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Scotland's Centre of Expertise

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A targeted analysis of the impact of insecticide withdrawals in Scotland, in the context of alternative control options

Policy Summary

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ADAS SRUC Forest Research

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1 Policy Summary

Scottish agricultural, horticultural and forestry crop production systems are heavily reliant upon the use of chemical insecticides. The principles of UK regulatory controls means that the availability of active chemical substances is likely to become increasingly restricted in response to human and environmental health concerns. At the same time, the efficacy of some insecticides is declining due to rising pest resistance and alternative control methods – included within Integrated Pest Management (IPM) – can incur additional costs and/or offer less effective protection. Consequently, it is likely that maintenance of yields, product quality and profitability will become increasingly challenging.

This report is an assessment of these challenges, based on analysis of current crop production patterns and usage of active substances, likelihood of regulatory withdrawal for different active substances, and stakeholder views on the effects of withdrawal and the potential for other control methods.

Some land parcels in production receive insecticide treatments whilst others receive none. For example, forestry usage is mainly concentrated on planting and replanting, which only accounts for c.20k ha out of total woodland of c.1.5m ha. Moreover, some crops receive multiple sprays. Estimated total spray areas (i.e. treated area multiplied by number of times sprayed) during 2019/20 are shown in Table E1.

The figures reveal the most commonly used insecticides and also the relative usage across different sectors. For example, lambda-cyhalothrin is the active substance used on the greatest area, and is applied across arable, vegetable, soft fruit and forestry production. Esfenvalerate is the next most used but is used only in arable production. Equally, some active substances, such as chlorantraniliprole and pyrethrins, are used on only relatively small areas in vegetable and soft fruit production respectively but are important for those sectors.

This relative importance of different active substances can be compared to the estimated risk of their regulatory withdrawal, colour coded in Table E1 as **green** for low, **amber** for medium and **red** for high, plus **grey** for now withdrawn. Domestic UK regulation is under review. Pesticide approval is currently assessed using criteria under EU regulation EC 1107/2009, as retained.

A high proportion of insecticide actives used in Scotland in 2019/20 are estimated to be at high or medium risk of withdrawal; six have already lost their authorisations for use in the UK. Moreover, many of the common active substances have the same mode of action (MoA), meaning that if a target pest species develops resistance to an active substance, all products with the same MoA will provide less effective crop protection. Forestry and arable production are particularly exposed to this risk, vegetables and soft fruit less so.

The practical significance of withdrawal also depends on the availability and cost-effectiveness of substitute protection methods, included within IPM. Stakeholder interviewees emphasized that withdrawal of active substances would negatively impact yields and quality plus raise production costs through greater reliance on less efficient management practices (including fallowing, changing of sowing and harvesting dates, cultivation of less suitable but clean sites, additional field operations and increased use of fungicides and herbicides). This would decrease profitability and, in some cases, render production unviable in some areas. Estimated production losses are subject to various uncertainties, but are shown in Table E2, ranging from £15m to £64m per sector, c.6% to c.25% per sector with larger decreases in gross profits (other things remaining equal). Potential losses for forestry, potatoes, vegetables and soft fruit are particularly significant.

Table 1: Estimated spray area of different actives in 2019/20 by production type, with Mode of Action (SASA, 2021)

Active Substance	Arable	Vegetables	Soft Fruit	Forestry	Mode of Action
Lambda-cyhalothrin	115,705 ha	16,940 ha	1,732 ha	variable	3A
Esfenvalerate	40,885 ha				3A
Acetamiprid	8,689 ha	755 ha		c.20,000 ha	4A
Thiacloprid	14,054 ha	2,534 ha	1,542 ha		4A
Cypermethrin				variable	3A
Tau-fluvalinate	11,293 ha				3A
Flonicamid	8,033 ha	866 ha			29
Deltamethrin	3,264 ha	4,308 ha	183 ha		3A
Pirimicarb		6,646 ha			1A
Spirotetramat	1,298 ha	2,840 ha	1,402 ha		23
Indoxacarb	503 ha	4,790 ha	131 ha		22A
Spinosad		1,846 ha	617 ha		5
Pymetrozine		2,315 ha			9B
Oxamyl	2,532 ha	1,073 ha			1A
Bifenazate			787 ha		20D
Fosthiazate	744 ha				1B
Clofentezine			466 ha		10A
Spirodiclofen			339 ha		23
Alpha-cypermethrin	324 ha				3A
Etoxazole			271 ha		10B
Cyantraniliprole		137 ha	30 ha	trial use only	28
Cyflumetofen			150 ha		25A
Fatty acids C7-C20			149 ha		UNE
Abamectin			112 ha		6
Chlorantraniliprole		39 ha		trial use only	28
Pyrethrins			32 ha		3A

