Deliverable D 2.2
Standardised metric(s) pesticide reduction quantification

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1. Abbreviations and acronyms

Abbreviation / Acronym	Description
IPM	Integrated Pest Management
JRC	Joint Research Center
QAI	Quantity of Active Ingredient
PLI	Pesticide Load Indicator
PPP	Plant Protection Product
NODU	Number of Doses Used
NMI 3	Dutch Environmental Indicator for Pesticides
POCER	Pesticide Occupational and Environmental Risk indicator

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The present document constitutes the Deliverable D2.2 “Standardised metric(s) pesticide reduction quantification”

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Developing a Comprehensive Indicator for Evaluating and Scoring Plant Protection Practices

Definition and implementation of the concept of Agronomic Service Provided (ASP) and improvement of agronomic service Provided (IASP)

Task 2.3 aims to review existing metrics and propose standardized metric(s) to compare crop protection practices and systems across the European Union. The metric inform national authorities and can support farmers and allows for monitoring on the efficacy of pesticide reducing practices and systems, and simplifies follow-up of implemented policies.
The goal of this task is to establish the groundwork for a harmonized IPM indicator, showing the deployment of IPM practices and to create guidelines for Member States and the European Commission. These guidelines will help to build a shared understanding of the principles of IPM and the actions that constitute it. Currently, no such indicator exists, and each Member State applies its own criteria for assessing IPM compliance (Farmer's Toolbox for integrated Pest management, final report, JRC, 2023).

1. A look at the indicators used in the various National Action Plans resulting from Directive 2009/128/EC

The existing indicators are summarized in the Farmer's Toolbox for integrated Pest management (final report, JRC, 2023). There are several quantitative indicators from the National Action Plans developed under Directive 2009/128/EC. By analyzing these existing metrics, we will work to develop the foundation for a new indicator that can compare systems and practices across Europe. This new metric must be capable of being applied to all crop protection practices, whether or not they involve a plant protection product.

1.1. Classification of Pesticide Indicators

Type of Indicator	Reduction in Impact	Reduction in Pesticide Use	Reduction in Both Impact and Use
Descriptive	○ Spraying equipment passing inspection ○ Presence of pesticide residues in food ○ Presence of PPP residues in feed ○ Presence of pesticides in groundwater ○ Presence of PPP in surface water ○ Number of farmers holding training certificates ○ PPP poisoning incidences ○ Pollution incidents involving pesticides ○ Population of wild birds and other species	○ Pesticide active ingredient (QAI) : sales data ○ Percentage of area under organic farming	○ Pesticide Load Index (PLI)

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	○ Bee poisoning incidences		
Calculated	○ PRIBEL (Pesticide Risk Indicator for BELgium) ○ SYNOPS (Synoptisches Bewertungsmodell für Pflanzenschutzmittel) ○ PRI Nation (Pesticide Risk Indicators at National level) ○ PRI Farm (Pesticide Risk Indicators at Farm level) ○ NMI3 ○ POCER-1 and POCER-2	○ Number of Doses Used (NODU) ○ Treatment Frequency Index (TFI)	○ HRI 1 (Harmonised Risk Indicator 1)

1.2. Explanation of Categories

- Reduction in Pesticide Use: These indicators primarily track the quantity of pesticides used, such as total sales or the number of treatments.
- Reduction in Impact: These indicators focus on measuring the environmental or health impacts of pesticide use, such as residue levels in water or food, or the occurrence of poisoning incidents.
- Descriptive Indicators: These indicators are based on direct observations or measurements of specific phenomena related to pesticide use.
- Calculated Indicators: These indicators are calculated using mathematical models and algorithms, often incorporating data on the toxicity (or usual dosage) of different pesticide substances and their application rates.

