Integrated Pest Management - Evidence and guidance for implementing SFI IPM

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REPORT SUMMARY

The project is addressing the implementation of the SFI IPM paid actions, including incentive payments rates, and provision of advice and guidance. The project has provided evidence to support implementation of the SFI IPM paid actions by determining engagement of farmers who are less likely to engage pro-actively with IPM initiatives. Participant farmers in this project were actively selected and contacted by the project team. This 'actively selected' group are differentiated from participants in the preceding IPM T&T (Project 253a), who opted-in to be involved and were therefore self-selecting.

The project was overseen by a steering group of stakeholders. It addressed three ELM theme areas summarised in the sub-sections below. Recommendations for each relevant policy question can be found under Findings and Recommendations.

Evidence to support implementation of SFI IPM paid actions

Evidence was gathered by 311 interviews/surveys with farmers, to determine farmer engagement with SFI IPM actions. The points below summarise the perceptions of the participants.

- Participants were generally positive about: (i) likely biodiversity benefits of SFI IPM paid actions, (ii) potential for SFI to reduce the need to use pesticides, and (iii) the use of public funds being appropriate to increase IPM uptake.
- Participants were more neutral about the role of SFI IPM paid actions providing sufficient pest control, and more negative about: (i) impact of SFI paid actions on food security, (ii) the effectiveness of IPM actions to fully manage pests in crops, and (iii) the level of payment available for SFI IPM paid actions.
- Insufficient financial incentives were considered significant barriers to uptake for many paid actions, especially for smaller-scale or mixed farms, as the payments rates were considered too low to implement what are viewed as high-risk strategies.
- Participants were generally positive about: (i) committing to SFI IPM actions, (ii) committing to IPM in general, (iii) growing margins or strips for biodiversity, and (iv) creating an IPM plan.
- Over a quarter of farmers already practiced one or more of growing flowering margins, creating IPM plans and avoiding use of insecticide. From those not already practicing those actions, participants were generally neutral or negative about: (i) growing companion crops (due to low success rate and risk of creating pest issues), and (ii) committing to no use of insecticide (due to high risk on some crops).
- Participants were supportive of further paid actions for: (i) diverse rotations, (ii) disease resistant varieties, (iii) use of decision support systems (DSS), and (iv) use of bioprotectants / biopesticides.
- The feedback about SFI IPM paid actions was sufficiently positive to encourage implementation of further paid actions to support additional effective pest control options that could further reduce the risks associated with pesticide use.
- Support for providing access to advisory and other knowledge exchange services was considered important by farmers, for improving the uptake of SFI IPM actions. The role of agronomists for providing on farm advice on IPM has been identified as an important driver to increase the uptake of IPM by farmers.
- Farmer typologies split participants into two groupings, broadly categorised as: 'environmentalists' and 'productionists' by how they ranked the importance of soil health, water quality, air quality, climate change mitigation, biodiversity, public health and food security. Note that these categories

are generalisations as 'environmentalist' farmers need to produce crops cost effectively to remain in business, and 'productionist' farmers recognise the importance of protecting the environment.

- There were also two broad typologies for both attitudes to the design and payments for DEFRA schemes (termed 'optimists' and 'pessimists') and willingness to commit to SFI, IPM and SFI IPM actions.
- The analysis of the typology of typologies resulted in 3 groups: (i) critical of scheme, but committed to IPM, (ii) pro-scheme but non-committed to IPM, or (iii) pro-scheme and committed to IPM.

In the final three months of the project, farmers were interviewed to determine their attitudes towards the SFI IPM paid actions after enrolment.

- Interviewed farmers generally viewed agri-environmental schemes positively, considering them crucial for balancing environmental and production needs while ensuring transparency.
- Generally, interviewed farmers had no preconceived expectations or perceptions of SFI IPM paid actions and had little understanding of what they would entail.
- Stated reasons for joining SFI included interest in techniques for soil health and reducing the need for insecticide use, although there was minimal understanding of SFI IPM in general.
- The farmers main motivational factors for joining SFI included monetary rewards, the long-term benefits to the environment, ease of compliance and integration with existing assurance schemes.
- Suggestions to improve the uptake of SFI IPM paid actions included increased monetary rewards, promoting education through accessible platforms, peer influence, simplifying the compliance processes, and integrating the scheme with existing farm practices.
- Stated barriers to the uptake of SFI IPM included concerns over land area lost from production, lack of knowledge about IPM practices, resistance to regulation and paperwork, inadequate internet access and computer literacy.
- SFI IPM paid actions payment rates were generally considered fair for IPM 1 and IPM 2, although higher payments to cover transitional risks were suggested.
- Payment rates for IPM 3 and IPM 4 were considered low, as it would not cover the purchasing and operational costs for establishing companion crops and would not be commercially viable enough, for those that use insecticide, to cover the risks involved in not using insecticide on some crops.

Test delivery of IPM guidance with actively selected farmers

- Following public launch of the IPM Planning Tool in autumn 2023, over 880 registered users have created over 1200 IPM plans.
- The IPM Planning Tool has been revised to account for previous feedback from users.
- 48 farmers tested the revised IPM Planning Tool and 33 provided feedback by questionnaire. Test users were from a good spread of regions and farm sizes. IPM plans were created for 9 crop types. The majority of plans were for winter wheat or grassland.
- The IPM planning that resulted from using the IPM Tool, recorded substantial commitments to increase IPM actions in the actively selected farmer group compared to current practice.
- Test users were positive about ease of use of the IPM Planning Tool, and the guidance provided.
- 91% of those who fully completed an IPM plan for one crop indicated they would consider using the IPM Tool for more than one crop in future seasons. 82% were 'likely' or 'very likely' to refer to the IPM Tool again to find information or to update an IPM Plan. 76% were 'likely' or 'very likely' to recommend the IPM Tool to others.

- A manuscript has been submitted to a peer-reviewed journal (open access), describing the development, testing and uptake of the IPM Planning Tool.

A subset of farmers were interviewed after testing the IPM Planning Tool to provide detailed feedback on its functionality and their attitudes towards the use of the IPM Tool to comply with SFI.

- Interviewed farmers generally expected the IPM Tool to provide knowledge and confidence for making informed decisions about IPM. Farmers stated that these expectations were met for both IPM knowledge provided within the tool and links to up-to-date information, and it provided reassurance and confidence that they were already implementing appropriate IPM actions and following good practice.
- The majority viewed the IPM Tool as a means to comply with SFI requirements and found that the IPM Tool provided land managers who have limited computer skills with a structured template for completing land management plans.
- The IPM Tool was generally seen as a good way to initiate discussions about IPM practices with farm partners and agronomists, however, others felt the tool mostly validated existing practices rather than adding new value.
- Barriers to using the online IPM Tool were acknowledged as time constraints, computer literacy, and a 'spraying culture' amongst farmers and agronomists.
- The main motivational factors for continued use of the IPM Tool included its contribution to farm management and best practices, incorporation of good resources and sources of information, encouragement from agronomists to use the tool, continued provision of financial incentives and compliance with SFI IPM.

Impact of farmers implementing IPM plans, on the risks associated with pesticide use

- The 100 farmers and advisers who tested the IPM Planning Tool in 2023, were contacted to ask if they would be willing to complete a detailed questionnaire, to investigate the impact of IPM and IPM planning. Completed responses were received from 25 participants.
- There was a high level of satisfaction with the level of invertebrate pest, weed and disease control obtained.
- Participants felt that their levels of pesticide usage were justified by the degree of pest pressure.
- The majority were 'likely' or 'very likely' to use the IPM Planning Tool to modify IPM actions for next growing season and to create a new IPM plan.
- A methodology was developed to relate the level of pest risk and number of IPM interventions, as recorded in the IPM Tool, to pesticide usage – quantified as a Treatment Frequency Index (TFI).
- The method was shown to be robust and could be scaled up if a larger dataset is obtained through future projects.
- For participants producing IPM plans through the IPM Tool, a positive relationship was shown between their perceived level of pest risk (diseases, invertebrate pests and weeds) on the farm and the number of IPM interventions adopted.
- The reasons for this positive relation could either be due to: (i) farmers and/or agronomists have responded to their perceptions of risk by putting more IPM practices in place and/or (ii) the design of the IPM Tool has presented them with more IPM practices to implement due to selecting more pests that pose as a risk, which has (iii) allowed farmers/agronomists to respond appropriately to the risks on their farms by planning to implement more IPM interventions.

- With the limited data set no clear trends could be seen in the relationship between pesticide TFI with either number of IPM interventions adopted or perceived pest risk.
- There was considerable variability found both within farm and between farms regarding the use and intensity of different pesticide products. The relationship between the differing variables of pesticide usage and pest risk was found to be complex and requires more than one season's worth of data to elucidate.

DEFINITIONS AND ACRONYMS

Word or Acronym	Description or Definition
DEFRA	Department for Environment, Food and Rural Affairs.
NFU	National Farmers' Union.
VI	Voluntary Initiative.
SFI	Sustainable Farming Initiative.
T&T	Test and Trial.
ELM	Environmental Land Management.
WP	Work Package.
IPM	Integrated Pest Management, where 'pest' refers collectively to pathogens, weeds and invertebrate pests.
IPM Plan	A generic term for a description of intended IPM actions. Also, the 'Voluntary Initiative (VI) IPM Plan' used to provide a metric of IPM uptake. Previously known as the IPM Assessment Plan.
IPM Planning Tool	Online Tool, for use by farmers to plan decision making according to IPM principles.
CRD	Chemicals Regulation Division of the Health and Safety Executive.
AHDB	Agriculture and Horticulture Development Board.
PPPs	Plant Protection Products.
Broadacre crops	Arable crop species grown over a large area.
Non broadacre crops	Horticultural and other edible field crops.
Guidance (these definitions of guidance and advice will be used in the interviews with farmer participants)	Guidance is an impartial service which will help you to identify your options and narrow down your choices but will not tell you what to do or which product to buy or practice to adopt; the decision is yours. Providers of guidance are responsible for the accuracy and quality of the information they provide but not for any decision made based on it.
Advice	Advice will recommend a specific product or course of action for you to take given your circumstances and goals. This will be personal to you, based on information you provide. Advice is provided by a qualified and regulated individual or organisation [e.g. through BASIS]. Providers of advice are responsible and liable for the accuracy, quality and suitability of the recommendation that they make.

INTRODUCTION

Defra's policy paper of 26 January 2023 describes how the SFI is designed to encourage uptake of IPM, by farmers agreeing to undertake paid actions. The main environmental impacts intended by Defra relate to biodiversity, climate adaptation, water quality and soil health. These are challenging aims.

The incentives are focussed on four paid actions and to achieve some or all of the intended benefits, there will need to be widespread adoption of the paid actions and uptake of a wider range of IPM control measures. Widespread adoption will require uptake by farmers not currently actively engaged, to increase their IPM. Uptake of a wider range of control measures will require effective IPM advice and guidance, and the evolution of paid actions.

Evidence from previous work

During 2022, the preceding IPM Test and Trial project (253a) addressed four ELM theme areas:

IPM Planning Tool to record IPM public goods delivery: An online IPM Planning Tool was developed for farmers and advisers to create, record and plan IPM activity on a range of arable and outdoor horticultural crops.

Advice and guidance: To assess the support farmers require to create an IPM Plan through links to video and written guidance available through the IPM Planning Tool.

Co-design of the SFI IPM: Defra published details of the SFI IPM on 26 January 2023. This included a flexible choice of paid actions for farmers, with payment rates defined for each action. This approach was advocated from evidence collected in project 253a.

Incentive payment rates: To provide insight into the possible basis for payment mechanisms, a broad group of possible paid actions was considered in workshops and choice experiments with farmers from the arable and horticultural sectors, to inform SFI payment rates.

Key findings in project 253a during 2022 were:

- Paid actions considered by Defra for inclusion in the SFI were checked against the evidence related to their effectiveness, impact on biodiversity and breadth of applicability across crops.
- Some of the proposed paid actions were justified, either on the grounds of positive biodiversity impact or good evidence for efficacy and scope for increased uptake. However, most of the proposed paid actions were limited in the range of pests against which they would be effective, so their impact on reducing the need for pesticide use would be limited.
- The proposed paid actions were compared against a wider list of IPM actions, which identified additional actions for consideration, with greater potential for impact. Their suitability as paid actions depends on how they can be defined and verified.
- The need for flexibility in the SFI IPM was identified, so farmers can implement actions that are feasible and beneficial in their cropping system.
- Possible paid actions were considered in workshops with farmers from the arable and horticultural sectors, to inform SFI payment rates. A choice experiment was used to understand risk/reward and explore how changes in payments would affect uptake. Some of the proposed paid actions were not practically feasible, or carried unacceptable financial risks, in some cropping systems. Inclusion of these actions in 'bundles' of paid actions ('Introductory', 'Intermediate' or 'Advanced') led to very high levels of subsidy being indicated.
- An online, interactive IPM Tool was developed for farmers and advisers to create, record and plan IPM activity. The IPM Tool guides users to: (i) identify important pests (invertebrates, weeds and

diseases) that drive pesticide use on their farm, (ii) identify effective IPM measures for those pests, (iii) record a plan of IPM measures they will implement.

- The IPM planning that resulted from using the IPM Tool, recorded substantial commitments to increase IPM actions compared to current practice. Participants overwhelmingly indicated that they would recommend to other farmers to consider using the online IPM Tool to help plan crop-specific IPM.
- The online IPM Tool was complimented for its ease of use, suitable language for a farmer audience, logical flow and links to up-to-date information from respected organisations.

The work in Test and Trial 253a was completed using evidence with three major reviews of IPM, procured by AHDB and Natural England (Blake *et al.,* 2021; Young *et al.,* 2022; Cook *et al.,* 2023).

Approaches used for this T&T (253b)

Detailed descriptions of the objectives, methods and results of each work package are given in the appendices. This project actively selected participant farmers, to provide a representative sample, including farmers who are less likely to pro-actively engage with IPM initiatives. The project is addressing three ELM theme areas:

Evidence to support implementation of the published SFI IPM paid actions by determining farmer engagement - with particular focus on actively selected farmers (work package 1)

The four SFI IPM paid actions referenced in this report are:

IPM1: Assess integrated pest management and produce a plan.

IPM2: Flower-rich grass margins, blocks, or in-field strips.

IPM3: Companion crop on arable and horticultural land.

IPM4: No use of insecticide on arable crops and permanent crops.

These were published by Defra on 23 June 2023 https://www.gov.uk/guidance/sfi-actions-for-integrated-pest-management:

- A sampling frame of 300 farmers were selected as representing the actively selected group for telephone interviews and online survey.
- The sampling frame was created using a stratified sampling method to select farmers from all sectors of interest (those able to receive financial support through the SFI scheme) and with key socioeconomic factors (farm size and type, farmer's age and gender).
- The interviews and survey were designed to explore reasons for engagement, or lack of engagement, with SFI IPM actions. Attention was given to determining the technical and economic barriers to IPM.
- Data collected from 311 farmer interviews/surveys were analysed using three methodologies:
  - Perceptual questions were employed to determine farmers' typologies.
  - A latent class analysis applied to the responses of the perceptual questionnaire were employed to determine farmers' typologies.
  - A multinomial regression model was used to determine the drivers behind the typologies found above.
- A representative sub-sample of farmers were selected for testing the IPM Planning Tool.
- A sample of 14 farmers and growers, who agreed to be contacted, were interviewed to determine their attitudes towards the SFI IPM paid actions after enrolment. The interview was designed as a

perceptual questionnaire, which focussed on (i) adequacy of payments, (ii) characterisation of the IPM actions covered, (iii) adequacy of the scheme, (iv) barriers identified for the uptake of the SFI IPM paid actions, and (v) potential benefits from the scheme.

Revise the guidance delivered through the IPM Planning Tool and test with actively selected farmers (work package 2)

- Following feedback from user testing the IPM Planning Tool in Test and Trial 253a, changes included:
  - Expanding the Tool by including the spring cropping for barley, beans, oats and wheat.
  - Enabling copying of data from previous years into a future season as a starting point for plan revision.
  - Highlighting of previous entries in the IPM plans of the options selected in the preceding season plan.
  - The addition of a section for claiming BASIS and NRoSO points for continuing professional development.
  - The addition of the IPM weeds section and print page function for the IPM Summary page.
  - Highlighting of sections on summary page where no IPM control measures had been selected, to indicate potential pest risks.
- A representative sample of 48 farmers were made aware of the IPM Planning Tool and completed IPM plans for one crop type grown on their farm.
- The rationale for this task is that the participants who opted-in to engage with project 253a and test the IPM Planning Tool were likely to be towards the higher end of the population distribution with regard to interest in IPM and adoption.
- Questionnaires and 'one to one' interviews were used to evaluate how the different components of the IPM Tool and its associated guidance were received by participants. Analysis of the resulting IPM planning assessed commitment by users to increase IPM practices.

Impact of farmers implementing IPM plans, on the risks associated with pesticide use (work package 3)

- A sample of 100 farmers/growers who completed IPM plans using the IPM Planning Tool, as part of Test and Trial 253a, were asked if they would be willing undertake an online survey, including the provision of their pesticide use data. The focus was to gain insight into how IPM planning and implementation relates to pest control and the risks associated with pesticide use.
- The questionnaire consisted of a set of qualitative and quantitative questions related to:
  - The extent to which participants implemented their IPM Plan or modified the IPM actions as the season progressed.
  - Satisfaction with the level of pest control obtained.
  - The extent to which pesticide use related to the IPM actions implemented.
  - Anticipated trends in pesticide usage in future seasons.

Project reporting and recommendations (work package 4)

- Monthly steering group meetings, organised and reported through this work package, provided oversight and input from stakeholders.
- This final report is a deliverable from the work package.

Evidence to support implementation of the published SFI IPM paid actions by determining farmer engagement - with particular focus on actively selected farmers (work package 1)

- Interviews/surveys were completed with 311 farmers.
- Farmers were generally positive about:
  - Likely biodiversity benefits of SFI IPM paid actions.
  - Potential for SFI IPM actions to reduce the need to use pesticides.
  - The lasting impact of SFI IPM measures.
  - SFI and the use of public funds being appropriate to increase IPM uptake.
- Farmers were more neutral about the role of SFI IPM paid actions providing sufficient pest control.
- Farmers were more negative about:
  - Impact of SFI paid actions on food security.
  - The capability of IPM actions to fully manage pests in crops.
  - The level of payment. They noted the importance of fair compensation and financial assistance to offset the economic challenges of implementing IPM practices, especially for smaller-scale or mixed farms.
- Farmers were generally positive about:
  - Committing to SFI IPM actions.
  - Committing to IPM generally.
  - Growing margins or strips for biodiversity.
  - Creating an IPM plan.
- Farmers were more neutral or negative about:
  - Growing companion crops (due to low success rate and risk of creating pest issues).
  - Committing to no use of insecticide (due to high risk on some crops).
- Farmers were supportive of further paid actions for:
  - Diverse rotations.
  - Disease resistant varieties.
  - Use of DSS.
  - Bioprotectants.
- Farmer typologies split participants into two groupings, broadly categorised as: 'environmentalists' and 'productionists' by their rankings of soil health, water quality, air quality, climate change mitigation, biodiversity, public health and food security.
- There were also two broad typologies for attitudes to the design and payments for DEFRA schemes, optimists and pessimists, and willingness to commit to SFI, IPM and SFI IPM actions.
- The final analysis of the typology of typologies resulted in 3 groups:

  1. Critical of scheme but committed to IPM.

2. Pro scheme but non-committed to IPM.

3. Pro scheme and committed to IPM.

- Increased advisory support for IPM and SFI IPM actions may be required to increase adoption and the Knowledge Transfer and Exchange (KTE) strategy should be adapted to suit the typologies of the audience. The significant role of the agronomist/adviser is important and future initiatives should consider the most appropriate KTE strategies for specific adviser/agronomist typologies.

Findings from the follow up interviews are presented below in Policy Questions: Payments and Advice and Guidance.

Revise the guidance delivered through the IPM Planning Tool and test with actively selected farmers (work package 2)

- The IPM Planning Tool was updated following user feedback on their requirements for improved functions. The feedback received on the updated functions has been positive.
- Forty eight registered participants tested the IPM Planning Tool by creating 77 IPM plans, for the following crops: winter wheat (22), oilseed rape (7), winter barley (11), winter beans (2), grassland (18), sugar beet (3), peas (3), maize (8), winter oats (1), spring wheat (1) and spring barley (1).
- The IPM planning that resulted from using the IPM Tool, recorded substantial commitments to increase IPM actions compared to current practice. The commitments to increase IPM were broadly similar to those recorded for the early/high adopters in the previous T&T.
- The majority of participants completed the online IPM Tool in under an hour and most completed the tool without requiring advice from their agronomist. Although it is noted that the engagement of a BASIS qualified adviser is a requirement of IPM1.
- Feedback from farmers who tested the IPM Tool was predominantly positive. The IPM Tool was complimented for its ease of use, clear instructions, straightforward data entry process and links to up-to-date information. Additionally, participants found the questions to be thought provoking as they prompted users to carefully consider their IPM approach.
- The majority of the respondents gave positive feedback on the video and written guidance and found these useful for completing the IPM Tool.
- A high percentage (91%) of those who fully completed an IPM plan for one crop indicated they would consider using the IPM Tool for more than one crop in future seasons.
- Participants overwhelmingly indicated (82%) they were likely to refer to the IPM Tool again to find information or to update an IPM Plan.
- Participants indicated (76%) that they would recommend to other farmers to consider using the online IPM Tool and would use the tool again to create a new plan for the following harvest year.
- Most participants were satisfied with the reporting/summary functionality of the IPM Tool. However, a small number of participants highlighted that they were not able to review and have a printable version of the report summary. This is similar to the feedback received by previous IPM Tool users and has resulted in the updated version of the tool which included the improved reporting and PDF print page functionality for the IPM Summary page.
- Interview feedback from farmers who tested the IPM Tool was generally positive. Suggestions for improvements to the IPM Tool included integration with other data recording software, enabling data transfer to reduce repetitive input, and enhancing the written and video guidance.

Impact of farmers implementing IPM plans, on the risks associated with pesticide use (work package 3)

- There was a high level of satisfaction with the level of invertebrate pest, weed and disease control obtained in the crops for which IPM plans had been created using the IPM Planning Tool.
- Participants felt that their levels of pesticide usage were justified by the degree of pest pressure.
- Most felt that the pesticide inputs were appropriate, even in retrospect.
- The majority were likely or very likely to use the IPM Tool to modify IPM actions for next growing season and to create a new IPM plan.

Finding from the analysis of the pesticide usage data are presented below in Policy Questions: Land Management Planning.

Policy Questions

The project findings and recommendations in relation to policy questions are summarised below. Full descriptions of the evidence gathered are given in the appendices.

Payments

Test the intended payments rates.

- There was a diverse range of opinions amongst actively selected farmers in attitudes towards agri-environmental schemes, familiarity with SFI IPM paid actions and adequacy of payments rates.
- Opinions towards Defra agri-environmental schemes were mixed, with some finding the scheme well-designed, user-friendly, and flexible, while others expressed concerned about complexity, lack of clarity, and insufficient financial compensation for the loss of income.
- There was a general view that farmers are supportive of schemes that benefit the environment, however, there needs to be a balance between providing land area for food production and environmental aims.
- 44% expressed confidence that agri-environmental schemes pay for the right actions, 35% disagreed with this statement and 19% were unsure.
- 69% of the actively selected farmers were aware of SFI IPM paid actions, however, the remaining 31% were either not aware or expressed uncertainty regarding the paid actions.
- In depth interviews found there was little understanding amongst those farmers who are less likely to be engaged in SFI of what the SFI IPM paid actions would involve.
- A significant portion of actively selected farmers (56%) agreed that SFI paid actions were likely to influence farming practices and 78% believed that the incentives would have a lasting impact.
- 42 - 47% of farmers agreed that SFI IPM is the best way to maximise the uptake of IPM and that IPM uptake requires the use of public funds.
- Insufficient financial incentives were considered a significant barrier to uptake for many of the paid actions, with 13% totally disagreeing, 26% disagreeing and 24% neutral on the statement that currents payment rates per SFI IPM action are appropriate.
- Farmers which were predominately grassland (temporary grassland or permanent pasture) expressed concerned that the SFI IPM paid actions currently available do not align with their current farming systems, as growing companion crops or implementing IPM plans were deemed either irrelevant or impractical to their current land use.

- Farmers which were predominantly arable or mixed expressed concerned that the benefits of implementing SFI IPM paid actions may not outweigh the costs and time involved for initiating these actions. Other concerns included the complexity of certain actions, the impracticality of transitioning arable land, the high risks involved for managing insect pests without the use of insecticides, limitations imposed by their current land use and incompatibility of the paid actions for those growing crops for seed production.
- Further opinions were expressed in the in-depth interviews, with farmers stating that being tied down for three years in the scheme is a main barrier for not adopting SFI IPM paid actions and there needs to be higher payment rates available to cover the risks involved in transitioning to SFI.
- Opinions towards the payment rates for each SFI IPM Paid Action:
  - IPM1: Produce an IPM plan. Payment rate is considered good, however, for those who do not regularly employ an agronomist part of the payment would go towards their services to complete the IPM plan. The provision of a financial incentive and compliance with SFI were found to be the main motivational factors to encourage farmers to continue the use of the IPM Planning Tool.
  - IPM2: Flower-rich grass margins. Payment rate was considered just about right. Concerns were expressed about land area being taken out of production, however, the recent introduction of the 25% limited area stipulation has been well received.
  - IPM3: Companion crop. Payment rate was considered low, as farmers felt it only just covered the cost of purchasing the companion crop seed, as well concerns about the practicalities and benefits of establishing companion crops with existing farm crops.
  - IPM4: No use of insecticide. Payment rate is considered low and not a commercially viable option by those who are currently using insecticides, given the risks involved during the transition phase to not using insecticide on some crops.
- Participants were supportive of the availability of further IPM paid actions which would be more suited to their farming systems.

Recommendation: Farmers who are already adopting SFI IPM paid actions have found high value in the scheme. Further knowledge exchange events or more clarity on the benefit of SFI IPM paid actions would be beneficial to improve the uptake amongst farming groups less likely to be engaged in SFI.

Recommendation: Flexibility within the SFI IPM paid action is important to ensure wide scale uptake, especially amongst farmer groups less likely to be already engaged, who would benefit from paid actions more suited to their land use, farm type and size, demographic, individual challenges and risks.

Recommendation: Incentive payments rates for IPM1 and IPM2 are considered adequate for the requirements to deliver these actions, however, the provision of higher incentive payments across all paid actions is considered a main driver to increase the uptake of SFI amongst less engaged groups.

Recommendation: Incentive payments rates for IPM3 and IPM4 are considered too low for the risks involved, particularly for the application of no insecticide, or the practical concerns in establishing and managing companion crops. Flexibility or modifications may be needed to these paid actions to ensure they are more suited to all types of farming systems and crop rotations.

Recommendation: There is considerable scope and support amongst farmers to increase the availability of further SFI IPM paid actions. Defra should investigate the evidence to support the inclusion of these paid actions into the SFI scheme.

Advice and Guidance

Would guidance replace the need for advice.

- It was found through the actively selected farmer survey that increased advisory support for IPM and SFI IPM actions would be beneficial to increase adoption amongst farming groups less likely to be already engaged in SFI or IPM in general.
- A small percentage of surveyed farmers were not aware of SFI overall (1%), did not know what practicing IPM involved (4%) or how to produce an IPM plan (4%). The actively selected farmers overall expressed a desire for greater clarity and knowledge exchange around IPM practices and alternatives to conventional pesticide inputs.
- The rank order of the sources of information that farmers use for guidance on IPM are agronomist (33%), government websites (26%), advisors (23%), farming press (20%) and other farmers (12%).
- Other farmers and farming press were highlighted as a notable source of IPM information, showing the significance of knowledge-sharing within farming communities and peer group support.
- Feedback from farmers who tested the IPM Tool was generally positive. Stated reason for using the IPM Tool for more than one crop were praise for the versatility and customisation across multiple crops, functionality and ease of use, compliance with farming initiatives and standards, and the tools approach to holistic farm management.
- Farmers found the guidance provided in the video and written guidance useful for completing the IPM Tool, however, some felt these mostly provided a reminder of IPM practices instead of providing new learning. Users were particularly complimentary on the links within the tool to independent sources of information.
- In-depth interviews found the main motivational factors for farmers to continue using the IPM Tool were the ability of the tool to contribute to farm management, regular incorporation of good resources and sources of information, and having influencers such as agronomists promote the use of the IPM Tool.
- It was generally reported with interviewed farmers that a culture change amongst farmers and agronomists would be beneficial to increase the uptake of IPM and change pesticide use and practice, and could encourage the use of more non-chemical control methods and only spraying when necessary.
- Interviewed farmers stated they would stop using the IPM Tool if it was no longer free to use, was no longer SFI compliant, better software alternatives were made available, or if it remains a survey tool rather than farm management software.
- IPM Planning Tool was regularly updated based on user feedback, which shows there been a proactive response to keep the tool relevant to farmers and agronomist.
- Benchmarking function was an important update as it enables farmers comparisons with peers at a national crop level. This update was completed after the farmer testing phase, however, general feedback received from IPM Tool users on the updated functions has mostly been positive.

Recommendation: The provision of increased advisory support, knowledge transfer and exchange activity and on farm learning would improve the uptake of SFI IPM. Knowledge exchange activities should be adapted to meet the target audience according to farmer or agronomist demographic.

Recommendation: Government websites and advisors have been highlighted as a key source of information to farmers. Government advice on SFI and IPM need to be kept updated and relevant to the latest farming practices and changes in research knowledge.

Recommendation: Guidance and advice available in the IPM Tool are a valuable source of information to farmers and agronomists. Mechanisms need to be defined and implemented for annual updating of the guidance for the IPM Tool to remain of value and relevance.

Recommendation: Farmer peer group learning and support was highlighted as a key mechanism to improve the implementation and uptake of IPM amongst farming groups. The provision of a support network of farmers to improve knowledge exchange amongst like-minded farming groups would be beneficial to improve the uptake of SFI.