Table 2: Production sectors with annual gross value added and potential losses if actives at high and moderate risk of withdrawal become unavailable

Crop	Output Value (£m)	Potential output loss (%)	Potential output loss (£m)	Potential impact on Gross Margin (%)
Barley	£362.2m	13.8% - 15.5%	£50m to £54m	-22.6% to -24.6%
Potatoes	£253.7m	20%	£51m	-50.3%
Vegetables	£128.5m	25%	£32.1m	-50%
Wheat and Oats	£211.3m	7%	£14.8m	-10.7%
Soft fruit	£153.9m	23%	£35.4m	-221%
Forestry	£529m	10%	£53m	-27.4%

1.1 Key issues raised by sector

Table 3: Summary of key issues raised by sector

Sector	Main concern	Main active(s) of concern	Main concerns about alternative approaches
Winter and spring barley	BYDV	Lambda-cyhalothrin	BYDV tolerant varieties are more expensive and lower yielding and are not optimised for Scottish conditions. No current IPM measures for spring barley offer adequate mitigation
Seed potatoes	Potato mosaic virus Potato leaf roll virus	Lambda-cyhalothrin Esfenvalerate	Resistance-breaker products such as spirotetramat, flonicamid and acetamiprid fail to manage the non-colonising aphids that move through crops and are major virus transmitters. Straw mulches impractical and too costly to adopt widely as an IPM strategy; mineral oils only approved up to tuber initiation. Lack of effective vector control will force production to marginal areas and ultimately threaten viability of Scottish seed production
Brussels Sprouts	Aphid infestation	Lambda-cyhalothrin Esfenvalerate	Cyantraniliprole and spinosad are valuable alternatives but substantially more costly. Biopesticide-based IPM practices incur a 60% increase in application costs over conventional pesticide programmes whilst providing inconsistent efficacy.
Carrots	Carrot fly Willow carrot aphid	Pyrethroids	Additional cost of current alternatives for carrot fly control, i.e. chlorantraniliprole and cyantraniliprole. If pyrethroids are lost, spirotetramat, flonicamid and acetamiprid can offer alternative means of aphid control if still available. Alternative IPM solutions such as irrigation, biopesticides, increased plant populations and delaying drilling are more costly and produce inconsistent results.

Strawberries	Western flower thrips Spider mite	Lambda-cyhalothrin Etoxazole Indoxacarb	Cost of physical infrastructure amendments. Limited scope for biological controls and associated higher labour costs incurred from removing damaged fruit
Forestry	Large pine weevil Aphids (Christmas trees)	Acetamiprid Lambda cyhalothrin	Possible revocation of approval for all acetamiprid uses. Fallowing for 2-5 years impacts restocking and forest expansion, reducing productivity and financial viability

1.2 Recommendations and next steps

- Uptake of IPM practices and voluntary stewardship schemes may help to reduce industry reliance upon pesticides and could help to prolong regulatory approval for an adequate range of active substances,
- The stakeholder engagement undertaken suggests that farmers and growers generally have little confidence that IPM practices (without the support of insecticides) will enable them to avoid substantial losses from existing enterprises.
- At present, an immediate loss of key insecticides is likely to have a very damaging impact on many Scottish farmers, growers and the supply chains that they serve.
- However (if withdrawals are ultimately considered necessary to protect human health and the environment) with sufficient notice periods and adequate investment into developing varieties and IPM practices that work in the Scottish climate there is the potential to mitigate some of those risks.
- A gradual, phased approach to withdrawals could help to protect the sectors identified as being at particular risk, and so protect the associated employment in rural sectors and contribution to the wider Scottish economy.
- The use of voluntary stewardship schemes can provide a helpful forum to debate where reliance on insecticides can be reduced and demonstrate a willingness from farmers and growers to adapt. A planned road map to reductions may help alleviate the concerns of other stakeholders, moderate the appetite for rapid withdrawals and allow for a phased approach with more time for adaptation.

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