don't know / NA	a. Decrease > 20% b. Decrease 10-20% c. Decrease 0-10% d. No change e. Increase 0-10% f. Increase 10-20% g. Increase >20% h. Don't know / NA	a. Decrease > 20% b. Decrease 10-20% c. Decrease 0-10% d. No change e. Increase 0-10% f. Increase 10-20% g. Increase >20% h. Don't know / NA	a. Decrease > 20% b. Decrease 10-20% c. Decrease 0-10% d. No change e. Increase 0-10% f. Increase 10-20% g. Increase >20% h. Don't know / NA
Medium-term	*As above*	*As above*	*As above*	*As above*	*As above*
Long-term	*As above*	*As above*	*As above*	*As above*	*As above*

10. What are the main cost drivers for farmers implementing IPM-based practices?

Multiple choice: Bullet list from which to tick one or more (not a drop down)

a. Labour/time requirements
b. Investment in new equipment
c. Training or advisory costs

d. Yield loss during transition
e. Yield loss after implementation
f. Certification/monitoring costs
g. Other [Text box]

11. Based on your experience or knowledge, what is the average percentage reduction in input costs (e.g., pesticides, herbicides, fertilisers) due to the adoption of the IPM-based practice(s) you are familiar with? *Please select the range that best reflects your estimate compared to conventional practices*

Bullet list from which to tick one (not a drop down)

Arable crops (e.g., cereals, legumes, root/tuber crops)	**Horticultural crops (e.g., vegetables, fruit, etc.)**	**Other specialized crops (e.g., vineyards, olives, etc.)**	**Forage and grasslands (e.g., permanent grassland, temporary forage crops)**	**Mixed farming / agroforestry (e.g., rotations combining arable and horticultural, agroforestry systems)**
a. No change b. 0-5% c. 6-10% d. 11-20% e. 21-30% f. > 30% g. Input costs increase h. Not applicable / cannot estimate	a. No change b. 0-5% c. 6-10% d. 11-20% e. 21-30% f. > 30% g. Input costs increase h. Not applicable / cannot estimate	a. No change b. 0-5% c. 6-10% d. 11-20% e. 21-30% f. > 30% g. Input costs increase h. Not applicable / cannot estimate	i. No change j. 0-5% k. 6-10% l. 11-20% m. 21-30% n. > 30% o. Input costs increase p. Not applicable / cannot estimate	i. No change j. 0-5% k. 6-10% l. 11-20% m. 21-30% n. > 30% o. Input costs increase p. Not applicable / cannot estimate

Logic: If answered "Input cost increase" to the above, please take the respondents to Q10. Otherwise, take the respondents to Q11.

12. What is the estimated increase in input costs?

Bullet list from which to tick one (not a drop down)

Arable crops (e.g., cereals, legumes, root/tuber crops)	**Horticultural crops (e.g., vegetables, fruit, etc.)**	**Other specialized crops (e.g., vineyards, olives, etc.)**	**Forage and grasslands (e.g., permanent grassland, temporary forage crops)**	**Mixed farming / agroforestry (e.g., rotations combining arable and horticultural, agroforestry systems)**
a. No change b. 0-5% c. 6-10% d. 11-20% e. >20% f. Not applicable / cannot estimate	a. No change b. 0-5% c. 6-10% d. 11-20% e. >20% f. Not applicable / cannot estimate	a. No change b. 0-5% c. 6-10% d. 11-20% e. >20% f. Not applicable / cannot estimate	a. No change b. 0-5% c. 6-10% d. 11-20% e. >20% f. Not applicable / cannot estimate	a. No change b. 0-5% c. 6-10% d. 11-20% e. >20% f. Not applicable / cannot estimate

13. What is the average estimated one-off (initial) cost of implementing the IPM-based practice(s) you are familiar with on crop yield? Please select the option that best fits your estimate. If possible, answer both per hectare and per farm.

Cost per hectare (€ per ha)

a. <25
b. 25-50
c. 51-100
d. 101-200
e. >200
f. Not applicable / No one-off cost

Cost per farm (€ per farm)

g. <100
h. 100-250
i. 251-500
j. 501-1,000
k. >1,000
l. Not applicable / No one-off cost

14. What is the average estimated annual cost of maintaining this IPM-based practice?

Cost per hectare (€ per ha per year)

a. <10
b. 10-25
c. 26-50
d. 51-100
e. >100
f. Not applicable / No recurring cost

Cost per farm (€ per farm)

g. <100
h. 100-250
i. 251-500
j. 501-1,000
k. >1,000
l. Not applicable / No recurring cost

15. What are the potential long-term economic benefits for farmers implementing IPM-based practice(s) you are familiar with?

