Increasing restrictions in water catchment and other environmentally sensitive areas has increased the interest in non-traditional herbicide formulations and weed control techniques.

We have started to see some interest again in controlled release and micro-encapsulated products for niche markets. However, they are still an expensive option and are likely to be confined to the premium markets or horticulture. Recently, a Victorian company released a controlled release hexazinone product that offers extended weed control in forests. The same company is working actively on non-traditional methods.

At this stage the highly desirable biological herbicides remain in the background as they struggle with problems with stability, reliability and flexibility.

The ecology of common heliotrope in a Mediterranean dryland cropping system

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Summary

Common heliotrope (*Heliotropium europaeum* L.) is a herbaceous Mediterranean summer annual that grows on fallows, stubbles and senesced pastures in the dryland cropping regions in the north of Victoria. It is considered a weed because it transpires moisture that could otherwise be used by ensuing crops and is toxic to livestock.

In this study, laboratory experiments have shown that germination of seeds of common heliotrope is not limited by light, cold treatment, or a leachable inhibitor. Temperature and water potential are the principal environmental factors that limit germination. The optimum conditions for germination are at a temperature of 35°C and a water potential of 0 MPa. Although 100% of seeds will germinate under these conditions, the percentage of seeds that germinate at sub-optimal conditions changes seasonally and between Australian populations. This is the principal mechanism of dormancy in the species, ensuring that seed do not germinate out of season when frost and competition will limit growth, and only after rainfall sufficient to allow successful reproduction. Germination of seeds of common heliotrope do not conform to the assumptions of the hydrothermal time model frequently used to predict field emergence of weed species.

Field observation and simulated rainfall experiments indicate that approximately 15–20 mm rainfall is the minimum amount required for germination of common heliotrope. Field experiments using micro-lysimeters indicate that this approximates the amount required for successful reproduction. Although common heliotrope can successfully reproduce entirely upon germinating rainfall, its growth, flowering and seed production is indeterminate, and further access to moisture from existing soil reserves or subsequent rainfall will result in massively increased biomass and reproductive output. Plants will continue to grow and produce seed over summer until they are killed by drought or stop growing with colder Autumn temperatures.

Laboratory and field studies show that root growth in common heliotrope is relatively slow. Root growth tends to methodically exploit the available area for moisture and is opportunistic in areas where moisture becomes available.

Analysis of long term summer rainfall data from the Victorian Mallee indicates that there is great potential for improved economy of control of common heliotrope by using residual herbicides such as Glean® or Ally®, instead of traditional methods of cultivation or knock-down herbicides. More information is needed on the efficacy of residual herbicides on common heliotrope and their persistence in Mallee soils before their full potential is known.