Integrating mechanical weed control into arable crops

Will Smith
Current state of weed management for UK arable

- Significant dependence on synthetic herbicides for effective control
- Pressure on these compounds from resistance, regulation and market preferences
- Evidence of uptake of IWM messaging e.g. drilling date, although often reactive to issues
- Alternative in-crop tools are going to be needed in the future

2021 IRG Survey (NIAB-Bayer)
What is the status of weed control in the UK?

**Italian rye-grass**
- ALS: 18%
- ACCase: 19%
- Flufenacet: 7%
- NIAB 2021

**Black-grass**
- ALS: 2%
- ACCase: 17%
- Flufenacet: 58%
- EMR: 13%
- BASF/ADAS 2021
Mechanical weeding

• Mechanical removal and burial of weeds
• Range of options available;
  • Pre-sowing cultivation
    • Primary cultivations
    • Secondary cultivation to produce stale seedbeds
  • Weed harrowing
    • Early in crop stages
    • Requires crop to be better rooted than the weed
• Inter-row cultivation
  • Spatially selective to minimise crop damage
  • Enables more aggressive cultivation, so removing established weeds
Control of black-grass

- IRC adds consistency to overall control, although remains strongly reliant on herbicide activity
- In some years IRC > herbicide, but control is only 20-40% so not a complete solution
- Future – understand the mechanism as to why control is poorer for grass-weeds and overcome this
ALS herbicides are still largely used in the spring, to target other weed species.

Balance available options for black-grass control in the spring – herbicides are an inappropriate use, significantly better to use alternative tools.
Stacking options...

Untreated 13/10/2022

Luxinum Plus (0.7 l/ha) + Stomp Aqua (2.0 l/ha)

Herbicide plus inter-row cultivation
Crop Yield

- Yield penalty from insufficient weed control early in the season
- Small yield reduction in reaction to inter-row hoeing
This is largely as a result of a single season (Hardwick 2021) – when conditions for hoeing early were unsuitable, causing root movement in the crop.
Costing of new tools

- The costs of a combined system are slightly higher.
- Purchasing an additional machine, and additional labour costs.
- Variable costs remain high, as no reduction in herbicides has been costed in.
- Variable costs of hoeing equates to £10/ha per pass.
Economic performance

- A combination of IRC and herbicides (green) performs equally to herbicides alone (red).
- At a site where black-grass is low, then IRC alone (blue) may be preferential.
Achieving pesticide reduction targets
Opportunities exist

- Summary from 4 trials
- The performance of banded and standard herbicides was similar within all years – although this is partially informed from generally poor herbicide efficacy
- The combination of banded herbicide (with a real reduction of 64%) and a single pass of inter-row cultivation was ranked high in effectiveness
Broad-acre herbicide

Banded herbicide + inter-row cultivation
Summary

- In-crop mechanical cultivation has the potential to significantly improve overall weed control in UK arable crops
- Economic parity – even without consideration for reduction in costs associated with herbicide use
- Significant opportunity to develop solutions that reconcile effective weed management with environmental targets
  - Barriers exist regarding regulation
- Wider barriers to uptake of direct non-chemical weed control require more research
  - Jump before being pushed?
Will Smith
will.smith@niab.com
07525 796082
@AgricWill