

Perennial Weed Management in Apple Orchards

Cesar Cappa, OMAFA Weed Management Specialist

As fall approaches, it is not only the trees that are shutting down. Weeds go through the same process, which involves an intense transfer of the products of photosynthesis down into the underground structures that let the plant survive the winter and produce vigorous, healthy growth the following season.

For most established perennial weeds, fall is the ideal window for chemical control. To get real control, killing the top of the plant is not enough. The underground portion often holds most of the biomass and it can easily regenerate new shoots (Figure 1). The only way to get an herbicide into those structures at a concentration high enough to kill them is a well-timed systemic application. Fall is generally an ideal time for that, since plants strongly mobilize material downward during this period.



Figure 1. Field horsetail quickly regrowing after a contact herbicide application.

An application at this time may be well worth the effort, as perennials tend to make up the bulk of the weed pressure in established apple blocks with a well-designed residual herbicide program. These programs are typically very effective at preventing the development of annual weeds and the establishment

of new perennials, but they are generally ineffective at controlling established perennial weeds.

The best timing to **control a perennial weed** is **before it establishes**, that is, when it is still at the **seedling stage**.

At this point, the weed has not developed the extensive underground system that makes it so resilient later on. Soil residual and contact herbicides can give complete control at this stage, but it is generally short lived, because most species start building their perennial structures quickly.

The Tree Is Doing the Same Thing as the Weed

Unfortunately, because the **trees are running the same schedule**, this is also when they are most vulnerable to herbicides, and an incorrect application at this stage can lead to **severe and long-lasting tree damage**.

Glyphosate is the main concern. It is generally not recommended after late June or early July, since the potential for tree damage goes up later in the season it is used. Later applications may produce no visible symptoms while still leaving the tree weaker and more sensitive to cold injury and pathogens.

Some very experienced growers do perform spot applications after these dates. When a late application is truly justified, some will use backpack sprayers to target tough perennial weeds. If you follow that practice, it is important to understand that it carries a high level of risk, and that contact with suckers must be avoided.

It also helps to understand why this issue is easy to overlook: glyphosate does not cause visible injury every time a high-risk application is made. The damage is often inconsistent, which might give false confidence. A grower may get away with it several times and assume it is safe, only to find that a block has already been permanently affected.

One rule applies to glyphosate and 2,4-D alike. Do not spray immediately after cutting suckers, because freshly cut stems absorb systemic products readily.



Other systemic herbicides, such as 2,4-D and clopyralid (Lontrel), are not as risky as glyphosate and can be used post-harvest, but a high degree of caution is still warranted.

A few practical guidelines:

- Keep the spray coarse. Choose nozzles and pressures that minimize drift and use hoods wherever it is practical.
- Avoid spraying over suckers as much as possible.
- Apply while the weeds are still growing vigorously, are not under stress, and have not lost their normal summer green colour.
- Application on loamy sand or coarser soils or bare ground increases the risk of injury.
- Significant rainfall or irrigation in 10 days after application also increases the risk of root uptake.
- Some literature mentions Gala, Fuji and Golden Delicious as cultivars that could be more sensitive to 2,4-D than other cultivars.
- Do not let spray drift onto or contact foliage, fruit, stems, trunks or exposed roots.

The Window Closes at Hard Frost

When it comes to timing, the fall window closes when there is a hard frost. At that point, the weed's metabolism comes to a stop and movement of the herbicide within the plant is very limited. A light frost is not necessarily the end of the season but it's better to do it before then. What matters is whether the foliage is still green and actively growing. Once a hard freeze has come through, absorption drops and efficacy goes with it, so the application is no longer worth making.

You Need Foliage for Absorption

Adding another layer of complexity, good systemic herbicides uptake depends on lush, well-developed foliage, and that is often lacking in orchards that have been treated recently with contact herbicides for sucker control. This is especially true during the relatively short window when glyphosate applications are considered safe and perennial weeds are becoming susceptible in late June. Most growers will prioritize the timing of chemical sucker control over the ideal timing for perennial weed control, but it should be expected

that applications made under these conditions will be less effective than those applied to fully developed, actively growing foliage.

Realistic Expectations

Even for the best-timed applications under ideal conditions, it is not reasonable to expect very high, durable levels of control from a single application. It takes a consistent, multi-year effort to deplete the reserves of these weeds. Often the applications will look excellent a few weeks after the application, but the weeds might be able to fully recover the following seasons if the efforts are not sustained.

One more caution before any tillage operation: take note of where creeping perennial weeds are located, particularly species that spread through rhizomes or root fragments. Cultivation can move these weeds around and facilitate their multiplication by creating numerous small root and rhizome fragments, each capable of producing new plants very effectively.

Common Orchard Perennial Weeds

Field Bindweed

This weed can develop very dense and competitive patches (Figure 2) and is very difficult to control because of the extremely extensive underground system it develops. It reproduces both vegetatively and by seed. Seeds germinate in spring and early summer and can persist in the soil for more than 50 years. It flowers from June through September.

The root system consists of vertical roots extending as much as 30 feet down, plus shallow horizontal laterals. Most parts of the root can produce buds capable of generating new plants.

Glyphosate and 2,4-D are both labelled for this weed in apples. The 2,4-D amine labels top growth control only. On the glyphosate side, Roundup WeatherMax lists field bindweed at full bloom or beyond. Up to 8 L/ha of this formulation is allowed in apples. That very high rate is certainly more effective on longer term control of bindweed but also represents a higher risk to nearby trees.

For this weed, sensitivity can vary widely from site to site depending on the environment and the genetics of



the population. As a result, it is possible to achieve excellent control in one orchard and very poor control in another, even under very similar conditions.

