Case study: Unintended glyphosate exposure in permanent native plantings

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Summary:

This case study shares the observed impact and implications for biodiverse systems following an accidental application of glyphosate to biodiversity plantings (groundcover and shrub layers) at the Pukekohe Research and Demonstration Farm, in early October 2025.

Overview

Four years after establishment, the native permanent plantings which are part of the Vegetables NZ-Onions NZ-A Lighter Touch biodiverse planting on vegetable farms project on the demonstration site in Pukekohe had begun to fully dominate the areas they were planted in.

The system had moved beyond establishment and into a functional phase, with flowering increasing to a level capable of supporting the reproduction of beneficial insects on the research and demonstration farm.

An accidental application of glyphosate occurred in early October 2025, applied across the entire plantings, including both groundcover and shrub layers.

Event description

The glyphosate was applied across the full planting area at a time when plants were actively growing and, in many cases, flowering. This acted as a full-system herbicide event on established biodiversity plantings, rather than a targeted weed control application. This resulted in a loss of around 70% of the native plant area.

Observed plant response

The response across the plantings was not uniform, but there there clear patterns in how different plant types reacted.

The most immediate and significant loss was in the groundcover layer. Nearly all groundcover species

Side drain plantings prior to glyphosate application (October 2025, above) compared with the front drain following full glyphosate effects (March 2026, below).

The brown grasses in the October image are live, naturally coloured native species, whereas the March image shows dead weed grasses.

were lost, including all *Acaena* spp., *Leptinella* spp., *Pratia* spp., *Lobelia angulata, Disphyma australe*, *Coprosma* 'Flat Freddy' and native *Carex* grass species. Other larger species such as *Pomaderris* spp. and *Dianella nigra* were also removed from the system. These plants collapsed quickly following application and did not recover. This layer had previously been doing the bulk of the work in suppressing weeds and providing flowering resource.

A small number of groundcover plants remained where they had been physically shielded by surrounding foliage. These plants cannot be considered tolerant of glyphosate; their survival was due to reduced contact rather than any inherent resilience, and they should still be treated as susceptible within the system.

The species that remained were primarily more established or structurally robust plants, including *Muehlenbeckia axillaris, Pimelea* spp., *Carpodetus serratus, Coprosma* spp., *Metrosideros carminea* 'Red Carpet', *Sophora prostrata*, *Podocarpus nivalis, Olearia* spp., *Ozothamnus leptophyllus*, and a small number of larger grass species, including *Carex virgata* and *Carex lambertiana*. These plants were still clearly affected by the glyphosate. Growth was suppressed and deformities were evident; however, they did not die and five months later are beginning to recover.

Pimelea spp. showing tip dieback following glyphosate exposure (on left), and subsequent regrowth as the plant recovers (on right).

Timeframe of impact

Within the first few weeks following application, both weeds and the most susceptible native species died rapidly.

The remaining native plants declined more slowly, with symptoms continuing to develop over the following months.

By around five months post-application, the majority of susceptible species had died.

Muehlenbeckia axillaris post-glyphosate, showing tip dieback and herbicide injury (above), with follow-up at showing distorted regrowth during recovery (below).

System-level effects

The most significant outcome was not simply plant loss, but the shift in how the system functioned.

Prior to the glyphosate application, large areas of the plantings were covered with a dense mat of native groundcover. This layer was holding weeds at bay and producing a high volume of flowers, supporting beneficial insects through both diversity and quantity of SNAP (shelter, nectar, alternative hosts and pollen).

Following application, these areas were largely removed. With the groundcover layer gone, the system opened up, and it did not take long for the weed seed bank to re-establish. Areas that had previously been stable and weed-suppressing quickly transitioned back to being weed-dominated.

Native plantings prior to glyphosate application showing strong SNAP function and effective weed suppression from a dense groundcover layer.

Biodiversity impacts

The reduction in native plant species has reduced the overall function of the plantings. There is now less shelter, fewer alternative hosts, and a significant drop in both pollen and nectar availability. Flowering diversity has reduced, and the continuity of flowering through key periods, particularly winter and spring, has been disrupted. These were the periods the plantings had been designed to support.

As a result, there is likely to be a reduction in the beneficial insect populations that the system had been starting to build and rely on for pest control within the cropping areas of the demonstration farm.

Implications for glyphosate use in biodiverse systems

This event makes it clear that while glyphosate is effective at removing weeds, it does not distinguish between weeds and the functional components of a biodiversity system.

It will remove soft, actively growing species quickly, but in doing so also removes the layers that provide structure, flowering resource, and ecological function. Even where some species survive, the system itself does not remain intact.

Recovery is not immediate. It depends on the species that remain, their ability to regrow, and whether replanting is undertaken. In the interim, the system shifts away from being biologically functional and back towards weed-driven.

Operational learnings

The cause of this event sits with system integration of the biodiversity into the farm cropping system rather than the product itself.

Introducing biodiversity into a working farm requires a shift in how the system is understood and operated. In this case, the planting areas had not been fully embedded into day-to-day operations. Staff were operating within established routines, and the presence of new planting areas was not enough to interrupt those patterns.

Marking areas can help, but on its own is not always sufficient. What is required is a clear understanding across all staff of what these areas are, why they exist, and how they fit into the overall farm system.

Starting with smaller areas and building up allows time for this adjustment to occur. Mistakes like this are part of that transition and need to be expected and managed as part of adopting a new system.

Conclusion
The glyphosate application provided short-term weed control, but at the cost of removing the established native planting and the function it was providing.

The system shifted from stable, weed-suppressing, biologically active plantings to one that is open and weed-dominated. Plant diversity has reduced significantly, and the ecological function of the area has been compromised.

Using glyphosate within established biodiversity plantings will limit the range of species that can be maintained and disrupt the long-term performance of the system. Recovery is possible, but it takes time and, in many cases, will require re-establishment.

Starting at a smaller scale, and ensuring that staff clearly understand what these plantings are and how they function within the farm system, is important for driving the behavioural change required early on. This reduces the risk of unintended applications and helps protect new biodiversity components as they are integrated into the cropping system.

Other related resources

Biodiverse planting on vegetables farms project - here

This project is designed to show how manipulation of plant diversity on a farm can increase beneficial insect numbers and reduce the pests in a crop, meaning less use of insecticides is required. Linked on this page are many grower resources relating to this biodiversity project, including how to guides, monitoring sheet templates and crop case studies.