Would learning how to do environmental land management and deliver public goods mean you didn't need to employ an adviser.

- A high percentage (88%) of the participants who fully completed the online IPM Tool indicated that they were able to complete the tool without requiring advice from their agronomist.
- The actively selected farmer group who tested the IPM Tool, and were less likely to be engaged in SFI, recorded substantial commitments to increase IPM actions compared to current actions by going through the process of IPM planning:
  - For invertebrate pests, the increased commitment for winter wheat was 16% more IPM control measures, and a higher commitment to change was recorded in the grassland group (46%).
  - The commitment to increase IPM from current practice for diseases in all crops ranged from 0 to 37% (winter wheat 7% and grassland 37%).
  - For weed control, the increased commitment to new IPM control measures recorded using the IPM Tool ranged from 24 to 38%.
- A high percentage of participants (76 – 82%) indicated they would refer to the IPM Tool again to find information, update an IPM Plan and recommended the IPM Tool to other farmers, showing the commitment to self-learning techniques for completing IPM plans and peer group support.
- Although creating IPM plans through using the IPM Tool was able to be done as a self-completion exercise by the participating farmers, there was a general consensus that agronomist still have an important role in providing IPM advice and implementation of IPM plans on farm.
- In-depth interviews indicated that the completing of IPM plans was a good conversation starter between farmers and agronomists, and the IPM Tool would be beneficial if it linked directly with other farm management software which the agronomists are likely to use.
- Agronomists and advisers were recognised as the highest source of information available to farmers for IPM guidance and provide an important role in providing on the ground and tailored advice to farmers, which would not be available through other sources.
- It was recognised in the in-depth interviews that to improve the uptake of SFI, the scheme requires the support and promotion from influencers that farmers hold in a high degree of trust, which include agronomist for predominately cropped farms and vets for livestock farmers.

Recommendation: The completion of IPM plans and the implementation of IPM on farm can be completed without the support of an advisor, however, agronomists still have a vital role in providing farmers support and advisory knowledge on IPM. The provision to complete IPM1 with a BASIS qualified advisor should be recommended or remain a requirement.

Recommendation: Agronomists remain a key source of advice to farmers for implementing IPM and for farming practices in general. Training and advisory support for agronomists on the benefit of implementing SFI IPM paid actions would be beneficial to improve the uptake of SFI.

Do LMPs work for difference outcomes, geographies, and sectors.

- To date there have been 883 registered users of the IPM Planning Tool who have completed 1264 individual IPM plans. These represent farmers and agronomists from a wide range of farming sectors across broadacre and outdoor horticultural crops from a geographical spread across England, showing the widespread adoption of the IPM Tool.
- The actively selected farmers who tested the IPM Tool represented a diverse range of farming groups of small hectare arable farmers, mixed farms, and permanent grassland. This farming group was underrepresented in the previous T&T and reported a benefit in improving their IPM uptake through the completion of IPM plans.
- In-depth interviews recognised that the IPM Tool provided land managers who have limited computer skills with a structured template, providing them a means of completing land management plans which may not have been previously available.
- General feedback from the actively selected farmers who completed IPM plans using the tool was that it formalised their approach to IPM and gave it a structure, gave confidence and reassurance to carry on with good practices, provided learning on different management strategies and gave them the opportunity to assess their IPM approach on the farm.
- In-depth interviews recognised potential barriers that could prevent some farmers from using the IPM Tool including time constraints, computer literacy, culture and avoidance of regulation.
- Computer literacy was highlighted as a particular barrier for farmers who may not feel confident in their use of computer technology or online software. Inadequate internet access was mentioned as another potential barrier for both the use of the IPM Tool and accessing the SFI scheme online.

Recommendation: Diverse farming groups value their independence and do not want to feel overregulated by government agri-environmental schemes. More tailored or 'one to one' on farm advice to these farming groups on the benefits of implementing land management plans and SFI in general may be more suited to the commercial and practical needs of their farms.

How can LMPs link to downstream processes in monitoring and verifying contracted delivery.

- Participants that provided information on their IPM planning and pesticide usage indicated that by producing land management plans they changed their thought process towards pesticide usage, even if it did not result in less need for pesticides, and would continue to produce IPM plans for future growing seasons.
- Through the process of producing LMPs, over a third of participants (40%) indicated that they would not be likely to use pesticide applications at the same level as the previous growing season, and overwhelmingly indicated (92%) they are likely to use non-chemical control methods. There was also a strong commitment (64 – 84%) to only use pesticide when the pest pressure was high.
- The methodology developed to relate the level of pest risk and number of IPM interventions, as recorded in the IPM Tool, to farmer stated pesticide usage as a Treatment Frequency Index (TFI) was shown to be robust and could be used for future projects.
- For participants going through the process of producing IPM plans through the IPM Tool, a clear relationship was seen between their perceived level of pest risk on the farm and the number of IPM interventions they planned to adopt.
- The relationship was stronger for diseases and invertebrate pests than for weeds. Generally, weed control is conducted on a rotational basis across all crops grown, whereas diseases and

invertebrate pests are crop specific. Results therefore are reflective of the single seasons worth of data collected which was focused on a single crop in rotation.

- The relationship seen between the perceived level of pest risk on the farm and the number of IPM interventions adopted could be due to either the farmers and/or agronomists response to their perceptions of risk by putting more IPM practices in place and/or an increase in the number of IPM interventions planned to be adopted due to IPM planning through the IPM Tool.
- The relationship between the differing variables of IPM planning, pesticide usage, IPM interventions adopted, and pest risk was found to be complex and requires data from more than one season to elucidate.

Recommendation: The adoption of land management plans has indicated a culture change amongst farmers in their attitudes towards pesticide usage. Whether this results in a demonstrable change in the risks associated with pesticide use needs to be tested over future seasons.

Recommendation: The impacts of IPM and IPM planning on the risks associated with pesticide use should be quantified using a pesticide load indicator (PLI). The current PLI uses multiple metrics for impact, which makes it difficult to use for this purpose. Defra should consider supporting further development of the PLI to ensure that it suitable for widespread use for quantifying pesticide risk by using either less complex metrics or a more simplified process.

APPENDIX 1 – WORK PACKAGES SUMMARY AND MILESTONES

The project is being delivered by ADAS in collaboration with SRUC. A project steering committee, chaired by the NFU, meets monthly to oversee the work and the project reports to Defra. The geographic scope of the work is England.

The project is being delivered as four work packages which addressed the project objectives. This interim report summarises methods, results and conclusions to date from all work packages.

Details of project milestones can be found in Table 1.1

Work Package 1

Delivering Objective 1: Provide evidence to support implementation of the published SFI IPM paid actions by determining farmer engagement – with particular focus on actively selected farmers.

Work Package Lead: Henry Creissen and Hernan Degiovanni, SRUC. Kath Behrendt, ADAS.

Planned completion date for Objective 1: 30 April 2024.

Aim: Evaluate farmers' views and understanding of the SFI IPM scheme and paid actions through questionnaires and interviews.

Outline: Work Package 1, led by Henry Creissen, Hernan Degiovanni and Kath Behrendt, is providing an evaluation of participants perceptions towards the SFI IPM scheme, the published paid actions, Defra role in incentivising the uptake of IPM, the availability of advice and guidance, and public environmental schemes in general. Questionnaire interviews were conducted with 300 farmers using an independent third-party organisation who specialise in market research, England Marketing.

Work Package 2

Delivering Objective 2: Revise the IPM Planning Tool based on user feedback and test with actively selected farmers.

Work Package Lead: John Gadsby and Antonio Calatayud, ADAS.

Planned completion date for Objective 2: 1 April 2024.

Aim: To improve the IPM Planning Tool for public use and collect feedback from actively selected farmers on their user experience of the IPM Planning Tool.

Outline: Work Package 2 led by John Gadsby and Antonio Calatayud, utilises the expertise of the ADAS Agriculture and Land Management group and Software Development team in improving the online version of IPM Planning Tool using feedback from the previous T&T, incorporating benchmarking and expanding the tool by including spring crops. From the 300 farmers contacted in WP1, 50 participants were invited to test the IPM Planning Tool and user feedback was collected via questionnaire and follow up interviews.

Work Package 3

Delivering Objective 3: Assess the impact of farmers implementing IPM plans, on the risks associated with pesticide use.

Work Package lead: Kath Behrendt, ADAS.

Planned completion date for Objective 3: 30 April 2024.

Aim: Elicit from farmers how IPM planning and implementation related to risk associated with pesticide use and the level of pest control achieved.

Outline: Work Package 3 is led by social scientists in the ADAS Policy and Economics group. A sample of 100 farmers/growers who completed IPM plans using the IPM Tool were invited to undertake an

online survey. The focus was to gain insight into understanding how IPM planning and implementation are associated with pest control and the risks associated with pesticide use.

Work Package 4

Delivering Objective 4: Project reporting and recommendations.

Work Package Lead: Neil Paveley and Philip Walker, ADAS.

Completion date for Objective 4: 30 June 2024.

Aim: Report the evidence and provide conclusions, findings and recommendations from the project.

Outline: Work package 4, led by the Dr Neil Paveley and Philip Walker, coordinates communications with the Steering Group and produced this final report.

Table 1.1: Project Milestones.

Milestones	Timeframe
Create a sampling frame representative of farmers and growers. (Objective 1)	1 October 2023 to 1 November 2023
Conduct 10 min telephone interviews with 300 farmers / growers eligible for SFI payments. (Objective 1)	1 November 2023 to 30 January 2024
Revise the IPM Planning Tool based on user feedback. (Objective 2)	1 October 2023 to 31 March 2024
Test IPM Tool with actively selected farmers and obtain user feedback. (Objective 2)	1 January 2024 to 1 April 2024
Statistical analysis, including farmer typology, and interpretation for policy. (Objective 1)	1 January 2023 to 28 February 2024
Interim Report completed. (Work package 4)	31 March 2024
Follow-up interviews with selected farmers who enrolled in the IPM scheme to determine attitudes towards the IPM scheme after enrolment. (Objective 1)	1 March 2024 to 30 April 2024
Design, produce, and distribute an online questionnaire to elicit farmers response to IPM planning and implementation. (Objective 3)	1 December 2023 to 31 March 2024
Undertake evaluation of questionnaire responses. (Objective 3)	1 December 2023 to 30 April 2024
Completed monthly project meetings and reporting to steering group on work completed so far and evidence. (Work package 4)	1 October 2023 to 30 June 2024
Final Report completed. (Work package 4)	30 June 2024

APPENDIX 2 - WORK PACKAGE 1: PROVIDE EVIDENCE TO SUPPORT IMPLEMENTATION OF THE PUBLISHED SFI IPM PAID ACTIONS BY DETERMINING FARMER ENGAGEMENT – WITH PARTICULAR FOCUS ON ACTIVELY SELECTED FARMERS.

2.1 WP 1 METHODOLOGY

2.1.1 Create a sampling frame representative of farmers and growers.

Farmers and growers were selected as the sampling frame for the survey. The survey adopted a hybrid in which participants could answer the questions by way of telephone interview or online questionnaire. The sampling frame was created using a stratified sampling method to select farmers from all sectors of interest (those able to receive financial support through the SFI scheme) and with key socioeconomic factors (farm size and type, farmer's age and gender). The sampling frame was formed through known farming contacts by an independent third-party market research organisation. Telephone interviews was the primary survey method as it was predicted to give a higher success rate in engaging actively selected farmers with the proposed sample size than online surveys. The market research organisation was procured by competitive tender and England Marketing were selected as they provided the highest scoring tender against pre-set criteria and have expertise in the agricultural sector with a proven track record.

England Marketing could call on resource of 680 farmers for their contribution towards the sampling frame, as well as advertising through the farming press and associations including British Growers Association. Through the process of conducting the telephone interviews it was found that this sector was less engaged with the survey process than expected. Within the 3-month data collected period, England Marketing completed 156 telephone interviews out of the 312 contracted. To encourage the engagement of the remaining sector, a complimentary online survey was set up in conjunction with the telephone interviews https://englandmarketing.qualtrics.com/jfe/form/SV_7amvewrh2rFdgGy .

The online survey link was also shared with the project steering group and distributed through their farmer networks. A proportion of this online sampling frame was formed by ADAS through known farmers contacts who have not been involved in previous SFI IPM T&T projects and were approached through an 'opt in' process to whether they wanted to complete the survey. The number of online surveys completed was 181 which gave a total of 312 completed surveys (one survey was not fully completed and excluded from the data set).

2.1.2 Conduct 10 min telephone interviews with 300 farmers / growers eligible for SFI payments.

The interviews and survey were designed using the same questions to explore reasons for engagement, or lack of engagement, with SFI IPM actions. Attention was given to determining the technical and economic barriers to IPM. These perceptions were used to determine farmers' typologies towards the uptake of IPM actions and towards the IPM scheme.

These were designed as a perceptual questionnaire to determine farmers' perceptions towards the following (see 2.4.1 WP 1 Supplementary Material for full interview questionnaire):

- The SFI scheme – e.g., aims, structure, functionality.
- Announced IPM actions – e.g., suitability in achieving goals of IPM, applicability to their farming system.
- Defra's role in incentivising the uptake of IPM – i.e. financial support to undertake IPM actions through SFI.

- Agri-environmental schemes in general – e.g., value, effectiveness in changing practice, legacy/longevity.
- What resources and practical support is viewed as useful.

2.1.3 Statistical analysis, including farmer typology, and interpretation for policy.

The data collected from the 311 farmer interviews/survey were analysed using two methodologies:

- Perceptual questions were employed to determine farmers' typologies. A principal component analysis was employed to place farmers with similar responses to the perceptual questions in the same group. The answers and socioeconomic characteristics of the groups were analysed to identify commonalities in the profiles of the farmers that comprise each group.
- A latent class analysis applied to the responses of the perceptual questionnaire were employed to determine farmers' typologies. This methodology is considered more formal in that it aims to optimally determine the number of groups in the sample based on the distribution of answers to the perceptual questionnaire. These groups were compared against the distribution of answers and farmers' socioeconomic characteristics to identify commonalities in the profiles of the farmers that compose each group.

2.1.4 Selection of actively selected farmers to be contacted to test the IPM Planning Tool.

From the 311 farmers who completed the interviews/surveys, a representative sample of farmers and growers were selected for testing the IPM Tool (see section 3.2.1). The criteria for selection of farmers to invite were determined by their answers to the following survey questions:

- Survey Q8 - Would you be willing to test the IPM tool for one crop type and then participate in a short telephone or in-person interview at a later date to help us gain a better understanding of how the tool could be improved. A £100 incentive will be offered in exchange for your time. Response Required – YES. Remaining no. of HTR farmers: 156.
- Survey Q47 - Would you like to receive further information on the SFI IPM scheme, and are you willing to contacted by the ADAS/SRUC project team to aid the further development of the SFI IPM standard? Response Required – YES. Remaining no. of HTR farmers: 130.
- Survey Q22 - How much of your land that you currently receive government scheme funding for have you already, or are you planning to enrol, in SFI IPM? Response Required greater than or equal to 5ha. Remaining no. of HTR farmers: 86.
- Survey Q40 - Are you aware of the Integrated Pest Management (IPM) assessment plan? [the VI IPM plan]. Response Required – No/Unsure Remaining no. of HTR farmers: 35.

Filtering via Q40 only left a small sample of 35 farmers to test the IPM Tool, so this criterion was excluded to leave a sample size of 86 farmers. From those 86, some farmers were manually excluded as they were known contacts who were likely to be high adopters. This gave a sample of 75 farmers willing to test the IPM Tool. From the remaining 44 farmers not filtered for Q22 from Q47, a reserve list of 42 farmers willing to test the IPM Tool were identified after two manual exclusions of known high adopters.

2.1.5 Follow-up interviews with selected farmers who enrolled in the SFI IPM to determine attitudes towards the SFI IPM after enrolment.

A sample of 14 farmers and growers who agreed to be contacted were interviewed to determine their attitudes towards the SFI IPM paid actions after enrolment. The interview was designed as a perceptual questionnaire aimed at identifying a thematic approach to farmers attitudes after enrolment in the IPM scheme. The questionnaire focused on the following areas:

- Adequacy of payments,- e.g. are they likely to encourage uptake or are adjustments to the payments required to encourage uptake.
- Characterisation of the IPM actions covered – are they suitable to their situation, are they effective IPM actions.
- Adequacy of the scheme,- e.g. what level of engagement can be expected, is it likely to promote adoption of IPM practices.
- Barriers identified for the uptake of the SFI IPM paid actions, requiring adjustments to the paid actions (if necessary), - e.g. are other paid actions preferred, are different payments required, do market or knowledge or environmental barriers exist.
- Potential benefits identified with the scheme – e.g. reducing risks associated with pesticides, provision of public goods, improved profitability.

2.2 WP 1 RESULTS

2.2.1 Perceived adequacy of agri-environment schemes.

The findings from the 311 farmer surveys revealed a diverse range of opinions and attitudes within the agricultural community. Regarding attitude and uptake of DEFRA agri-environmental schemes, when asked whether these schemes adequately compensate for the right actions, responses were divided; while 44% [percentages are rounded] of farmers expressed confidence that the schemes pay for the right actions, a notable 35% disagreed, indicating a lack of consensus. Furthermore, almost one-fifth of respondents (19%) remained unsure, suggesting a level of uncertainty or complexity surrounding the effectiveness of these initiatives. When asked to expand their answers, farmers who indicate that DEFRA pay for the right actions also commented that payments could include “more options for grassland, especially upland”. In turn, farmers who consider that DEFRA do not pay for the right actions commented that “with the global insecurities and potential for wars, paying farmers to persuade them away from food production seems to make little sense”. They also said that the schemes are “still too prescriptive and in some cases not well thought out” and some farmers even said that “we're heading down the wrong path; money been given out for the wrong reasons”. In addition, farmers who were unsure whether DEFRA schemes pay for the rights actions also commented that DEFRA schemes “are getting better” but “after 10 years being part of HLS (higher level stewardship) and ELS (entry level stewardship) of the Environmental Stewardship scheme, I am yet to discover whether SFI will pay sufficient to cover costs and allow me to retain some profit”.

Similarly, opinions regarding the design of DEFRA agri-environmental schemes were split, with 38% of farmers considering them well-designed, while 39% disagreed. The remaining 22% were uncertain about the quality of the schemes' design, highlighting a considerable degree of ambiguity within the farming community regarding this aspect of government initiatives. Based on the comments provided, there was a mixed perception of the design and effectiveness of DEFRA agri-environmental schemes among farmers. While some farmers find the schemes well-designed, user-friendly, and flexible, others express concerned about complexity, lack of clarity, and insufficient financial compensation for the loss of income. Positive feedback highlights improvements in the schemes over time, particularly with SFI, which is considered more user-friendly and better designed compared to previous schemes like Countryside Stewardship. Farmers appreciate the holistic approach of the schemes, especially regarding field margins, hedgerows, and manure management. Additionally, some farmers acknowledge the positive impact on the environment and the opportunity to diversify income sources from less productive land. However, there are significant criticisms as well. Many farmers expressed frustration with the complexity, rigidity, and constant changes in the schemes. Concerns about the schemes' alignment with farming practices, food security implications, and insufficient financial incentives were prevalent. Moreover, there were complaints about the administrative burden, lack of understanding of farming realities by policymakers, and the perceived disconnect between the

schemes and the needs of different types of farms. Overall, while there is recognition of the potential benefits of agri-environmental schemes, there are also substantial challenges and areas for improvement to better meet the needs of farmers and the environment.

In terms of general attitudes towards agri-environmental government schemes, the findings depict a nuanced landscape of opinions. While a significant proportion of farmers (40%) expressed somewhat positive attitudes towards these schemes, a notable portion (14%) held somewhat negative views. Interestingly, a substantial number of respondents (28%) indicated neutrality, neither leaning positively nor negatively towards the schemes. Furthermore, a smaller yet noteworthy segment of farmers exhibited extreme attitudes, with 4% expressing extremely negative views and 12% expressing extremely positive sentiments. This variety of perspectives underscored the complexity of farmers' perceptions towards government interventions in the agricultural sector.

2.2.2 Attitude and understanding of SFI, IPM and SFI IPM 2023 paid actions.

Out of 311 respondents, 214 individuals were aware of the IPM actions within the SFI scheme which indicates a substantial level of familiarity among the participants. However, it is noteworthy that 66 respondents were not aware of these IPM actions, suggesting a significant portion of the sample may benefit from further knowledge transfer and exchange (KTE) activities regarding IPM actions within the SFI framework. In addition, 30 respondents expressed uncertainty about their awareness, reflecting a degree of ambiguity or lack of clarity surrounding IPM actions within the SFI scheme. This data underscores the importance of comprehensive KTE strategies to ensure farmers are well-informed about the various components and practices embedded within agricultural incentive programs like the SFI.

When asked about their willingness to commit to the SFI and IPM in general, a considerable number of farmers expressed their likelihood to commit to SFI, with 111 individuals indicating they were very likely to commit, while 89 stated they were likely to do so (Table 2.1). Interestingly, 69 respondents mentioned that they already adhere to SFI practices, often under different existing schemes like the Environmental Stewardship scheme. Regarding IPM overall, 66 respondents expressed that they were very likely to commit, and 93 stated they are likely to do so, reflecting a significant level of interest and potential adoption of IPM strategies (Table 2.1). Notably, 54 participants reported already implementing IPM practices. It is worth noting the significant level of uncertainty among respondents, as reflected by those who indicated they do not know what certain practices entail. For instance, 12 respondents expressed unfamiliarity with IPM overall, while 13 respondents reported not knowing what creating an IPM plan involves. Therefore, targeted efforts aimed at disseminating comprehensive knowledge about the benefits and implementation of SFI and IPM practices are essential to ensure farmers are equipped with the necessary understanding to participate effectively and derive maximum benefits from these initiatives. Table 2.1 presents the distribution of answers per IPM action or measure proposed.

Table 2.1: Likelihood of farmers to commit to SFI, IPM and the four SFI IPM 2023 paid actions. Percentages are rounded.

Question How likely are you to:	Very unlikely	Unlikely	Neutral	Likely	Very likely	I already do this	I do not know what this is
Commit to SFI	2%	4%	7%	29%	36%	22%	1%
Commit to IPM overall	4%	5%	20%	30%	21%	17%	4%
Grow wild flower rich margins, blocks or strips	9%	12%	12%	23%	15%	29%	0%
Create an IPM plan	3%	4%	12%	25%	27%	26%	4%

Grow companion crops	13%	19%	24%	19%	10%	13%	2%
Commit to not using insecticide	5%	16%	19%	21%	12%	27%	0%

Table 2.2 presents the distribution of answers per IPM measure proposed divided by the type of farmer who responded to the questionnaire. These results show that all types of farmers were willing to commit to the SFI. However, farmers with permanent grassland or horticultural growers are less likely to commit to a full IPM plan, grow margins and strips or companion crops. In addition, the majority of farmers are reluctant to stop using insecticides, although all farmers with permanent grassland showed a willingness to reduce the use of insecticides.

Table 2.2: Distribution of Farmers who Declare to be Committed to Several IPM Practices per Type of Farmer (Percentages are expressed relative to the total number of farmers in each category).

	Arable						Mixed					
Likelihood	SFI	IPM Overall	Margins and Strips	IPM Plan	Companion Crops	Not insecticide	SFI	IPM Overall	Margins and Strips	IPM Plan	Companion Crops	Not insecticide
Unknown	0.00	0.00	0.00	0.00	0.00	1.06	1.36	4.08	0.00	4.08	1.36	0.00
Very Unlikely	3.19	2.13	6.38	1.06	6.38	4.26	0.68	1.36	5.44	1.36	6.80	4.76
Unlikely	4.26	4.26	9.57	1.06	22.34	22.34	4.08	4.76	12.24	3.40	19.73	17.01
Neutral	8.51	12.77	9.57	6.38	21.28	23.40	4.08	16.33	10.88	10.20	23.81	19.05
Likely	34.04	37.23	18.09	28.72	21.28	20.21	23.81	28.57	23.13	22.45	21.09	18.37
Very Likely	29.79	19.15	14.89	25.53	12.77	13.83	42.86	27.89	17.69	30.61	11.56	11.56
I do this	20.21	24.47	41.49	37.23	15.96	14.89	23.13	17.01	30.61	27.89	15.65	29.25
	Horticulture						Permanent Grass					
Likelihood	SFI	IPM Overall	Margins and Strips	IPM Plan	Companion Crops	Not insecticide	SFI	IPM Overall	Margins and Strips	IPM Plan	Companion Crops	Not insecticide
Unknown	0.00	0.00	0.00	0.00	0.00	0.00	1.61	9.68	0.00	9.68	3.23	0.00
Very Unlikely	50.00	0.00	50.00	0.00	50.00	100.00	1.61	9.68	22.58	8.06	38.71	3.23
Unlikely	0.00	50.00	50.00	0.00	0.00	0.00	1.61	4.84	12.90	9.68	14.52	6.45
Neutral	50.00	0.00	0.00	50.00	0.00	0.00	9.68	35.48	14.52	22.58	30.65	12.90
Likely	0.00	0.00	0.00	0.00	0.00	0.00	32.26	25.81	30.65	27.42	9.68	25.81
Very Likely	0.00	0.00	0.00	0.00	0.00	0.00	30.65	8.06	9.68	19.35	1.61	11.29
I do this	0.00	50.00	0.00	50.00	50.00	0.00	22.58	6.45	9.68	3.23	1.61	40.32
	Temporary Grass											
Likelihood	SFI	IPM Overall	Margins and Strips	IPM Plan	Companion Crops	Not insecticide						
Unknown	0.00	0.00	0.00	0.00	0.00	0.00						
Very Unlikely	0.00	0.00	0.00	0.00	0.00	0.00						
Unlikely	0.00	0.00	25.00	0.00	25.00	25.00						
Neutral	0.00	25.00	25.00	25.00	25.00	25.00						
Likely	25.00	0.00	25.00	0.00	25.00	0.00						
Very Likely	25.00	50.00	25.00	50.00	25.00	25.00						
I do this	50.00	25.00	0.00	25.00	0.00	25.00						

The responses provided revealed a multitude of reasons why respondents were very unlikely to engage in various actions related to SFI and IPM practices. Many farmers expressed the opinion that the actions do not align with their current farming systems, particularly amongst those farmers with grassland. For instance, some mentioned that committing to SFI or IPM overall, growing wildflower-rich margins or creating beetle banks does not fit their farming systems or would yield little gain for them or the environment. Others cited concerns about “low payments for high-risk strategies”, “the complexity of implementing certain practices”, or “the impracticality of transitioning arable land to different crops” due to profitability concerns. In addition, some farmers highlighted the difficulty of managing insect problems without the use of insecticides, while others mentioned the need for control methods to control pests effectively.

Furthermore, respondents emphasised logistical challenges such as paperwork, lack of local seed sources, or the cost and effort involved in implementing new practices. Some noted that their farms were predominantly temporary grassland or permanent pasture, making actions like growing companion crops or implementing IPM plans irrelevant or impractical. Others mentioned specific crop requirements or emphasized the profitability of grass production as a priority. Overall, these responses underscored the diverse range of considerations, from economic viability and practicality to ecological concerns and logistical barriers, which influence farmers' decisions regarding SFI and IPM practices.

The responses from farmers who were likely to engage in SFI and IPM practices revealed a spectrum of reasons why they remain hesitant to take certain actions. Many cited practical concerns such as the unsuitability of certain practices for their specific farming systems or the limitations imposed by their current land use. For instance, farmers growing cereals for seed expressed concerns that actions like growing wildflower-rich margins or companion crops are not compatible with their primary crop focus. Others mentioned the need for more confidence in alternative methods of pest control or the necessity of using insecticides for successful crop production despite efforts to minimise their usage.

Logistical challenges and economic considerations emerged as prominent factors influencing farmers' decisions. Some farmers expressed concerns about the cost and time involved in implementing certain practices, especially when the benefits may not outweigh the expenses or when there is uncertainty about the effectiveness of the measures. Others highlighted issues with paperwork, upfront costs, or the potential negative impact on farming productivity as reasons for their reluctance to commit to SFI or IPM practices. Moreover, farmers emphasised the need for more information, evidence, or flexibility in the schemes to better suit their individual circumstances, including the size and type of their farms, the suitability of their land, and the specific challenges they face in crop production. Overall, these responses underscore the complexity of balancing environmental stewardship with practical and economic considerations within the context of modern agriculture.

Farmers expressed several reasons why they perceive certain IPM actions outlined in the SFI 2023 as ineffective. One recurring theme was the notion that many farmers are already implementing these practices even before the introduction of the SFI. For them, committing to IPM or growing companion crops does not alter their existing practices or mitigate risks further. Moreover, for those already adhering to organic farming principles, the SFI IPM 2023 actions may seem redundant as, for example, they may already use fewer insecticides.

In contrast, farmers acknowledge the potential effectiveness of certain actions proposed by the SFI. Many see the cultivation of wildflowers and the implementation of companion crops as beneficial for promoting biodiversity, providing habitats for beneficial insects, and reducing the reliance on pesticides. These actions were viewed as contributing to more sustainable farming practices, improving soil health, and enhancing ecosystem resilience. IPM is recognised as a valuable tool for reducing the need for and risks around pesticide use and fostering a holistic approach to pest management. Farmers appreciate the emphasis on responsible pesticide use and the promotion of alternative strategies for pest control. The actions outlined in the SFI are seen as encouraging farmers to be more mindful of their environmental impact and to adopt practices that lower that impact.

Farmers opinions vary when considering whether the SFI IPM 2023 paid actions to are likely to result in a change in practice (Table 2.3). The majority (around 58%) expressed a neutral to likely sentiment regarding the value of the incentives to their farming operations. This suggested that while some farmers see potential benefits in the incentives offered, others remain uncertain about their value or effectiveness in driving change on their farms. This mixed response highlighted the need for clearer communication and perhaps more tailored incentives to address the diverse needs and circumstances of farmers.