2. Advantages and limits

2.1. Pesticide use indicators

The existing pesticide use indicators show the sales of products and therefore demonstrate the use of products. The objective of reducing dependency is potentially visible in these indicators through a drop in the quantities sold, which may reflect a reduction in dependency.
If the indicator only tracks quantities (QAI, TFI, NODU), it is not possible to track the reduction in impact. This second dimension can be monitored by categorizing products or effects (HRI1, PLI) or with another indicator dedicated to impacts.
These pesticide use indicators have known biases:

- When the quantity is tracked by quantities of active substance, the trend potentially conceals a substitution of products with a high amount of active ingredient per hectare, which does not reflect a reduction in dependence (product substitution).
- When the quantity is tracked by the number of doses used, the above bias is eliminated, but it remains difficult to identify systems that are highly dependent on one or other types of uses.
- Monitoring quantities allows us to report on a reduction in these quantities, but does not provide any information to explain the source of this reduction. It may therefore be natural (e.g. favorable weather conditions) or structural such as a substitution of products by other non chemical practices, or an optimization of doses (increased efficiency of treatments through more precise positioning or more efficient machines).

It is not possible to use this type of indicator to assess the proportion of the reduction in sales linked to a change in system or an improvement in the resilience of systems. Consequently, this

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creates challenges in identifying the new measures needed to address crop protection issues, as it is impossible to dynamically monitor the implementation of new plant protection practices and thus to support those practices that struggle to gain traction.

However, the major advantage of these pesticide use indicators are their easy calculation methods, as they require only a limited amount of information such as quantities sold by active substances. This is a major advantage when it comes to drawing up quick and reliable annual reports.

Once the stakeholders have understood how they are calculated, these indicators, which are simple to calculate, can turn out to be poor proxies for dependence on plant protection products, since they do not reflect the ability to use them only as a last resort.

2.2. Pesticide Impact indicators

The existing pesticide impact indicators show the effects of products on human health and the environment and therefore demonstrate the impacts of products. The objective of reducing dependency is potentially visible in these indicators through a drop in the contamination of different environmental compartments or target organisms, which may reflect a reduction of impacts.

Some indicators tracks only current impacts (PLI, PRIBEL, NMI3), while others are more sophisticated and can model impacts (SYNOPS, POCER-1 POCER-2, PRI Nation and PRI Farm). Few indicators consider both Use and Impacts by categorizing products or effects (HRI1[1], PLI) or by combination of two indicators.

These pesticide impact indicators have known biases:

- When impact is tracked by product categorization based on risk classes (notably mortality risk levels on certain organisms), there is an arbitrary dimension or threshold effects that are created when categories are aggregated into a single indicator.
- When impact is tracked by product categorization based on risk classes (notably mortality risk levels on certain organisms), the fact that the different categories are not aggregated results in a multiplicity of indicators that pose a risk to the legibility of trends. Is it more important to reduce the impact of the most toxic products or to reduce dependence on all products?
- Monitoring impacts allows us to report on a reduction in these impacts, but does not provide any information to explain the source of this reduction. It may therefore be natural (favorable weather conditions) or structural such as a substitution of products by other practices, or an optimization of doses (increased efficiency of treatments through more precise positioning or more efficient machines). It is not possible to use this type of indicator to assess the proportion of impact reduction linked to the adoption of IPM Principles, or to promote the most effective practices (those with the greatest impact reduction).

For our task, the limitation is that neither consumption nor description or modeling of impacts are good proxy to follow promotion and implementation of Integrated Pest Management (IPM) principles. In fact, indicators on consumption fails to promote the transformation of systems necessary for the integration of IPM methods, giving precedence to principle number 1. Furthermore, the changes in practices associated with one principle cannot be separated from changes in practices associated with another only by looking at the changes in consumption nor impact indicators.

[1] Based on categories of active substances and hazard weightings defined for this purpose in the Annex of Commission Directive (EU) 2019/782

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2.3. The benefits of creating a service dimension to the action

Currently, there is no such unified indicator across Europe, as each Member State applies its own criteria for evaluating the implementation of IPM principles. This proposition is not intended to replace existing indicators within each action plan. Rather, it serves as a complementary tool to assess any practice that falls within one of the eight general principles of Integrated Pest Management (IPM):

1. Prevention and Suppression,
2. Pest Monitoring,
3. Decision-Making,
4. Biological/Physical/Non-Chemical Methods,
5. Pesticide Selection,
6. Reduced Pesticide Use,
7. Anti-Resistance Strategies, and
8. Evaluation.

