COGGO Project – Investigation of herbicide residue impact after waterlogging

Background

It is suspected that a lack of soil microbial activity, due to waterlogging, may be delaying the breakdown of herbicides in soil. SCF grower members have specifically raised herbicide carryover as an issue where waterlogging has occurred in their paddocks. Anecdotal evidence suggests reduced plant vigour and yield penalties the year after use of some common herbicides, particularly:

- Pyroxasulfone (Sakura) impacting on canola the year after application.
- Imidazolinone (IMI) herbicides impacting on non imi-tolerant barley the year after application.
- Bixlozone (Overwatch) impacting on following cereal and canola crops.
- Pyroxasulfone & Diflufenican (Mateno Complete) impacting following canola crops.

The exact loss in productivity has been difficult to determine in paddock to date, as it is acknowledged that factors such as soil type, weather conditions, organic matter content and microbial activity all play a role in herbicide break-down.

There is also no previous replicated research, to the knowledge of SCF, that has studied the impact of waterlogging on chemical residue breakdown, only in dry conditions has this been investigated (by WANTFA, results delivered in 2017).

With variable paddock conditions in mind, the proposed project will incorporate a small plot trial component as well as multiple paddock-scale investigations.

Project Aims

This project aims to provide grain growers in the Great Southern Region of WA with data that quantifies herbicide residue breakdown during periods of waterlogging and quantifies the impact on following crops. This will allow growers, particularly those based in higher rainfall environments, to make more informed herbicide application and rotation decisions. Currently, only anecdotal evidence exists that herbicide carryover is an issue after waterlogging, so it is difficult to estimate a yield penalty and assign a value to it.

Methodology/Treatments

This project will include a two small plot trials which will be established in 2024, and over-seeded in 2025. The small plot trials will focus on herbicide's applied on cereals, with the aim to observe the carryover effect in canola, as well as herbicides applied on Canola to observe the carryover effect on cereals. The project also includes paddock scale investigations that will compare chemical residue and crop impact on previously waterlogged and free-draining parts of each paddock selected.

Small plot trials:

- Located in the Great Southern region, in a trial location susceptible to waterlogging.
- Assessment of at four commonly used herbicides of concern (IMI, Sakura, Overwatch & Mateno Complete).
- Chemicals applied as per label instructions in year one.
- Year two measurement will include; residues (soil & plant tissue samples sent for chemical residue and nutrition testing) and subsequent crop performance (establishment, vigour, biomass and yield) monitored in year two.

Paddock Scale investigation:

- Eight paddock investigations will be completed, four in 2024 and four in 2025.
- For each investigation, paired soil and plant tissue and nutrition samples will be taken for analysis from a previously waterlogged part of the paddock (year before i.e., 2023, and 2024) and a from an area of the paddock, not impacted by waterlogging.
- The nutrient analysis will be used to rule out nutrient deficiency as a cause of visual plant differences

Summary

This project will assist in validating if waterlogging is impacting on the breakdown of herbicides, which may be causing subsequent residual issues in following years.

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