



# WEED MANAGEMENT WORKSHOP

Hand weeding of Spring Weeds in the Inglewood  
Triangle

This workshop aims to help you recognise certain weeds and the best management practice for hand weeding them within a bushland context. This will follow the three principles of the Bradley Method. Learning about each weed species will then help you prioritise your targets and decide the best plan for successful management.

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HARMONY WEEDING

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## What is a weed?

A weed is simply a plant growing where it is not wanted.

A weed is not necessarily exotic, Australian native plants can be weeds in Perth, as are many eastern states wattles for example. Many of our common weeds were introduced as garden plants and have established well after escaping the garden.



## Why weed?

- They change plant distribution of the native ecosystem.
- They create a fire hazard.
- They compete for space, water, nutrients, and sunlight.
- They often grow faster and are very fecund.
- They may have allelopathic properties.
- They can be toxic to animals and people.
- They may provide shelter and food for many pests and diseases.

A noxious weed is a plant that has been declared by law to have an adverse economic effect on agricultural production or a plant which creates some other significant problem (such as some aquatic species that clog and foul the rivers). In WA these are Declared Plants or DP. On a national level, certain weeds are classified as Weeds of National Significance or WONS. E.g. Bridal Creeper.

“It is estimated that weeds cost Australian farmers around \$1.5 billion a year in weed control activities and a further \$2.5 billion a year in lost agricultural production. The real cost of weeds to the environment is difficult to calculate, however it is expected that the cost would be similar to, if not greater than, that estimated for agricultural industries.” (The Impact of Weeds, <https://www.environment.gov.au/biodiversity/invasive/weeds/weeds/why/impact.html> )

## Integrated Pest Management (IPM) and hand weeding.

There are many ways to weed an area. Physical and mechanical removal, biological control, and chemical treatment are some of the choice methods of weeding. Other non-chemical methods include mulching, grazing, solarisation, burning, temporary flooding, and weed mats. When selecting a method be sure to choose one that has the least amount of impact on the environment whilst also achieving your goals within the time frame. You will probably choose a combination of approaches which is what IPM is. In this workshop we will be concerned with hand weeding methods.

Hand weeding has many benefits. It is the most appropriate method in many circumstances and has the least off target damage. You can hand weed in the rain but not spray. Chemical control or herbicidal spraying also has the issue of drift and off target damage, and certain herbicides, whilst being selective, may also suppress seed germination and seedling growth. Certain weeds also develop a resistance to herbicides. The downside is hand weeding is labour intensive and more expensive than other methods such as spraying.

### **What is 'The Bradley Method'?**

They are simply principles to guide your weeding behaviour. Developed by two sisters during the 50's and 60's in Sydney weeding a bush site, through trial and error they found certain principles of weeding were successful in guiding their efforts. This method now informs Landcarers all over the world.

The Bradley Method follows three main principles,

1. Always work from areas with native growth towards weed infested areas.
2. Make minimal soil disturbance.
3. Don't over clear, let the native plants regenerate the rate of weed removal.

The principles are not perfect and are not always achievable in certain circumstances. However, for our purposes they are applicable.

### **What to weed?**

At times, the problem of weeds can seem overwhelming, but with a good plan, good things are achievable.

Accurate identification is the first step in the control of weeds. Identify, list all the weed species present throughout the year, and make maps of your weeds. These will help you recognise the more problematic species and where they are. Maps will also provide a reference over time of your progress or failures which can be addressed more readily.

The types of questions to then ask would be-What weeds are presenting the biggest threat? Are they annual or perennial? Broadleaf (dicotyledon) or grasses (monocotyledon)? What types of hazards do they present (e.g. fire)?

For example-Grasses, such as Perennial Veldt Grass, often present the biggest threat within Banksia woodlands. They are usually an extreme fire hazard due to their flammable nature, and their thick density within the bush makes them a successful competitor. Compare it to the bulby weed Gladioli, that is less dense and does not present a fire hazard, this weed has less of a priority.

### **How to Weed.**

Follow the principles of the Bradley Method, these will guide you on choosing where to start once you have chosen your target weeds. Then what is the best method for removal? Cutting out, pulling or digging? We will look at the Triangles problem weeds individually, but key is know your plant and its root system. This should inform you to the best choice for the weeds removal-does it have a tap root (dicotyledons) or fibrous root system (monocotyledons)? Is it stoloniferous or rhizatomous? Bear in mind the Bradley Method second principle as you will want to create the least amount of soil disturbance. For example, cutting a fibrous root with a sharp knife is preferable than just pulling the entire plant out, root mass and soil. Pulling a flowering bulby weed by hand firmly but slowly can successfully bring up the bulb. Alternatively, a sharp knife cutting the stem under the surface of the soil can remove the green leaf and prevent photosynthesis and growth of the bulb.