According to the “Farmer’s Toolbox for Integrated Pest Management - Final report,” there is no existing indicator in Europe that reflects the implementation of IPM principles.
This note builds on the **internal guidelines of the French Pesticide Savings Certificates Commission (CEPP commission)**, which were inspired from the **methodological bases established by the Haute Autorité de Santé (HAS)** in France for assessing medicinal products. These internal guidelines were developed to support the assessment of standardized actions proposed under the CEPP scheme, where agricultural practices aimed at reducing the use and impact of plant protection products are evaluated. When agronomic trials alone cannot measure the efficacy of such practices, the note outlines principles for evaluation. The assessment compares current farming practices and systems with proposed innovations, such as improved efficiency in the use of plant protection products (e.g., high-performance sprayers), substitution practices (e.g., biocontrol products), or system redesign (e.g., changes in the landscape or the rotation).
For task 2.3, the Agrowise consortium has recognized the need for clear assessment criteria, particularly given the variation of "current practices" across different countries, applicants, crops, and pests. Drawing from the evaluation methods used by the HAS for medicinal products and the CEPP commission internal note, the Agrowise consortium proposes that practices are evaluated according to the **service they provide** to farmers. This service should ensure effective pest control, prevent future pest proliferation, and maintain comparable yield and quality, enabling the practices to be integrated into the farmer’s production system.
In the present document, the word ‘pest’ is used as a generic term to cover weeds, pests and diseases.

3. Definitions of the new proposed metrics

The medical service provided and the improvement of the medical service provided are two key concepts used by the Haute Autorité de Santé (HAS), in France, to evaluate medications or medical devices within the framework of reimbursement by Social Security.
The following definitions propose a transposition of the concept of **“provided service”** from the medical field to the agricultural sector in the context of plant health.

3.1. The Agronomic Service Provided (ASP)

The agronomic service provided of a practice can thus be defined as the capacity of the given practice to fit into a farmer's technical itinerary, enabling him/her to effectively protect his/her

crops, while:

1) **Maintaining** comparable quality and yield.
2) **Maintaining** similar or better income.

The assessment of the ASP takes into account (See appendix for more precision)

- The **effectiveness** of the practice (The effectiveness of the practice combines an assessment of its efficacy against the target pest and its capacity to reduce pesticide use per hectare.),
- Whether it is curative or prophylactic,
- The **level of threat posed directly** or indirectly by the targeted pest,
- **Level of infestation** of the pest (based on previous monitoring),
- The level of the **undesirable effects on environment** (parameter to be defined for non-chemical practices, particularly in terms of the environmental compartments concerned),
- Its **position in the technical itinerary and the possible needs of combination** as part of an integrated protection system. This position is considered in the light of other possible practices for the same use,
- Other benefits of the practice in terms of human and environmental health (including unintended effects on biodiversity),
- Crop protection effect on long term (cumulative or not),
- Crop protection effect at a landscape level needing an implementation at different scales,
- Variation of effect on different crops/region, (for this aspect, the aggregation method will be specified at the end of the project on the basis of case studies)

Taking the example of the evaluation of the medical service provided, and depending on the assessment of these criteria, it is possible to propose the following levels of Agronomic Service Provided:

1) Major ASP (agronomic service provided): ASP I ;
2) Moderate or Low ASP, but still justifying support for the introduction of the practice: ASP II or ASP III;
3) Insufficient ASP to justify any support: ASP 0.

The ASP is assessed in absolute terms in relation to above parameters for the proposed practice for the use in question.

3.2. Definition of the levels of agronomic service provided

Inspired by the doctrine of the HAS technical commission, we propose to distinguish between 3 levels of ASP: major, moderate, low. A 4th level of insufficient agronomic service (ASP 0) will be used for practices that do not provide a relevant service in the current state of knowledge or for practices that do not have the capacity to demonstrate the effect they claim. All practices included in the taxonomy will be assessed on the efficiency parameter (linked to task 2.4 of the project). By the end of the Agrowise project in October 2025, the crop protection practices linked to 3 case studies will be evaluated using the agronomic service methodology described. This evaluation can be continuously re-evaluated on the basis of new knowledge.