When considering the potential impact of the IPM paid actions on changing farming practices, the data suggests a similar trend. While a significant portion of respondents (around 56%) believe that the incentives were likely to influence practices on farms, there is still a notable percentage (14%) who perceived the incentives as unlikely to bring about substantial changes (Table 2.3). This underscored the importance of ensuring that the incentives are aligned with the goals and realities of farm management, and that they sufficiently motivate farmers to adopt more sustainable and environmentally friendly practices.

Table 2.3: Distribution of opinions regarding the three SFI IPM paid actions with payments based on hectares (percentages are expressed relative to the total number of farmers in each category) e.g. no insecticides, companion cropping, wildflower strips/margins.

	Arable			Mixed		
Likelihood	Are of Value	Change Practices	Have Longetivity	Are of Value	Change Practices	Have Longetivity
Very Unlikely	3.19	3.19	6.38	2.04	1.36	1.36
Unlikely	14.89	18.09	17.02	6.12	8.16	10.20
Neutral	26.60	23.40	29.79	22.45	31.29	33.33
Likely	52.13	54.26	44.68	57.82	49.66	51.02
Very Likely	3.19	1.06	2.13	11.56	9.52	4.08
	Horticulture			Permanent Grass		
Likelihood	Are of Value	Change Practices	Have Longetivity	Are of Value	Change Practices	Have Longetivity
Very Unlikely	50.00	50.00	50.00	12.90	9.68	11.29
Unlikely	50.00	0.00	50.00	9.68	3.23	11.29
Neutral	0.00	0.00	0.00	40.32	37.10	43.55
Likely	0.00	50.00	0.00	32.26	41.94	27.42
Very Likely	0.00	0.00	0.00	4.84	8.06	6.45
	Temporary Grass					
Likelihood	Are of Value	Change Practices	Have Longetivity			
Very Unlikely	0.00	0.00	25.00			
Unlikely	0.00	0.00	25.00			
Neutral	50.00	0.00	0.00			
Likely	25.00	100.00	50.00			
Very Likely	25.00	0.00	0.00			

In terms of the longevity of the incentives in shaping future farming practices beyond the duration of the scheme, the responses were more evenly distributed. While a significant portion of farmers (around 78%) believe that the incentives would have a lasting impact, there is a minority (around 18%) who expressed doubts about the sustainability of these incentives in influencing long-term changes in land management practices (Table 2.3). This highlighted the need for policymakers to consider the durability and continuity of incentives beyond the scope of individual schemes.

Table 2.4 shows a diversity of perceptions among farmers regarding the effectiveness and implications of implementing SFI IPM 2023 paid actions on farms. There was a notable degree of scepticism regarding the capability of the SFI IPM actions to fully manage pests in crops. While a significant portion of respondents (44%) agreed or totally agreed with this statement, almost a third expressed disagreement or uncertainty, indicating varying levels of confidence in the efficacy of the SFI IPM practices in pest management. This uncertainty may stem from the complexity of pest dynamics and the diverse environmental and agricultural contexts in which farmers operate.

Opinions diverge regarding the potential impact of IPM paid actions on biodiversity, the need to use pesticides, food security, food safety, water quality, and the uptake of IPM actions by UK farmers. While a majority of respondents believed that biodiversity, reduced need for pesticides, and water quality will be positively influenced by implementing SFI IPM 2023 paid actions, opinions are more divided on the improvement of food security and food safety. This reflected the multifaceted nature of agricultural systems and the complex interactions between farming practices, environmental factors, and food production outcomes.

There is considerable uncertainty and disagreement regarding the sufficiency and appropriateness of the financial incentives provided by IPM paid actions to encourage the implementation of IPM actions. While a significant portion of farmers expressed doubt or disagreement regarding the adequacy of the current payment per IPM action, there is also a notable percentage who agreed or totally agreed with this statement. This suggests a need for further evaluation and potential adjustments to ensure that financial incentives align with the actual costs and benefits associated with implementing IPM

practices, highlighting the importance of ongoing dialogue and collaboration between policymakers, agricultural experts, and farmers to optimise the effectiveness of IPM paid actions in promoting sustainable agriculture.

Table 2.4: Percentage of farmers who agree with proposed perceptual statements around the SFI 2023 IPM paid actions. Percentages are rounded.

Statement	Totally disagree	Disagree	Neutral	Agree	Totally agree	I do not know
Managing **pests** in crops is completely possible using the actions currently included in the IPM actions	9%	24%	29%	21%	3%	13%
Biodiversity will increase on farms by implementing the actions currently included in the IPM paid actions	3%	9%	25%	47%	10%	6%
Pesticide use will be reduced on farms by implementing the actions currently included in the IPM paid actions	4%	13%	18%	51%	8%	7%
Food security in the UK will be improved by implementing IPM paid actions	18%	30%	26%	15%	4%	7%
SFI IPM is the best way to maximise the uptake of IPM	3%	13%	30%	38%	4%	11%
IPM uptake requires the use of **public funds**	4%	17%	25%	35%	12%	8%
The current **payment** per IPM action is appropriate	13%	26%	24%	16%	1%	21%

Regarding additional IPM actions that farmers believe should be supported through the SFI IPM paid actions there was a diverse range of opinions, concerns, and suggestions. One prevalent theme is the recognition of the importance of diverse rotations and disease-resistant varieties in promoting IPM and sustainable agriculture (Figure 2.1). Many farmers emphasised the benefits of diverse rotations in breaking cycles of pests and diseases, improving soil health, and enhancing biodiversity. Disease-resistant varieties are seen as a crucial tool in reducing the need for chemical interventions, thus aligning with the broader goals of IPM to minimise risks associated with pesticide use while maintaining or improving productivity.

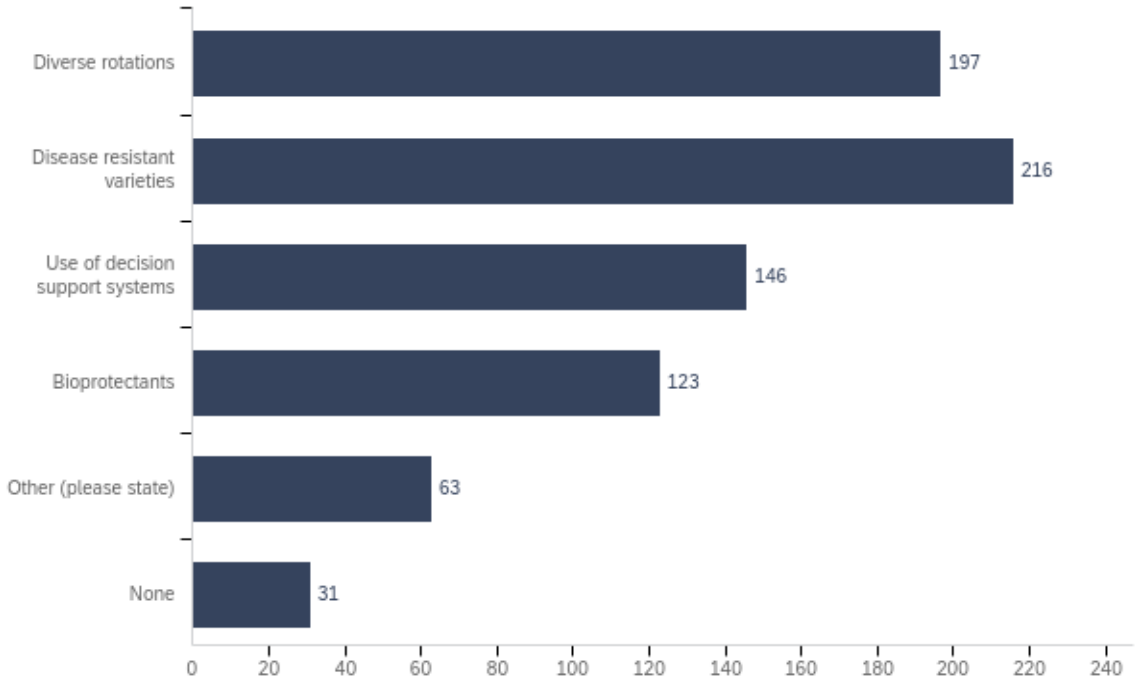

Figure 2.1: Number of Farmers who agree that these additional IPM measures should be supported by the SFI IPM 2023 scheme (N=311).

Farmers expressed a desire for greater clarity and KTE around IPM practices and alternatives to conventional chemical inputs. Some respondents indicated uncertainty or lack of understanding about certain IPM actions, reflecting the complexity and diversity of farming practices across different regions and contexts. This underscored the importance of providing accessible information, training, and support to farmers to facilitate the adoption of IPM strategies effectively.

The responses provided by farmers under the "Other" category offer valuable insights into additional IPM actions that they believed should be supported by DEFRA. These responses reflect a range of concerns and suggestions related to farming practices, environmental sustainability, and food security. Some farmers emphasised the importance of reducing the need to use pesticides and promoting alternatives such as non-chemical weed control methods, precision farming, and the introduction of beneficial organisms like mycorrhizal fungi. Others highlighted the significance of crop rotation, organic farming, and agroforestry in enhancing soil health, biodiversity, and resilience to pests and diseases.

Several respondents stressed the need for tailored support and incentives for specific practices such as direct drilling, hedgerow creation, and the preservation of traditional farming methods. Suggestions also included measures to improve farm efficiency, such as funding for new technologies like bioprotectants. Moreover, some farmers proposed a collaboration between farmers, agronomists, and end customers to promote sustainable agricultural practices and ensure food security.

A diverse array of information sources was utilised by respondents to gather knowledge and guidance on IPM practices (Figure 2.2). Among the most prominent sources are agronomists, advisers, and government websites, with a significant percentage of farmers relying on these channels for information. Agronomists and advisers play a crucial role in providing on-the-ground guidance and tailored advice to farmers, leveraging their expertise to help farmers implement IPM strategies effectively within their specific context. Government websites are also a key resource, indicating the importance of official guidelines and recommendations in shaping farmers' understanding and adoption of IPM practices.

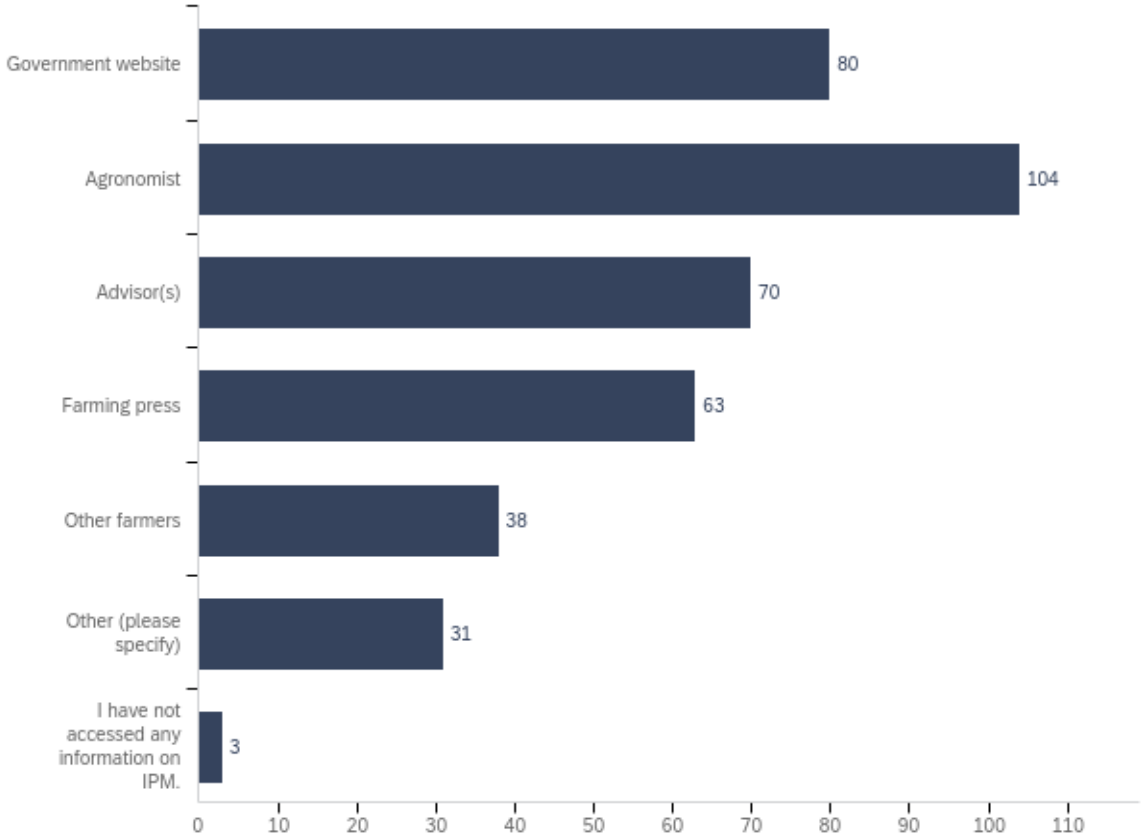

Figure 2.2: Number of farmers per source of information on IPM.

The data highlighted the role of peer networks and industry publications in disseminating information on IPM. A notable percentage of farmers cite other farmers and farming press as their main sources of information on IPM in this study and similar recent studies e.g. Creissen and Meador (2022). This underscores the significance of knowledge-sharing within farming communities and the value of learning from peers' experiences and best practices. The presence of other sources such as research institutes, industry organizations like AHDB and NFU, and online forums reflects the diverse range of informational resources available to farmers seeking guidance on IPM (Creissen and Meador 2022).

2.2.3 Determining Farmer Typology

Performing a typology of responses can reduce the dimensionality of complex datasets and gain deeper insights into underlying patterns and structures within the data (Weller *et al.*, 2020; Barnes *et al.*, 2022). By categorising respondents into distinct groups, based on their perceptual responses, we could identify commonalities and differences among individuals or entities. This not only simplifies the interpretation of the data but also facilitates the formulation of targeted interventions or policies tailored to specific groups. In the context of agricultural research, for example, understanding the diverse perspectives of farmers on IPM practices through typologies allows policymakers to design more effective extension programs or incentives that address the unique needs and challenges faced by different farmer segments.

Employing a Latent Class Analysis (LCA) for performing the typology offers several advantages over traditional clustering or segmentation methods. A LCA is a probabilistic modelling technique that assumes the existence of unobserved (latent) groups within the data and estimates the probability of individuals belonging to each group based on their response patterns. Unlike deterministic clustering algorithms, LCA accommodates measurement error and captures the uncertainty inherent in

categorising respondents into distinct classes. This probabilistic framework allows for the identification of nuanced patterns and subgroups that may not be apparent through simple descriptive statistics or exploratory analyses. In the context of perceptual questions related to IPM, LCA enables us to uncover latent typologies of farmers with distinct attitudes, beliefs, or behaviours towards pest management practices, providing a more nuanced understanding of the underlying heterogeneity within the farming community.

Moreover, LCA facilitates the exploration of relationships between latent typologies and external variables, enabling researchers to identify predictors or correlates of group membership. By examining how demographic, socio-economic, or contextual factors influence the probability of belonging to certain typologies, policymakers can develop targeted interventions that address the specific needs and constraints of different farmer segments. LCA allows for the comparison of model fit indices across different specifications, enabling researchers to assess the robustness and validity of the identified typologies.

We performed three typologies based on perceptual questions. The first typology is derived from a ranking of factors deemed crucial to farmers' agricultural systems, including soil health, water quality, air quality, climate change mitigation (achieving Net Zero), food security, and nature recovery (biodiversity). The typology based on this ranking reveals two distinct groups in the sample of farmers interviewed (Table 2.5). These are labelled as: 'Environmentalists' and 'Productionists', noting that the labelling is a simplification. This typology showed distinct preferences and priorities among the two identified groups. These groups have contrasting views on the importance of different agricultural and environmental considerations. For instance, Environmentalists prioritise soil health as the most important concept on their farms, followed closely by water quality and air quality. This suggested a strong emphasis on sustainable land management practices and environmental stewardship among Environmentalist farmers. Conversely, Productionists rank water quality as their top priority, indicating a greater focus on the preservation and management of water resources. They also express concerns about air quality and climate change mitigation, albeit to a lesser extent compared to Environmentalists.

The rankings highlight divergent perspectives on issues such as food security, biodiversity, and public health. Environmentalists place a relatively lower importance on food security and public health compared to other concepts, suggesting a prioritisation of broader environmental and ecological concerns. On the other hand, Productionists assign higher rankings to food security, indicating a stronger emphasis on ensuring agricultural productivity and resilience to meet nutritional needs. These findings underscore the nuanced preferences and values within the farming community, reflecting differing ideological orientations and priorities regarding agricultural sustainability, environmental protection, and human well-being.

Table 2.5: Typology of farmers around the ranking of importance of various factors at farm level.

Groups	Soil Health	Water Quality	Air Quality	Climate Change Mitigation	Food Security	Biodiversity	Public Health
Environmentalists	1st	2nd or 3rd	5th or 6th	6th or 7th	3th or 4th	2nd or 3rd	6th or 7th
Productionists	2nd or 3rd	3rd or 4th	5th or 6th	6th or 7th	1st or 2nd	5th or 6th	6th or 7th

The second typology is derived from farmers' perceptions of agri-schemes. We asked them to indicate their attitudes toward agri-environmental government schemes, including their opinions on whether DEFRA agri-environmental schemes are well-designed, if they believed these schemes pay for the right actions, and whether government funds should be allocated to agri-environmental schemes. Based on their responses to these questions, we established the second typology (Table 2.6).

Table 2.6: Typology of farmers around the ranking of importance of various factors at farm level.

Groups	Attitude towards agri-schemes	DEFRA designs well designed?	DEFRA pay correct actions?	Should public money be used for agri-subsidies?
Optimists	Neutral, Positive	Yes	Yes	Yes
Pessimists	Neutral, Negative	No	No	Yes

The second typology reveals distinct patterns in farmers' perceptions of agri-schemes, particularly in their attitudes towards these schemes and their views on the effectiveness of DEFRA's design and funding mechanisms. In one group, labelled as 'Optimists', farmers expressed a predominantly neutral to positive attitude towards agri-schemes. They believe that DEFRA designs these schemes effectively and that they appropriately allocate funds to incentivise the right agricultural actions. Moreover, Optimists support the idea of utilising public money for agri-subsidies, indicating a willingness to invest in environmental and agricultural initiatives through government support. Conversely, the other group, labelled as 'Pessimists', showcased a different stance towards agri-schemes. Farmers in this group tend to have a neutral to negative attitude towards these schemes. They expressed scepticism about DEFRA's design capabilities, with many believing that the schemes are not well-designed to achieve their intended goals. Similarly, Pessimists doubt whether DEFRA adequately allocates funds to incentivise the correct agricultural actions. Despite their reservations about DEFRA's approach, however, Pessimists still support the notion of using public funds to support agriculture, suggesting a recognition of the importance of government support in agriculture despite their concerns about its efficacy.

The third typology is structured around farmers' likelihood to engage in various IPM practices, including committing to the SFI, adopting IPM practices overall, cultivating wild-flower rich margins, blocks, or strips, formulating an IPM plan, growing companion crops, and choosing not to use insecticides. Responses span from very unlikely to very likely, with two additional options: "I already do this" and "I do not know what this" (Table 2.7).

Table 2.7: Typology of farmers based on their likelihood to engage in various IPM practices.

Groups	Commit to SFI	Commit to IPM overall	Grow strips	Create an IPM plan	Grow companion crops	Commit to not using insecticide
Willing	Very likely; I do this	Very likely; I do this	Very likely; I do this	Very likely; I do this	Neutral; Very likely; I do this	Very likely; I do this
Unwilling	Likely; Very likely	Neutral; Likely	Likely; I do this	Neutral; Likely	Neutral; Likely	Neutral; Likely

The third typology delineates farmers' inclinations towards engaging in various IPM practices, encompassing commitments to the SFI, adopting IPM principles holistically, cultivating wild-flower rich strips/margins, developing IPM plans, growing companion crops, and not using insecticides. Within the 'Willing' group, there was a prevalent eagerness to adopt all SFI IPM paid actions, with a strong likelihood of adoption if not currently adopted. Conversely, among the 'Unwilling' group there is a more varied response, with a mix of likelihood and neutrality evident across different IPM practices. While there is a notable inclination towards certain practices like committing to SFI overall and growing wildflower strips/margins, there is also a significant level of neutrality, particularly regarding aspects such as abstaining from using insecticides.

Farmers' categorisation into these typologies provides valuable insights into their readiness to adopt IPM practices and engage with initiatives like the SFI. Willing farmers demonstrate a high propensity

towards embracing IPM strategies, as evidenced by their expressed likelihood or current engagement across all IPM paid actions. In contrast, Unwilling farmers showed a more cautious stance, with varying levels of readiness across different IPM practices. Understanding these distinctions is crucial for tailoring outreach efforts and policy interventions aimed at promoting sustainable farming practices, ensuring that strategies are effectively targeted to address the specific needs and attitudes within each farmer group.

We finally performed a typology of typologies (Table 2.8) in which we integrated the insights from the previous three typologies to understand broader patterns among farmers' attitudes and preferences. The analysis revealed distinct groups characterised by their collective responses across typologies. Among Environmentalist/Optimist/Committed farmers, there appeared to be a consistent alignment towards environmental concerns and a willingness to commit to IPM, however, there was a mix of the portion of these farmers falling within the optimists and pessimist views towards agri-environmental scheme. A notable portion aligned with Group 1 which indicated a moderately strong commitment to sustainable farming practices and a high likelihood of engaging in various IPM practices, but with more neutral or negative attitudes towards agri-schemes, which has been labelled as Critical to scheme but committed to IPM. The other sizable portion of Environmentalists aligned with Group 2, which showed positive attitudes towards agri-schemes but less likelihood of engaging in certain IPM practices and labelled as Pro scheme but non-committed to IPM.

Interestingly, among Productionist/Pessimist/Non-committed farmers, there is more variability observed across typologies. While a significant portion was assigned to Group 2 (Pro-scheme but non-committed to IPM), reflecting a tendency towards neutrality or positive attitudes towards agri-schemes and a lower likelihood of engaging in certain IPM practices, there are also notable numbers in Group 1 and Group 3 (labelled as Pro-scheme and committed). Group 1 farmers exhibited a more aligned stance with Environmentalists, indicating a shared interest in sustainable practices, albeit with potentially differing priorities or perspectives, and a tendency towards more neutral or negative attitudes towards agri-schemes. On the contrary, Group 3 farmers represented a nuanced segment within this ideological group, characterised by their propensity towards certain IPM practices such growing strips or margins or having an IPM plan in place, and generally have more positive attitudes towards agri-schemes.

Table 2.8: Typology of farmers based on their likelihood to engage in various IPM practices (percentages rounded).

	Typology 1 (Farming priorities)		**Typology 2 (Scheme perceptions)**		**Typology 3 (Willingness to commit)**	
Composite typology	Environmentalists	Productionist	Optimists	Pessimists	Committed	Non-committed
1. Critical of scheme but committed to IPM	56%	43%	15%	84%	72%	31%
2. Pro scheme but non-committed to IPM	59%	40%	100%	0%	0%	100%
3. Pro scheme and committed to IPM	0%	100%	100%	0%	100%	0%

When we analysed the sources of information on IPM used by farmers classified in the last typology, distinct patterns emerged among the groups. Group 1, characterized by their high likelihood of

engaging in various IPM practices, predominantly relies on agronomists as their primary source of information, with 56% of respondents citing them. This group also showed a substantial reliance on government websites (40%) and advisors (47%), indicating a diverse approach to gathering information, likely driven by their proactive stance towards IPM implementation (Table 2.9).

Interestingly, Group 2 farmers, who exhibit a lower commitment towards IPM practices, demonstrated a relatively balanced reliance on various sources of information. While agronomists remain a significant source for them as well (33%), there is a notable decrease compared to Group 1 (Table 2.9). However, this group showed a similar in reliance on government websites and advisors. In contrast, Group 3 farmers, who displayed a high likelihood of engaging in IPM practices, showed the lowest reliance on external sources overall. They exhibit minimal dependence on government websites, agronomists, advisors, and farming press, indicating a potential lack of access to or interest in seeking out information on IPM strategies, or they are a self-reliant on their own sources of information or understanding of IPM (Table 2.9).

Table 2.9: Typology of farmers based on their likelihood to engage in various IPM practices (percentages rounded).

Sources of Information	**Group 1** Critical to scheme but committed to IPM	**Group 2** Pro scheme but non-committed to IPM	**Group 3** Pro scheme and committed to IPM
Government Website	40%	46%	13%
Agronomist	56%	33%	9%
Advisors	47%	44%	8%
Farming Press	46%	38%	15%
Other Farmers	44%	44%	4%
Other	44%	34%	20%
Accessed no information on IPM	0%	0%	0%

2.2.4 Findings from semi-structured interviews with actively selected farmers

A qualitative thematic approach was taken to assess behavioural insights into perceived enablers and barriers to uptake of SFI IPM paid actions. The evidence assessed was taken from the 14 in-depth interviews with actively selected farmers who indicated a willingness to participate in further research (via the online survey). The approach provided a description of the evidence collected and identified references made by interviewees to different themes determined through thematic coding of interview transcripts.

Data was analysed in NVivo 12 software. The number of interviewees who were categorised under a theme are used for the results, rather than number of times a theme is referred to. This data was chosen to understand popular themes, rather than be weighted for some points which were deemed more relevant to interviewees.

Expectations and understanding of SFI IPM paid actions

- Interviewees did not have any initial expectations or formed perceptions of SFI IPM paid actions. One farmer had read the SFI booklet online, but generally there was little understanding of what the SFI IPM paid actions would entail.

"To be fair, I didn't have a particular view, other than it was a box ticking exercise which we may have to undertake."

"We know we did the bare minimum to make sure that we were compliant for Red Tractor. So yeah, now it's coming to SFI. It's more serious."

- Reasons for joining the SFI scheme included wanting to learn more about (i) techniques that can be used for soil health, and (ii) reducing the use of insecticides.

"if you've got a bit of room to be able to experiment and push the boundaries, then you can and that's where the SFI payments are helping."

- There was a general belief that knowledge amongst the farming community on the use and effectiveness of companion cropping may still be lacking.

- All interviewees were aware of the 25% limited area stipulation for SFI actions. The move was supported by all interviewees apart from one who argued that if there was going to be a limit, it should have been introduced earlier because now there is a 2-tier system with some early joiners being allowed to put 100% of their land area.

"I'm really glad they've done it. It was the best thing I have ever seen…"

"I think that no scheme should be set up to take whole farms out of production. I think the aim to take less productive areas out or areas which will benefit wildlife, the loss is fine but encouraging large estates and things just to rewild to SFI, the whole estate, is wrong. So, 25% is a good idea."

Motivating factors for enrolling in the SFI IPM

- Receiving a monetary reward for undertaking actions that are already considered valuable by land managers and farmers was viewed as a key motivator - *"It's good when you get into it. Because when you are farming, you do need things every day. And now there's an option to be paid for it. Gives you an incentive to do it."*

- Beyond financial incentives, the potential for long-term environmental benefits like improved soil health, clean water, and reduced need for chemical use were significant motivators. Interviewees recognised that sustainable practices could enhance their business viability.- *"it's better for the environment, so better for your business long term with healthy soils, clean water, clean air that it sounds like a no brainer"* and *"It can be driven by a desire to improve the way we work, which it can be both financial, environmental, economic and a whole host of other things."*

- After participating in the SFI IPM paid actions, interviewees generally found that the paid actions under the SFI were less restrictive in terms of choice of plans compared to countryside stewardship - *"old stewardship schemes and things like that, anything complicated it was and anything was restrictive was a complete nightmare and then the regulation if it wasn't right. The penalties if it wasn't right, were quite severe and it just sometimes didn't seem worth doing it because the costs were too high."*

- The ease of compliance and the simplicity of integration with existing practices, such as Red Tractor, was seen as making participation in SFI IPM attractive. Interviewees appreciated that compliance requirements are often aligned with existing practices, making it easier for them to participate - *"It's an easy compliance under the SFI, because it's something we're already doing, to some extent, under a Red Tractor farm assurance. Because we're already reasonably familiar with the thing we see it as not a difficult thing to complete…"*

Views on current level of SFI payments

- Generally, interviewees thought that the payments given for SFI IPM actions are fair and reasonable. However, they also believed that higher payments to cover the risks involved in transition to SFI would encourage more uptake.

- Interviewees views on each of the four SFI IPM paid actions were generally consistent:

  - **IPM 1: Produce a plan** - Good payment, however, part of the payment would go to the agronomists. *"A couple of hours in the office doing and making a plan, yeah, that's good money."*
  - **IPM 2: Flower-rich grass margins** - Interviewees felt that this payment was *"Just about right."* Some interviewees raised the point that the payment should cover taking land out of production. *"…Probably a fair payment for taking unproductive lands and getting a guaranteed payment from."* and *"Well, it's alright, but this would be taking too much land out of production if you are not careful."*
  - **IPM 3: Companion Crop** - Payment for companion crop maybe low because it just covers the cost of the seed. *"I thought about doing this one but, once you've counted up the seed, it doesn't pay well or it didn't cover the cost of the seed. I know in theory once you get a further benefit from it, but I'm taking a gamble"*
  - **IPM 4: No use of insecticide** - Payment for no insecticide was generally considered low and not commercially viable given the risks involved during the transitioning phase. *"Nothing like enough, unless you are in the lucky position that you have got BYDB tolerant barley… There is nothing like enough money there to gamble on a crop… You just wouldn't do it."*

Initiatives that could enhance uptake

- Interviewees discussed a number of initiatives that they thought policy makers/government could consider to encourage more farmers to take up SFI IPM paid actions, including:

  - Increasing monetary rewards.
  - Promoting the SFI through education on topics surrounding the benefits of not using insecticide. This could involve adding articles in farmers weekly, other newsletters and social media. Written articles are a better way of attracting farmers than conducting workshops and events as farmers can read them as and when they are free.
  - Holding events and trainings to attract the farming community of different generations.
  - Reducing the use of acronym and using accessible language.
  - Speaking to commercial farmers to understand commercial agriculture and their goals. This will also involve understanding how commercial farmers may struggle to put the changes in place without significantly affecting their profits.
  - Delivering the scheme consistently (payments, goals, plans).
  - Having a mobile application which can incorporate personalised feedback and warnings, similar to muddy boots. This will make the tool a farm management tool rather than just a tick the box exercise.
  - Linking the tool with agronomists (via a mobile platform).
  - Providing more clarity about the scheme itself and how it rolls over.