### Tools of the trade.



Sharp, serrated knives such as bread and steak knives are an asset. Secateurs, trowels, hoes, and short handled loppers are also useful depending on the type of weed. One more issue to remember is the collection and disposal of your weed mass. Make neat piles of weeds as you go, do not throw around as it will be easier to clean up later. Jute bags are more resilient to tearing than plastic. Remember to always wear gloves. Long sleeves shirts and trousers are a great way to protect you from scratches from the shrubs. Safety glasses or sunglasses can protect your eyes from scratches, stabs and flying debris.

### When to weed?

By knowing your weeds and their life cycle, we can plan when the time is best to start. We are concentrating on the spring weeds in this workshop; however many present an issue that is tackle-able (weed-able) all year round. With that in mind, the main question will be-When does the weed seed? You will want to try and remove the target before this happens. If you get beaten by the deadline, cutting off the ripened seed heads can save you years of further weeding down the track!

### Careful with lookalikes!

Many weeds can and do closely resemble native plants so please be careful until you are confident in your identification. If in doubt, do not remove. For example, the juvenile leaves of many weedy grasses resemble the first leaves of native orchids and can easily be mistaken to the untrained eye. Watsonia and Freesia leaves resemble the Kangaroo paw. There are many others, so the best guiding principle is-if in doubt, leave it! Many native plants will not grow back once pulled out. Remember it is an offence to pick wildflowers!

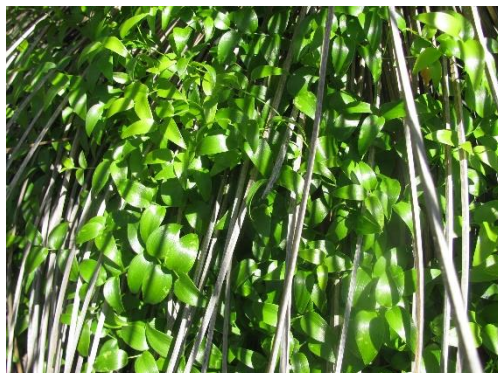
### The Long Term

The desire to control weeds is a long-term mission and can be thought of as having three stages. First the initial impact of a weeding program, then there is a follow up and finally the consolidation of all that work by keeping on top of small outbreaks of weeds. Using government grants it is usual to have professional Landcarers weed a big site initially and they may also do the follow up works. The longer-term consolidation is frequently carried out by volunteers of the Friends' groups.



## PRIORITY SPRING WEEDS OF THE INGLEWOOD TRIANGLE

### *Asparagus asparagoides* (Bridal Creeper) DP WONS



Description: Rhizomatous and tuberous, perennial, herb and climber, 1-5 m high. Fl. white, Aug to Sep.

Reproduction. Primarily seed, occasionally rhizome/tubers. *Dispersal*. Birds, foxes, rabbits, water, soil, machinery, garden refuse. *Time to first flowering*. 2-3 years. *Seedbank persistence*. 2-3 years if buried. *Fire response*. Generally survives fire. Notes. Biocontrol agents include a leafhopper, a rust fungus and a leaf beetle. Extremely invasive, smothers vegetation, forms monocultures, increases fire risk during summer die-off phase. *Origin*. South Africa. *History of use/introduction*. Garden escape. First recorded in Australia in 1857 and by 1870s was a common garden plant.

Manual control is very difficult on established infestations but seedlings and juveniles can be pulled successfully if the ground is loosened to ensure the rhizome is removed with the plants. Burn all seed and rhizome fragments.

Biological Control: A Bridal Creeper Rust fungus was released in 2001, has established, and is having a significant impact. In WA, this rust is the most promising biocontrol agent ever introduced. If it isn't present in your area, then transfer it immediately. The rust reduces the plants leaf area and causes early leaf fall before flowering and reduces the production of seed. Rust can be easily spread by collecting infected leaves and rubbing them on plants in unaffected areas. The rust also spreads rapidly by wind dispersal. It has generally been more effective in the higher (>450 mm) rainfall areas. Bio control is required to reduce the spread of seed by birds before other methods of control have a chance of long term success.



### *Avena Barbata* (Bearded Oat)



Erect annual, grass-like or herb, 0.3-1 m high. Fl. green, Aug to Oct.