3.1. Definition of ASP levels

Here is how we could assign explain the different level of ASP:

3.1.1. Major ASP : ASP I

Corresponds to the key treatment for a recognized major use, having a strong curative or preventive impact. (The practice either prevents or nearly completely stops the infestation or is essential for keeping it under control.)

Estimated service percentage: 80% to 100%

3.1.2. Moderate ASP : ASP II

The practice is useful but pertains to less critical uses, or its impact on major uses is less significant than for major ASP. Nonetheless, it is important for preventing damage (economically significant) in these uses. (The practice significantly improves crop conditions but does not fully prevent or eliminate damages caused by pests.)

Estimated service percentage: 50% to 80%

3.1.3. Low ASP : ASP III

The practice has limited effectiveness or low relevance for the target use, often in conditions where more effective protection strategies exist. It may reduce some damages but does not represent a major advancement. (The practice has an effect, but it is limited to certain specific aspects (e.g., certain types of damages, for instance, damage to a particular type of organ)

Estimated service percentage: 20% to 50%

3.1.4. Insufficient ASP (ASP 0)

The practice does not provide a sufficient benefit to be successfully integrated into a protection strategy. It may be entirely ineffective (a rare case) or have a negligible effect compared to other available options (other practices or stategies). (The practice does not provide any significant effect in the control of the pests.)

Estimated service percentage: 0% to 20%

3.2. Possible interpretation

- A major ASP would indicate a practice that prevents damage or completely or almost completely stops the infestation (very high efficiency). Those practices are rare.
- A moderate ASP would imply substantial but not total protective benefit. These practices could be combined to reach high efficiency.
- A low ASP would indicate a limited impact or limited to partial aspects of protection (e.g., protects only one organ, is efficient for a specific crop at particular growth stage).
- An insufficient ASP would show an absence of remarkable service.

These percentages are conceptual estimates based on the intensity rating of pest pressure for each level of ASP. This type of evaluation could help to build a framework to assess the effectiveness of a plant protection practice, regardless of the lever of action it mobilizes. Following task 2.3 Agrowise project will assess practices according to the above definition of ASP. The consortium will analyze ASP for plant protection practices related to three case studies: the case of codling moth in apples, the case of downy mildew in vineyards, and the case of weed control in arable crops. This will enable the consortium to present a more operational definition of this metric within the framework of WP6, as the definition of the agronomic service provided is closely tied to the effectiveness of practices, which is the focus of Task 2.4, as an immediate follow up of this task in M 7 of the project.

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3.3. The improvement of the Agronomic Service Provided (IASP)

The **IASP** makes it possible to compare a newly introduced practice to those already available for the same type of use (crop-pest combination). This evaluation measures the pest management progress achieved by a new practice compared to an existing practice.
This concept is relative and is expressed in terms of the range of practices that a farmer can envisage in response to a problem affecting her/his crops. As a result, IASP is an overall assessment of the progress made by a new practice in comparison with existing strategies.
This concept requires the definition of a common level of protection and a standard protection strategy for a given use (crop-pest combination). This could be defined by several sources:
Official definition of these Standards:

- National regulation and recommendation (for example for quarantine organism)
- Agency assessment
- Extension services official guidelines
- Advisory systems official guidelines

When those definitions do not exist:

- Expert consensus
- Evidence-based practices
- Field trials

Currently, in the majority of cases the second situation will apply.

3.4. Definition of IASP levels

3.4.1. Major improvement (IASP I)

A major improvement may be recognized for practices with a new mechanism of action, which has demonstrated a high level of evidence and confidence or a superiority associated with a relevant effect in terms of maintaining yield and quality in the presence of a pest compared with the agronomic relevant practice in a context of insufficiently covered protection needs and targeting a major pest.
This assessment corresponds to situations of upheaval in practices (which fundamentally change the ability to protect a crop affected by a major or emerging pest) for which the IASP determinants are satisfactory to maintain production while protecting the crop.