"Education because obviously, there are farmers who don't tend to survive… education would be obviously help as well. It's really hard to do workshops or attend so very often, the best way to reach people is just articles in in the farmers weekly..."

"Promotion: Email promotion from Defra or whoever to promote the benefits."

"Education and knowledge. Finding out what people do and spreading the word, what crops to mix together. So, knowing what varieties are beneficial together. There's been lots of work done with OC rate and there's and it's now very easy to get the correct companion crop store."

Barriers for SFI uptake for the farming community as a whole

- When considering the barriers to SFI uptake across the wider farming community, there was a general consensus amongst interviewees that the following were prominent barriers:
  - Not having enough land or losing productive land.
  - Drilling companion crops not practical.
  - Not having enough knowledge about IPM best practices.
  - Wanting to stay independent and not wanting to be regulated .
  - Wanting to avoid paper-work.
  - Computer literacy and having good internet access.
  - Being tied down for three years in the scheme.

"I do know one or two farmers that just don't want the paperwork, smallish farms, and they aren't going to get involved at all with crop assurance or the SFI said, well, let's not bother with the IPM either."

"It's probably just losing, you know, losing their land. I suppose some farmers can't see the benefit of having a cover crop or not putting insecticide on. So they either need more financial gain or perhaps more education of the benefits that can happen to having a margin…"

- Some suggestions by interviewees to remove these barriers were in line with suggestions to improve the uptake of the SFI. Suggestions included:
  - Increasing monetary rewards.
  - Educating and sharing knowledge.
  - Initiating farmer to farmer and peer influencing/learning.
  - Using influencers that farmers trust to encourage uptake such as agronomists and vets (for livestock farmers).
  - Creating a cultural change that is not driven by rule or monetary rewards but the desire and motivation to improve.
  - Ensuring that the instructions given are simple and clear and working towards gaining trusts from the farming community.
  - Ensuring consistency and promoting good practice.
  - More hands-on approach by reaching out to farmers on farms and encouraging them to participate.
  - Getting external-support from other parties to fill in the tool (such as agronomists).

"I think they need to explain why we're having to do this or what the tangible outcome of doing this actually is and second and thirdly, make it easy to do, which I think you've done with your tool. Finally, to make the reward applicable to the operation, but I still come back to that..."

Other IPM actions that could be supported through SFI IPM

- Interviewees suggested a number of other IPM actions that could be supported through the SFI IPM, including:
  - Mechanical weeding.
  - Cover crops and use of bio-fabrication.
  - Support to leave permanent crops as currently practiced with no modifications.

- Direct drilling.
- Spring cropping, green cover crops, dual cropping.
- Encourage actions to help control aphids or slugs and letting farmers choose within that scheme.
- In-field strips.

General view of Interviewees on agri-environment schemes funded by the government:

- In general, interviewees find agri-environmental schemes beneficial and are supportive of the schemes. There was a common belief that it would have been harder for farmers who are paid to farm to invest in initiatives that are good for the environment without these schemes, given the costs.

  "We should have been doing this 20 years ago and that's why I'm very positive for the environmental schemes and I do think they should be funded by the taxpayer… "

- There was a common consensus that being paid for contributing to the environment is much better than being paid for owning land under the Basic Payment Scheme (BPS). However, interviewees felt that transparency in agri-environment schemes was essential for uptake, as was ensuring that schemes don't take productive land out of food production. Interviewees felt there needed to be a good balance between focusing on food production and supporting environmental needs.

  "I think it's good in that we need to support the environment and it gives people who've got like, unproductive land, unproductive corners and patches the chance to earn something from them. But it shouldn't take away from production on good land."

2.3 WP 1 CONCLUSIONS

311 interviews/surveys completed with farmers.

Participants were generally positive about:

- Likely biodiversity benefits of SFI IPM paid actions.
- Potential for SFI IPM actions to reduce the need to use pesticides.
- The lasting impact of SFI IPM measures.
- SFI and the use of public funds being appropriate to increase IPM uptake.

Participants were more neutral about the role of SFI IPM paid actions providing sufficient pest control.

Participants were more negative about:

- Impact of SFI paid actions on food security.
- The capability of SFI IPM paid actions to fully manage pests in crops.
- The level of payment
  - The importance of fair compensation and financial assistance to offset the economic challenges of implementing IPM practices, especially for smaller-scale or mixed farms.

Participants were generally positive about:

- Committing to SFI IPM.
- Committing to IPM generally.
- Growing margins or strips for biodiversity.

- Creating an IPM plan.
- Participants were more neutral or negative about:
    - Growing companion crops (due to low success rate and risk of creating pest issues).
    - Committing to no use of insecticide (due to high risk on some crops).

Participants and actively selected interviewees were supportive of further paid actions for:

- Diverse rotations.
- Disease resistant varieties.
- Use of DSS.
- Bioprotectants.
- Permanent crop preservation
- Mechanical weeding
- In-field strips

Farmer typologies split participants into two groupings, broadly categorised as: 'environmentalists' and 'productionists' by their rankings of soil health, water quality, air quality, climate change mitigation, biodiversity, public health and food security.

There were also two broad typologies for attitudes to the design and payments for DEFRA schemes, optimists and pessimists, and willingness to commit to SFI, IPM and SFI IPM actions.

The final analysis of the typology of typologies resulted in 3 groups:

1. Critical of scheme but committed to IPM.

2. Pro scheme but non-committed to IPM.

3. Pro scheme and committed to IPM.

Increased advisory support for IPM and SFI IPM actions may be required to increase adoption and the Knowledge Transfer and Exchange (KTE) strategy should be adapted to suit the typologies of the audience. The significant role of the agronomist/adviser is important and future initiatives should consider the most appropriate KTE strategies for specific adviser/agronomist typologies.

14 in-depth semi-structured interviews completed with actively selected farmers.

- Interviewees had no preconceived expectations or perceptions of SFI IPM paid actions, with little understanding of what they would entail.
- Reasons for joining SFI included curiosity about techniques for soil health and reducing insecticide use.
- Monetary rewards and long-term environmental benefits were significant motivators.
- Ease of compliance and integration with existing practices, like Red Tractor, enhanced the attractiveness of the SFI.
- SFI IPM paid actions were generally considered fair, though higher payments to cover transition risks were suggested.
- Views on specific paid actions varied, with some considered adequate while others were deemed insufficient.

- Suggestions to enhance uptake included increasing monetary rewards, promoting education through accessible mediums, simplifying compliance processes, and integrating the scheme with existing farm practices.
- Common barriers to uptake included concerns over land loss, lack of knowledge about IPM practices, resistance to regulation and paperwork, and inadequate internet access.
- Solutions to overcome barriers were similar to uptake and included increasing monetary rewards, education, peer influence, and ensuring simplicity and trust.
- Interviewees generally viewed agri-environmental schemes positively, considering them crucial for balancing environmental and production needs while ensuring transparency.

2.4 WP 1 Supplementary Material

Defra SFI IPM

Survey Flow

Block: Intro + GDPR (4 Questions)

Branch: New Branch
If
If GDPR I consent to the collection and processing of my provided data for the sole purpose of condu... I do not consent - end the survey now. Is Selected

EndSurvey: Advanced - Screen-Out

Standard: Screeners (13 Questions)

Branch: New Branch
If
If Are you eligible for a Sustainable Farming Incentive (SFI) agreement? To be eligible to apply for... No Is Selected

EndSurvey: Advanced - Screen-Out

Standard: Awareness Questions (8 Questions)
Standard: ADAS/SRUC additions (4 Questions)
Standard: Actions (10 Questions)
Standard: Incentives (1 Question)
Standard: Resources (5 Questions)
Standard: General thoughts on SFI IPM Standard, Payments and Actions (1 Question)
Standard: Block 8 (4 Questions)

EndSurvey:

Page Break

Start of Block: Intro + GDPR

Q1
This research has been commissioned by Defra to establish an understanding of the levels of knowledge and awareness that exist regarding the Integrated Pest Management (IPM) scheme, which forms one of the 8 areas of the SFI (Sustainable Farming Incentive).

We are seeking responses from farmers in the UK. Participation in this research is voluntary and the survey should take no more than 15-minutes to complete.

You will receive a £20 Amazon voucher in exchange for your completed response.

Q2 **Keeping your data safe**

We take data protection very seriously. This survey is conducted in accordance with the Market Research Society Code of Conduct, and information you provided will be treated in accordance with General Data Protection Regulations (GDPR) Act 2018 and applicable UK general data protection laws.

By proceeding with this survey, you are giving your consent for us to process your data in accordance with our privacy policy, which can be found here: https://www.englandmarketing.co.uk/privacy-policy. This is to be used solely for the purposes of this research. All the answers you provide within this survey will be treated confidentially. Your anonymity will be maintained throughout the research, with each participant assigned a unique participant identification number, which will be used in answer responses and analysis. You will not be identifiable by any information included within our report. Data collected through this survey will be held for one year after the close of the project, after which it will be destroyed.

Please get in touch with our Data Protection Officer kara@englandmarketing.co.uk if you have any queries about your participation in this research or any additional accessibility requirements to be able to participate in this survey.

Q3 **GDPR**

I consent to the collection and processing of my provided data for the sole purpose of conducting research on behalf of Defra to understand UK farmers' knowledge and perceptions of the SFI IPM Standard. I understand that my responses will be anonymised and aggregated, and my personal data will not be shared for marketing purposes. I am aware that my participation is voluntary, and I can withdraw consent at any time.

- ○ I consent - proceed with the survey. (1)
- ○ I do not consent - end the survey now. (2)

Q4

End of Block: Intro + GDPR

Start of Block: Screeners

Q5 Are you eligible for a Sustainable Farming Incentive (SFI) agreement?

To be eligible to apply for an SFI agreement you need to have been a Basic Payment Scheme (BPS) eligible farmer on either 16 May 2022 or 15 May 2023.

- ○ Yes (1)
- ○ No (2)

Skip To: End of Block If Are you eligible for a Sustainable Farming Incentive (SFI) agreement? To be eligible to apply for... = No

Page Break

Q6 Are you aware of the IPM Tool?

- ○ Yes (1)
- ○ No (2)
- ○ I am unsure. (3)

Page Break

Display This Question:

If Are you aware of the IPM tool? = No

Or Are you aware of the IPM tool? = I am unsure.

Q60 The IPM Tool is an online, interactive tool developed for farmers and advisers to record and plan IPM activities. It provides specific guidance on the IPM control measures that are relevant to the crops you grow, and the particular pests, weeds and diseases that are a problem on your farm. ipmtool.net

Display This Question:

If Are you aware of the IPM tool? = Yes

Q7 Have you used the IPM Tool before to help you create an IPM plan?

- ○ Yes (1)
- ○ No (2)
- ○ I am unsure. (3)

Page Break

Display This Question:

If Have you used the IPM tool before to help you create an IPM plan? != Yes

Q8 Would you be willing to test the IPM tool for one crop type and then participate in a short telephone or in-person interview at a later date to help us gain a better understanding of how the tool could be improved. A £100 incentive will be offered in exchange for your time.

- ○ Yes (1)
- ○ No (2)

Page Break

Display This Question:

If Would you be willing to test the IPM tool for one crop type and then participate in a short telep... = Yes

Q9 Please provide some contact details so that we can get in touch with you regarding testing the IPM tool.

The details you provide will only be used for these stated purposes and will NOT be shared or used for any other reason.

- ○ First Name (3) _____
- ○ Last Name (4) _____
- ○ Email (1) _____
- ○ Telephone number (2) _____

Page Break

Q10 Where is your farm located?

(If you are situated across a county border, please select the county that your farm is **primarily** located in).

▼ Bedfordshire (1) ... Worcestershire (46)

Q11 What type of farm do you have?

- ○ Arable (1)
- ○ Outdoor Horticulture (2)
- ○ Protected horticulture (3)
- ○ Temporary grass ((4)
- ○ Permanent grass (5)

Q12 What is the total area (in hectares) that you farm?

Please supply as a number only.

_____

Page Break

Q13 Are you a Red Tractor registered farm?

- ○ Yes (1)
- ○ No (2)
- ○ I am not sure. (3)

Q14 Are you a LEAF farmer?

- ○ Yes (1)
- ○ No (2)
- ○ I am not sure. (3)

Q15 Is your farm registered with any Quality Assurance schemes other than those already mentioned?

- ○ Yes (please state which) (1) _____
- ○ No (2)
- ○ I am not sure. (3)

Page Break

Q16 Please rank the following in order of their importance on your farm, with 1 being the most important.

You can rank by tapping or clicking on the statement, then dragging and dropping it into place.

_____ Soil health (1)
_____ Water quality (2)
_____ Air quality (3)
_____ Climate change mitigation (achieving Net Zero) (4)
_____ Food security (5)
_____ Nature recovery (biodiversity) (6)
_____ Public health (7)

End of Block: Screeners

Start of Block: Awareness Questions

Q17 Are you aware of the Sustainable Farming Incentive (SFI)?

- ○ Yes (1)
- ○ No (2)

Skip To: Q21 If Are you aware of the Sustainable Farming Incentive (SFI)? = No

Page Break

Display This Question:

If Are you aware of the Sustainable Farming Incentive (SFI)? = Yes

Q18 Have you entered an SFI pilot agreement?

- ○ Yes (1)
- ○ No (2)
- ○ I am unsure. (3)

Skip To: Q20 If Have you entered an SFI pilot agreement? = Yes

Page Break

*

Q19 What is the total area of your land (in hectares) that is **currently enrolled** in SFI? Please supply your answer as a number only. Please enter '0' if none applies.

_____

*

Q20 How much of your land (in hectares) do you **plan to enrol** in SFI? Please supply your answer as a number only. Please enter '0' if none applies.

_____

Page Break

Q21 What area of land (in hectares) on your farm do you currently receive government scheme funding for (i.e., Environmental Land Management / Countryside Stewardship scheme?)

Please supply your answer as a number only, enter '0' if the answer is none.

_____

Page Break

Display This Question:

If If What area of land (in hectares) on your farm do you currently receive government scheme funding f... Text Response Is Greater Than or Equal to 1

And Are you aware of the Sustainable Farming Incentive (SFI)? = Yes

Q22 How much of your land that you currently receive government scheme funding for have you already, or are you planning to enrol, in SFI IPM?

Please supply your answer as a number only, enter '0' if the answer is none.

_____

Page Break

Display This Question:

If Are you aware of the Sustainable Farming Incentive (SFI)? = Yes

Q23 Are you aware of the Integrated Pest Management (IPM) actions of SFI?

- ○ Yes (1)
- ○ No (2)
- ○ I am unsure. (3)

Page Break

Display This Question:

If Are you aware of the Integrated Pest Management (IPM) actions of SFI? = Yes

Q24 Where have you gathered information about the IPM actions of SFI? Please select all that apply.

- ☐ Government website (1)
- ☐ Agronomist (2)
- ☐ Farming press (3)
- ☐ Advisors (4)
- ☐ Other farmers (5)
- ☐ Other (please state) (6) _____

End of Block: Awareness Questions

Start of Block: ADAS/SRUC additions

Q25 What is your attitude **in general** towards agri-environmental government schemes?

- ○ Extremely negative (1)
- ○ Somewhat negative (2)
- ○ Neither positive nor negative (3)
- ○ Somewhat positive (4)
- ○ Extremely positive (5)

Page Break

Q26 Do you consider that DEFRA agri-environmental schemes are, **in general**, well designed?

- ○ Yes (please feel free to include your thoughts) (1)
_____
- ○ No (please feel free to include your thoughts) (2)
_____
- ○ I am unsure (please elaborate on why you are unsure) (3)
_____

Q27 Do you consider that DEFRA agri-environmental schemes, **in general**, pay for the right actions?

- ○ Yes (please feel free to include your thoughts) (1)
_____
- ○ No (please feel free to include your thoughts) (2)
_____
- ○ I am unsure (please elaborate on why you are unsure) (3)
_____

Page Break

Q28 Do you think government funds should be used for agri-environmental schemes?

- ○ Yes (please feel free to include your thoughts) (1)
  _____
- ○ No (please feel free to include your thoughts) (2)
  _____
- ○ I am unsure (please elaborate on why you are unsure) (3)
  _____

End of Block: ADAS/SRUC additions

Start of Block: Actions

Q29 Based on what you know, how likely are you to...

	Very unlikely (1)	Unlikely (2)	Neutral (3)	Likely (4)	Very likely (5)	I already do this. (6)	I do not know what this is. (7)
Commit to SFI (1)	○	○	○	○	○	○	○
Commit to IPM overall (2)	○	○	○	○	○	○	○
Grow wild flower rich margins, blocks or strips (3)	○	○	○	○	○	○	○
Create an IPM plan (4)	○	○	○	○	○	○	○
Grow companion crops (5)	○	○	○	○	○	○	○
Commit to not using insecticide (6)	○	○	○	○	○	○	○

Page Break

Display This Question:

If Based on what you know, how likely are you to... = Very unlikely

Carry Forward Selected Choices from "Based on what you know, how likely are you to..."

Q30 Please explain why you are **very unlikely** to take the below action(s).

- Commit to SFI (1) _____
- Commit to IPM overall (2) _____
- Grow wild flower rich margins, blocks or strips (3) _____
- Create an IPM plan (4) _____
- Grow companion crops (5) _____
- Commit to not using insecticide (6) _____

Display This Question:

If Based on what you know, how likely are you to... = Unlikely

Carry Forward Selected Choices from "Based on what you know, how likely are you to..."

Q31 Please explain why you are **unlikely** to take the below action(s).

- Commit to SFI (1) _____
- Commit to IPM overall (2) _____
- Grow wild flower rich margins, blocks or strips (3) _____
- Create an IPM plan (4) _____
- Grow companion crops (5) _____
- Commit to not using insecticide (6) _____

Page Break

Display This Question:

If Based on what you know, how likely are you to... = Very likely

Carry Forward Selected Choices from "Based on what you know, how likely are you to..."

Q32 Of those you have said you would be **very likely** to do, how effective would each of these actions be in reducing the risks associated with pesticides on your particular farm?

	Very ineffective (1)	Ineffective (2)	Neutral (3)	Effective (4)	Very effective (5)
Commit to SFI (x1)	○	○	○	○	○
Commit to IPM overall (x2)	○	○	○	○	○
Grow wild flower rich margins, blocks or strips (x3)	○	○	○	○	○
Create an IPM plan (x4)	○	○	○	○	○
Grow companion crops (x5)	○	○	○	○	○
Commit to not using insecticide (x6)	○	○	○	○	○

Display This Question:

If Based on what you know, how likely are you to... = Likely

Carry Forward Selected Choices from "Based on what you know, how likely are you to..."

Q33 Of those you have said you would be **likely** to do, how effective would each of these actions be in reducing the risks associated with pesticides on your particular farm?

	Very ineffective (1)	Ineffective (2)	Neutral (3)	Effective (4)	Very effective (5)
Commit to SFI (x1)	○	○	○	○	○
Commit to IPM overall (x2)	○	○	○	○	○
Grow wild flower rich margins, blocks or strips (x3)	○	○	○	○	○
Create an IPM plan (x4)	○	○	○	○	○
Grow companion crops (x5)	○	○	○	○	○
Commit to not using insecticide (x6)	○	○	○	○	○

Page Break

Display This Question:

If Based on what you know, how likely are you to... = I already do this.

Carry Forward Selected Choices from "Based on what you know, how likely are you to..."

Q34 Of those you have said **you already do**, how effective are these actions in reducing the risks associated with pesticides on your particular farm?

	Very ineffective (1)	Ineffective (2)	Neutral (3)	Effective (4)	Very effective (5)
Commit to SFI (x1)	○	○	○	○	○
Commit to IPM overall (x2)	○	○	○	○	○
Grow wild flower rich margins, blocks or strips (x3)	○	○	○	○	○
Create an IPM plan (x4)	○	○	○	○	○
Grow companion crops (x5)	○	○	○	○	○
Commit to not using insecticide (x6)	○	○	○	○	○

Page Break

Display This Question:

If Of those you have said you would be very likely to do, how effective would each of these actions... = Ineffective

Or Of those you have said you would be very likely to do, how effective would each of these actions... = Very ineffective

Or If

Of those you have said you would be likely to do, how effective would each of these actions be in... = Very ineffective

Or Of those you have said you would be likely to do, how effective would each of these actions be in... = Ineffective

Or If

Of those you have said you already do, how effective are these actions in reducing the risks asso... = Very ineffective

Or Of those you have said you already do, how effective are these actions in reducing the risks asso... = Ineffective

Q35 Why do you believe these actions would be, or are, ineffective?

_____

_____

_____

_____

_____

Display This Question:

If Of those you have said you would be very likely to do, how effective would each of these actions... = Effective

Or Of those you have said you would be very likely to do, how effective would each of these actions... = Very effective

Or If

Of those you have said you would be likely to do, how effective would each of these actions be in... = Effective

Or Of those you have said you would be likely to do, how effective would each of these actions be in... = Very effective

Or If

Of those you have said you already do, how effective are these actions in reducing the risks asso... = Effective

Or Of those you have said you already do, how effective are these actions in reducing the risks asso... = Very effective

Q36 Why do you believe these actions would be, or are, effective?

_____

_____

_____

_____

_____

Page Break

Display This Question:

If Are you aware of the Sustainable Farming Incentive (SFI)? = Yes

Q37 What other IPM actions do you think should be supported through SFI IPM Standard? Please select all that apply.

- ☐ Diverse rotations (1)
- ☐ Disease resistant varieties (2)
- ☐ Use of decision support systems (3)
- ☐ Bioprotectants (4)
- ☐ Other (please state) (5) _____
- ☐ ⊗ None (6)

Page Break

Display This Question:

If What other IPM actions do you think should be supported through SFI IPM Standard? Please select a... != None

Q38 Why do you believe that this/these action(s) should be supported through SFI IPM Standard?

_____

_____

_____

_____

_____

End of Block: Actions

Start of Block: Incentives

Display This Question:

If Are you aware of the Sustainable Farming Incentive (SFI)? = Yes

Q39 Although the IPM plan will be a fixed annual payment, Defra will be incentivising the other 3 actions with payments based on hectares. To what extent do you think...

	Very unlikely (1)	Unlikely (2)	Neutral (3)	Likely (4)	Very likely (5)
The incentives are likely to be of value to me. (1)	○	○	○	○	○
The incentives will change practices on farms. (2)	○	○	○	○	○
The incentives have longevity in how land will be farmed better in the future (i.e. beyond the duration of the scheme). (3)	○	○	○	○	○

End of Block: Incentives

Start of Block: Resources

Q40 Are you aware of the Integrated Pest Management (IPM) assessment plan?

- Yes (1)
- No (2)
- I am unsure. (3)

Page Break

Display This Question:

If Are you aware of the Integrated Pest Management (IPM) assessment plan? = Yes

Q41 Have you completed an IPM plan in the last year?

- Yes (1)
- No (2)
- I am unsure. (3)

Page Break

Display This Question:

If Have you completed an IPM plan in the last year? = Yes

Q42 Do you know what your IPM plan score was?

- Yes - please enter (1) _____
- No (2)

Page Break

Q43 What practical support would you require to undertake IPM under the SFI scheme on your farm?

_____

_____

_____

_____

_____

Page Break

Display This Question:

If Are you aware of the Integrated Pest Management (IPM) assessment plan? = Yes

Q44 Who or what is/are your main information source(s) on IPM?

- ☐ Government website (1)
- ☐ Agronomist (2)
- ☐ Advisor(s) (3)
- ☐ Farming press (4)
- ☐ Other farmers (5)
- ☐ Other (please specify) (6)

_____

- ☐ ⊗ I have not accessed any information on IPM. (7)

End of Block: Resources

Start of Block: General thoughts on SFI IPM Standard, Payments and Actions

Q45 To what extent do you agree with the following statements...

	Totally disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Totally agree (5)	I do not know (6)
Managing pests in crops is completely possible using the actions currently included in the IPM standard (1)	○	○	○	○	○	○
Biodiversity will increase on farms by implementing the actions currently included in the IPM standard (2)	○	○	○	○	○	○
Pesticide use will be reduced on farms by implementing the actions currently included in the IPM standard (10)	○	○	○	○	○	○
Food security in the UK will be improved by implementing the actions currently included in the IPM standard (3)	○	○	○	○	○	○

Food safety in the UK will be improved by implementing the actions currently included in the IPM standard (4)	○	○	○	○	○	○
Water quality will be improved by adopting the actions currently included in the IPM standard on farms (5)	○	○	○	○	○	○
IPM standard is the best way to maximise the uptake of IPM actions by UK farmers (6)	○	○	○	○	○	○
IPM standards can only be implemented with the use of public funds (7)	○	○	○	○	○	○
The amount of money provided by the IPM standard per IPM action is enough to encourage implementation of the IPM action covered (8)	○	○	○	○	○	○
The current payment per IPM action is appropriate in the IPM standard (9)	○	○	○	○	○	○

End of Block: General thoughts on SFI IPM Standard, Payments and Actions

Start of Block: Block 8

Q46 What is your age?

Please enter as a number only.

_____

Page Break

Q47 Would you like to receive further information on the SFI IPM scheme, and are you willing to contacted by the ADAS/SRUC project team to aid the further development of the SFI IPM standard?

- Yes (1)
- No (2)

Q48 Would you like to receive a £20 Amazon voucher in exchange for taking part in this research?

Please note: this will be issued within 2 weeks of the completion of the research and will be issued to you via email.

- Yes (1)
- No (2)

Page Break

Display This Question:

If Would you like to receive further information on the SFI IPM scheme, and are you willing to conta... = Yes

Or Would you like to receive a £20 Amazon voucher in exchange for taking part in this research? Plea... = Yes

Or Would you be willing to test the IPM tool for one crop type and then participate in a short telep... = Yes

And If

If Please provide some contact details so that we can get in touch with you regarding testing the IPM tool.The details you provide will only be used for these stated purposes and will NOT be shared or... Text Response Is Not Displayed

And And Please provide some contact details so that we can get in touch with you regarding testing the IPM tool.The details you provide will only be used for these stated purposes and will NOT be shared or... Text Response Is Not Displayed

Q49 Please provide some contact details so that we can get in touch with you to issue your voucher and/or to provide you with more information about the SFI IPM scheme.

The details you provide will only be used for these stated purposes and will NOT be shared or used for any other reason.

- First Name (3) _____
- Last Name (4) _____
- Email (1) _____
- Telephone number (2) _____

End of Block: Block 8

APPENDIX 3 - WORK PACKAGE 2: REVISE THE IPM PLANNING TOOL BASED ON USER FEEDBACK AND TEST WITH ACTIVELY SELECTED FARMERS.

3.1 WP 2 METHODOLOGY

3.1.1 Improve delivery of guidance through the IPM Planning Tool and implement benchmarking.

Following feedback from user testing the IPM Planning Tool in Test and Trial 253a, further improvements and functions were developed to improve the impact of the tool. An updated version of the IPM Tool was made public on 22 January 2024 and a further update, which included the print page function for the IPM Summary page, was made public on 8 March 2024. The changes incorporated into the tool included:

- Expanding the Tool by including the spring cropping for barley, beans, oats and wheat, which are important for environmental aims.
- Enabling copying of data from previous years into future season, to reduce the repetitiveness of data entry for users.
- Highlighting of previous entries in the IPM plans of the options selected in the preceding season plan. This is to provide the user a refresher of their previous entries without having to fully re-load the previous season IPM plan.
- The addition of a section for claiming BASIS and NRoSO points for continuing professional development.
- The addition of the IPM weeds section and print page function for the IPM Summary page.
- Highlighting of sections on summary page where no IPM control measures were selected against pests of significant risk.

After these updates, benchmarking functions were developed so users could compare their IPM practices against those of their peers, at a national crop level. Comparisons with the performance of peers is considered a powerful driver to increase user commitment to change practices. Regional benchmarking was investigated for inclusion in the IPM Tool but could not be implemented due the complexity and requirement for third-party software support to make this fully functional.

The benchmarking data was dynamically retrieved from the database, which allowed users to always have access to the latest data available. The benchmarking methodology allowed users to select any of the questions available during the creation of the IPM plan, then retrieve the total of users that have answer that question with the percentage of each option available. To allow users to understand potential trends the benchmarking also displayed the data from the previous year. After completion of the benchmarking function, it was noted that the instructional video guidance on how to use the IPM Tool was outdated and an updated video, which included instructions on the new functions, was added to the tool when the benchmarking function was made public on 8 May 2024.

Following further feedback from users using the tool, improvements were made to the ‘other’ crops self-completion function so their entries could be viewed on the pest issues, control strategies and summary pages. Updates were made to the IPM Summary page where the user notes sections made whilst completing the tool were displayed on the summary print out. This was following feedback from users that it would be useful for them to see their notes on the IPM summary and not just within the separate sections of the tool, as being able to view the notes as a reference alongside the pest issues and control measure selected on the summary would further assist them with their IPM review and decision making. The final updated version of the IPM Planning Tool which included these functions was made on public on 30 June 2024.

3.1.2 Test the updated IPM Planning Tool with actively selected farmers.

During the interviews/surveys in WP1, participants were made aware of the IPM Planning Tool and asked if they would be willing to be contacted to test the tool. Thereafter, processes similar to those used in project 253a were followed for: (i) obtaining informed consent for their participation, (ii) the methodology to be followed by participants testing the IPM Planning Tool, (iii) the questionnaire and interviews used to gather feedback on the user experience, and (iv) analysis of the responses.

The rationale for this task is that the participants who engaged with project 253a and tested the IPM Planning Tool were a self-selecting group, likely to be towards the higher end of the population distribution with regard to interest in IPM and adoption. Hence, the impact of IPM planning on farmers who may be less actively engaged in IPM adoption was difficult to define.

