

Maximise Clethodim Performance: Impact of Frost

Key Message

Frost events in the few days before or after Clethodim application can reduce activity of the herbicide on annual ryegrass. Clethodim efficacy tends to be reduced more substantially by frost where ryegrass populations have evolved resistance to this herbicide.

Clethodim and Frost Events

Growers are reporting variable control of annual ryegrass with clethodim. Poor performance of clethodim can be attributed to cold and frosty conditions. In 2013 and 2014 trials to examine the effect of frost on clethodim treatment of annual ryegrass were conducted under controlled conditions using a frost chamber to mimic a frost event. Seedlings at the 3 leaf stage were sprayed with increasing rates of clethodim at midday, either before or after exposure to 3 consecutive nights of a -2°C frost treatment.

Key Research Findings

- Frost treatment, particularly before clethodim application, reduced clethodim activity in susceptible annual ryegrass populations.
- Clethodim efficacy was further reduced in resistant annual ryegrass populations regardless of whether the frost event was prior to or post clethodim application. However, the impact was greater when frost occurred before clethodim application (Figures 1 & 2).

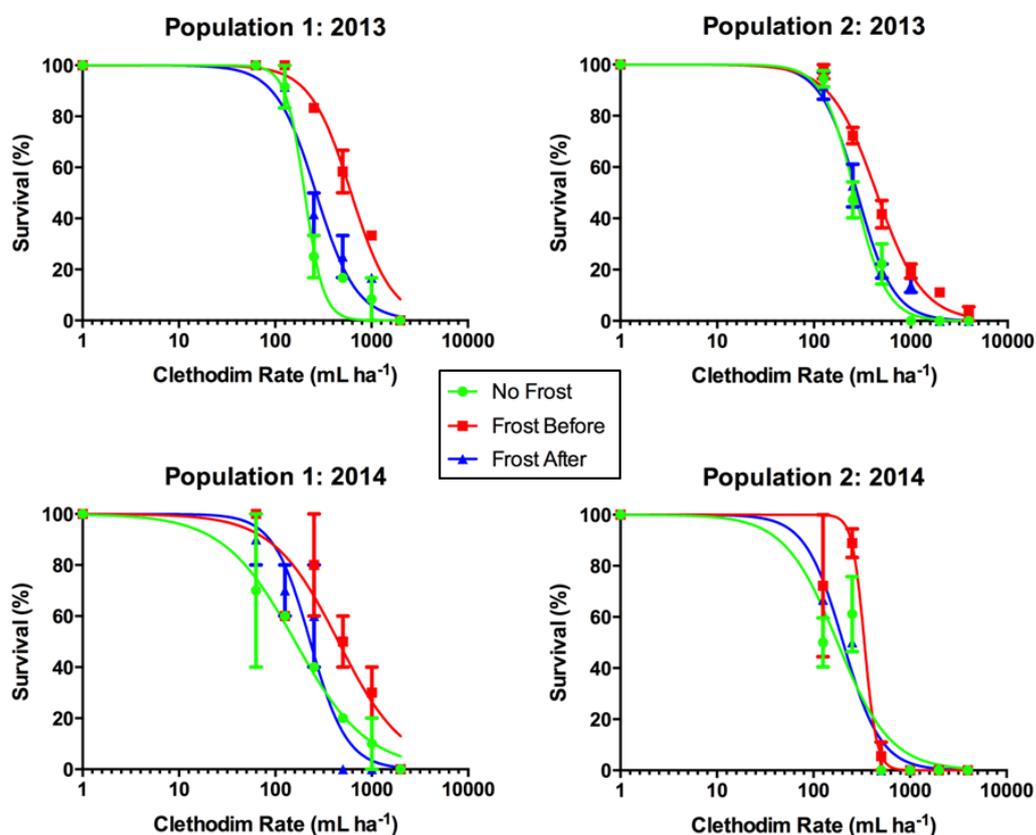


Figure 1: Response of clethodim resistant annual ryegrass populations (identified in Vic and WA) to clethodim treatment with 3 simulated nights of frost prior to or post application. Control plants were not sprayed with herbicide. Plant survival was assessed 28 days after completion of frost treatment.

Key Research Findings

- Frost reduced clethodim control of resistant ryegrass at rates as high as 4 L ha⁻¹ (Figure 2)
- Reduction of clethodim activity by cold temperatures could be a factor in the variable response of clethodim in the field in late winter.
- Clethodim activity is reduced when applied to larger annual ryegrass plants.

