

## Herbicide Resistance

### Herbicide Resistance in New Zealand

Herbicide resistance was first discovered in New Zealand in maize crops. This wasn't considered surprising as unlike many other crops grown here, maize tends to be grown year after year in the same paddock using the same persistent residual herbicides. This is a classic scenario for the build up of resistance. As the weed seeds germinate, they encounter the same residual herbicide. This allows the population to mutate and build resistance in future generations.

The most common resistant weed is fathen which is now resistant in most parts of the country to herbicides from the triazine group of chemicals such as atrazine, terbuthylazine and cyanazine. A biotype of willow weed has also been found to be resistant to triazine herbicides but while these infestations are not widespread they are a warning that willow weed could develop resistance in other locations.

Recently, fathen has also been found to be resistant to dicamba in some locations where dicamba has been used repeatedly to control atrazine-resistant fathen. At this stage chemicals with different modes of action and from different chemical groups can still be used to control this weed. However, of major concern is the over-use of these herbicides. One such herbicide with a potential problem is Amaze (nicosulfuron) belonging to the chemical family sulfonylureas (ALS inhibitors). Chemicals from this group have shown great predisposition to herbicide resistance. Therefore, when controlling fathen it is very important to avoid repeated use of any one herbicide whether you are dealing with atrazine-resistant, dicamba-resistant or non-resistant fathen. Longer term management solutions should be employed.

There are problems too, with resistance to MCPA and 2,4-D in nodding thistle, slender winged thistle and giant buttercup

populations. This makes it difficult to control weeds in clover based pastures as alternatives may damage the clover itself. Chilean needle grass biotypes have been found to be resistant to dalapon.

Overall nine herbicide resistant weeds have been identified in New Zealand so herbicide resistance is not yet common and we need to keep it that way.

### What exactly is pesticide resistance?

Among the billions of individuals that make up a pest population in a crop (insects, fungi or weeds) there may be some individual pests that are less susceptible to a particular pesticide than others. If the same pesticide is continually applied, then the more susceptible individuals will be killed, leaving only resistant individuals to breed and multiply. If the resistance can be inherited, then eventually a large proportion of the pest population may become resistant to the pesticide. This means that a larger dose of the pesticide is needed to kill the pest, or the pesticide simply won't control the pest at all.

### How does resistance happen?

Resistance may occur through normal variability within a pest population. Some may have less susceptibility to chemical control and survive a pesticide application. This is not a particular problem and applies to natural, biological predators as well as synthetic pesticides.

The major concern is when resistance happens as the result of changes in the overall susceptibility of the entire pest population to exposure to a particular chemical. This leads to resistant populations developing and could be the result of:

- mutation of a single gene
- 1 resistant weed/10 ha

- repeated use of the same herbicide or similar
- too high use rate
- long residual activity
- failure to notice escapes (this will be a small patch and not paddock wide).

Failure to control weeds may not always be the result of resistance. Other reasons include:

- failure to correctly identify target pests leading to the use of an inappropriate chemical
- poor spray application due to operator error or inadequate sprayer calibration
- application in adverse weather conditions
- faulty product

### **So what can we do?**

Prevention is far better than cure. The appearance of resistant weeds is likely to be the consequence of many years of inappropriate practices and not an overnight occurrence. Continuing on in the same way, year after year is not an option even if resistance is not already in evidence.

The following guidelines will help to avoid a build up of resistant weeds:

- Identify weeds properly before selecting the appropriate chemical
- Rotate herbicides between different chemical groups – seek advice if unsure
- Use herbicide mixtures with different modes of action
- Use non-herbicide weed control
- Use fewer residual herbicides
- Use the correct application rate
- Look for weed escapes
- Rotate crops

### **Choosing appropriate herbicides**

The LandWISE 'Herbicide Classification Chart' will help you to select the right herbicide for the pest weeds you are targeting.

It charts the primary target, and the products which can be used for control. These are listed by product name, chemical name (active ingredient), chemical group, mode of action and the herbicide class.

The products are then grouped into categories according to the recommended time of application – pre-emergent, post-emergent etc. You can download this publication from the following link or order it online:

<http://www.landwise.org.nz/downloads.php>

It is important to seek further advice from your rural adviser or chemical company when planning herbicide applications. They can tell you about combinations or rotations of chemicals to ensure that resistance does not become a problem.

Some useful information can be found on the following websites links:

<http://www.hortnet.co.nz/publications/nzpps/resistance/herbicides.htm>

<http://weeds.massey.ac.nz/>

<http://www.weedscience.org/in.asp>

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