A sample of 75 farmers defined from WP1 were contacted to test the tool (see section 2.1.4 for selection of sample). The sample was defined as farmers who expressed an interest to test the tool, were eligible for SFI payments and indicated that they would put more than the 5ha minimum of land required for SFI from the current area of land on which they already received government scheme funding (basic payments, countryside stewardship etc). The version of the IPM Tool participants were asked to test was the updated version made live on 22 January 2024, which included the updated functions detailed in Section 3.1.1 , but did not include print page function for the IPM Summary page or the benchmarking function developed for future updates.

The profile of the farmers contacted represented all sectors from a geographical spread across England and included 22 arable farms 60ha to 600ha in size, 40 mixed farms 25ha to 600ha in size and 13 permanent grassland 6ha to 770ha in size (Table 3.1). The majority of the farm types were under 300 ha in size.

Table 3.1: Profile of farm types invited to the test the IPM Tool first representative sample group.

Farm Size (ha)	Arable Farms (Number)	Mixed Farms (Number)	Permanent Grassland (Number)
0 – 100	4	6	4
101 – 200	8	17	4
201 – 300	3	8	3
301 – 400	2	3	0
401 – 500	2	5	1
501 – 600	3	1	0
601 - 700	0	0	1

A second sample of 42 farmers defined from WP1 were contacted to test the tool due to a low response rate of the first invited group. This sample was defined as farmers who expressed an interest to test the tool, were eligible for SFI payments but did not indicate how much of the current area of land on which they already received government scheme funding they planned to put into SFI. The profile of the farmers contacted represented all sectors from a geographical spread across England and included 14 arable farms 40ha to 400ha in size, 17 mixed farms 12ha to 320ha in size, 8 permanent grassland 2ha to 250ha in size, 1 temporary grassland (< 5 years old) farm 250 ha in size and 2 outdoor horticulture farms 30ha to 600ha in size and (Table 3.2). The majority of the farm types were under 300 ha in size.

Table 3.2: Profile of farm types invited to the test the IPM Tool second representative sample group.

Farm Size (ha)	Arable Farms (Number)	Mixed Farms (Number)	Permanent Grassland (Number)	Temporary Grassland (Number)	Outdoor Horticulture (Number)
0 – 100	3	8	6	0	1
101 – 200	4	6	1	0	0

201 – 300	6	2	1	1	0
301 – 400	1	1	0	0	0
401 – 500	0	0	0	0	0
501 – 600	0	0	0	0	1

To maximise willingness of the group to engage, the methodology was modified to limit the amount of user commitment required, as follows: Users were asked to complete IPM planning using the Tool for one crop type and the feedback questionnaire was a simplified version based on that used from the previous T&T. From the 117 farmers contacted to test the tool the IPM Planning Tool, we collected IPM plans from 48 participants and 33 provided user feedback via the questionnaire. From those that provided feedback, 23 agreed to be contracted for a follow-up 1-2-1 in-depth interview and questions were incorporated within the interviews for WP1 to collect detailed user feedback on using the tool (see section 3.2.3 for interview results). From the 117 participants invited to complete the IPM Tool, with the 48 registrations this gave a 41% return.

3.2 WP 2 RESULTS

3.2.1 IPM Planning Tool testing with actively selected farmers and commitment to change.

The profile of farmers who completed the IPM Tool represented all sectors from a geographical spread across England and included 16 arable farms 40ha to 600ha in size, 24 mixed farms 35ha to 500ha in size and 8 permanent grassland 21ha to 770ha in size (Table 3.3). At the closing date for participants to complete IPM plans using the tool, there were 77 completed separate crop plans by 48 registered participants. The number of completed plans by different crop group were: General Practices 51, Grassland 18, Maize 8, Oilseed Rape 7, Peas 3, Potatoes zero, Sugar Beet 3, Winter Barley 11, Winter Beans 2, Winter Wheat 22, Winter Oats 1, Spring Wheat 1, Spring Barley 1, Apples zero and zero for Brassicas.

Table 3.3: Profile of farm types who completed the IPM Tool.

Farm Size (ha)	Arable Farms (Number)	Mixed Farms (Number)	Permanent Grassland (Number)
0 – 100	2	6	5
101 – 200	5	7	0
201 – 300	2	7	2
301 – 400	3	1	0
401 – 500	2	3	0
501 – 600	2	0	0
601 – 700	0	0	0
701 – 800	0	0	1

Completing IPM plans through the IPM Tool should act as a driver for farmers to increase adoption of IPM control measures (interventions) beyond those currently in use on-farm. The commitment to change of the 48 farmers who tested the IPM Tool were compared to the 113 participants who completed the tool as part of the previous T&T to understand if there were any differences or commonalities between the two groups.

The completers of the tool in project 253a were participants who were identified as highly engaged in IPM as early/high adopters, in comparison to the actively selected farmers recruited for project 253b. Table 3.4, Table 3.5 and Table 3.6 give the breakdown of the degree of commitments to increase

adoption for the two projects across the crop groups where information was provided in the IPM Tool for interventions against invertebrates, diseases and weeds respectively (general weed issues in all crop rotations and crop specific weed intervention measures for grassland and apples). For project 253b the majority of IPM Plans were completed for wheat (253a 91; 253b 22) and grassland (253a 16; 253b 18), which is reflected on the farm types of the actively selected farmers who tested the IPM Tool and will form the basis of the main crop group comparisons between the two projects. For the purposes of comparison wheat, barley, oats, peas and beans are winter sown, as spring cropping was not available in the version of the IPM Tool used in project 253a and therefore excluded from the tables. For project 253b there was only a small sample number for the remaining crop groups and no IPM plans were completed for the crop groups potatoes or apples, therefore data should be treated with caution for crops for which few IPM plans were completed.

In both projects completing crop plans using the IPM Tool recorded increased commitment to IPM measures in most cases, compared against current practice. For interventions against invertebrate pests, increases in IPM measures in wheat was 11% in 253a and slightly higher at 16% in 253b. In the self-selecting farmer group there was a particularly high commitment to change recorded in the grassland group (103%) and relatively high commitment (46%) in the actively selected farmer group. There was a similar level of increases in IPM measures against invertebrate pests between the two groups for the crop groups barley, sugar beet and maize (9 – 18%).

The commitment to increased IPM from current practice for diseases in all crops was 0 to 38% in project 253a and from 0 to 37% in project 253b. The increases between the two groups for disease interventions in winter wheat (7 – 8%) and grassland (37 – 38%) were very similar.

For weed control in general weeds in rotation, there was a 19% commitment to new IPM control measures recorded using the IPM Tool in project 253a compared with 24% in 253b. Similarly in weed control in grassland, there was a 46% commitment to new IPM control measures recorded using the IPM Tool in project 253a compared with 38% in 253b.

Table 3.4: Degree of intention to adopt new IPM practices for invertebrate pests. Comparison between self-selecting (Project 253a) and actively selected farmers (Project 253b).

	Project	Wheat	Barley	Oats	Oilseed Rape	Potatoes	Sugar Beet	Peas	Beans	Grassland	Maize	Apple
Total number of feasible IPM interventions (unsuitable interventions excluded)[1]	253a*	912	263	43	283	84	77	32	63	87	25	4
	253b**	234	99	8	65	0	17	10	3	98	10	0
Total number of IPM interventions that are already current practice[2]	253a*	747	213	37	172	62	55	19	37	37	21	2
	253b**	190	81	8	48	0	12	7	3	54	9	0
Total number of new IPM interventions which could be adopted[3]	253a*	165	50	6	111	22	22	13	26	50	4	2
	253b**	44	18	0	17	0	5	3	0	44	1	0

Total number of new IPM interventions committed to in IPM Tool[4]	253a*	79	23	4	43	5	10	9	11	38	2	1
	253b**	30	7	0	7	0	2	2	0	25	1	0
Percent of new IPM interventions committed to in IPM Tool[5]	253a*	48%	46%	67%	39%	23%	45%	69%	42%	76%	50%	50%
	253b**	68%	39%	0%	41%	n/a	40%	67%	0%	57%	100%	n/a
Percent of new IPM interventions as percentage of current practice[6]	253a*	11%	11%	11%	25%	8%	18%	47%	30%	103%	10%	50%
	253b**	16%	9%	0%	15%	n/a	17%	29%	0%	46%	11%	n/a

Table 3.5: Degree of intention to adopt new IPM practices for diseases.
Comparison between self-selecting (Project 253a) and actively selected farmers (Project 253b).

	Project	Wheat	Barley	Oats	Oilseed Rape	Potatoes	Sugar Beet	Peas	Beans	Grassland	Maize	Apple
Total number of feasible IPM interventions (unsuitable interventions excluded)[1]	253a*	861	241	26	304	87	49	40	140	63	21	4
	253b**	208	85	8	58	0	13	13	5	75	18	0
Total number of IPM interventions that are already current practice[2]	253a*	760	217	25	255	79	48	40	111	39	20	4
	253b**	190	79	8	53	0	10	12	4	52	17	0
Total number of new IPM interventions which could be adopted[3]	253a*	101	24	1	49	8	1	0	29	24	1	0
	253b**	18	7	0	5	0	3	1	1	23	1	0
Total number of new IPM interventions committed to in IPM Tool[4]	253a*	63	13	1	16	1	1	0	13	15	1	0
	253b**	14	2	0	2	0	3	1	0	19	1	0
Percent of new IPM interventions committed to in IPM Tool[5]	253a*	62%	54%	100%	33%	13%	100%	0%	45%	63%	100%	0%
	253b**	78%	29%	0%	40%	n/a	100%	100%	0%	83%	100%	n/a

Percent of new IPM interventions as percentage of current practice[6]	253a*	8%	6%	4%	6%	1%	2%	0%	12%	38%	5%	0%
	253b**	7%	3%	0%	4%	n/a	30%	8%	0%	37%	6%	n/a

Table 3.6: Degree of intention to adopt new IPM practices for generals weeds and weeds in grassland and apples.
Comparison between self-selecting (Project 253a) and actively selected farmers (Project 253b).

	Project	Grassland	Apple	General Weeds
Total number of feasible IPM interventions (unsuitable interventions excluded)[1]	253a*	176	61	1468
	253b**	207	0	548
Total number of IPM interventions that are already current practice[2]	253a*	98	27	1047
	253b**	113	0	372
Total number of new IPM interventions which could be adopted[3]	253a*	78	34	421
	253b**	94	0	176
Total number of new IPM interventions committed to in IPM Tool[4]	253a*	45	14	201
	253b**	43	0	89
Percent of new IPM interventions committed to in IPM Tool[5]	253a*	58%	41%	48%
	253b**	46%	0	51%
Percent of new IPM interventions as percentage of current practice[6]	253a*	46%	52%	19%
	253b**	38%	0	24%

[1] the number of feasible interventions (excluding those that are not relevant for a pest identified as a slight, moderate or significant issue on a farm). Note: the total in each row is of all the completed LMPs returned from that group.

[2] the number of interventions given in the previous row, minus the number of interventions that are already in current use on a farm.

[3] the number of interventions which could be adopted (by subtracting [2] from [1]).

[4] the number of interventions which farms committed to adopt in IPM planning in the short or long term.

[5] = [4] as a percentage of [3].

[6] = [4] as a percentage of [2].

*Project 253a sample size of 231 completed separate crop plans by 113 registered participants. The number of completed plans by different crop group were: General Practices 135, Grassland 16, Maize 6, Oilseed Rape 33, Peas 10, Potatoes 8, Sugar Beet 11, Winter Barley 27, Winter Beans 20, Winter Wheat 91, Winter Oats 6, Apples 1 and zero for Brassicas.

**Project 253b sample size of 75 completed separate crop plans by 48 registered participants. The number of completed plans by different crop group were: General Practices 51, Grassland 18, Maize 8, Oilseed Rape 7, Peas 3, Potatoes zero, Sugar Beet 3, Winter Barley 11, Winter Beans 2, Winter Wheat 22, Winter Oats 1, Apples zero and zero for Brassicas.

3.2.2 Online IPM Tool actively selected farmer feedback.

The feedback analysis presented here is a high-level reflection on actively selected farmer experiences of using and completing the online IPM Tool (see 3.4.4 WP 2 Supplementary Material for full feedback questionnaire).

Participation and Tool Completion

- Thirty-six participants responded to the survey questionnaire. This number represents a 75% response rate based on the sample of 48 actively selected farmers who tested the IPM Tool for one crop type. The high response rate indicates a positive willingness to participate in IPM planning through the use of online IPM tools.
- Of the 36 participants who attempted the feedback survey, 30 were farmers and 3 indicated that they were both a farmer and an agronomist. Three participants only partially completed the survey, so they were excluded from the analysis.
- The crop type used most often by actively selected farmers when testing the IPM Tool was winter wheat, followed by improved grassland and oilseed rape (Figure 3.1).

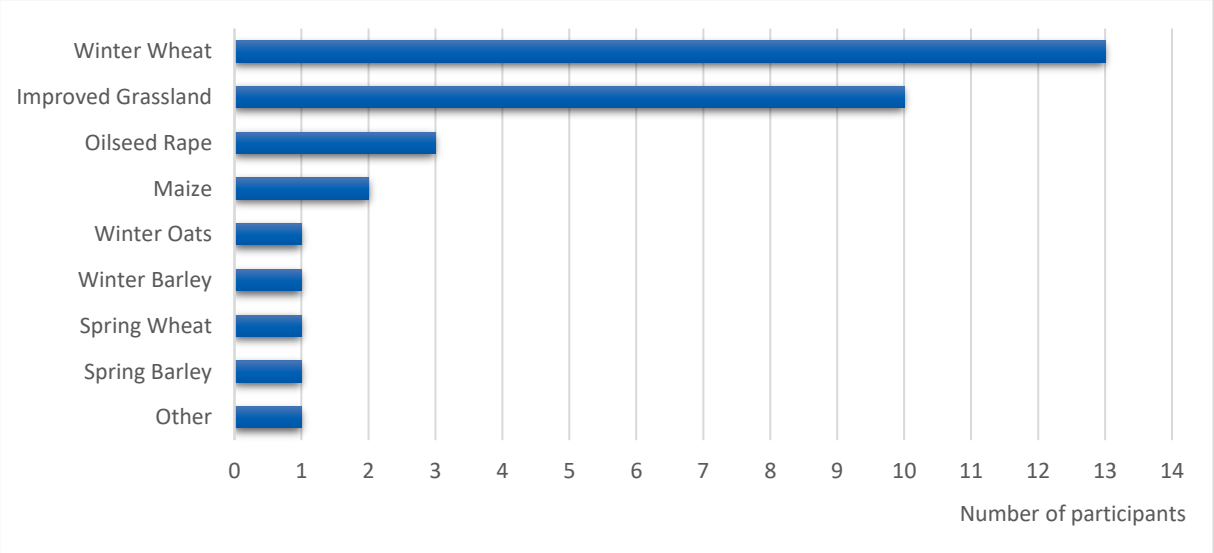

Figure 3.1: Crop types used in IPM Tool testing by actively selected farmers.

- Most (88%) of the participants who fully completed the online IPM Tool indicated that they were able to complete the tool without requiring advice from their agronomist. Four (11%) of the participants indicated that they were BASIS qualified.
- Most (91%) of the participants found the introductory page of the online IPM Tool helpful. One of the reasons cited for **not** finding the introductory page useful was: "*I didn't read it. I rightly assumed it would be a tick box exercise*". Another reason cited was "*It assumed pre knowledge of IPM and didn't give any useful information it was full of jargon*".

- Most (93%) of the participants completed the online IPM Tool in under an hour. Only two participants took longer than an hour to complete the tool (Figure 3.2).

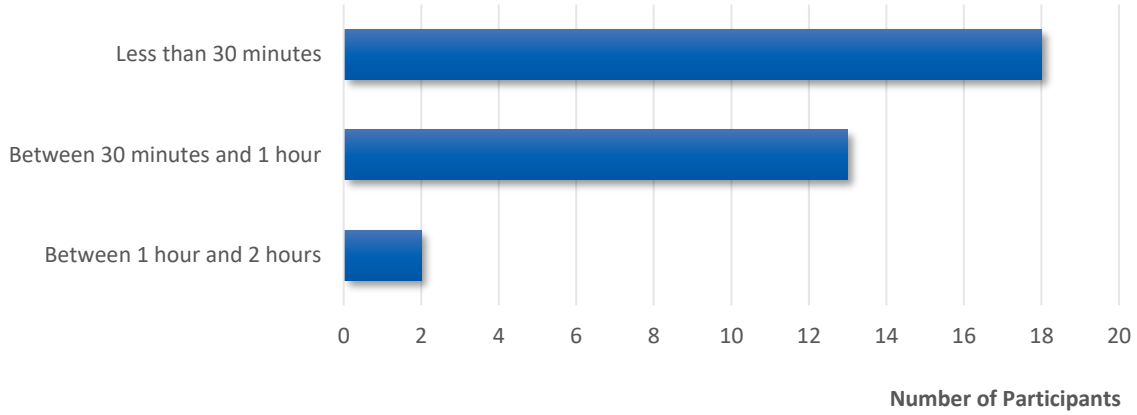

Figure 3.2: Time spent completing the online IPM Tool.

- Most (91%) participants who fully completed an IPM plan for one crop indicated they would consider using the IPM Tool for more than one crop.

Reason for using IPM Tool for more than one crop

- Four main themes emerged for why farmers would use the IPM Tool across multiple crops:
  - Versatility and customisation.
  - Functionality and user experience.
  - Compliance with farming initiatives and standards.
  - Holistic farm management.
- Participants appreciated that the IPM Tool is a versatile tool that is relevant for many crops. In particular, participants felt that it was essential to consider individual crops separately given that they are treated differently, have different risks, and different IPM approaches. Cited responses included: *"Different crops have different IPM approaches"; "to cover all the crops I grow as they are all treated differently"; "It has made me think about what benefits we could see in other crops"* and *"useful to do for arable as well as grass ".*
- Participants mentioned that the IPM Tool's functions and positive user experience further facilitated the use of the tool across different crops. Participants praised it as a valuable "*thinking tool*" that facilitates decision making process by providing focus and direction. Cited responses such as *"I feel strongly this is right sort of thought process we should go through in making decisions*"; *" it made me think about what benefits we could see in other crops"* and "*Gives good focus and direction to improve husbandry of crop*" further highlight farmer sentiments.
- Streamlining compliance emerged as a significant advantage for participants, with the tool demonstrably fulfilling SFI IPM plan requirements and facilitating Red Tractor. Cited responses included: *"fulfils the requirement for an IPM plan for SFI"; "It proves to Red Tractor that I have done one"* and *" will be useful for SFI in future"*.
- Participants believe that creating a plan for more than one crop is essential for holistic farm management purposes. Cited reasons included: *"Having all crops in one standard format would be beneficial"*; *"I think you need to consider all crops as many pests overlap different crops or are caused by previous actions or lack of "* and *"For a whole farm approach to IPM"*.

IPM Tool Usability and Functionality

Participants were asked a number of questions related to how they found the online process of completing the IPM Tool and their level of satisfaction with different aspects of the online IPM Tool.

- Overall, feedback related to the online IPM Tool usability and functionality was extremely positive.
- Farmer participants mostly found the online process of completing the IPM Tool easy or very easy (Table 3.7).

Table 3.7: Participant responses to the question - ˜*How did you find the online process of completing the IPM Tool?*"

How did you find the online process of completing the IPM Tool?	Percent of Total Participants (N=33)
Very Easy	21%
Easy	52%
Neither Easy nor Difficult	27%
Difficult	0%
Very Difficult	0%
Totals	**100%**

- Participants were overwhelmingly satisfied with the ease of registration and use, as well as the links to guidance in the online IPM Tool (Figure 3.3).

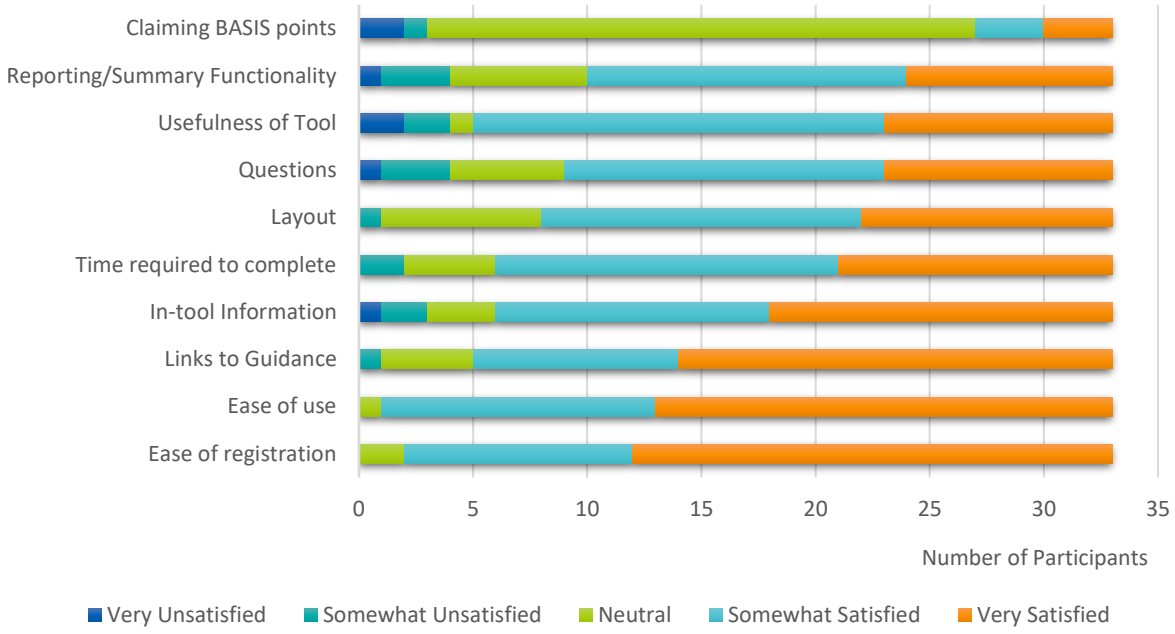

Figure 3.3: Satisfying aspects of the online IPM Tool as scored by actively selected farmers who completed the tool – noting how satisfied (on a scale of Very Unsatisfied to Very Satisfied) they were with each aspect as stated in the survey questionnaire.

- In particular, participants mentioned that the tool was simple and easy to use with clear instructions and straightforward data entry process. Additionally, they found the questions to be thought provoking, as they prompted users to carefully consider their IPM approach. Cited responses included: *"The click box answers made it very easy to use."* and *"The questions made me think about*

our IPM approach on our farm". "All the information is in one place to start preparing a plan I can use to improve my farming"

- Participants found the embedded links valuable, highlighting that the embedded links were simple yet rich in information. Participants mentioned that the links were particularly helpful for pest identification. Cited reasons included: "*simple and good links to explanations and data*"; "*Links to good information*" and *"Links to AHDB guidance. I could use the link to recognise pests / diseases that I know by sight but not name".*

- Layout and questions in the online IPM Tool where less satisfying to participants (Figure 3.3). The main concern expressed was with regards to the questions, particularly the depth of the questions and their applicability. Some participants pointed out that the questions were limiting and basic. Participants expressed their desire for more recommendations and information on pest and disease control measures to be incorporated in the report and felt that a lot of important aspects of IPM such as seed treatments and seed test options have not yet been incorporated. Cited responses included: "*your trying to snapshot something that happens organically over a season, weather etc all play a role, to make a tool useful it need to do more than tick a box for a SFI application, there are chemical resistance announcements etc there are crop trials, there are aspects that involve seed treatments choices seed test options to reduce chemical treatments all mentioned by my agronomist not by the IPM plan, the big hole is on cultivation option or soil type which limit some choices so without that what value do recommendations it makes have?*"; *"Would have liked more information on pest and disease threshold levels"; "Would like more comment about some of the pest and disease control measures " and "Perhaps a more obvious link to information on specific pests".*

- The questions were also found to be lengthy and repetitive by some participants. Repetition was mainly seen in control measures across cereal crops which participants believe are mostly managed in a similar way. Suggestions were provided to make the questions less repetitive, especially for farmers who may have to complete the form for more than one crop. Cited responses included: *"The form was long & repetitive"; "For our particular farm a lot of the categories don't apply and it would have been better to have had a not applicable button, because clicking the not suitable for our farm button feels as though we could have done that option but chose not to, when actually it wasn't ever going to be possible ", "Make it less repetitive when completing for more than one crop - maybe suggest that people complete it in stages?"* and "*Lots of repetition of control measures across cereal crops. Mostly managed in similar way "*.

- Most participants were satisfied with the reporting/summary functionality of the IPM Tool (Figure 3.3). However a small number of participants (n=4) were unsatisfied with the reporting/summary functionality as they were not able to review and see a sample completion. Cited responses included: "*I would like a PDF printout of the results* and *"PDF print out of the plan or perhaps an email copy of the plan ".*

Video and Written Guidance

Participants were asked questions related to the video and written guidance provided within the online IPM Tool. In general, feedback was positive, however there were a number of participants who stated that they did not find or use the video or written guidance. Some of the cited responses are provided below.

Video Guidance

- Participants mostly found that the **introductory video** contained relevant information, was engaging and was a good length. Just under a half of all participants (45%, 15/33) felt that they learnt something new from watching the introductory video (Figure 3.4).

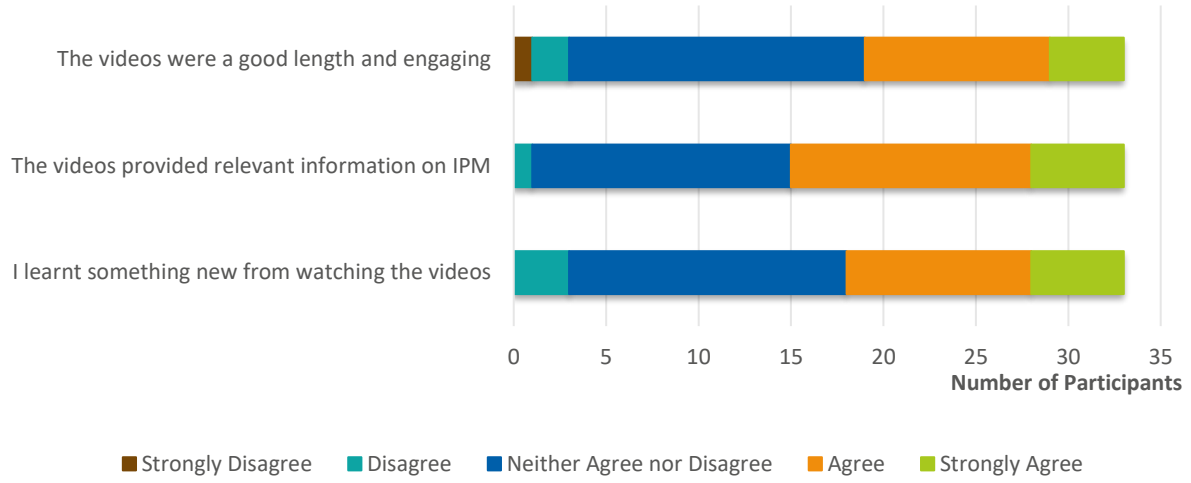

Figure 3.4: Responses to <u>introductory</u> video guidance statements as scored by participants who completed the tool – noting their level of agreement (on a scale of Strongly Disagree to Strongly Agree) with the statements provided.

- Participants mostly found that the **guidance videos** were easy to understand and follow, as well as being both engaging and a good length. More than half of all participants (51%, 17/33) felt that the videos helped them complete the tool without additional support (Figure 3.5).
- Some participants stated that they did not watch the video guidance or found them too long. Cited responses included: *"I didn't watch or read any guidance but managed to complete it, although can see how others wouldn't without the guidance"* and "*videos bit overlength*".

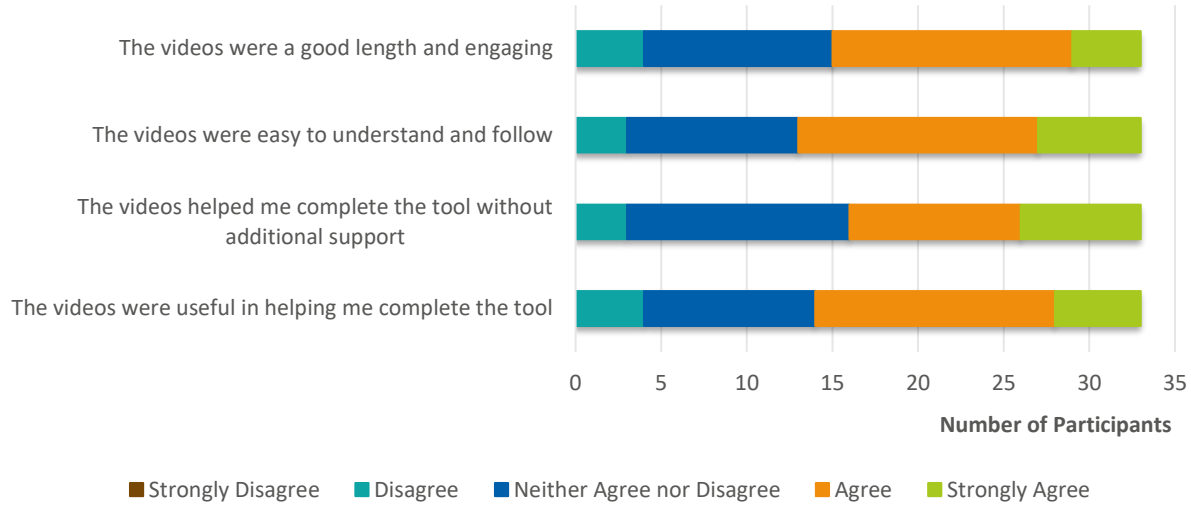

Figure 3.5: Responses to <u>general</u> video guidance statements as scored by actively selected farmers who completed the tool – noting their level of agreement (on a scale of Strongly Disagree to Strongly Agree) with the statements provided.

Written Guidance

- Participants largely felt that the **written guidance** helped them learn something new, including learning about different aspects of IPM. Most participants (82%, 27/33) also felt that the written guidance would be a valuable ongoing source of information (Figure 3.6).