Multiple choice: Bullet list from which to tick one or more (not a drop down) + open comment

a. Lower input costs (e.g., pesticides, herbicides, etc.)
b. Increased yields/resilience
c. Improved market access (e.g., eco-lables)
d. Subsidies/incentives
e. Other [Text box]
f. Please elaborate on your choices: [Open text]

16. What is the average estimated overall impact of the IPM-based practice(s) you are familiar with on farm profitability (i.e., revenue minus costs)? *Please answer relative to current (baseline) practices.*

Bullet list from which to tick one (not a drop down)

Direction of impact

	Arable crops (e.g., cereals, legumes, root/tuber crops)	**Horticultural crops (e.g., vegetables, fruit, etc.)**	**Other specialized crops (e.g., vineyards, olives, etc.)**	**Forage and grasslands (e.g., permanent grassland, temporary forage crops)**	**Mixed farming / agroforestry (e.g., rotations combining arable and horticultural, agroforestry systems)**
Short-term	a. Likely decrease b. No significant change c. Likely increase d. Not sure / too context dependent	a. Likely decrease b. No significant change c. Likely increase i. Not sure / too context dependent	a. Likely decrease b. No significant change c. Likely increase d. Not sure / too context dependent	a. Likely decrease b. No significant change c. Likely increase d. Not sure / too context dependent	a. Likely decrease b. No significant change c. Likely increase q. Not sure / too context dependent
Medium-term	*As above*	*As above*	*As above*	*As above*	*As above*
Long-term	*As above*	*As above*	*As above*	*As above*	*As above*

If increase or decrease: What is the approximate magnitude of change (percentage)?

	Arable crops (e.g., cereals, legumes, root/tuber crops)	**Horticultural crops (e.g., vegetables, fruit, etc.)**	**Other specialized crops (e.g., vineyards, olives, etc.)**	**Forage and grasslands (e.g., permanent grassland, temporary forage crops)**	**Mixed farming / agroforestry (e.g., rotations combining arable and horticultural, agroforestry systems)**
Short-term	a. < 5% b. 5-10% c. 11-20% d. > 20% e. Not applicable / cannot estimate	a. < 5% b. 5-10% c. 11-20% d. > 20% j. Not applicable / cannot estimate	a. < 5% b. 5-10% c. 11-20% d. > 20% e. Not applicable / cannot estimate	a. < 5% b. 5-10% c. 11-20% d. > 20% e. Not applicable / cannot estimate	a. < 5% b. 5-10% c. 11-20% d. > 20% e. Not applicable / cannot estimate
Medium-term	*As above*	*As above*	*As above*	*As above*	*As above*
Long-term	*As above*	*As above*	*As above*	*As above*	*As above*

17. Is it likely that this IPM-based practice could lead to higher market prices or premiums for agricultural products (e.g., through sustainability labels, improved quality, organic certification, etc.)?

Bullet list which to tick one (not a drop down)

Likelihood of price premium

a. No, unlikely
b. Possibly, in niche or certified markets
c. Yes, likely for mainstream markets
d. Not sure

If yes, what is the estimated premium (% increase in sale price)?

Arable crops (e.g., cereals, legumes, root/tuber crops)	**Horticultural crops (e.g., vegetables, fruit, etc.)**	**Other specialized crops (e.g., vineyards, olives, etc.)**	**Forage and grasslands (e.g., permanent grassland, temporary forage crops)**	**Mixed farming / agroforestry (e.g., rotations combining arable and horticultural, agroforestry systems)**
a. < 5% b. 5-10% c. 11-20% d. > 20% e. Not applicable / cannot estimate	a. < 5% b. 5-10% c. 11-20% d. > 20% k. Not applicable / cannot estimate	a. < 5% b. 5-10% c. 11-20% d. > 20% e. Not applicable / cannot estimate	a. < 5% b. 5-10% c. 11-20% d. > 20% e. Not applicable / cannot estimate	a. < 5% b. 5-10% c. 11-20% d. > 20% e. Not applicable / cannot estimate

18. In your opinion, how significant are the following external factors in influencing the economic impacts of IPM-based practices? *Please rate the importance of each factor in shaping the costs or benefits of implementing IPM on a scale from 1 (Not significant) to 5 (Very significant)*

External factor	1 – Not significant	2	3	4	5 – Very significant
Government subsidies or support schemes					
Climatic conditions (e.g., droughts, rainfall)					
Market demand for sustainably grown products					
Availability of IPM-related advisory services					
Policy and regulatory environment					
Regional biodiversity and landscape conditions					

Part 4: Perceptions and context

19. Do you think the economic benefits of IPM outweigh the costs over the long term?

Single choice: Drop-down or bullet selection

a. Yes
b. No
c. It depends (please explain): [Text box]

20. What are the main factors influencing whether IPM is economically viable for a given farm?

Open text

21. Which farm types or sectors are most likely to benefit economically from IPM?

Open text

22. What contextual factors (e.g., farm size, policy, climate, market, etc.) affect the economic outcomes of IPM adoption?

Open text

Part 5: Data and evidence

23. Are you aware of any economic studies, reports, or datasets that provide evidence on the (potential) economic impacts of implementing IPM-based practices?

Single choice: Bullet list from which to tick one (not a drop down) + text box for sources

a. Yes
b. No
c. Please, if possible, provide sources: [Open text]

24. Would you be willing to be contacted for a follow-up interview to explore your responses further?

Single choice: Bullet list from which to tick one (not a drop down) + text box for email

a. Yes
b. No
c. If yes, please provide your email: [Open text]

Part 6: Thank you

Thank you again for your participation in this questionnaire! Your submission will help us understand the potential economic impacts of implementing IPM-based practices.

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