Alternatives to Glyphosate for control of groundkeepers

PCN ACTION SCOTLAND

This report summarises the work found in "A desk-based review of alternatives to glyphosate to control groundkeepers" written by Shailesh Shrestha and Fiona Burnett of SRUC.

- Groundkeepers (A.K.A Volunteers) are potato tubers which are not removed during harvesting and subsequently grow in future crops.
- Groundkeepers are of both economic and agricultural importance:
  - They provide safe havens for potato pests and diseases such as PCN to persist in a field which can reduce yield of future potato crops planted.
  - They compete for resources (e.g., nutrients and space) with the actively growing crop, contributing to a reduced yield.
  - They are costly for growers to remove (Estimated loss of £500K/year could be attributed to poorer groundkeeper management.)
- Currently the most effective way to remove groundkeepers is to use the herbicide glyphosate (>75-90% efficacy, £53-66/ha), however its regulatory status in terms of continued use remains unclear.
- It is estimated that there would be a 3-20% yield reduction in UK potato farms without the use of Glyphosate.
- Given this, the future may see the use of more expensive but less effective alternatives as currently no individual alternative is as effective/economical as glyphosate.

Aim

Outline the different alternatives to glyphosate use:

- Chemical
  - Maleic Hydrazide
  - Mesotrione
  - Thifensulfuron/Metsulfuron/Fluroxypur (TMF mix)
- Non-chemical
  - Crop rotation
  - Frost
  - Mechanical
- Integrated weed management (IWM)

Figure 1 - Potato groundkeepers in wheat stubble.

Chemical alternatives

- **Maleic Hydrazide** is a sprout suppressant with good efficacy (25-75%, £92/ha) if applied at the correct time to a growing potato crop. If the timing of application is incorrect efficacy can be poor and even cause yield reductions. This can only be used on ware crop so is not an option for seed growers.
- **Thifensulfuron/Metsulfuron/Fluroxypur (TMF mix)** (≤60%, £61/ha) are already commonly used in cereal crops and are the most cost-effective alternative to glyphosate. Their lower efficacy rate means they are more suited for use as part of IWM.
- **Mesotrione** is an enzyme inhibitor with a high efficacy (70-95%, £63/ha), however it is currently only approved for use in maize fields. As maize is not widely grown in Scotland, it is unlikely to be a useful alternative, unless it is approved for other crops commonly used in rotation with potatoes.

Non-chemical alternatives

- **Crop rotation** (up to 40%, £220/ha/year) with competitive crops e.g., Winter wheat or leafy vegetables can reduce ground keeper numbers. Widening crop rotations to 7 years instead of 6 would also contribute to a reduction. Allowing the field to be used for pasture can be highly effective in reducing groundkeepers, however this may not be financially viable for many growers.
- **Frost** (20-80%, £46/ha - if shallow ploughing) control sees tubers left on surface after harvest to be killed by frost. This requires 50 hours at ≤-2 °C. Frost does not penetrate to deeper tubers so would need to be combined with additional tillage practices to achieve high efficacy rates.
- **Mechanical** (up to 40%) – Following harvest, it is possible to manually remove tubers from the field. However, this has high labour costs and labour availability. Investing in more efficient harvesters can also reduce groundkeeper return. However, other considerations are paramount when investing in high value machinery.

Integrated Weed Management (IWM)

- This would see the combined use of both chemical and non-chemical alternatives with estimated efficacy of up to 75%.
- IWM requires a higher financial and management input from growers.
- Precision technology is being developed to target and spot treat groundkeepers. Although the technology is costly, its use in future will reduce the cost of herbicide application when compared to current blanket spraying methods.
- IWM requirements can be difficult to implement where land is rented for potato production.

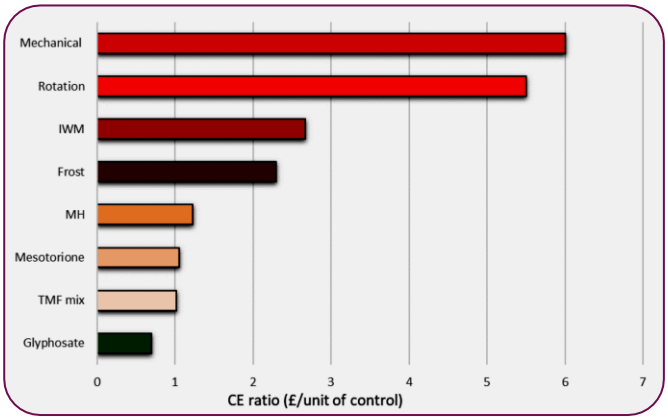
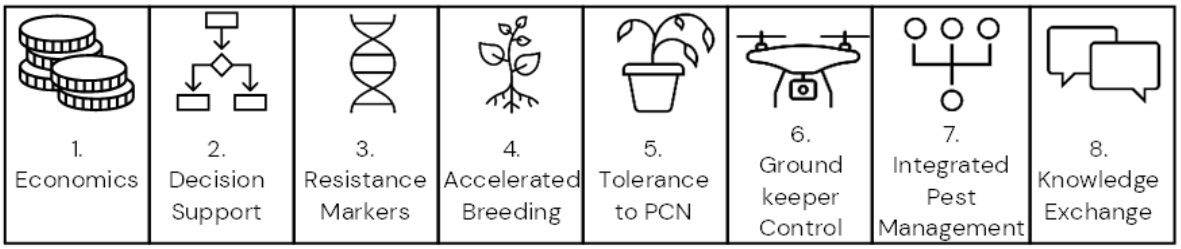


Figure 2 - Cost effectiveness of alternative treatments to control groundkeepers.

- Cost effectiveness (CE) ratios compare effectiveness with implementation costs.
- Figure 2 shows that glyphosate is still the most cost-efficient method of controlling groundkeepers.
- As detailed above there are alternatives with relatively low CE ratios e.g., TMF mix, however they all have drawbacks.
- Therefore, an IWM would be the most viable option if glyphosate becomes unavailable in the future. Its higher CE ratio would be offset be savings it may create in other areas.



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