3.4.2. Important to moderate progress (IASP II, III)

Important or moderate progress may be recognized for practices that have demonstrated superiority associated with practical efficacy in terms of yield and quality compared to the standard protection strategy in a context where the need for protection is insufficiently covered. The value of this efficacy can be positively modified by making implementation easier and support the economic benefits.

4. Possible interpretation and method to assess plants protection practices

4.1. Basis

The implementation of these ASP and IASP concepts makes it possible to assess transparently the advantage of a practice and may be complemented by a unique value attributed to a

particular practice. This value will allow a comparison between practices even if they are used on different crops.
To qualify ASP and IASP, particular attention is paid to the following criteria:

1) The quality of the demonstration, which includes the comparison and choice of the standard protection strategy, the methodological quality of the experiments, plant material used for the trials (consistent with commonly used varieties), the relevance of the test methods used and the indicators used to score them, the statistical significance of the results, etc.

2) The efficacy in terms of crop protection, easiness of use, logistics of implementation and safety for the operator and neighbors and the unintended effects on the environment and non-target organisms.

3) The relevance of the observed effect in relation to the reference practice.

For each practice, we could propose an assessment in 3 parts:

1) Acceptance or non-acceptance of the benchmark, which will only be possible where there is a proven agronomic service provided (if the service provided is insufficient, the practice is not really useful),

2) Level of agronomic service recognized for the practice

3) Level of improvement in the agronomic service provided

These rules will be applied to all practices. They will be updated when necessary to take account of regulatory, technological and methodological developments.

4.2. How to assess the practices

4.2.1. Determine a use case

We will use the following examples during Agrowise project:

- Apple <> codling moth
- Vineyards <> downy mildew
- Arable land <> weeds

This method can be applied to any use case. These were chosen according to the priority of the project (orchards and arable crops) and among the main pests. They were also chosen to provide examples of combinations of practices for the same pest (example of codling moth) and a set of practices against a variety of weeds (weed control in field crops).

4.2.2. Determine the list of practices from the taxonomy

The list of practices targeting a pest is drawn up using the taxonomy produced as part of Workpackage 2 of the Agrowise project and on the basis of the work carried out by the institutes participating in the development of the method. As part of the generalization of the method, this list of eligible practices can be drawn up by various players, including advisors or groups of farmers themselves, using the taxonomy produced as part of the Agrowise project as a possible working basis.
For example, in the case of codling moth, the list would be as follows (based on the taxonomy produced as part of the project):

- 1.3.3 Harvest Management
- 1.6.2.2 Removal of inoculum Sources-removal of infested plant parts/ plant debris management
- 1.5.1 Management of ecological infrastructure

- 2.1.1.4 Monitoring with traps – Olfactory attractants (Pheromones and feeding attractants) / Smart traps
- 2.1.2 Assessment
- 3.1.1.1 Use of pest and disease prediction models
- 4.1.1 Biological control agents – *Bacillus thuringiensis*, Granulovirus, Parasitoids wasps
- 4.2.2.1 Use of Pheromone traps – Mass trapping, Mating disruption
- 4.2.4.1 Sterilized insect pest or organism – SIT
- 4.3.1.2 Barriers : other physical – nets
- 4.4.1.2 Biopesticides/Botanical pesticides
- 5.1.1 Pesticide selection
- 6.1.1 Adapting spraying technology
- 6.1.2 Spray application
- 7.1.1 Choice of active substance and Control agent
- 8.1.1 Documentation and reporting
- 8.1.2 Impact Assessment

4.2.3. Assess SAR from the following table

The table below serves as a guide for combining the different ratings for the agronomic service parameters. It can be used directly for all crop protection practices.

ASP parameters➔ ⬇practices list	Practice	Effectiveness Against Target	Capacity to Reduce Pesticide Use /5	Level of Pest Harmfulness /5	Effect on Biodiversity	Associated with Prophylaxis Yes/No	Effect on Other Environmental Domains	Territorial Scale	Temporal Scale

Refer to the appendix for the definition of each parameter

If a practice is effective across several crop-pest combinations, assess the main combinations and note any major differences.