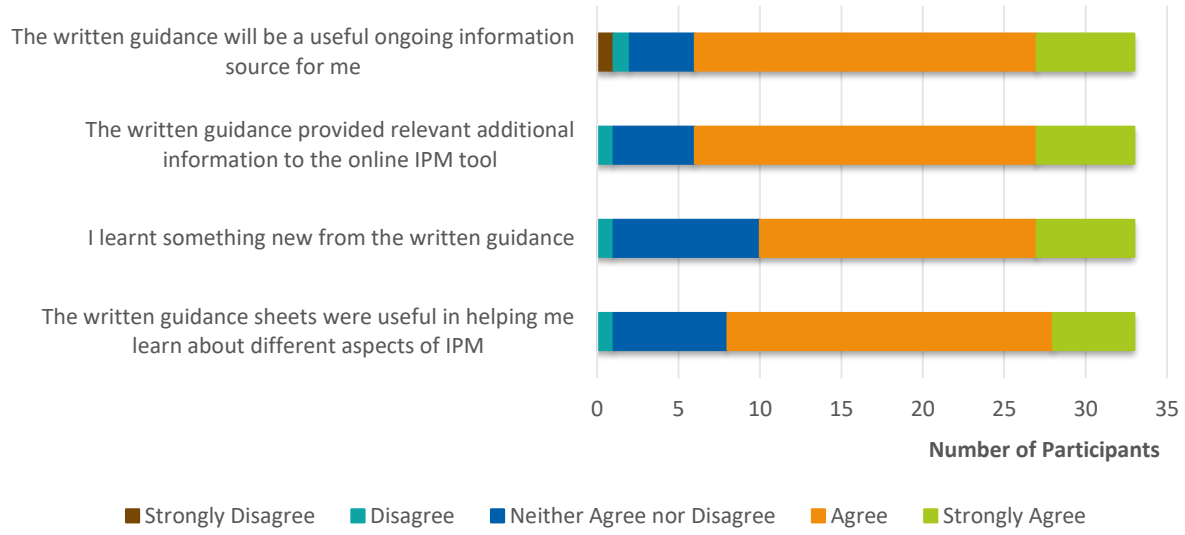

Figure 3.6: Responses to written guidance statements as scored by actively selected farmers who completed the tool – noting their level of agreement (on a scale of Strongly Disagree to Strongly Agree) with the statements provided.

Complete Experience

Considering their overall complete experience of using the online IPM Tool, participants were asked to rate a number of statements related to how likely it would be that they would do what was suggested in the statements. Figure 3.7 highlights the responses provided for each statement.

- Participants overwhelmingly indicated that they would recommend the online IPM Tool to others, with 76% (25/33) likely or very likely to recommend it. Likewise, 64% (21/33) of all participants indicated that they were likely or very likely to use the tool to create a new plan for the following harvest year.
- Over a third of all participants (42%, 14/33) indicated that it was unlikely or very unlikely that they would use the video guidance again. However, over half of all participants (55%, 18/33) indicated that they were likely or very likely to use the written guidance again.
- Most participants (82%, 27/33) indicated that they were likely or very likely to refer to the IPM Tool again to find information or update their IPM plan and two thirds of participants (67%, 22/33) indicated that they would use the tool to create IPM plans for multiple crops.

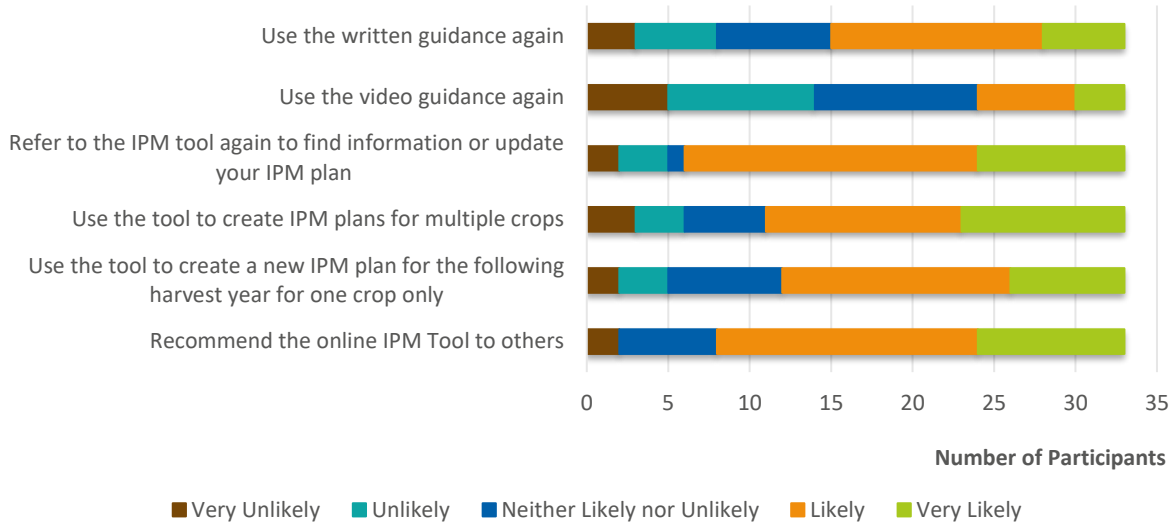

Figure 3.7: Responses to complete experience statements as scored by actively selected farmers who completed the tool – noting level of likelihood (on a scale of Very Unlikely to Very Likely) with the statements provided.

3.2.3 Behavioural Insight Interviews with actively selected farmers

Recruitment of farmers/growers to participate in semi-structure interviews

A total of 23 farmers who completed the online IPM Tool feedback survey indicated that they would be willing to provide further insights into their experience and perspectives. All 23 respondents were sent an email invitation to participate in a 1-to-1 interview with an ADAS researcher. Follow-up calls were made to those who did not respond to the email invitation to ensure inclusion of farmers who may have missed the emails or had limited access to the internet.

Through these efforts, the team were able to reach 16 respondents. Two declined to participate further due to timing and farm commitments, leaving a total of 14 confirmed interviews for analysis.

Interview design

Respondents were given the option of completing the interview via Microsoft Teams or by telephone during the invitation. A consent form was emailed to respondents to read and sign before the interview.

Interviews lasted approximately 30-60 minutes and the team noticed that the interviews on Teams were slightly longer on average than those conducted over the phone.

The interviews were guided by the semi-structured interview guide (see Section 3.4.5) where the researcher has the flexibility to probe respondents to expand and provide examples when necessary. During the interview, respondents were also assured that both positive and negative feedback were critical for the improvement of the IPM Tool to obtain honest opinions.

All interviews were recorded, given the permission from the respondent, and the recordings were transcribed using Microsoft's automatic transcription services. Participants were informed that the recording would be stored securely at ADAS, transcribed and anonymised to remove any details that could identify the respondent and their farm. The respondents were also made aware that the recording would be deleted once the project was completed and signed off.

The following sections present the views and perceptions of the 14 participants who completed the 1-to-1 semi-structured interviews.

Expectations and opinions of the online IPM Tool

- Interviewees had varying expectations and opinions of the online IPM Tool, including providing them knowledge and confidence to make informed decisions. Others saw it mainly as helping them comply with the SFI IPM requirements. Cited responses included:

  "So I was kind of hoping that the IPM Tool would give me a bit of information essentially and help guide me through that side of what we do on the farm, a farm in partnership with my parents... I kind of saw it as an opportunity to upskill myself and also enter those conversations with a bit more knowledge and confidence to explore how we as a business can adopt IPM techniques and in the future."

  "I didn't really have any expectation other than I wanted it to be SFI compliant, but in a way it's quite similar to the NFU one. So it's like an IPM management tool really. So, it wasn't really very different, so I didn't find anything particularly out of ordinary about it."

- Generally, interviewees expected the IPM Tool to be SFI compliant, a straightforward method for recording IPM choices and a good platform for providing IPM knowledge and information to help with decision making.

  "To make it easy to record our IPM choices. I was hoping it would suggest new ideas for IPM. And yeah, to tick all the boxes. So we know what they're expecting of us to record. You know, so that we're fully compliant."

  "I thought it would help with decision making… Really help with decision making with certain pests really."

- There was a general perception that the tool is a great conversation starter, especially with other farming partners and agronomists when considering an IPM plan for the farm.

  "…But I'd like to start opening that conversation up, and I think that Tool gives me the confidence to start doing that."

Functionality of the IPM Tool (useability and practicalities)

- There was a general consensus amongst interviewees that the tool was self-contained and entailed excellent guidance.

  "I thought the explanation provided is excellent. The guidance is really good."

  "It links to other resources. So yeah, I think everything (is self-contained), I didn't go outside of the of the IPM Tool."

  "I know I didn't need to look elsewhere. I think I had to press the odd "I" button and get a definition or an understanding. But it was perfectly possible to do. It wasn't really hard."

- Some interviewees felt that the IPM Tool primarily records what farmers already do on their farm and does not add to the work they already perform. Others felt it offered reassurance and confidence that they were already implementing appropriate IPM actions and following good practice.

  "But when we filled it in, what does it do for us? It actually doesn't do anything, it just records a bit of information about our thinking processes. It's fine if you want to do a survey, but it doesn't add to the management of the crop in any way, shape or form to me."

  "It's more reassurance rather than telling me what to do. Reassuring that what we're doing is right."

- Those who found the tool useful mentioned that the tool was highly organised and provided farmers who have limited computer skills with a good template that was well structured. Others mentioned that the tool allowed users to formalise their approach to IPM and help them consider what needs changing on the farm.

- Those who did not find the tool particularly beneficial felt that the tool was simplistic and was just aimed at *"ticking the SFI box".* It was also mentioned that inputting IPM plans into the tool for more than one crop can be highly repetitive.

- Other data recording tools (which were predominantly software based) used by interviewees were identified as having similarities in data requirements as the online IPM Tool. These included Red Tractor, Gatekeeper and Muddy Boots. Several suggestions for improvements to the IPM Tool were made, including adding the ability to download field information from other tools and upload it to the IPM Tool to autofill some information. Some interviewees felt that copying across information that is the same year to year could significantly reduce the time taken to complete the IPM Tool.

  "… I would also suggest that a lot of agronomists use things like Muddy Boots software to do the recommendations and other things like that – In some respects if the app had been designed to link to software that agronomist uses, yeah, that would have, in a way, gauged the agronomy used on the farm."

  ".. So my agronomist uses this and we then update our information accordingly. So I've got this in my pocket all the time" [Muddy Boots]

  "…I found that some of these questions could have been answered by basically inputting my post code. The area I lived, the farm area etc. would have prepopulated a lot of the risk factor for some of the diseases and things like that.

- While there was a general consensus that the written and video guidance were useful, some interviewees felt that the information provided was more of a reminder of what they already know than a learning experience.

  "Yes, it was useful in the sense that it reminded me of what I do. But it wasn't useful in the sense that I learnt anything about it."

- A number of suggestions were made for improving both the written and video guidance, including:

  - A directory of resources which would allow faster access to the videos in the future.
  - Keeping videos short.
  - Infographic style approach to presenting and providing advice.
  - Providing real life experience of what works and what is effective (potentially presenting case studies of farms).
  - Having a frequently asked questions section embedded with potential answers.
  - Improving overall video quality.

Perceived barriers to continued use of the IPM Tool

- Participants discussed a number of barriers to their continued use of the IPM Tool. The common themes that emerged across the interviews included:

  - **Time constraints** – Interviewees felt that farmers and land managers may perceive the IPM Tool as an additional red-tape that may take time away from their main job.

"... rather than allowing you to get on and do the job that earns the money… But by the time you've had your Red Tractor assurance, you've then had your LEAF questionnaire. You've done your crop management. Bits and pieces to get to reduce the figures to feed into the accountant. You've then taken your yield maps and done the bits and pieces with those to come up with your fertiliser plans [and] to come up with your seed…"

"finding time to do it"

- **Computer literacy -** Sentiments were expressed regarding the need for older farmers to have assistance to complete the online IPM Tool. There was a general consensus that involving agronomists or working with an agronomist while completing the tool would help farmers with lower computer literacy or access to a computer.

"So for my dad, he absolutely hates computers and it would be that."

"I know there's a lot of other people that are 60's onwards. Who wouldn't want to go on a computer, unless they really, really, really have to, like if they've got an alternative option, then go with that"

- **Spraying Culture** – Some interviewees felt that agronomists might be pressured by existing culture to spray rather than take the task of finding out [other control measures] and spraying only when necessary. A potential solution suggested was to incentivise agronomists to introduce the IPM Tool to their clients.

"…if you can get the agronomists on board, then that's that. Yeah, we employ them to tell us what to do. So if they tell us to do something then… We tend to do it..."

- Interviewees mentioned that they would stop using the tool if (i) there was a fee to use it, (ii) it was no longer SFI compliant, (iii) there was a better alternative tool, and (iv) if it remains a survey tool rather than a farm management software.

Motivational factors to continued use of the IPM Tool

- Perceived advantages of using the tool which interviewees felt would keep them motivated to use it included:
  - The ability of the IPM Tool to contribute to farm management and best practice.
  - Incorporation of good resources and ideas regularly into the tool.
  - Having influencers such as agronomists pushing the use of the tool.
  - Continued provision of financial incentives.
  - Compliance with SFI.

"… I think so because the more you think about IPM, what I really want is, answers to the IPM. I want to know what the best the best pollinating crops are. And whether to have them field stripped and how far apart they should be in all of that. I mean that's what I want. I want the techniques to improve my IPM rather than just saying, well, the just keeping a record of what I'm doing. So I think it would be good if it had a bit of both."

"Well, I was interested in it because I wanted it to fulfill the requirements of the SFI. That's my principal driver."

"Really just help me almost tick the box for the SFI agreement."

3.3 WP 2 CONCLUSIONS

- The IPM Planning Tool was updated following user feedback on their requirements for improved functions. The feedback received on the updated functions has been positive.
- Farmers who expressed an interest from WP1 were invited to test the IPM tool to create an IPM plan for one crop type grown on their farm. 48 registered participants undertook this process, creating 77 plans, for the following crops: winter wheat (22), oilseed rape (7), winter barley (11), winter beans (2), grassland (18), sugar beet (3), peas (3), maize (8), winter oats (1), spring wheat (1) and spring barley (1).
- The IPM planning that resulted from using the IPM Tool, recorded substantial commitments to increase IPM actions in the actively selected farmer group compared to current practice. The commitments to increase IPM were broadly similar to those recorded for the early/high adopters in the previous T&T.
- The overall number of completed responses to the online feedback survey (n=33) represented a 75% response rate based on the representative sample of 48 farmers who tested the IPM Tool for one crop type. This indicates a positive willingness to engage in IPM planning through the use of online IPM tools.
- The majority of participants completed the online IPM Tool in under an hour and most completed the tool without requiring advice from their agronomist.
- Feedback from actively selected farmers who tested the IPM Tool was predominantly positive. The IPM Tool was complimented for its ease of use, clear instructions, straightforward data entry process and links to up-to-date information. Additionally, participants found the questions to be thought provoking as they prompted users to carefully consider their IPM approach.
- The majority of the respondents gave positive feedback on the video and written guidance and found these useful for completing the IPM Tool.
- A high percentage (91%) of those who fully completed an IPM plan for one crop indicated they would consider using the IPM Tool for more than one crop in future seasons.
- Participants overwhelmingly indicated (82%) they were likely to refer to the IPM Tool again to find information or to update an IPM Plan.
- Participants indicated (76%) that they would recommend to other farmers to consider using the online IPM Tool and would use the tool again to create a new plan for the following harvest year.
- Most participants were satisfied with the reporting/summary functionality of the IPM Tool. However, a small number of participants highlighted that they were not able to review and see a sample completion, which is similar to the feedback received by previous IPM Tool users and has resulted in the updated version of the tool which included the improved reporting and PDF print page functionality for the IPM Summary page.
- Interviewees expected the IPM Tool to provide knowledge and confidence for making informed decisions about IPM.
- Many viewed the IPM Tool as a means to comply with SFI requirements.
- The IPM Tool was seen as a great way to initiate discussions about IPM practices with farm partners and agronomists.
- Some interviewees felt the tool primarily validated existing practices rather than adding new value, while others appreciated the reassurance it provided.

- Suggestions for improvement included integrating with other data recording tools, enabling data transfer to reduce repetitive input, and enhancing the written and video guidance.
- Barriers to using the online IPM Tool were acknowledged as: time constraints; computer literacy; and spraying culture.
- Motivating factors included the IPM Tool contribution to farm management and best practices, incorporation of good resources and ideas, and encouragement from agronomists to use the tool.
- Continued financial incentives and compliance with SFI were common motivators for sustained use of the IPM Tool.

3.4 WP 2 Supplementary Material

3.4.1 Stakeholder engagement on incorporation of IPM Planning Tool with other available IPM Resources.

The IPM Planning Tool plans to be a key component of an ecosystem of resources and services guiding IPM uptake. Some IPM resources, such as the VI/NFU IPM plan, are already well established, whereas, others such as the IPM Decisions DSS platform are in the early stages of release. It was identified that these resources are complementary, and the project partners worked with stakeholders to ensure there is no actual or perceived duplication, which was highly likely to result in a strong adverse reaction from users. Engagement with the key IPM stakeholder groups, to ensure clear communication, was conducted outside the remit of this T&T project.

3.4.2 Public release of the IPM Planning Tool.

Public access to the IPM Planning Tool is required for it to have a positive impact on IPM uptake and Defra's policy aims, however, funding rules mean that Defra T&T could not fund the public release of the tool. Through self-funding by ADAS, the IPM Planning Tool was made available (free of charge) to the public on 27 September 2023 and hosted by ADAS server via https://ipmtool.net/ . Users accessing this version of the tool were required to accept terms and conditions developed by RSK ADAS Limited. The T&Cs are publicly available to view through the IPM Tool.

Access to the IPM Planning Tool was also available through links on the NFU and VI webpages https://www.nfuonline.com/updates-and-information/ipm-plans/ and https://voluntaryinitiative.org.uk/schemes/integrated-pest-management/ which also contained links to the VI/NFU IPM Plans, so the webpages acted as a public resource to signpost available software for the completion of IPM plans as described in the SFI paid action. A link to the IPM Tool was also made available through the FarmPEP website https://farmpep.net/resource/ipm-planning-tool

3.4.3 Promotion of the IPM Planning Tool.

At the launch of the IPM Planning Tool on 27 September, ADAS coordinated a press release with NFU and SRUC, which was circulated to the following publications:

- Farmers Guardian – Reach 26,424 https://www.farmersguardian.com/news/4130871/ipm-planning-tool-launched
- Farmers weekly – Reach 38,429 https://www.fwi.co.uk/arable/growers-to-benefit-from-free-ipm-tool-for-sfi-option
- Farmers Guide – Reach 30,274 https://www.farmersguide.co.uk/arable/weed-pest-management/new-free-to-use-integrated-pest-management-ipm-tool-launches/

- Southwest Farmer – Reach 11,400 https://www.southwestfarmer.co.uk/news/23826968.new-integrated-pest-management-planning-tool-launches/
- Agronomist and Arable Farmer Magazine – Reach 8,000 https://www.aafarmer.co.uk/agronomy/new-pest-management-ipm-tool-launched.html

The IPM Planning Tool was promoted at the following dissemination events:

- BCPC Disease Expert Review – NIAB, Cambridge 17 October 2023.
- Agri-tech IPM Workshop – Over, Cambridge 7 November 2023.
- Video of how to complete the IPM Tool included in the BASIS IPM Planning Module.
- AAB IPM and Biocontrol 2023 Conference – Derby, Derbyshire 15-16 November 2023.
- AICC Annual Technical Conference 2024 – Towcester, Northamptonshire 17-18 January 2023.
- BCPC Pests & Beneficials Expert Group Review – NIAB, Cambridge, 25 January 2024.
- Cereals The Arable Event – Newnham, Hertfordshire, 12 June 2024.

The IPM Planning Tool was promoted through the following press articles:

- Free to use integrated pest management (IPM) tool launches – 29 September 2023 Farmers Guide.
- New IPM planning tool launched – 2 October 2023 Farmers Guardian.
- Growers to benefit from free IPM Tool for SFI option – 15 October 2023 Farmers Weekly.
- Payment Available for IPM Planning - 17 November 2023 Farmers Guardian.
- New updates announced to ADAS IPM planning tool – 23 January 2024 NFU Online.
- Free IPM Tool adds crop types and review feature – 23 January 2024 Farmers Weekly.
- Free IPM Planning Tool releases update including new crop types - 23 January 2024 FarmingUK.
- ADAS updates IPM Tool to include benchmarking features – 23 May 2024 Agronomist and Arable Farmer.

3.4.4 IPM Planning Tool Participant Feedback Survey Questionnaire

Introduction

Thank you for testing the IPM Tool. We would like to hear how you found the process. This questionnaire should take less than 15 minutes to complete.

Please read before you start the survey.

Consent to Participate:

All answers you provide in the survey will be treated confidentially. Your anonymity will be maintained throughout the research, with each participant assigned a unique participant identification number, which will be used in answer responses and analysis. Your contact details will only be used for the purpose of carrying out this project. Data will be stored in accordance with General Data Protection Regulations (GDPR) and will not be shared outside of the research team. Following project completion all personal data will be securely destroyed. **You are free to withdraw from completing the survey at any point.**

Please confirm: I have read and understand the information above and I consent to participate in the survey: [*Yes/No*]

Yes	No
○	○

[Yes continue, No re-route to End Page]

Further information: Should you have any concerns or queries about participation in the survey, the storage and processing of your personal data or any other aspect of this research, please contact Kath.Behrendt@adas.co.uk

[New survey page] General Questions

1. What best describes your role? [*option to select one answer only*]

Farmer/grower	○
Agronomist	○
Both	○

2. Which of the following would you classify **the majority** of your farmed area as? [*Select one answer only*]

Arable	○
Horticulture	○
Grassland	○
Other	Please specify [free text]

3. Are you BASIS qualified? [*Yes/No*]

Yes	No
○	○

4. Did you require advice/guidance from a BASIS qualified Agronomist to complete the online IPM Tool? [*select one response only*]

Yes	**No**	**Not Applicable**
○	○	○

4a. You have indicated that you required advice from a qualified BASIS Agronomist.

Please tell us which of the following you required advice/guidance on (*select all that apply]*

Checking responses I had done myself	○
Advice on answering/providing responses to certain questions	○
Help filling in all questions and sections in the online tool	○
Guidance on finding information to help me fill in the online tool	○

Other	Please specify [free text]

[New survey page] Tool Completion

5. Please indicate how much of the online IPM Tool you completed [*option to select one answer only*]

Fully Completed	○
Partially completed for one crop	○
Did not start at all	○

5a. You have indicated that you only 'partially completed' the online IPM Tool, please tell us the reason(s) why you didn't continue using the tool to complete an IPM plan.

(Fillable text field – limited characters)

[New survey page] IPM Tool and Functionality

6. Would you consider using the IPM Tool for more than one crop?

Yes	No	Unsure
○	○	○

[Yes continue to question 6a, No re-route to question 6b]

6a. Please tell us why you **would** consider using the IPM Tool for more than one crop

(Fillable text field – limited characters)

6b. Please tell us why you **would not** consider using the IPM Tool for more than one crop

(Fillable text field – limited characters)

7. Did you find the introductory page helpful? [*Yes/No*]

Yes	No
○	○

[No continue to question 7a, Yes re-route to question 8]

7a. You have indicated that you did not find the introductory page helpful. Please provide the main reason for your response. [*Free text response*]

(Fillable text field – limited characters)

8. Which crop did you complete the online IPM Tool for [*select one only*]

Winter Wheat	○
Winter Barley	○
Winter Oats	○

Winter Beans	○
Oilseed Rape	○
Peas	○
Potatoes	○
Sugar Beet	○
Maize	○
Improved Grassland	○
Spring Wheat	○
Spring Barley	○
Spring Oats	○
Spring Beans	○
Apples	○
Brassica	○
Other	Please specify [free text]

9. Please rate the following statement 'the reporting/summary functions made the tool more useful' [*option to select one answer only*]

Strongly Agree	○
Agree	○
Neither Agree nor Disagree	○
Disagree	○
Strongly Disagree	○

10. How easy was it to use the reporting/summary functions? [*option to select one answer only*]

Very Easy	○
Easy	○
Neither Easy nor Difficult	○
Difficult	○
Very Difficult	○

11. Please rate how easy you found each of the listed reporting/summary functions [*option to select one answer only per row*]

Aspect	**Very Easy**	**Easy**	**Neither Easy nor Difficult**	**Difficult**	**Very Difficult**
a. Viewing the results	○	○	○	○	○
b. Understanding the results	○	○	○	○	○

[New survey page] Completing the IPM Tool

12. Please rate the following statement 'the online tool took significantly less time to complete than I expected' [*option to select one answer only*]

Strongly Agree	○
Agree	○
Neither Agree nor Disagree	○
Disagree	○

Strongly Disagree	○

13. How long did it take you to complete the online IPM Tool for the crop type you indicated? [*option to select one answer only*]

Less than 30 minutes	○
Between 30 minutes and 1 hour	○
Between 1 hour and 2 hours	○
More than 2 hours	○

14. How did you find the online process of completing the IPM Tool? [*option to select one answer only*]

Very Easy	○
Easy	○
Neither Easy nor Difficult	○
Difficult	○
Very Difficult	○

15. Please rate your level of satisfaction with the following aspects of the IPM Tool [*option to select one answer per row only*]

Aspect	**Very Satisfied**	**Somewhat Satisfied**	**Neutral**	**Somewhat Unsatisfied**	**Very Unsatisfied**
a. Ease of registration	○	○	○	○	○
b. Ease of use	○	○	○	○	○
c. Links to guidance	○	○	○	○	○
d. In-tool information	○	○	○	○	○
e. Questions	○	○	○	○	○
f. Layout	○	○	○	○	○
g. Reporting/Summary functionality	○	○	○	○	○
h. Claiming BASIS points	○	○	○	○	○
i. Time required to complete	○	○	○	○	○
j. Usefulness of Tool	○	○	○	○	○

16. Which aspect of the online IPM Tool were you **MOST satisfied** with and why? [*Free text response*]

(Fillable text field – limited characters)

17. Which aspect of the online IPM Tool were you **LEAST satisfied** with and why? [*Free text response*]

(Fillable text field – limited characters)

18. Did you encounter any problems using the online IPM Tool?

Yes	No
○	○

18a. You have indicated that you encountered problems with the online IPM Tool. Please tell us what these were. [*Free text response*]

(Fillable text field – limited characters)

[New survey page] Video Guidance

19. Please rate the following statements about the i**ntroductory videos** provided on IPM [*option to select one answer per row only*]

Statement	**Strongly Agree**	**Agree**	**Neither Agree nor Disagree**	**Disagree**	**Strongly Disagree**
I learnt something new from watching the videos	○	○	○	○	○
The videos provided relevant information on IPM	○	○	○	○	○
The videos were a good length and engaging	○	○	○	○	○

20. Please rate the following statements about the **video guidance** provided on using the tool [*option to select one answer per row only*]

Statement	**Strongly Agree**	**Agree**	**Neither Agree nor Disagree**	**Disagree**	**Strongly Disagree**
The videos were useful in helping me complete the tool	○	○	○	○	○

The videos helped me complete the tool without additional support	○	○	○	○	○
The videos were easy to understand and follow	○	○	○	○	○
The videos were a good length and engaging	○	○	○	○	○

[New survey page] Written Guidance

21. Please rate the following statements about the **written guidance** provided as part of the online IPM Tool [*option to select one answer per row only*]

Statement	**Strongly Agree**	**Agree**	**Neither Agree nor Disagree**	**Disagree**	**Strongly Disagree**
The written guidance sheets were useful in helping me learn about different aspects of IPM	○	○	○	○	○
I learnt something new from the written guidance	○	○	○	○	○
The written guidance provided relevant additional information to the online IPM Tool	○	○	○	○	○
The written guidance will be a useful ongoing information source for me	○	○	○	○	○

22. Considering your ***complete* experience** using the online IPM Tool, how likely are you to do the following? [*option to select one answer per row only*]

Factor	**Very likely**	**Likely**	**Neither Likely nor unlikely**	**Unlikely**	**Very Unlikely**
Recommend the online IPM Tool to others	○	○	○	○	○
Use the tool to create a new IPM plan for the following harvest year for one crop	○	○	○	○	○

Use the tool to create IPM plans for multiple crops	○	○	○	○	○
Refer to the IPM Tool again to find information or update your IPM plan	○	○	○	○	○
Use the video guidance again	○	○	○	○	○
Use the written guidance again	○	○	○	○	○

23. Is there anything else you think is important for us to consider in relation to improving the online IPM Tool. [*Free text response*]

(Fillable text field – limited characters)

[New page] Follow-up Participation

24. A telephone or in-person interview would help us gain detailed feedback from you on how to improve the IPM Tool and the IPM SFI.
25. Can we invite you to participate in a 1-to-1 interview with an ADAS researcher at a later date? [*Yes/No*]

Yes	No
○	○

[ADD Q. Capture Details for recontacting]

20.a. You have indicated that you would be happy to participate in a 1-2-1 interview at a later date. Please provide your email address.

(Fillable text field – limited characters)

20b. Please provide your best telephone contact number

(Fillable text field – limited characters)

[New page] Thank you for participating

Thank you for taking the time to complete this online survey. If you have further comments or wish to discuss the use of data in this survey, please contact Kath.Behrendt@adas.co.uk

[New page] Survey completed

3.4.5 Follow-up telephone survey – IPM Tool behavioural insights

Actively selected farmer semi-structured interviews

The aim of these interviews is to understand attitudinal and behaviour changes in actively selected farmers/growers who completed the online IPM Tool as part of SFI IPM 253b. We predominantly want to garner attitudinal and behavioural reasons behind why the tool may or may not be used in the future. Therefore, the interviews are designed to elicit farmers understanding, views and experiences of utilising the online IPM Tool, including the video and written guidance. This is the final element of participation in this test and trial for these participants. These semi-structured interviews will be conducted with actively selected farmers who have completed the IPM Tool and provided feedback through the online questionnaire. The interviewees have volunteered to provide further insights into their experience and perspectives of the online IPM Tool.

Please note: a previous stage of this research was an SFI IPM 253a which undertook a similar process with more progressive farmers which completed the IPM Tool in 2022. For this work package, we are interested in actively selected interviewees' experiences of using the **current version** of the online IPM Tool.

