INTEGRATED WEED MANAGEMENT FACT SHEET

VOLUNTEER POTATOES

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(Solanum tuberosum)

Potato tubers left in the soil after harvest can lead to a volunteer potato plant problem in the next cash crop.

These volunteer potatoes (*Solanum tuberosum*) generally are the most significant weed problem in the paddock following a potato harvest.

Volunteer potatoes cause potential losses in the subsequent vegetable crops through competition for resources and require a multiple strategy approach for controlling them on Australian vegetable farms.

KEY POINTS AND RECOMMENDATIONS

- Volunteer potatoes generally are the most significant weed problem in the paddock for subsequent vegetable crops. Tubers can germinate from depths of 1 – 20 cm and can also re-sprout after foliage has been destroyed.
- Where it is timed appropriately, an **integrated weed management (IWM)** strategy can be very effective in managing this problem when combining proper harvest practices, using appropriate harvest conditions, physical destruction by tillage, weeding or grazing and herbicide application with tillage.

IWM STRATEGY

Volunteer potatoes (Figure 1) can remain dormant for several months in the soil following harvest. They can germinate from a depth of 1 – 20 cm and can also re-sprout after the foliage (stems) have been destroyed. Therefore, volunteer potatoes can be costly and challenging to control. An IWM strategy combining **cultural measures**, **physical control** where possible and **chemical control** is recommended.

Figure 1. Volunteer potatoes dormant in wheat crop

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CULTURAL MEASURES

Potato growers should minimise the number of tubers left in the paddock during potato harvest. Modifying harvest equipment to remove small types. However, may be an option for some soil types, however, managing soil moisture and cloddiness is important to ensure that the harvest equipment does not jamb. If it is critical for subsequent crops to be "volunteer potato-free", harvester chains or webs should be reduced in size as much as possible where small "cull" potatoes can be removed from the paddock. Second passes and postharvest gleaning with smaller chain settings may be warranted.

In the summer months, leaving the volunteers on the surface as long as possible dries them out, depletes energy reserves and reduces their ability to sprout or re-sprout (Figure 2). Conversely, **air temperature below -2.5 °C** kills most volunteer tubers on the soil surface.

Figure 2. Potato tuber chopped by supercoulter-type weeder and left on surface soil in summertime

PHYSICAL CONTROL

Inter-row cultivation using **finger weeders** usually requires multiple passes to achieve beneficial results. Often, the volunteer potato plant stems are only broken close to the soil surface and a new branch will emerge a few days later. Nevertheless, these operations are helpful particularly when timed correctly for all weeds present (multiple weed species other than volunteer potato). Appropriate timing of finger weeder passes is likely to include managing weeds such as volunteer potato when they have recently germinated, and ensuring the crop is not at risk of damage. A **supercoulter-type operation with light vertical tillage** that chops larger volunteer potatoes up, but does not bury any potatoes, might be warranted (Figure 2).

Grazing paddocks with pigs, sheep or cattle will also reduce the number of tubers. Postharvest prior to the first cultivation is the best timing for animals to consume volunteer potatoes. Pigs are unique and very effective at digging up and consuming potatoes under the surface. A word of caution, there have been cases where cattle have choked on tubers. Australian laws require an exclusion period between animals grazing (fresh manure applied) and planting horticulture crops. At the time of writing, high risk crops require a 90-day exclusion period, while it is 45 days for low-risk crops. For more information, see the Soil Wealth's 'Safe compost for fruit and vegetables' fact sheet. Planting a **grazing crop** following potatoes is another IWM option and may allow application of selective herbicides to control volunteer potatoes while the grazing crop is in place, depending on herbicide withholding periods and grazing crop selected. Growers will need their paddocks to be fenced off to allow grazing and have access to troughs, dams and holding yards.