Grass. *Life form*. Annual, caespitose. *Reproduction*. Seed. *Dispersal*. Possibly wind, agricultural machinery, livestock and mammals (on fur). *Photosynthetic Pathway*. C3. *Seedbank persistence*. 6 months to 3 years (shorter if not buried). *Notes*. Able to outcompete native grasses. Is allelopathic and forms extensive, fibrous root system. Can increase fire frequencies. Reportedly needs disturbance to establish. Capable of adapting morpho-physiological traits to environmental conditions, such as different water and light availability, higher mean temperatures and altitude. Self-pollinated. Produces prolific seed. Buried seed often remains dormant until exposed by cultivation or other disturbance. Predominantly germinates after onset of autumn rains, compared with *Avena fatua* which germinates from autumn to spring. Has no adaptations for long distance dispersal. Herbicide resistance has been recorded. *Origin*. Mediterranean/Asia. *History of use/introduction*. Contaminant of grain.

## *Avena fatua* (Wild Oats)



*Avena fatua*

Photo: J.D. Dodd

Erect annual, grass-like or herb, 0.6-0.9 m high. Fl. green, Aug to Dec.

Grass. *Life form*. Annual, caespitose. *Reproduction*. Seed. *Dispersal*. Mammals, agricultural machinery, possibly wind (local dispersal only). *Photosynthetic Pathway*. C3. *Seedbank persistence*. 6 months to 6 years, shorter if not buried. *Fire response*. Mature plants likely killed, but post-fire conditions favour seed germination and growth. *Notes*. Highly competitive, matures rapidly and sheds seed early. Produces prolific seed. Approximately 40% of the seedbank germinates after opening rains and a further 30% later in the season, with germination continuing until the end of spring. Seeds have a large germination window and will germinate in temperatures of 10-26.5 degrees celsius. Self-pollinated with some out-crossing. Most seeds fall within 1-2 metres of the parent plant. Seeds have a hygroscopic awn, with varied dormancy depending on burial depth. Has staggered germination. Smoke can stimulate seedling emergence. Persistence is longer in undisturbed soil and deeper burial favours longer dormancy. Dead material is reported to be allelopathic. Has recorded widespread herbicide resistance. *Origin*. Mediterranean/North Africa, Eurasia, Europe. *History of use/introduction*. Contaminant of grain. *Similar exotic species*. *Avena barbata*



### *Ehrharta calycina* (Perennial Veldt Grass)



*Ehrharta calycina*

Photos: S.M. Armstrong

Fl. green/purple/red, Mar to Apr or Aug to Sep.

This is a tufted, perennial grass with high growth rates and grows to 80 cm tall. The inflorescence is a drooping erect panicle of reddish-purple flowers and it appears in spring. It reproduces by short rhizomes and seed. Established plants resprout vigorously from the base of the tussock following drought stress. Seed germinates under a wide range of temperature and light conditions. Prolific seed set results in high soil seed bank densities. After fire it resprouts and seed production is enhanced. It is resistant to drought and frost but does not tolerate waterlogging, anaerobic conditions or high salinity levels. is a native of Southern Africa. Introduced as a forage crop and cultivated in Australia and California as a drought-resistant pasture. It was also introduced for erosion control. For small infestations, cut out plants ensuring crown removal.

### *Ehrharta longiflora* (Annual Veldt Grass)



*Ehrharta longiflora*

Photos: L. Fontanini & R. Randal

Caespitose annual, grass-like or herb, 0.2-0.6 m high. Fl. purple-green, Jul to Nov.

**General Biology.** *Growth form.* Grass. *Life form.* Annual, caespitose. *Reproduction.* Seed. *Dispersal.* Water, wind, mammals, slashing. *Photosynthetic Pathway.* C3. *Seedbank persistence.* 1+ years. *Fire response.* Increases in cover by mass germination of soil-stored seed. *Origin.* Namibia, South Africa. *History of use/introduction.* Animal fodder. *Similar exotic species.* *Ehrharta calycina*.



## *Euphorbia terracina* (Geraldton Carnation Weed)



Erect or ascending perennial, herb, 0.1-0.5(-1.2) m high. Fl. green-yellow, Aug to Dec. Sandy & calcareous soils. Disturbed coastal areas, swamps.