ADAS is perceived by farmers as an impartial organisation which places us in a position of trust in our relationship with the farmer and growers. Considering the sensitive nature of the research and the economic and time pressures faced by farmers, this relationship will be vital for gaining open and honest responses and gaining participation in future projects.

Interview Guide.

The interviews will take place using a combination of telephone and virtual interviews (via MS Teams or Zoom) which will last approximately 25-30 minutes and will be guided by a semi-structured interview guide.

The interviews will follow the structure outlined below:

- **General expectations and opinions of using the IPM Tool:** This section is the shortest question to open up the interview.
- **Usability of the IPM Tool:** Gathering the views of the farmers/agronomists/advisors on their user experience and if they experienced any challenges navigating the tool.
- **Enablers and Barriers to uptake of the IPM Tool:** Discussions on how the interviewees utilised the information output from the IPM Tool and their opinions of the enablers and barriers of their peers (such as farmers in their area) using the tool, as well as themselves.
- The interview guide will be produced by experienced social scientists working with technical experts in IPM. All information collected will be analysed thematically and organised in line with Defra's research questions to allow for quick assimilation of information learned.

Interviewer general guidance

Instructions for the interviewer in the guide are italicized and shaded in blue. Prompts are alphabetised and in blue. Questions are not italicised and are numbered in black.

All appropriate questions must be asked, however, the interviewee is not obliged to answer. Where the interviewee declines to answer move on to the next question.

Instructions

Anonymous cross-referencing system: For GDPR regulations we ask each interviewer to have a cross-referencing system to allow the respondents to be kept anonymous. The names and matching references must be kept centrally with limited access. When compiling data, only provide the anonymous interview reference, do not provide any name or address of interviewee.

Interview Mode: Interviews will be conducted using a combination of telephone and virtual interviews (via MS Teams or Zoom) and will last approximately 20-30 minutes.

Audio Recording: All interviews should be audio recorded (with consent), pause the recording if necessary. Where audio recording is not permitted, please take extensive notes.

Prior to the interview all participants must have been:

1. Screened and be expecting the interview on the agreed day at the agreed time
2. Provided with a participant information sheet and consent form either via email or post

Recording Responses:

Please record responses on the 'NFU IPM Interview Response Form' document provided separately.

Key Terms & Definitions: For the purpose of this SFI IPM T&T and the interviews we have defined IPM using the Sustainable Use Directive definition which is as follows:

Integrated pest management means careful consideration of all available plant protection methods and subsequent integration of appropriate measures that discourage the development of populations of harmful organisms and keep the use of plant protection products and other forms of intervention to levels that are economically and ecologically justified and reduce or minimise risks to human health and the environment. 'Integrated pest management' emphasises the growth of a healthy crop with the least possible disruption to agro-ecosystems and encourages natural pest control mechanisms.

Latest Defra Update: Area Limits effective from 26 March 2024

In relation to SFI IPM any new applications submitted on or after 26 March 2024, there are 6 SFI actions which must only be done on a proportion of your farm. These actions are referred to as 'limited area' actions and for IPM the relevant action is:

- IPM2: Flower-rich grass margins, blocks, or in-field strips

Interview introduction

Interview Number:	
Interviewer:	
Interviewee First Name:	
Date & Time of Interview:	

Please start the interview by reading the text below.

Thank you for agreeing to be part of this research. Defra has funded a programme of Test and Trials projects to support the development of the SFI, engage with land managers and provide real world learning to understand how different elements of the scheme may work in the future. The main aim of this IPM T&T is to inform how the delivery of IPM public goods could be fostered through the Sustainable Farming Incentive (SFI). The discussion today will focus on understanding the responses provided in the online questionnaire that you have completed. This will assist us in working out the barriers or enablers that have impacted your experience with the IPM tool and whether these have influenced your decision making around future IPM planning on your farm.

Your participation in this interview is voluntary, you are free to withdraw at any time during the interview. If there are any questions you prefer not to answer, please just let me know. You should have received a **consent form**.

1. Can I ask you to confirm that you have read and completed the consent form and you are consenting to participate in this interview? **YES/NO**

If consent form has not been received and returned, please establish verbal consent:

For data protection reasons I would like to ask you to read through this consent form and check the 'Yes' boxes if you are happy with the associated statements.

Provide the participant with the consent form with enough time to read and sign. Consent is compulsory and if the interviewee does not consent DO NOT proceed with the interview.

In order that we can capture the full detail of what you tell us today, we would like to ask your permission to record the discussion. The recording will be stored securely at ADAS, transcribed and anonymised to remove any details that could identify you or your farm. It is expected that the anonymised transcript will be used by the research team to ensure accuracy in reporting. The anonymised information you provide may also be shared with NFU (who are running this project) and Defra (who are funding this project). The recording will be deleted when the project is completed and signed off.

2. Are you happy for the discussion to be audio-recorded today? **YES/NO**

If permission given, ask if it is OK to turn on the recorder. [State for the recording the date, interviewee name and interviewer no.]

If no, please stop the recording and take notes. Notify the participant the recording has been stopped and you will be taking notes to capture the conversation.

With your permission, we will take written notes of our discussion today and will share our summary with you so that you can suggest amendments if needed and indicate anything that you do not want us to share. *Check participant is happy for discussion to start.*

Section 1: General expectations and opinions of the IPM Tool *(approx. time 5 mins)*

This section will build on the responses of feedback about the online IPM Tool, which were collected in the online questionnaire. The focus is on open questions.

1. Could we start by you outlining what you expected the online IPM Tool would do?
   [Prompts]
   - *Monitoring tool*
   - *A source of IPM information*
   - *A record of actions being done rather than a plan*
   - *Exploring & questioning adoption of IPM practices.*
2. In what ways has your experience of using the online IPM Tool differed from, your expectations?
   [Prompts]
   - *Data inputting exercise*
   - *A record of actions being done rather than a plan*
   - *Made you consider how to adapt the management of your crops.*
3. Why did you decide to use the online tool?
   [Prompt - Neighbour/peer influences, efficiency driven – e.g. less paper work, reduced time inputs or other
4. Do you think your decision to use the online IPM Tool was influenced by other individuals (for example other farmers in your local network, your agronomist) who had already used and completed the tool?
   [Prompt for why if not given– why do you think these individuals have influenced your decision?]
5. Have you shared the tool with other individuals in your network (for example other farmers) and encourage them to complete an IPM plan using the IPM Tool?

[Prompt for why if not given]

- *What motivated you to share the tool with other farmers?*
- *What discouraged you from sharing the tool with other farmers?*

Section 2: Useability and functionality of the online IPM Tool *(approx. time 10 mins)*

This section will gather the user experience of the online IPM Tool to comprehend the practicalities of using the tool.

6. How computer literate would you say you are?

   [Prompt of a Likert scale 1 being not very computer literate to 5 being very literate]

   *a. **1** - You struggle with browsing the Internet, e-mails or inputting into numbers into an Excel spreadsheet*

   *b. **3** - You feel confident using apps and software you commonly use, but take time with new updates*

   *c. **5** - You feel very confident and actively seek out trying new technology/software.*

7. Can you tell me what technology device you used to complete the online IPM Tool?

   [Prompts]

   a. Desktop computer
   b. Laptop
   c. Tablet such as an iPad
   d. Smart phone

For those using smart phone:

- *Can you tell me why you used a smartphone instead of other devices such as Laptop or tablet?*
- *Can you please share your experience of completing the tool using your smartphone?*

8. Was the information and guidance provided enough, or did you have to look for further information elsewhere to complete the online IPM Tool?

   [Prompts]

   a. Did you look on the Internet for more information or clarification?
   b. Did you ask anyone such as an agronomist/advisor or other farmer for more information or clarification?

9. Do you use any farm software/assurance schemes where you input similar data as you did for the online IPM Tool?

   Note to Interviewer: A common feedback point was the repetitiveness of the online IPM tool and so we want to see if there are ways to reduce this.

10. Did you find the tool repetitive?

    [Prompts to engage discussion if just a yes/no response]

    a. Would you be able to explain where the tool felt repetitive?
    b. Would it be useful to have an option for more information from the current season to be copied to start next season's plan?
    c. how do you think repetitiveness can be overcome? How might it influence your future use of the online tool?

11. What do you think is an acceptable time to complete an IPM plan for one crop type using the online IPM Tool?

Note to Interviewer: 55% of questionnaire respondents said 'Less than 30 minutes'.

[Prompt]

12. Some survey respondents mentioned that the IPM Tool could benefit from adding more in-depth questions. Do you agree?

[Prompt for why if not given]

a. *If yes, which topics do you think could be added to the tool to enhance its usefulness.*
b. *If no, why do you think it may not be useful to add additional questions to the tool.*

Read this out before asking next questions. *We are interested in understanding whether the video and written guidance provided in the online IPM Tool impacted on your confidence, ambition and capacity to make more informed decisions regarding IPM, the use of the online IPM Tool and future land management changes. Are you happy to answer some questions related to these?*

13. Was the written and/or video guidance provided useful for you and your business? If so, what was useful and how will it improve your IPM planning?

[Prompt]

a. *Did you watch the videos and get what you needed from them and will be unlikely to need to go back to them in future?*

14. In what ways do you think the written and/or video guidance could be improved to further assist your IPM planning and decision making?

[Prompt]

a. *Will you use the videos as a 'refresher' in the future and/or would you want new videos in the future looking at different aspects of IPM?*

Section 3: Enablers and Barriers to continued use of the IPM Tool *(approx. time 5-10 mins)*

Discussions on enablers and barriers to continued use of the online IPM Tool as part of IPM planning.

15. Do you feel more confident making decisions now that you have completed an IPM plan using the online tool?
[Prompt if yes/no response provided]
Can you explain in more detail what has made you feel more confident? Or has not made you feel comfortable?
16. How did the online IPM Tool assist you in your IPM planning?
[Prompts]

a. How could the online IPM Tool best fit into your long-term IPM planning strategies?
b. Is the tool likely to result in an immediate change in IPM practice on farm?
c. Did the tool highlight IPM measures that you had not previously considered adopting?

17. What do you think are the key barriers to farmers utilising the online IPM Tool?

[Prompt]

a. Do you think an advisor would help farmers be able to make the most of the online IPM Tool?

18. What would motivate you the most to continue using the online IPM Tool?
[Prompts]

a. Future planning/decision-making

b. Social influence (what your family/neighbours think)

c. Market influence (consumer, retailer, processor, crop assurance schemes)

d. Improve crop performance/farm profitability/efficiency

e. Continual learning and knowledge exchange.

f. Availability of incentive payments

19. What would stop you or prevent you from using the online IPM Tool again?

[Prompts]

a. Repetitiveness

b. Prefer not to share data, even though it is anonymised

c. Time to complete the online tool

d. Motivations stated above (in Q.18) not coming to fruition.

20. How do you perceive the 'paid actions' in SFI will impact on your utilisation of the online IPM Tool in the future?

Section 4: Enablers and Barriers to uptake of the SFI IPM paid actions *(approx. time 5-10 mins)*

Discussions on enablers and barriers to future involvement in SFI IPM

21. Before you were involved in this SFI IPM Test and Trial, what was your view of what the SFI IPM paid actions was? Has that view changed?

Thinking about what would **motivate or enable** farmers to get involved in SFI IPM:

22. What do you think are the key enablers or reasons for why farmers would enrol in SFI IPM?

[Prompt – the payments, environmental concerns, collaboration with peers, influence of crop advisor, consumer or market pressures (inc. QA scheme requirements), opportunity to improve crop performance/farm profitability?]

23. What are your views on the current level of payments for the four SFI IPM actions?

[Prompts]

a. are they likely to encourage uptake or are adjustments to the payments required to encourage uptake.

b. These are the four SFI IPM actions and current payment levels

- IPM1: Assess integrated pest management and produce a plan - You'll receive £1,129 for the assessment and plan per year.

- IPM2: Flower-rich grass margins, blocks, or in-field strips - You'll receive £798 per hectare per year.

- IPM3: Companion crop on arable and horticultural land - You'll receive £55 per hectare per year.

- IPM4: No use of insecticide on arable crops and permanent crops - You'll receive £45 per hectare per year.

24. What initiatives do you think policy makers/government could consider to encourage more farmers to uptake SFI IPM paid actions?

[Prompt]

a. are they likely to encourage uptake or are adjustments to the payments required to encourage uptake.

Thinking about **barriers** that would stop farmers enrolling in SFI IPM:

25. What do you think are the key barriers to farmers uptake of SFI IPM paid actions?

    [Prompt – are other paid actions preferred, are different payments required, do market or knowledge or environmental barriers exist]

26. How do you think these barriers could be overcome?

    [Prompt – more appropriate payments, education and familiarity with IPM, innovation and best practice, research funding for IPM projects that meet farmer needs, clear understanding that it can increase improve crop performance/farm profitability]

27. What do you see as the biggest barrier to you/your farm continuing to be involved in SFI IPM?
28. What other IPM actions do you believe should be supported through SFI IPM and why?

    [Prompts]

    a. disease rotations

    b. disease resistant varieties

    c. use of decision support systems

    d. bioprotectants

    e. cover cropping

    f. mechanical weeding

29. Are you aware of the 25% 'limited area' stipulation for SFI actions that came into effect on the 26th March 2024? If so, what is your general view on this?

    [Prompt]

    For IPM this relates to action IPM 2: Flower-rich grass margins, blocks, or in-field strips

30. What is your view on agri-environmental schemes, in general, being funded by the Government?
31. Finally, what do you think would encourage farmers **the most** to uptake SFI IPM paid actions?

Thank you for your time and insights today.

1. Is there anything you feel we have not covered that you think is important?

2. The ongoing development of SFI IPM will likely involve additional engagement activities in future (such as pilot studies). Would you like to be invited to follow on events? *YES/NO*

If you have any questions or would like to withdraw within the next 7 days, please contact Kath.Behrendt@adas.co.uk

APPENDIX 4 – WORK PACKAGE 3: ASSESS THE IMPACT OF FARMERS IMPLEMENTING IPM PLANS, ON THE RISKS ASSOCIATED WITH PESTICIDE USE.

4.1 WP 3 METHODOLOGY

4.1.1 Elicit from farmers how IPM planning and implementation related to risks associated with pesticide use and the level of pest control achieved.

Minimising the risks associated with pesticide use will be a key focus of the forthcoming National Action Plan. There is little data available in the literature on the relationships between IPM implementation and the risks associated with pesticide use. A sample of 100 farmers/growers who completed IPM plans using the IPM Planning Tool, as part of Test and Trial 253a, were invited to undertake an online survey (see 4.4.1 WP 3 Supplementary Material for full survey questionnaire). The focus was to gain insight into understanding how IPM planning and guidance influenced the extent to which users implemented their IPM plan or modified the IPM actions, as IPM plans provide an objective quantification of the IPM actions. Implementing IPM actions should reduce the need for pesticide treatment and treatment should then be applied according to need.

Assessment of IPM plans created through the tool can indicate the extent to which the planned actions were implemented, and by obtaining pesticide treatment data this could be related to treatment need. We considered 'need' at three levels: (i) the perceived need by the farmer at the time of treatment decisions, that resulted in the inputs, (ii) the perceived need in retrospect, i.e. with hindsight, did the farmer consider that the inputs could have been different, and (iii) for major crops/pests (for which independent survey data are available) we can make an estimate of the objective need.

The survey questionnaire was designed to be accessible, easy to understand and give meaningful responses. It consisted of a set of qualitative and quantitative questions intended to capture robust responses from farmers/growers related to the following objectives (4.4.1 WP 3 Supplementary Material for full survey questionnaire):

- The extent to which users implemented their IPM Plan or modified the IPM actions as the season progressed.
- The extent to which pesticide use related to the IPM actions implemented.
- The extent to which IPM approaches influenced decisions on pesticide usage in future seasons.
- User satisfaction with the level of pest control obtained.

Initial responses to the online survey were low, so follow-up emails were sent to farmers to encourage them to complete the survey either online or via a telephone interview with an ADAS consultant (see 4.4.2 WP 3 Supplementary Material for interview guide). A total of 87 emails were distributed to farmers who had not commenced the online survey. The outcomes of these follow-up emails were as follows:

- 22 farmers responded that they were not interested in participating.
- 10 agreed to an interview.
- 6 were potentially interested in participating in an interview.
- 1 farmer agreed to complete the survey via email.

At the close of the survey period (8 March 2024) 25 completed responses (12 via follow-up emails and 13 via online survey) had been received.

4.1.2 Analysis of questionnaires and pesticide usage.

The questionnaire responses were compiled and uploaded in a secure place where an evaluation was undertaken using coding software NVivo and Excel. Both a qualitative thematic approach and quantitative systematic analysis were used to highlight the main themes and conclusions of the survey responses.

To reduce the time burden for the participants completing the questionnaire, pesticide usage data was collected for one crop from a single field which was broadly representative of that crop on the farm.

4.2 WP 3 RESULTS

4.2.1 Findings from pesticide usage survey

Participants were asked a number of questions related to how satisfied they were with the level of invertebrate pest control, weed control and disease control they obtained over the growing season.

- Most participants were overwhelmingly satisfied with the level of control they obtained across all three areas (pests, weeds and disease). Some participants (16%, 4/25) indicated that they were not satisfied with the level of weed control they obtained over the growing season (Figure 4.1).

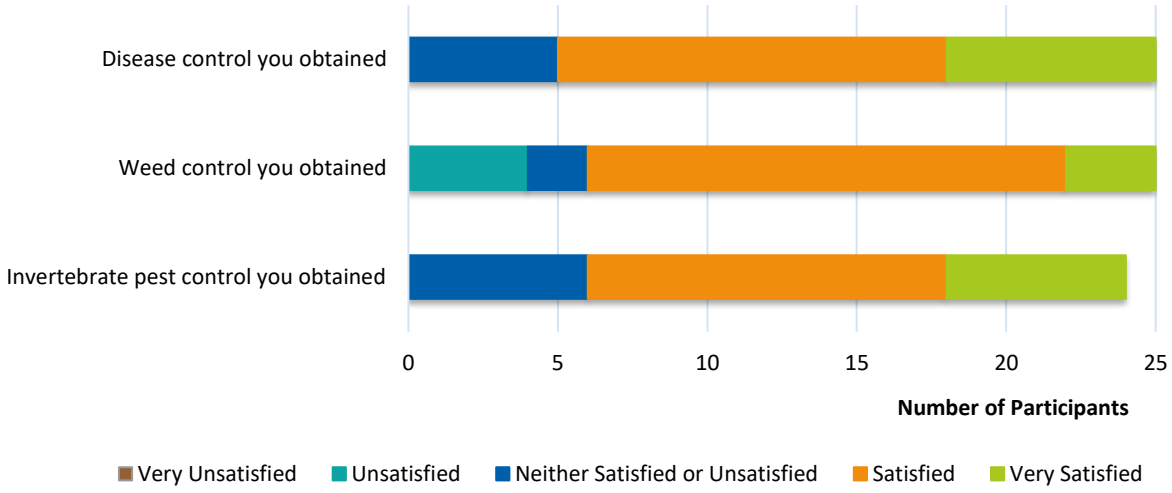

Figure 4.1: Satisfaction with level of invertebrate pest, weed and disease control obtained over the growing season as scored by participants who completed the pesticide usage survey – noting how satisfied (on a scale of Very Unsatisfied to Very Satisfied) they were with each aspect as stated in the survey questionnaire.

Participants were further asked a number of questions related to whether they felt the pest, weed or disease burden on their farm justified the level of inputs (pesticides, herbicides and fungicides). They were also asked if different inputs would have been used with the benefit of hindsight.

- Most participants agreed or strongly agreed that the burden on their farm for all three areas (pests, weeds and disease) justified their level of pesticide, herbicide and fungicide use (Figure 4.2).
- Over half of the participants (56%, 14/25) indicated that with hindsight they would not have changed their inputs. Just under a quarter of participants (24%, 6/25) indicated that they would have used different inputs with hindsight (Figure 4.2).

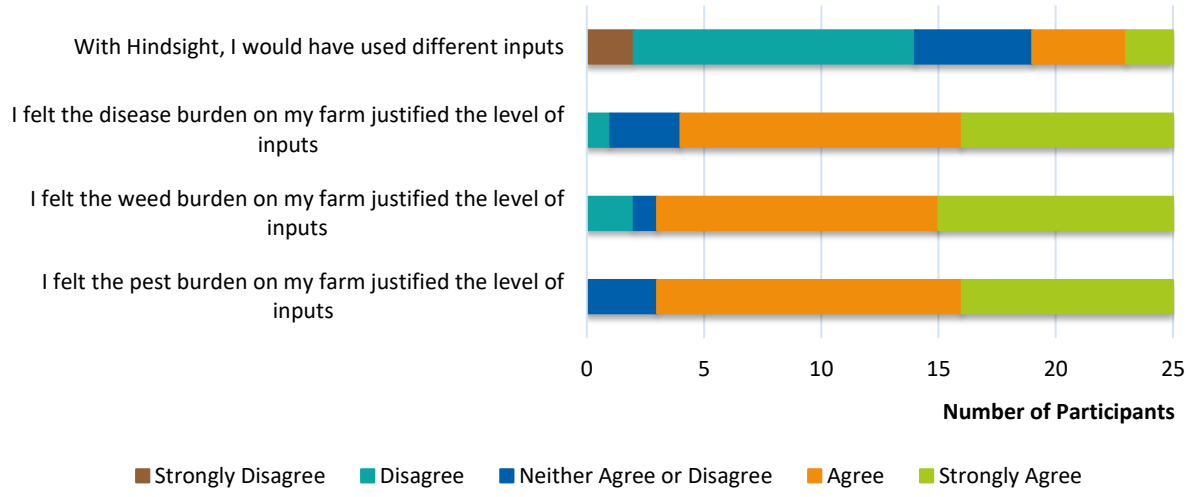

Figure 4.2: Responses to pest, weed and disease burden statements as scored by participants who completed the pesticide usage survey – noting their level of agreement (on a scale of Strongly Disagree to Strongly Agree) with the statements provided.

Considering their pesticide treatment need, participants were asked to rate a number of statements related to how likely it would be that they would do what was suggested in the statements. Figure 4.3 highlights the responses provided for each statement.

- Participants overwhelmingly indicated that they would use the IPM Tool to create a new IPM plan for the next growing season with 84% (21/25) likely or very likely to use the IPM Tool again. Likewise, 64% (16/25) of all participants indicated that they were likely or very likely to use the tool to modify their IPM actions for the next growing season. Most participants (76%, 19/25) were also likely or very likely to refer to the IPM Tool again to find information on non-chemical control methods.
- Over a third of all participants (40%, 10/25) indicated that it was unlikely or very unlikely that they would continue pesticide applications at the same level as last growing season. But more than a quarter (7/25) said they were likely to use pesticides at the same level.
- Participants overwhelmingly (92%, 23/25) indicated that they were likely or very likely to use non-chemical control methods.
- Most participants (84%, 21/25) indicated that they were likely or very likely to only use insecticide products when the pest risk on their farm was high. Likewise, most participants (76%, 19/25) indicated that they were likely or very likely to only use herbicide products when the weed risk on their farm was high.
- When fungal disease risk is high, just under two thirds of all participants (64%, 16/25) indicated that they were likely or very likely to use fungicide products.

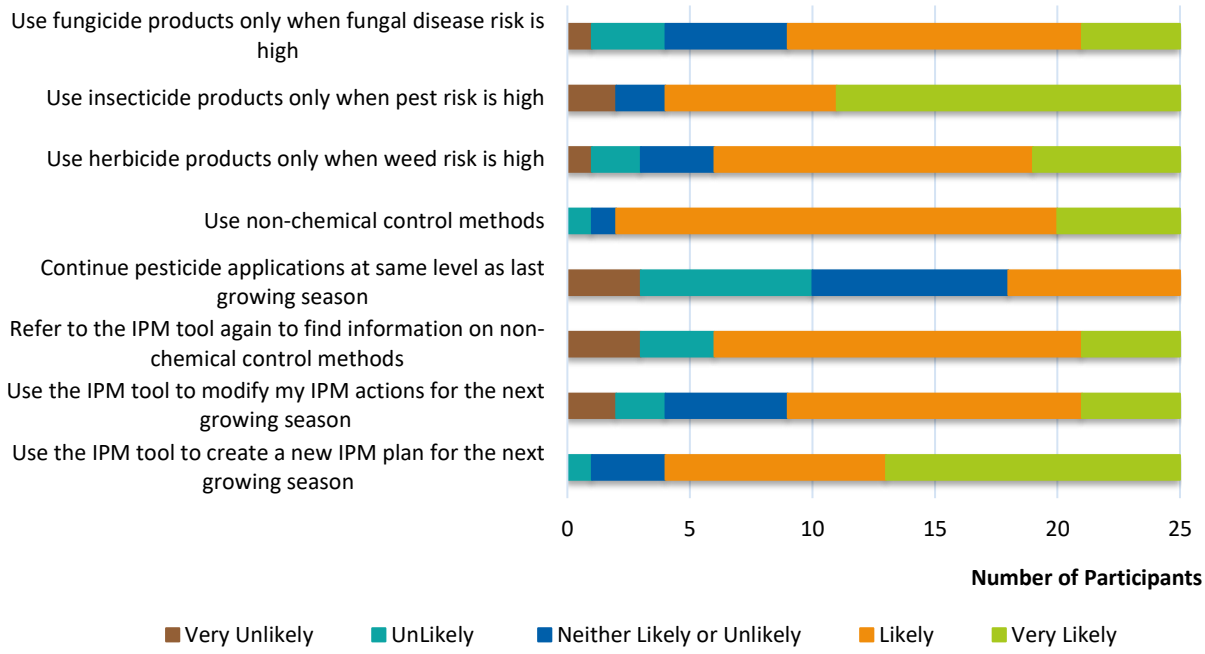

Figure 4.3: Responses to IPM statements as scored by participants who completed the pesticide usage survey – noting their level of likelihood (on a scale of Very Unlikely to Very Likely) with the statements provided.

4.2.2 Treatment Frequency Index

Using the 25 completed survey responses, a method was developed to determine a Treatment Frequency Index (TFI). TFI relates the number of pesticide product applications on a farm to the maximum permitted individual dose for each product. A TFI of 1 indicates that the farmer has used the product according to the maximum permitted individual dose. Mathematically, the TFI for a farm can be calculated using the following formula:

$$TFI_{farm} = \sum \frac{Dose\ used\ by\ farmer}{Maximum\ permitted\ individual\ dose}$$

After removing responses with data that was only partially relevant for TFI calculations, 17 cleaned and collated responses were available for analysis. The small sample size limited the analysis and caution is advised against interpreting results as being statistically significant. All these 17 analysed farms provided pesticide data for winter wheat, and therefore this was the main crop used for TFI comparisons as only limited survey data was provided for the other crop types grown.

Figure 4.4 compares TFI_{Farm} based on herbicides and fungicides used on each of the 17 analysed farms during the 2022-2023 growing season to control diseases and weeds in winter wheat crops. The chart highlights the variation amongst farms in pesticide usage which is likely influenced by pest prevalence and different farm management practices. There are couple of farms which stand out with notably high TFI_{Farm} values for fungicides (F-IPM-90) and herbicides (1133494-1133476-121278205 and 1134272-1134254-122476573). These farms tended to apply more pesticide products over the growing season compared to the other farms. For insecticide use, only four of the surveyed farmers indicated that they used insecticide products, and all were used at the maximum permitted dose (TFI=1, data not shown in Figure 4.4).

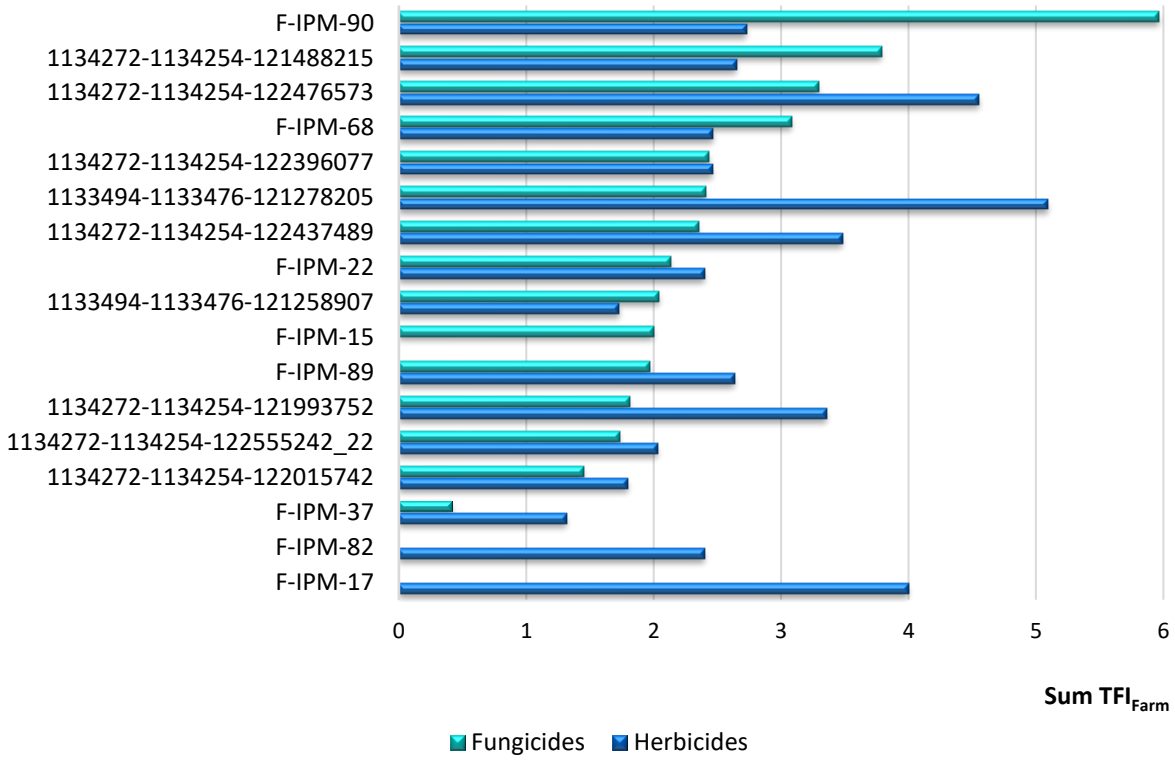

Figure 4.4: TFI_{Farm} by Farm ID and crop type (winter wheat).