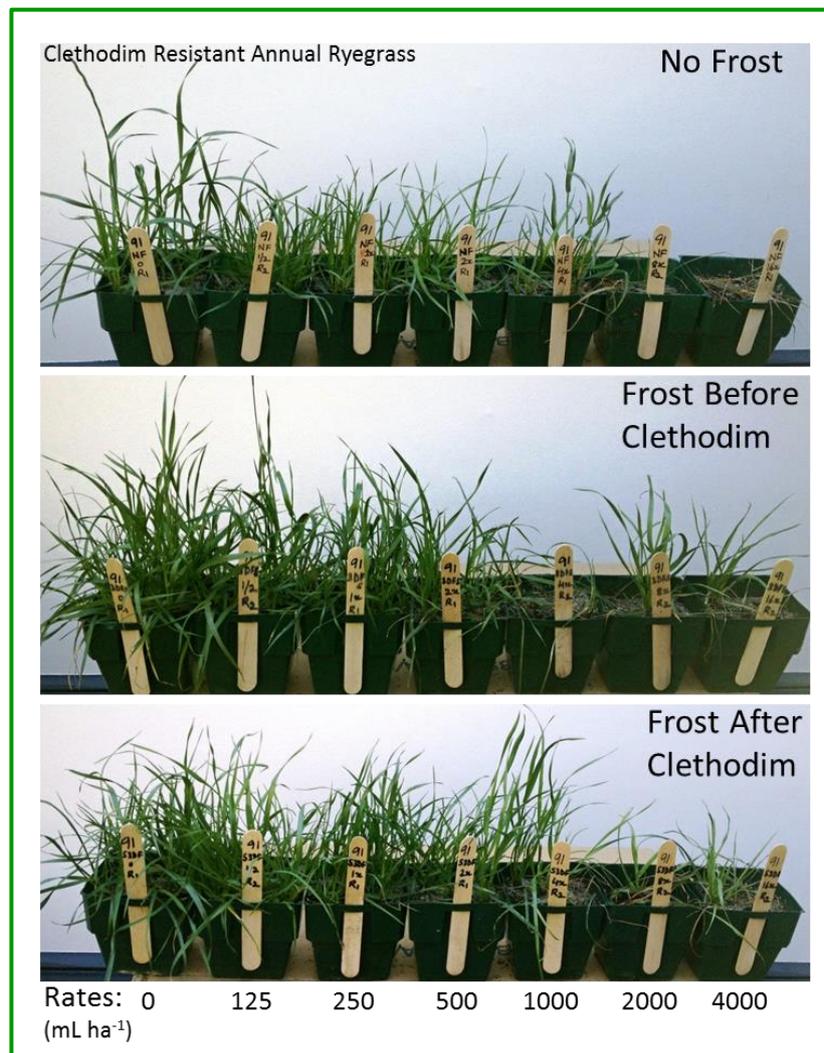


Figure 2: Growth of clethodim resistant annual ryegrass populations following clethodim treatment with 3 simulated nights of frost prior to or post application. Control plants were not subjected to frost. Plant survival was assessed 28 days after completion of frost treatment.

Management Strategies and Considerations

In the presence of resistance to clethodim, applying the product to smaller annual ryegrass plants and under warmer conditions improves control.

- Spray early when ryegrass is small and weather temperatures are more likely to be warmer.
- Use a weather cold front to your advantage - wait until there is cloud cover as this reduces the chance of frosty conditions overnight.
- Wait for a couple of days after a frost event, to apply clethodim to actively growing ryegrass.

A good management tactic for clethodim resistant ryegrass in break crops is to use a pre-emergent herbicide followed by a mixture of clethodim plus butroxydim, on small ryegrass plants.

Clethodim

Clethodim (e.g. Select®, Titan®, Havoc® etc.) is used for post-emergence control of annual and perennial grasses in broadleaf crops. Applied at the 2-6 leaf stage of growth, it is rapidly absorbed and translocates to areas where new plant growth is occurring.

Belonging to the Group A mode of action chemical class, this systemic emulsifiable concentrate is a cyclohexanedione that inhibits acetyl coA carboxylase (ACCase), preventing the synthesis of plant lipids (fatty acids). Plant lipids are vital to the integrity of cell membranes and for new plant growth.

Effects following clethodim application usually develop 7-10 days later and symptoms present as burn-back and gradual browning of leaves. Complete control requires 7-21 days, depending on environmental conditions and crop competition.

Hard water affects the performance of clethodim so when possible, clean rainwater should be used. When hard water is unavoidable the addition of ammonium sulphate, which is relatively inexpensive, can aid herbicide uptake and improve clethodim efficacy.

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