Alternative Names. False Caper, Geraldton Carnation Spurge, Terracina Spurge. Herb. Short-lived perennial. *Reproduction*. Seed. *Dispersal*. Local spread by fruit opening explosively, birds, ants, movement of limestone soils and by machinery. Sap is poisonous and an irritant. *Seedbank persistence*. 3-5 years. *Fire response*. Plants are generally killed by fire, however some resprout. Fire may cause mass germination of soil-stored seed. Has allelopathic properties, can reduce germination of other plant species, form dense thickets and out compete native species for space, light and nutrients. Has rapid growth and prolific seed production in the first season. Can grow well or adapt to shade and high light conditions, tolerant of waterlogging and drought. Toxic sap deters native herbivores. Loses most of its leaves during summer. Germination may occur at any time of the year if there is adequate rainfall. If there is insufficient rainfall, depletion of the seed bank may be relatively slow. Plants from early cohorts produce greater numbers of seeds per plant than late cohorts. Disturbance that brings seed to the soil surface should be avoided, as buried seed is far less likely to germinate. Mature plants have a deep root system and are able to resprout readily when cut, grazed or burnt. Similarly, seedlings are not easily killed through slashing or any physical means that do not remove the entire plant. Resprouting plants are often more robust and have greater seed output. *Origin*. Mediterranean coast and islands, Canary Islands in the Atlantic, north of the Red Sea and the Black Sea to Georgia. *History of use/introduction*. The reasons for its introduction are uncertain, however many species of *Euphorbia* are used as ornamentals. *Similar exotic species*. *E. peplus*, *E. paralias*.

Hand removal can stimulate germination of the soil seedbank. Ensure adequate personal protective clothing is worn to avoid contact with sap. Since seed production is highest from plants which emerge early, it is important to control early cohorts, if not treated when small these become increasingly tolerant to herbicides. Control of the late emergents before seed formation will prevent fresh seeds being added to the existing seed bank.

### *Ferraria crispa* (Black Flag)



Malodorous cormous, perennial, herb, to 0.6 m high. Fl. purple-black-brown, Jul to Nov.

Perennial corm. *Reproduction*. Primarily corms, also seed. *Dispersal*. Soil movement, water. *Time to first flowering*. 2 years. *Seedbank persistence*. Short, 1 year. *Fire response*. Generally survives fire. *Notes*. Flowers last for one day only. Produces seed from self pollination. Pollinated by flies. Flowers produce a strong pungent scent. Each year plants produce new corms that are added to a column of dormant corms produced in previous years. There can be 15-20 corms in a single column. *Origin*. South Africa. *History of use/introduction*. Garden escape. Suggested method of management and control: Hand remove very small populations in degraded sites. Sift soil to find all corms.

### *Freesia alba X leichtlinii*



Cormous, perennial, herb, 0.1-0.4 m high. Fl. cream & white & yellow & purple, Jul to Oct.

Flowering month/s August, September. Annually renewed corm. *Reproduction*. Primarily seed, occasionally offsets/stem-cormels. *Dispersal*. Water, soil, birds. *Time to first flowering*. 2-3 years. *Seedbank persistence*. Short, days-1 year. *Fire response*. Generally survives fire. *Origin*. South Africa. *History of use/introduction*. Garden escape. If hand removing care must be taken to remove all corms.

*Fumaria capreolata/densiflora*



Climbing or scrambling annual, herb, 0.1-1(-3) m high. Fl. white & red/brown, Aug to Nov. Common on wasteland, road verges.

Alternative Names. Climbing Fumitory, Whiteflower Fumitory. *Origin*. Northern Africa, temperate Asia, Europe Macronesia, northern Africa, Temperate and western Asia, Europe. *Notes*. Colonises degraded sites. May hybridise with *Fumaria muralis*. Can be difficult to control due to a strongly persistent soil seed bank. Herbicide control can be unpredictable and variable, with tolerance and resistance varying among species of *Fumaria*. Potential biological control agents were assessed after one species *Fumaria densiflora* developed populations with herbicide resistance.

*Gladioli caryophyllaceus*



Cormous, perennial, herb, 0.2-0.8(-1) m high, with twisted leaf blades. Fl. pink, Aug to Nov. Grey or white sand, loam.

Annually renewed corm, some dormancy between fire. *Reproduction*. Primarily seed, occasionally offsets. *Dispersal*. Wind. *Seedbank persistence*. Medium, 1-5 years. *Fire response*. Generally survives fire. Fire can bring corms out of dormancy and stimulate prolific flowering. *Notes*. Endangered in South Africa. As it flowers particularly well following fire, seedling recruitment in the seasons following fire could be very high. *Origin*. South Africa. *History of use/introduction*. Garden escape.

### *Raphanus raphanistrum* (Wild Radish)



Erect annual, herb, 0.15-1 m high. Fl. yellow-white/pink, Apr to May or Jul to Nov. Disturbed areas.