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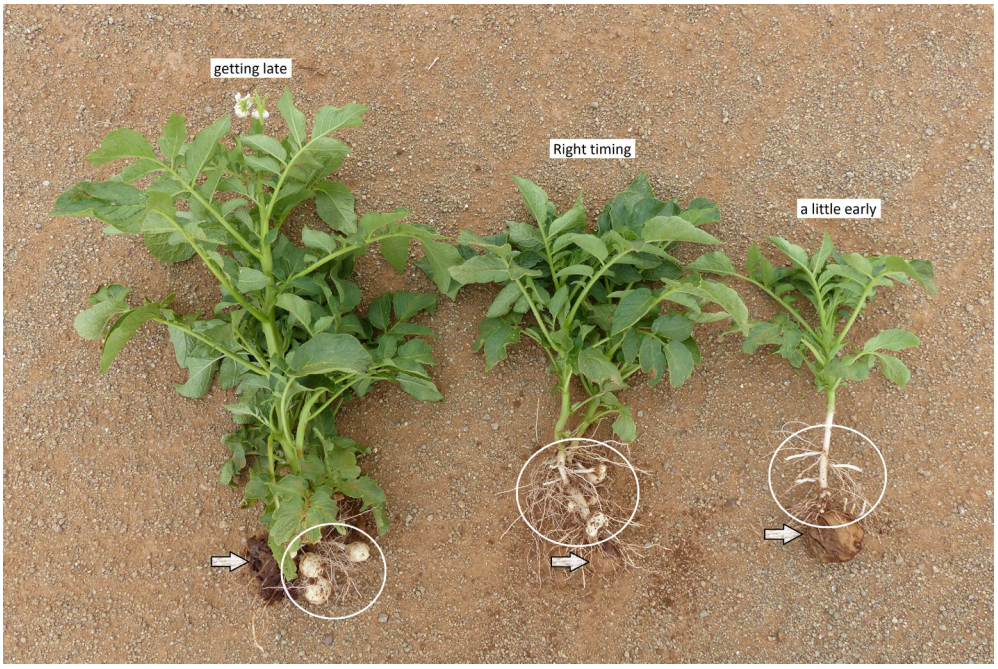

Figure 3. The volunteer plant on the far right has sprouts (haulm) that have not yet emerged. The volunteer plant on the far left has a rotten seed piece, but daughter tubers may yield viable weeds in future crops. The centre volunteer plant is at the tuber initiation stage, which is ideal timing for post-emergent herbicide application.

CHEMICAL CONTROL

One of the key objectives is to kill the volunteer plants and prevent them from producing new tubers (daughter tubers), which can become weeds in future crops. **A combination of herbicide and tillage is very effective when timed correctly.** The optimum post-emergent herbicide application time is at **tuber initiation** (Figure 3).

Of the herbicides registered for volunteer potato control at the time of writing (February 2021), **glyphosate**, **fluroxypyr** and **dicamba** are the most effective. Importantly, vegetable growers need to follow plant back guidelines closely, especially for fluroxypyr (half-life in soil is 5 – 9 days) and dicamba (half-life in soil is 7 – 28 days). Tillage seven days after post-emergence herbicide application greatly reduces the number of daughter tubers formed compared to herbicide application alone. **Oxyfluorfen** is a longer-term soil residual herbicide with activity on volunteer potatoes. **Ethofumesate** applied as a pre-emergent to volunteer potatoes can reduce competition with the crop. **Imazamox** may be an option to consider in dryland beans.

Since volunteer potatoes are often sparsely scattered across paddocks, optical camera technology attached to a field robotics system may be the most economical,

Only use pesticides in accordance with current APVMA registrations or those which are covered by a current APVMA permit. Always read the label and follow the instructions precisely. For current information on pesticide registrations and permits in Australia, consult the APVMA PubCRIS website https://portal.apvma.gov.au/pubcris

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Figure 4. WEEDit® (optical camera) sprayer near Cowra NSW

beneficial approach for fallow volunteer potato control. WEEDit® and GreenSeeker® spray systems in Australia currently operate only in pre-plant fallow paddocks ("green on brown", Figure 4) where cameras detect chlorophyll (not green colour) and rapidly trigger valves to open and apply herbicide to the plant, for total weed-only coverage. This technology can deliver a 90% reduction in chemical used on the paddock. Robust rates may be used and will give excellent results, and spray drift will be minimal.

Optical camera and field robotics technology is rapidly advancing, and will soon be able to conduct "green on green" weed control (i.e. selectively controlling weeds within a growing crop). Adding artificial intelligence to identify volunteer potato plants could allow "unsupervised" and highly accurate selective control of this and other weed species in the future. For more information, read GRDC's "Green on green camera spraying – a game changer on our doorstep?" publication.

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Hort Innovation ahr applied horticultural research RMCG