Fact sheet

ORTH WEST LOCAL LAND SERVICES

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Herbicide residues and drought

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Herbicides residues

Many herbicides have some level of persistence and have the potential to damage future crops. No matter which product is used most will end up in the soil and may bind to clay particles and organic matter. For this reason heavy clay soils bind more chemical than sandy. Herbicides also differ in the strength with which they bind to soil. Strongly bound chemicals will tend to break down more slowly. Sandy soils will bind herbicide less strongly and the herbicide present is more available for plant uptake, hence lower rates of residual herbicides such as atrazine are used on sandy soils.

Dry conditions over the last twelve months will have slowed the breakdown of residual herbicides and may damage future crops.

Breakdown pathways

Microbial - the action of soil microbes and fungi deactivate the herbicide. Microbes may use herbicides as a source Nitrogen, Sulphur and/or Carbon. For most products microbial action is the more important breakdown pathway and will occur more quickly under conditions of greater moisture and warm temperatures. Chemical breakdown through hydrolysis is also an important pathway and involves a reaction with water that deactivates the herbicide. The speed of this reaction is strongly influenced by soil pH.

A third but less important process is photolysis in which the chemical is broken down by sunlight. As well as microbial and chemical breakdown herbicides may also be leached further down the profile or lost to the atmosphere through volatilization (the active component is evaporates).

Figure 1: Picloram damage in faba bean near Edgeroi NSW.

The breakdown process varies according to the herbicide group.

Group B

The group B sulfonylurea such as Atlantis®, Ally® undergo breakdown by hydrolysis which slows at higher pH, hence the longer residual action on vertosols (cracking clay soils). The group B Imidazolinones (“imis”) eg Spinnaker® Intervix®, undergo microbial breakdown which is slowed by low pH as the herbicide is more tightly bound at lower pH. Most of these herbicides will leach down the profile which means susceptible crops may not “find” these herbicides until later in the season.

Group C

Breakdown of group C herbicides occurs mostly via microbial action at higher pH and occurs relatively slowly leading to persistence. Persistence may be shorter in paddocks where group triazines have been used previously due to a buildup of microbes responsible for breakdown. At lower pH chemical

hydrolysis proceeds more quickly leading to shorter residual action. Simazine has shorter persistence than atrazine.

Group D

Includes trifuralin, these have moderate to high soil binding and are broken down by microbial action and also photo degradation from sunlight if not incorporated. These products are also volatile and can be lost to the atmosphere if not incorporated.

Group H

Isoxaflutole commonly used on chickpea in northern NSW needs to undergo an initial breakdown to produce the active herbicide component. Further microbial break down occurs to degrade the active component and this occurs faster at higher pH, significant plantback periods apply for some crops.

Group I

Some pyridine herbicides belonging to Group I eg Tordon® have significant persistence and the main pathway for breakdown is via microbial action which will be slowed by dry conditions. The active in Tordon® picloram is soluble and may be leached down the profile. Other group I herbicides such as 2,4-D have short persistence but can cause issues when used shortly before sowing without follow up rain.

Group K

Metolachlor (Dual®) has moderate soil binding and does not persist for long periods in the soil, breakdown is mostly by microbial action but some photo degradation may occur if the product is not incorporated.

Avoiding damage from residual herbicides

Herbicide labels may detail plantback periods and a minimum rainfall amount prior to plantback, the length of time that soil remains moist is more important than the total rainfall received. Remember your legal obligation to read and follow the label instructions.

If you are concerned consider hand sowing a small plot of the intended crop in the paddock several months prior to the main sowing and watch for any signs of herbicide damage, this test can also be carried out in pots. Note that these tests may not reveal residues deeper in the soil profile. The GRDC publication “Field Crop Herbicide Injury: The Ute Guide” will help identify the cause of observed symptoms.

Also take note of weed species emerging or not emerging in the paddock as this may indicate herbicides that are still active.

Herbicide resistant crops eg “imi” canola can be used if residues are suspected however, avoid using the same herbicide group on these crops as this may increase residue levels further. Laboratory analysis of soil is relatively expensive and may not be available for particular herbicides and may not detect those applied at very low rates such as some Group B chemicals.

Good spray application records (which are a legal requirement) will help plan rotations and avoid residues.

More information

Soil Behaviour of Pre-Emergent Herbicides in Australian Farming Systems. Mark Congreve (ICAN) and John Cameron (ICAN).

Avoiding crop damage from residual herbicides, Agriculture Victoria.