Notes. Can be biennial. Weed of highly disturbed edges. Germinates after significant autumn rains, otherwise germination can be sporadic and staggered throughout the year. Has a flexible lifecycle, high genotypic and phenotypic variability, enabling it to adapt to different environments. Produces prolific seed with high longevity and dormancy. Has recorded resistance to chlorsulfuron in South Africa and multiple resistance to several herbicide groups in other regions. *History of use/introduction*. Macaronesia, northern Africa, temperate Asia, Europe.

#### **Phytophthora dieback**

Phytophthora dieback is caused by the plant pathogen, *Phytophthora cinnamomi*, which kills susceptible plants, such as banksias, jarrah and grass trees, by attacking their root systems. Dieback is a symptom of a Phytophthora infection and affects more than 40 per cent of the native plant species and half of the endangered ones in the south-west of Western Australia.

The plants die because they cannot take up the water and nutrients they need.

It's not easy to detect as infected plants often appear to be dying from drought.

There is no known cure for the disease.

Phytophthora disease also affects many agricultural crops and garden plants.

The fungus is spread through the movement of soil and mud, especially by vehicles and footwear. It also moves in free water and via root-to root contact between plants.

Forestry and mining industries, as well as recreational bushland users (such as off-road vehicles, mountain bikes and bush walkers) need to take particular care not to spread the disease.

Management practices to prevent the spread of Phytophthora dieback into uninfected areas include strict hygiene measures such as:

- cleaning stations to avoid transport of contaminated soil
- cleaning footwear and washing down vehicles and equipment
- use of dieback free construction materials
- seasonal and permanent road and trail closures
- information signs and education.

## What you can do

### You can play a vital role in stopping the spread of *Phytophthora dieback*:

- look out for information signs around dieback-affected areas and follow the instructions
- do not move soil or plant material
- use clean-down stations and boot cleaning stations
- stay out of quarantined areas in bushland and forest
- do not enter disease risk areas during, or for three days after, rain

70 percent Methylated spirits in a spray bottle is suitable for sanitising small hand tools and footwear in the field. Tools should first be brushed clean then sprayed to cover all surfaces. Allow a few minutes for spray to dry. Household bleach (typically containing 3-6% Sodium Hypochlorite) should be diluted to one part bleach to 10 parts water for soaking tools.

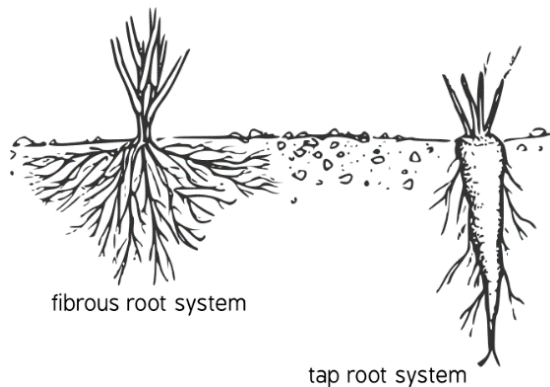
### Glossary

Allelopathy-the chemical inhibition of one plant (or other organism) by another, due to the release into the environment of substances acting as germination or growth inhibitors.

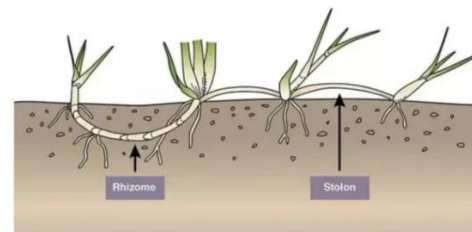
Annual-plant completes life cycle in one season.

Biennial-plant completes life cycle in more than one but not more than two years.

Perennial-plant lasts many years, growing more than two seasons.



Rhizomes grow below the surface. Stolons creep along the surface.



Flowering plants (Angiosperms) can be divided into two categories: -

Dicotyledon-a flowering plant with an embryo that bears two cotyledons (seed leaves).

Monocotyledon- grass and grass-like flowering plants (angiosperms), the seeds of which typically contain only one embryonic leaf, or cotyledon



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<https://www.dpaw.wa.gov.au/management/pests-diseases/phytophthora-dieback>

All weed photos and species notes sourced from Florabase

<https://florabase.dpaw.wa.gov.au/>

[http://www.herbiguide.com.au/Descriptions/hg\\_Bridal\\_Creeper.htm](http://www.herbiguide.com.au/Descriptions/hg_Bridal_Creeper.htm)

### **Suggested Reading/Reference Books:**

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