If the effectiveness of a practice was tested in multiple regions or countries, check for any significant differences in efficacy.

The aggregation of the nine defined parameters will allow us to determine the Agronomic Service Provided by the agricultural practice. To achieve this, certain parameters are considered as primary determinants:

- the effectiveness of the practice against the target pest,
- the potential to reduce pesticide use, and
- the risk level posed by the pest.

The remaining parameters will be used to adjust this initial level of service provided, providing a more nuanced evaluation.

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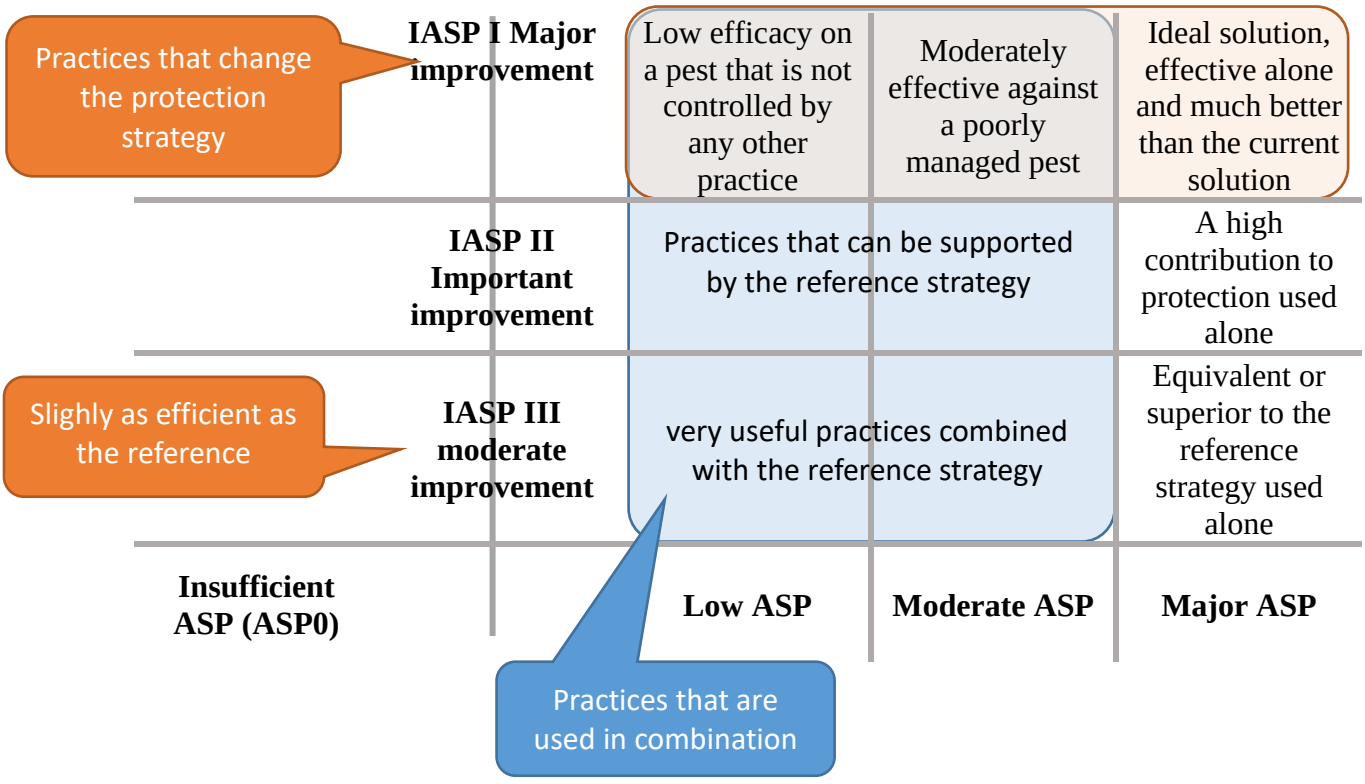
At this stage of the method, the ASP is attributed. It is then possible, in the case of a practice that can be introduced into the reference system, to evaluate an improvement in the agronomic service provided. To do this, it is necessary to define the standard protection strategy referred to. This stadard strategy is the one considered as the reference according to the criteria set out in 3.3.