Table 4.1 highlights the variation in TFI_{Farm} across the 17 analysed farms. Sum TFI_{Farm} represents the total sum across all pesticide products and pesticide groups (fungicides, herbicides and insecticides) used on the farm during the 2022-2023 growing season. The Sum TFI_{Farm} for individual farms ranged from 1.73 to 8.85, indicating a wide variation in the total intensity of pesticide product use across the 17 analysed farms. Variations in TFIs could be due to differing pest management strategies or varying pest pressures across the farms.

Table 4.1 also shows the total number of pesticide products used during the growing season per farm with the number of pesticide products used across all farms ranging from 3 to 14. The results indicate that there is considerable variability both within farm and between farms regarding the use and intensity of different pesticide products. While some farms use a large number of products at varying intensities, others maintain a more consistent but possibly lower-intensity use of products. Farms that used fewer products tended to have a lower Sum TFI_{Farm}, however, some of those farms had a relatively high mean fraction of maximum permitted individual dose potentially indicating a more concentrated use of certain pesticide products.

The relationship between the varietal resistance ratings, as determined from the farmer surveys for winter wheat varieties grown, and fungicide TFI was also analysed, however, no clear relationship was seen for any of the main winter wheat diseases (data not shown), possibly due to the small sample size.

Table 4.1: Total pesticide product usage and Sum TFI_{Farm} for all pesticide products and pesticide groups (fungicides, herbicides and insecticides) by crop type (winter wheat). Data were derived from the spray records provided by farmers as part of the pesticide usage survey.

Farm ID	No. Products used	Sum TFI_{farm}
1133494-1133476-121258907	7	3.77
1133494-1133476-121278205	11	7.50
1134272-1134254-121488215	11	7.44
1134272-1134254-121993752	14	6.16
1134272-1134254-122015742	5	3.25
1134272-1134254-122396077	8	4.89
1134272-1134254-122437489	9	5.83
1134272-1134254-122476573	14	8.85
1134272-1134254-122555242_22	6	3.77
F-IPM-15	3	2.00
F-IPM-17	5	4.00
F-IPM-22	6	4.53
F-IPM-37	5	1.73
F-IPM-68	8	6.76
F-IPM-82	3	2.40
F-IPM-89	6	4.60
F-IPM-90	13	8.69

4.2.3 Treatment Frequency Index and Pesticide Control Interventions

As discussed in Section 3.2.1, completing IPM plans through the IPM Tool should act as a driver for farmers to increase adoption of IPM control measures (interventions) beyond those currently in use on-farm. The 17 farms included in the pesticide survey analysis were matched to data from their completed IPM Tool(s) for the 2022-2023 growing season to provide counts of control interventions for all crops on each farm. From the 17 farms, 13 had completed IPM plans for winter wheat and the number of completed IPM plans for each other crop type is shown in Table 4.2.

Table 4.2: Number of completed IPM plans for surveyed farms by crop type

Crop	Number of IPM Plans completed
Maize	3
Oilseed Rape	6
Peas	4
Potatoes	2
Sugar Beet	3
Winter Barley	4
Winter Beans	3
Winter Oats	2
Winter Wheat	13

All products - winter wheat only

There was no correlation between the number of winter wheat control interventions and TFI (R^2 = 0.002 data not shown). It should be noted that the sample size was small. There was notable variability in the total number of winter wheat control interventions adopted ranging from 29 to 57. Further analysis with a larger data set would be needed to enable robust inferences to be made, and it may take more than one season to see effects of implementing IPM control measures.

4.2.4 Treatment Frequency Index and Pesticide Risk

Pesticide risk scores for all crops were determined based on the risk ratings (no risk, slight risk, moderate risk and significant risk) indicated by each of the farms in their IPM plan(s) for the 2022-2023 growing season. Counts of each risk type indicated for each crop and farm were weighted and summed to give a total risk score for pests, diseases and weeds. Weights were applied as follows:

No risk = 0

Slight risk = 1

Moderate risk = 2

Significant risk = 3

The total risk scores for pests, diseases and weeds were then summed to provide a combined risk score per farm and crop. All crop risk scores were then summed to give an overall risk score per farm.

Fungicides - winter wheat only

The distribution of points in the scatter plot shown in Figure 4.5 indicates the variability in disease risk score and Sum TFI_{Farm} for fungicide products used by farms for winter wheat crops over the 2022-2023 growing season. Despite a negative correlation seen (F_{pr}= 0.02. R^2 = 0.46), the relationship between disease risk score and TFI for fungicide was not completely clear. It might be anticipated that TFI would be higher where the perceived pest risk was higher. There was no indication of this, with the limited data set. One farm had a high TFI despite recording few perceived pest risks, which has skewed the distribution. Future work should explore whether some farmers perceive pest risk to be low because of pesticide treatment. It should be noted again that the small sample size would be influencing the results shown and caution is advised when interpreting the results.

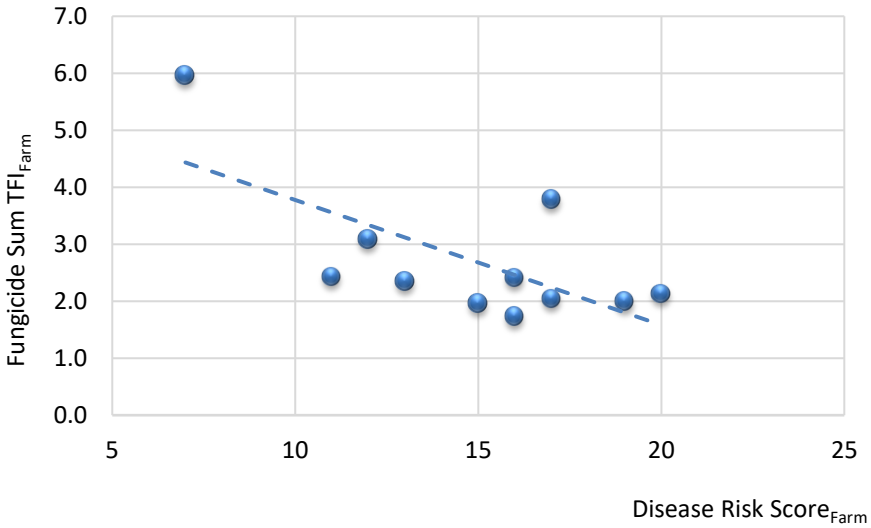

Figure 4.5: Scatter plot showing correlation between the Sum TFI_{Farm} for fungicides only and disease risk score for winter wheat crops over the 2022-2023 growing season.

Herbicides - winter wheat only

There was no clear correlation between weed risk score and TFI for herbicide use (R^2 = 0.27 data not shown). The range in variation of weed risk scores was 5 to 14. With a larger data set it may be possible to establish whether a relationship exists.

All products - winter wheat only

The distribution of points in the scatter plot shown in Figure 4.6 indicates the variability and potential relationship between total risk score for winter wheat and Sum TFI_{Farm} for all products used by farms over the 2022-2023 growing season. As can be seen, there is a slight correlation (F_{pr}= 0.03. R^2 = 0.38) between total risk score for winter wheat and TFI for all products used on farm. The results indicate a weak inverse relationship with pesticide usage for winter wheat decreasing with increasing risk. This relationship seems counter intuitive and may suggest other factors are influencing the TFI. Again, caution is advised against interpreting the results due to the small sample size.

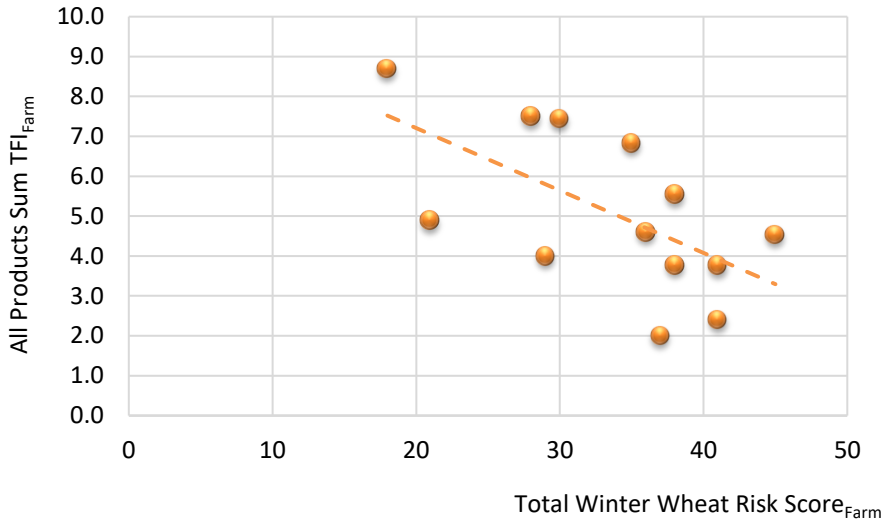

Figure 4.6: Scatter plot showing correlation between the Sum TFI_{Farm} for all products and total risk score for winter wheat crops over the 2022-2023 growing season.

4.2.5 Pesticide Risk and Control Interventions

Winter wheat

There was no statistical relationship between the number of winter wheat control interventions on the analysed farms and the total risk score for winter wheat used on the farms (R^2 = 0.10 data not shown). The range in variation for number of winter wheat control interventions was 29 to 57 and total risk score for winter wheat ranged from 18 to 45. The variability suggests that other factors could be influencing the assessment of risks on farm or the relationship between the two variables is complex.

All products and all crops

When all disease control interventions were plotted against disease risk score for all crops for which IPM plans were completed (Figure 4.7), a strong relationship between the variables was seen (F_{pr}= <0.001. R^2 = 0.78). Figure 4.7 indicates that as perceived disease risks increased, the participants were more likely to increase the number of disease control interventions used on farm. Figures 4.8 shows there was also a strong relation between control interventions and invertebrate pest risks (F_{pr}= <0.001. R^2 = 0.64). The correlation for weeds was weaker (F_{pr}= 0.04. R^2 = 0.24), however, the relationship was still significant and the same positive trend was noted (Figure 4.9). Figure 4.10 shows a strong

correlation between all control interventions and total risk score for all crops (F_{pr}= <0.001. R^2 = 0.85). Similar to disease, invertebrate pests and weeds risks, the scatter plot indicates that as total combined risks on farm increased, the participants were more likely to increase the number of IPM control interventions used on farm.

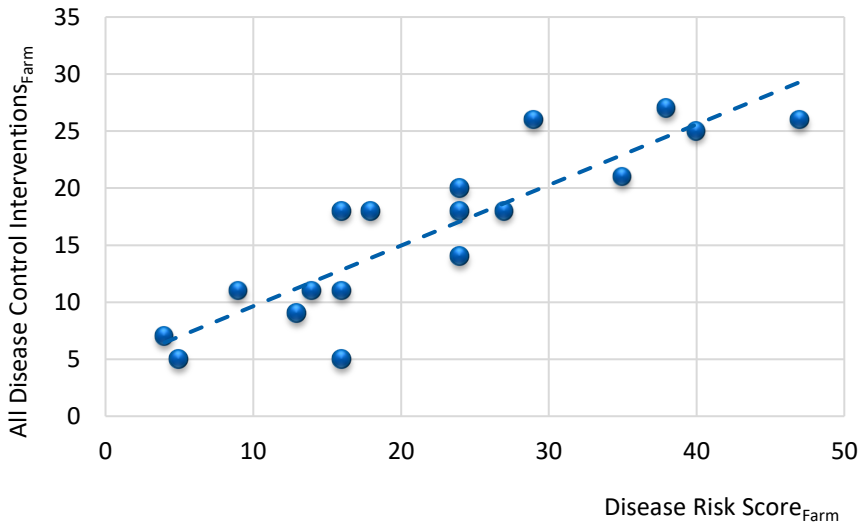

Figure 4.7: Scatter plot showing correlation between disease risk score and all IPM disease control interventions used on each of the farms for all crops during the 2022-2023 growing season.

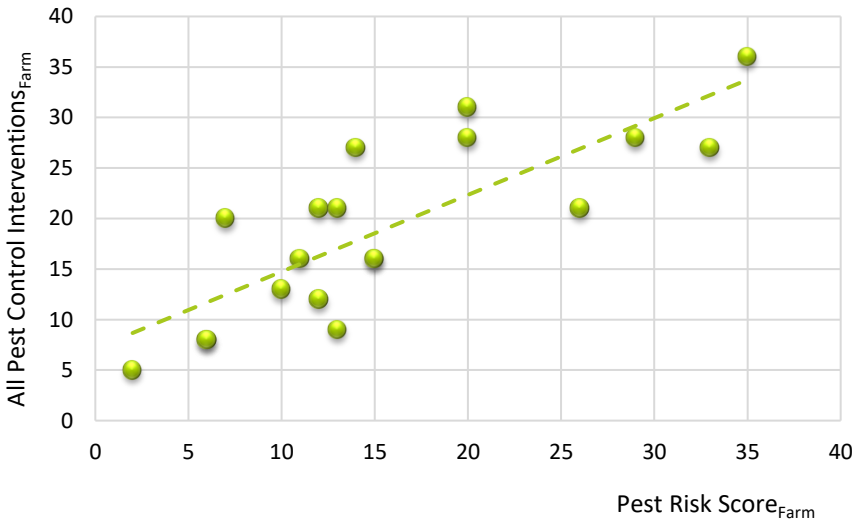

Figure 4.8: Scatter plot showing correlation between invertebrate pest risk score and all invertebrate pest control IPM interventions used on each of the farms for all crops during the 2022-2023 growing season.

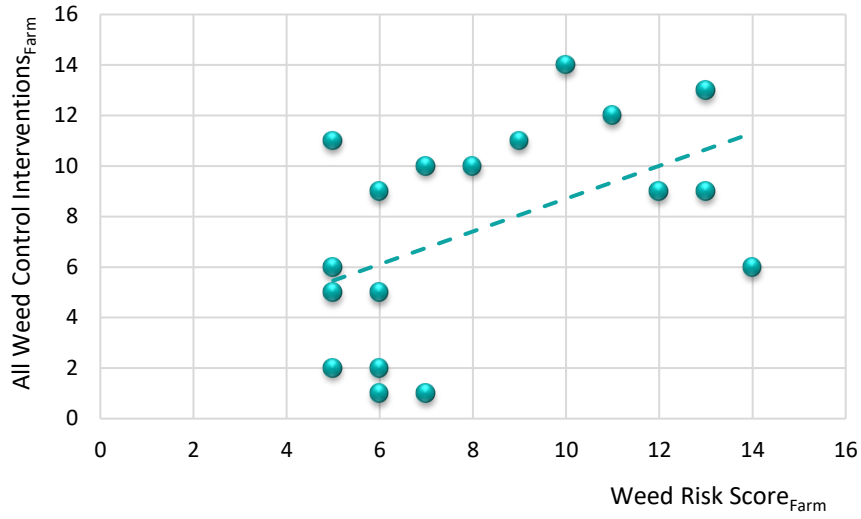

Figure 4.9: Scatter plot showing correlation between weed risk scores and all IPM weed control interventions used on each of the farms for all crops during the 2022-2023 growing season.

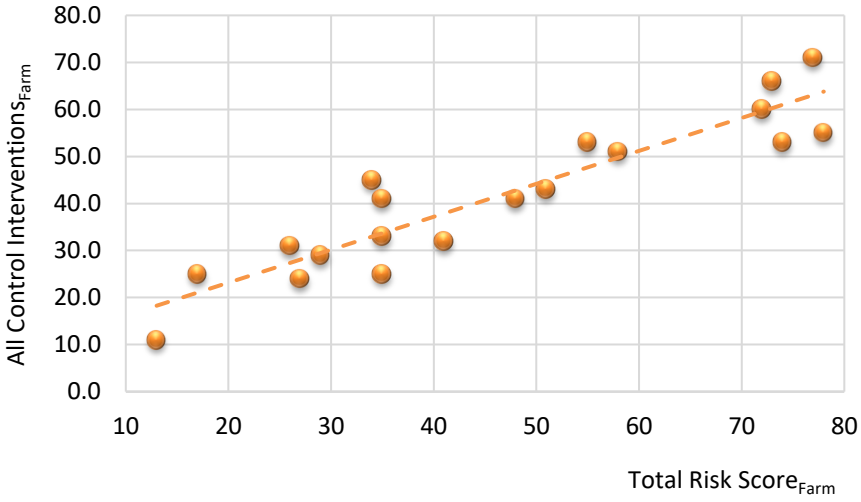

Figure 4.10: Scatter plot showing correlation between the total pest risk score and all IPM control interventions used on each of the farms for all crops during the 2022-2023 growing season.

4.3 WP 3 CONCLUSIONS

- There was a high level of satisfaction with the level of invertebrate pest, weed and disease control obtained.
- Participants felt that the levels of pesticide usage were justified by the degree of pest pressure.
- Most felt that the pesticide inputs were appropriate even in retrospect.
- The majority were likely or very likely to use the IPM Tool to modify IPM actions for next growing season and to create a new IPM plan.

- The methodology developed to relate the level of pest risk and number of IPM interventions, as recorded in the IPM Tool, to farmer stated pesticide usage as a Treatment Frequency Index (TFI) was shown to be robust and could be used for future projects.
- For participants producing IPM plans through the IPM Tool, a relationship was shown between their perceived level of pest risk on the farm and the number of IPM interventions adopted.
- The relationship was stronger for diseases and invertebrate pests than for weeds. Generally, weed control is conducted on a rotational basis across all crops grown, whereas diseases and invertebrate pests are crop specific. Results therefore are reflective of the single seasons worth of data collected which was focused on a single crop in rotation.
- The reasons for this positive relation could either be due to: (i) farmers and/or agronomists have responded to their perceptions of risk by putting more IPM practices in place and/or (ii) the design of the IPM Tool has presented them with more IPM practices to implement due to selecting more pests that pose as a risk, which has (iii) allowed farmers/agronomists to respond appropriately to the risks on their farms by planning to implement more IPM interventions.
- The limited data set from the small farmer interview sample resulted in no clear trends seen in the relationship between pesticide TFI with either number of IPM interventions adopted or pest risk.
- The results indicated there was considerable variability both within farm and between farms regarding the use and intensity of different pesticide products.
- The relationship between the differing variables of IPM planning, pesticide usage, IPM interventions adopted, and pest risk is likely to be complex and will require a larger data set to determine the effects.

4.4 WP 3 Supplementary Material

4.4.1 SFI IPM: IPM Tool users survey – pesticide usage and need

SFI IPM: IPM Tool users survey – pesticide usage and need [transcript of the online survey text]

This survey is intended for farmers/growers who have completed an IPM plan using the IPM Planning Tool.

Introduction:

Thank you for agreeing to participate in this SFI IPM follow-up survey. We aim to understand how the IPM plans created in the IPM Planning Tool (https://ipmtool.net/) and implemented by many farmers over the last growing season affected the control of invertebrates, weeds and pathogens and the use of pesticide on farms. For this, we need your pesticide usage over the growing season 2022-2023.

This questionnaire should take around 45 minutes to complete.

Consent to Participate:

Your participation in this survey and providing your pesticide records is voluntary. All information you provide will be treated confidentially. Your anonymity will be maintained throughout the research, with each participant assigned a unique participant identification number, which will be used in answer responses and analysis. The data gathered will be aggregated and anonymised. The anonymised results will be shared with the project team which will include ADAS researchers, SRUC and the NFU. The analysis will be published. Your contact details will only be used for the purpose of carrying out this project. Data will be stored only by ADAS and in accordance with General Data Protection Regulations (GDPR) Act 2018 and UK general data protection regulation. Data will not be shared outside of the

research team. Following project completion all personal data will be securely destroyed within 12 months of the project final report being submitted.

You are free to withdraw from completing the survey at any point.

Further information: Should you have any concerns or queries about participation in the survey, the storage and processing of your personal data or any other aspect of this research, please contact Kath.Behrendt@adas.co.uk

Please confirm: I have read and understand the information above and I consent to participate in the survey: [*Yes/No*]

Yes	No
○	○

[Yes continue, No re-route to End Page]

[New survey page] General Information

5. In which region is your farm located? *[Select from list]*
6. Please confirm that you have completed an IPM plan using the IPM Planning Tool? [*Yes/No*]

Yes	No
○	○

[if No route to end of survey]

7. Have you also completed a VI/NFU IPM plan? [*Yes/No*]

Yes	No
○	○

[if yes continue to Q4, if no continue to Q5]

8. You have indicated that you have completed a VI/NFU IPM plan. Please tell us your IPM score from this. *[numerical response]*
9. What would you classify the **majority** of your farmed area as? *[select one only]*

Arable	○
Horticulture	○
Grassland	○

10. What is the size (in hectares) of your farmed area? *[Numerical response]*
11. What crops did you grow over the 2022-2023 cropping season? *[Free text]*

[New survey page] IPM Plan and pesticide usage

Please complete the remaining questions for one crop type (e.g. winter wheat) for which you created an IPM plan using the IPM Planning Tool.

12. Please tell us which planned IPM actions you modified during the 2022-2023 cropping season.

IPM action
[free text]
[free text]
[free text]
[free text]
[free text]

13. You have indicated that you modified the actions in your IPM plan. Please tell us any reasons you had for modifying your implemented actions. *[Free text]*

	Very Satisfied	**Satisfied**	**Neither satisfied nor unsatisfied**	**Unsatisfied**	**Very Unsatisfied**
14. How satisfied were you with the level of invertebrate pest control you obtained?	○	○	○	○	○

	Very Satisfied	Satisfied	Neither satisfied nor unsatisfied	Unsatisfied	Very Unsatisfied
15. How satisfied were you with the level of weed control you obtained?	○	○	○	○	○

	Very Satisfied	Satisfied	Neither satisfied nor unsatisfied	Unsatisfied	Very Unsatisfied
16. How satisfied were you with the level of disease control you obtained?	○	○	○	○	○

Pesticide treatment

Please complete questions 17 to 20 as comprehensively as possible. Please be assured that there will never be any scrutiny of the pesticide data provided in terms of regulation and individual farm data will not be identified.

Spray applications

Please record all pesticide sprays and use full brand names. Record the usage of the products for one individual field which is broadly representative of the crop type. Please state NONE if none used. Information for adjuvants is not required.

17. Please record **Seed** information for the 2022-2023 cropping season *[Table response]*

Seed Information	Response (*free text*)
Farm Saved or Certified	
Variety (name)	
Was disease and/or pest resistance a factor in selecting this variety? (Yes or No)	
Seed Treatment (Product Name or NONE if not used)	

18. Please record all **Herbicides** used in the 2022-2023 cropping season, including any repeat applications *[Table response]*

Product	Crop Sprayed	Dose (Litre/ha)	Total area sprayed (ha)	Date of spray

19. Please record all **Insecticides** used in the 2022-2023 cropping season, including any repeat applications *[Table response]*

Product	Crop Sprayed	Dose (Litre/ha)	Total area sprayed (ha)	Date of spray

20. Please record all **Fungicides** used in the 2022-2023 cropping season, including any repeat applications *[Table response]*

Product	Crop Sprayed	Dose (Litre/ha)	Total area sprayed (ha)	Date of spray

21. Please rate the following statements about your pesticide treatment need [*option to select one answer per row only*]

Statement	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
I felt the pest burden on my farm justified the level of inputs	○	○	○	○	○
I felt the weed burden on my farm justified the level of inputs	○	○	○	○	○
I felt the disease burden on my farm justified the level of inputs	○	○	○	○	○
With hindsight, I would have used different inputs	○	○	○	○	○

22. Considering your pesticide treatment needs how likely are you to do the following? [*option to select one answer per row only*]

Factor	Very likely	Likely	Neither Likely nor unlikely	Unlikely	Very Unlikely
Use the IPM tool to create a new IPM plan for the next growing season	○	○	○	○	○
Use the IPM tool to modify my IPM actions for the next growing season	○	○	○	○	○
Refer to the IPM tool again to find information on non-chemical control methods	○	○	○	○	○
Continue pesticide applications at same level as last growing season	○	○	○	○	○
Use non-chemical control methods	○	○	○	○	○
Use herbicide products only when weed risk is high	○	○	○	○	○
Use insecticide products only when pest risk is high	○	○	○	○	○
Use fungicide products only when fungal disease risk is high	○	○	○	○	○

23. Is there anything else you think is important for us to consider in relation to pesticide use and the need for pesticide treatments [*Free text response*]

(Fillable text field – limited characters)

[RE-ROUTE CLOSE FROM Q2 for 'did not complete']

Q2a. You have indicated that you did not complete an IPM plan using the IPM Planning Tool, please tell us the main reason for this. [*Free text response*]

(Fillable text field – limited characters)

[New page] Thank you

Thank you for taking the time to complete this online survey. If you have further comments or wish to discuss the use of data in this survey, please contact Kath.Behrendt@adas.co.uk

We may need to contact you in the future for further research. Would you be willing to share your email contact details? *[Yes/No]*

Yes	No
○	○

[If yes, route to next question, if No route to survey completed page]

Please provide your email address [Free text]

(Fillable text field – limited characters)

[New page] Survey completed

4.4.2 Follow-up telephone survey – Pesticide usage and need

Follow-up telephone survey – Pesticide usage and need [transcript of the telephone survey text]

ADAS Interviewer general guidance

Instructions for the interviewer in the guide are italicized and shaded in blue. Prompts are alphabetised and in blue. Questions are not italicized and are numbered in black.

All appropriate questions must be asked, however the interviewee is not obliged to answer. Where the interviewee declines to answer move on to the next question.

Instructions

Anonymous cross-referencing system: For GDPR regulations we ask each interviewer to have a cross-referencing system to allow the respondents to be kept anonymous. The names and matching references must be kept centrally with limited access. When compiling data, only provide the anonymous interview reference, do not provide any name or address of interviewee.

Interview Mode: Interviews will be conducted using a combination of telephone and virtual interviews (via MS Teams or Zoom) and will last approximately 30-45 minutes.

Audio Recording: All interviews should be audio recorded (with consent), pause the recording if necessary. Where audio recording is not permitted, please take extensive notes.

Prior to the interview all participants must have:

1. Been screened and be expecting the telephone or virtual meetings on the agreed day at the agreed time

2. Been provided with a participant information sheet and consent form either via email or post

Recording Responses:

Please record responses on the 'NFU IPM Interview Response Form' document provided separately.

Key Terms & Definitions: For the purpose of this SFI IPM T&T and the interviews we have defined IPM using the Sustainable Use Directive definition which is as follows:

Integrated pest management means careful consideration of all available plant protection methods and subsequent integration of appropriate measures that discourage the development of populations of harmful organisms and keep the use of plant protection products and other forms of intervention to levels that are economically and ecologically justified and reduce or minimise risks to human health and the environment. 'Integrated pest management' emphasises the growth of a healthy crop with the least possible disruption to agro-ecosystems and encourages natural pest control mechanisms.

INTERVIEW INTRODUCTION

Interview Number:

Interviewer:

Interviewee First Name:

Date & Time of Interview:

Please start the interview by reading the text below.

Thank you for agreeing to participate in this SFI IPM follow-up survey. We aim to understand how the IPM plans created in the IPM Planning Tool (https://ipmtool.net/) and implemented by many farmers over the last growing season affected the control of invertebrates, weeds and pathogens and the use of pesticide on farms. For this, we need your pesticide usage over the growing season 2022-2023.

This questionnaire should take around 45 minutes to complete.

Consent to Participate:

Your participation in this survey and providing your pesticide records is voluntary. All information you provide will be treated confidentially. Your anonymity will be maintained throughout the research, with each participant assigned a unique participant identification number, which will be used in answer responses and analysis. The data gathered will be aggregated and anonymised. The anonymised results will be shared with the project team which will include ADAS researchers, SRUC and the NFU. The analysis will be published. Your contact details will only be used for the purpose of carrying out this project. Data will be stored only by ADAS and in accordance with General Data Protection Regulations (GDPR) Act 2018 and UK general data protection regulation. Data will not be shared outside of the research team. Following project completion all personal data will be securely destroyed within 12 months of the project final report being submitted.

Can I ask you to confirm that you consent to participate in this interview? YES/NO

Please establish verbal consent before proceeding:

Consent is compulsory and if the interviewee does not consent DO NOT proceed with the interview. Thank them for their time and end the interview.

In order that we can capture the full details of what you tell us today, we would like to ask your permission to record the discussion. The recording will be stored securely at ADAS, transcribed, and anonymised to remove any details that could identify you or your farm. It is expected that the anonymised transcript will be used by the research team to ensure accuracy in reporting. The anonymised information you provide may also be shared with NFU (who are running this project) and Defra (who are funding this project). The recording will be deleted when the project is completed and signed off.

Are you happy for the discussion to be audio-recorded today? YES/NO

If permission is given, ask if it is OK to turn on the recorder. [State for the recording the date, interviewee name and interviewer no.]

If no, please stop the recording and take notes. Notify the participant that the recording has been stopped and you will be taking notes to capture the conversation.

With your permission, we will take written notes of our discussion today and will share our summary with you so that you can suggest amendments if needed and indicate anything that you do not want us to share. Check participant is happy for discussion to start.

The proceeding structure of the interview follows the same questions as detailed in Section 4.4.1.

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Cook S, Godfrey G, Telling S, Bartel E, Tatnell L. Burn A, Ellis S. (2023) Integrated Pest Management (IPM) for Biodiversity Enhancement. Natural England, UK.

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Welle BE, Bowen NK, Faubert SJ. (2020). Latent Class Analysis: A Guide to Best Practice. Journal of Black Psychology, 46 (4), pp. 287-311.

Young C, Cook S, Wedgewood E, Bennison J, Bartel E, Blake J, Huckle A, Allen J, Godfrey K, Eyre C, Butters L, Ree H, Bowsher-Gibbs M, Creissen H. (2022) Review and guidance for integrated management of economically significant weeds, pests and diseases in a range of horticultural and other edible field crops. AHDB, UK.