General principles to control this species are:

- Easily controlled as seedling, but only for about three to four weeks after germination. After the seedling stage it begins to generate perennial underground structures.
- Treat once flowering has started from June through fall.
- Plants stressed by drought or any other factor are much harder to control. Treatments applied to healthy vegetation with vigorous growth will be more effective.
- Plan on high-rate sequential applications and judge the result a year later rather than three weeks later.
- Expect site-to-site variation with glyphosate and consider 2,4-D if the pre harvest interval allows it.

Canada Thistle

This weed also has an aggressive growth pattern, with deep and persistent roots reaching as much as 3 m and producing adventitious buds (capable of producing new plants) that push up new shoots continuously (Figures 3 & 4). It is a prolific seed producer, and the seeds can remain viable in soil for more than 20 years.

Clpyralid (Lontrel) and glyphosate are both effective on this weed, but as noted above, no single application will be completely effective, and regrowth several weeks after treatment should be expected.

The Lontrel label indicates season-long control of top growth. However, at the 0.34 L/ha rate allowed for apples, not all rhizomes will be killed, and some regrowth may occur by the end of the season. Only one application is permitted per growing season. The ideal application timing is from the rosette to pre-bud stage when plants are actively growing and not under stress.

For glyphosate, Roundup WeatherMax lists Canada thistle at bud stage or beyond at 3.17 to 4.67 L/ha.

It's important to note that the development stages mentioned above **refer to the weed, not the trees**.

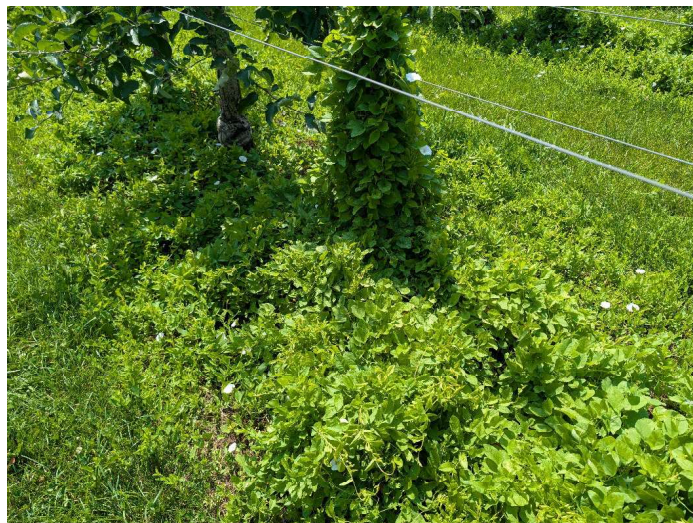


Figure 2. Field bindweed patch in August.



Figure 3. Canada thistle sprout emerging from its perennial roots in an apple orchard during early spring.



Figure 4. Canada thistle patch quickly recovering after a contact herbicide application due to its strong underground reserves.



The rosette stage occurs early in the spring (Figure 3), after which plants bolt and begin producing the flower buds referred to in product labels. In the fall, a second flush of growth will occur, especially after mowing or if herbicides were applied earlier in the season. The new rosette growth, accompanied by strong downward movement of sugars to the roots, increases herbicide absorption and translocation, making fall applications particularly effective.

Vetch

Vetch is a perennial weed, with new shoots emerging from underground roots throughout the season, starting as early as late April but most often in late May to early June (Figure 5).

Control of this perennial legume is poor with glyphosate, which is weak on legumes generally. Clopyralid (Lontrel) or 2,4-D should be the products of choice.

Vetch is also the exception to the fall-timing rule. In hairy vetch work, spring applications were consistently more effective than fall ones.

Horsetail

This primitive weed is extremely difficult to control because of its anatomy. It develops a very robust underground system of rhizomes and tubers that can reach 2 m in depth and accounts for roughly 85% of the plant's annual dry matter production. The aerial portion, in contrast, has a thick cuticle and a small surface area for retaining and absorbing product (Figure 6). Poor retention and poor translocation are the main reasons chemical control fails on this species. It reproduces by rhizomes and spores, and cultivation is ineffective, as is repeated mowing, slashing or burning.

It is also quite tolerant of systemic herbicides such as 2,4-D and glyphosate.

Casoron (dichlobenil) is not widely used, largely because of the impracticality of applying a granular product, but it does have activity on this weed and is registered on apples in Canada for application to the soil surface in late fall or early spring. Expect suppression rather than eradication. Dichlobenil reduces stand populations but applied alone it will not destroy the underground rhizome and tuber network.



Figure 5. Vetch at base of apple tree in June. (Photo: K. Grigg-McGuffin, OMAFA)



Figure 6. Newly emerging horsetail in the orchard in May. (Photo: K. Grigg-McGuffin, OMAFA)

Experienced growers know to expect regrowth even from the best applications. Neither chemical nor mechanical tactics are likely to achieve full control of horsetail, even after several applications.



In Short

- Fall is generally the best chemical window for established perennials, because that is when the plant is moving reserves down into the structures you need to kill.
- It is also the worst window for tree safety. Glyphosate should generally be finished by early July.
- 2,4-D and clopyralid are the postharvest tools applied with coarse sprays, hoods where possible, and no contact with suckers or trunks.
- Green, actively growing, unstressed foliage is a requirement for highly effective applications.
- Hard frost closes the window.
- Vetch is the exception. Target it in spring.
- Plan on several years to achieve sustainable levels of control.

Always read and follow the label.

Registrations and rates change; the label is the legal document.

Resources & References

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