4.2.4. Assess the IASP for practices not included in the Standard protection strategy

a. Determine if it represents an improvement (e.g., fewer interventions, better productivity, fewer residual effects, or a shift to a different protection strategy).
b. Classify the improvement as high, moderate, or low.
c. If no improvement is found, examine why and consider how it could be improved.

4.2.5. Interpretation of the combination ASP/IASP

Taking into account the above definitions, it is possible to classify crop protection practices according to, on the one hand, the service it provides (ASP) and, on the other hand, the improvement in service it allows (IASP) compared with the current strategy.
The table below shows the different combinations. The agronomic service provided (ASP) increases from left to right, and the improvement in the agronomic service provided (IASP) increases from bottom to top.



5. Conclusion

The concepts of "agronomic service provided" and "improvement of agronomic service provided" differ from the indicators commonly used in National Action Plans. Indicators that track quantities and environmental impacts of pesticides provide valuable insights into the trends in pesticide usage and their effects on various environmental compartments. However, these indicators are limited in their ability to measure the evolution of crop protection practices.

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This is why the notion of agronomic service is proposed.
The idea within the AGROWISE project is to explore whether it is feasible to rate the practices listed in the taxonomy based on these two indicators. Furthermore, the value of this information will be asessed for the use in Member State. Both concepts could be enhanced with numerical values, enabling the cumulative assessment of all implemented practices and the expansion of their deployment.

6. Appendix: Methodology for Evaluating Plant Protection Practices

This annex presents a protocol aimed at developing a methodology to assess the agronomic service provided (ASP) by plant protection practices, as well as improvements in this service, as described in the main report.
The methodology, which has been initially tested in a workshop with the Faculty of Agriculture in Zagreb, is structured around three selected case studies.
For each case, a comprehensive list of known protection practices is compiled (link to the taxonomy from task 2.1), and the typical number of treatments applied against a target pest is provided as a reference point. This allows a comparison of reference treatment levels between different countries, supporting a clearer understanding of both the agronomic impact and potential areas for implementation. The selected case studies are as follows:

1. Codling moth in apple orchards,
2. Downy mildew in vineyards,
3. Weed control in arable crops (this case may be further subdivided based on identified production techniques).

6.1. Protocol Developed During the Workshop

The following protocol, established during the workshop, will be applied to evaluate the remaining practices across the three case studies. The workshop enabled productive exchanges with partners, allowing us to establish shared definitions for key concepts that constitute the agronomic service provided.
This collaborative effort has ensured a consistent understanding and application of terms, which will support accurate and comparable assessments across practices and case studies. The protocol includes structured evaluations that reflect both the effectiveness of each practice and its potential contribution to reducing pesticide use, thereby enhancing the agronomic service provided.

6.2. Parameters of the Agronomic Service Provided

The parameters defining the agronomic service provided are outlined below, along with their intended application in evaluating the various practices. Should the team encounter any difficulties, adjustments to these definitions will be proposed at the end of the project (within the dissemination deliverable planned in Work Package 6) to ensure that the methodology can be readily adopted by any interested Member States following the project's completion.

6.2.1. Effectiveness of the Protection Method Against the Target

This effectiveness is, wherever possible, based on field studies providing a measure of the practice's efficacy against the target pest. When such studies are unavailable, the effectiveness level is assessed by an expert panel, which assigns a rating from 1 (very low effectiveness) to 5 (very high effectiveness).

6.2.2. Capacity of the Method to Enable Pesticide Savings

This aspect differs somewhat from the previous parameter, as a method can be highly effective against the target pest but may not necessarily lead to a reduction in pesticide use. For example, if a treatment targets several pests, it is triggered by one main pest. A secondary pest can then be considered a collateral effect of the treatment. In this configuration, even a fully effective control method against this secondary pest would not be able to reduce pesticide use, since the treatment would be triggered for the main pest anyway.
This dimension will be assessed based on all available data from consortium partner institutions and will ultimately be rated on a scale from 1 (little to no reduction) to 5 (complete replacement of treatments against the target).
These two parameters will be evaluated as part of Task 2.4, led by the Faculty of Agriculture in Zagreb.

