

Developing an assessment framework to identify plant health benefits and risks for emerging novel crops in Scotland

Policy Summary



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1 Policy Summary

1.1 Background

Scotland's arable sector is predominantly dominated by three crops namely wheat, barley and oilseed rape. This narrow crop choice exposes the sector to significant vulnerabilities such as pest pressures, soil degradation, and regulatory constraints. Hence, farmers are looking for new/novel crops. Novel crops could diversify rotations, improve farm incomes and reduce the need for synthetic inputs if they are at low risk of pest and disease problems compared to conventional crops. However, each potential novel crop should be carefully assessed before introduction to determine the benefits and risks, particularly if there might be risks to other sectors, for example a risk to other established crops or a risk to the plant health status of plants in the natural environment.

Oilseed rape provides a historic example. It was introduced in the UK in 1970s as an alternative crop and as a break crop to cereals. Although initially relatively pest and disease free, the yield of oilseed rape in the UK has declined in recent years and the need for plant protection products has increased due to pests like cabbage stem flea beetle and diseases such as light leaf spot and clubroot. All of which also impact other brassicas in a rotation. This highlights the need for a robust framework to assess the risks and benefits of introducing novel crops. This project developed a risk assessment framework to be used as a decision-support tool to evaluate the benefits and risks of new crops in Scotland, with a focus on plant health risks, pest management, and environmental impacts.

The aim of this project was to design a risk assessment framework suitable for use by policy makers and land managers which will allow them to identify the main risks and benefits of any novel crop introduction and help them in decision making. The design is flexible enough to be adapted for use in other sectors.

1.2 Research Undertaken and Main Findings

Framework Design: Other risk assessment (RA) frameworks were reviewed to design a format suitable for use in the context of plant health in Scotland. The devised framework aims to assess the risks and benefits associated with introducing new/novel crops in Scotland. This is simple and flexible to be utilised by various sectors. It has four questions and guidance to score each question. The score is divided into low, moderate, and high. Each question has a national and local element to be considered. Hence, the user can get the overview as well the specific impacts to their place of interest. Policy makers will be the main users of the framework designed at the national levels, with the local levels suitable for individual land managers, farmers and agronomists.

Framework Validation: To validate the framework, oilseed rape was used as a historic case study. The framework effectively captured the risks associated with oilseed rape cultivation under historical (1970s) and current (2020s) scenarios, demonstrating its adaptability to evolving agricultural challenges. Key risks included pest pressures (e.g., aphids, flea beetles) and disease impacts (e.g., light leaf spot, verticillium stripe). Working retrospectively to validate the framework demonstrated that oilseed rape's decline would have been predicted by the framework had it been available at the time, highlighting the major factors that could have been addressed to prevented or slow the advance of plant health issues present today, including the emergence of pests and diseases and also over-reliance on key control methods.

Novel Crop Assessments: Further case studies were developed to further validate the RA Framework.

- Sugar Beet: High-risk due to virus yellows and soilborne pathogens, compounded by pesticide restrictions and climate change.
- Industrial Hemp: Moderate risk, with limited data on pest pressures in Scotland's humid climate.
- Mustard (Cover crop): High pest risks (like oilseed rape) but with downstream benefits such as biocontrol against nematodes.

The RA framework was tested in stakeholder workshops with participants endorsing the framework's utility while highlighting knowledge gaps (e.g., forestry crops). They were also keen to see additional case studies and suggested expanding the examples given to include legumes.

1.3 Recommendations and next steps

- Expanded range of case studies: Apply the framework to legumes and other emerging crops to diversify the populated risk assessment examples.
- Address knowledge gaps: Because of the long-term nature of tree planting, stakeholders were more risk averse and more worried by gaps in knowledge with which to populate a RA. Therefore, collaborating with sectors like forestry to improve pest and disease evidence / data for trees or understudied crops is recommended.
- Policy Integration: Incorporate the framework into agricultural policy to guide sustainable crop diversification and mitigate risks from pests, diseases, and regulatory changes.

1.4 Conclusions

This project provides a science-based tool to de-risk agricultural innovation, allowing novel crops to be evaluated for resilience, productivity, and environmental sustainability. By integrating stakeholder insights and empirical data, the framework supports Scotland's transition toward diversified, climate-resilient farming systems.

Keywords: Crop diversification, risk assessment, plant health, pest management, sustainable agriculture.

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