6.2.3. Level of Pest Harmfulness

This parameter indicates that a solution provides a greater agronomic service if it addresses a major pest that causes significant crop damage. The three case studies are considered major targets and will all receive the maximum score of 5. A secondary target, such as minor leaf miners in apple orchards, would receive a lower score. Finally, a score of 1 would be assigned to a target for which interventions are currently unnecessary.

6.2.4. Direct effect of the Practice on Biodiversity

This effect is measured on a scale ranging from "--" to "++" (with the five levels being "--", "-", "0", "+", "++"), where a highly positive effect allows for the restoration of certain biodiversity parameters. Note that this parameter reflects the direct effect of the practice on biodiversity. For instance, in the case of mating disruption for controlling codling moth in apples, the effect is considered neutral, as the technique itself does not impact biodiversity. However, indirectly, it creates areas with less frequent treatments, which helps preserve beneficial organisms (and will be assessed in parameter 6.2.6).

6.2.5. Is the Practice Associated with Prevention?

This dimension reflects the practice's role in prevention and suppression of target pests, as prophylactic practices should be prioritized to reduce crop pressure and promote sustainable crop protection. This parameter is rated as either "Yes" or "No."

6.2.6. Effect of the Practice on Other Environmental Domains

This dimension aims to identify, when possible, in which environmental compartment the effect is observable and whether the effect is positive, negative, or neutral. These effects can vary widely and may include factors such as nitrogen input or water ressources preservation.

6.2.7. Action at the spatial Scale

At what scale should the effects of the practice be evaluated: at the field scale (<4 ha), at the scale of a block of fields, or at the territorial scale? Three possible ratings will be used: field, block of fields, and territory.
This evaluation of the scale at which effects are visible enables us to integrate information on practices that have better effects on the scale of a plot of land or a territory. This information on the scale of action is essential to help implement the practice in the best possible conditions.

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6.2.8. Temporal Scale of the Action

What is the dynamics of the action? Is it a multi-year effect following the use of the practice, or is it a cumulative effect? The three modalities for this parameter will be: annual effect, multi-year effect, and cumulative effect. This rating will complement the anticipation rating outlined in the taxonomy.
Similarly for the temporal scale, the parameter enables us to highlight the fact that a practice renders an additional service when it is renewed (cumulative effect), or a service when it is implemented and preserved over a long period of time (long-term effect). This information is decisive in adapting the mode of support for the implementation of the practice.

6.2.9. Capacity of the Method to Withstand Resistance Risks

This parameter emerged during the workshop and could help to inform the robustness of a system including the practice being evaluated. At this stage, it will be tested as an additional parameter in the evaluation of agronomic services provided.
This parameter has two parts:

- **Resistance Risk Against the Practice**: The likelihood that resistance will develop if the practice is widely adopted.
- **Modulation of Resistance Risk**: The impact of introducing the practice on the overall resistance risk of the strategy, including effects on treatments that the method does not directly target.
- **Notations for Capacity to Withstand Resistance Risks:**
  - Reduction of Resistance Risk
  - Maintenance of Current Risk
  - Increase in Resistance Risk

6.2.10. Exemple for sexual confusion of Codling moth in apple orchards

Practice	Effectiveness Against Target	Capacity to Reduce Pesticide	Level of Pest Harmfulness /5	Effect on Biodiversity	Associated with Prophylaxis Yes/No	Effect on Other Environmental Domains	Territorial Scale	Temporal Scale	Anticipation /5
Sexual Confusion in Apple Orchards	75%	5	5	0	Yes	0	Block of fields	Cumulative effect	2 to 3

Finally, after evaluating this practice together during the workshop, the participants agreed that the practice of mating disruption of codling moths provided a major service: ASP I.
And the practice would greatly improve protection practice if it were adopted more widely in Croatia. As its adoption in France is more widespread, it is the diffusers combining confusion against codling moth and other leaf miners that represent an improvement in the service provided.

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