Community experience in the Hills

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Watsonia

"Watsonia", in this article, is the vernacular name used not only for several species of the genus *Watsonia*, but also for similar plants such as Chasmanthe and Gladiolus. Watsonia are weeds of southern African origin, which have the typical characteristics of a below ground corm, and wide, flat strap-like leaves arising from the base. They are dormant in late summer and autumn, and flower in spring on tall stems or stalks. Regeneration is by corm reproduction below ground around the parent corm, and also by seed or cormil production on the flower stems. Flowers are typically red or orange, but also include white, pinks and mauve. In round figures, there are about a dozen significant *Watsonia*, *Chasmanthe* and *Gladiolus* species naturalized in the south west of WA.

Watsonia are not significant agricultural weeds and will not normally survive grazing. They are regarded as "wasteland plants", often growing profusely on road and stream verges but stopping abruptly at the farm fence where grazing or cropping starts. Because they are not an agricultural problem, little seems to be known about them in official circles, and there is very little literature available. Watsonia have been (and still are in some quarters!) regarded as attractive garden plants, and this, no doubt, is the underlying reason for their wide spread throughout the south west. They are sold in nurseries in the eastern states where they might not cause so much of a problem, and from time to time nurseries and garden centres in Perth and possibly elsewhere advertise their availability. Our Mediterranean climate is ideal, and there appears to be no significant predators here to give effective control.

History of control in and around Darlington

In 1979 John Ellery, a member of the Darlington Ratepayers and Residents Association (DRRA), proposed to the Darlington community that something be done to control the spread of the "Wattie menace", and suggested various measures including street working bees followed by street parties, prizes for the biggest number of corms pulled, and so on, to raise awareness and start things moving. "Wattie Wopping" was eminently successful over a number of years and included Shire of Mundaring support in removing heaps of grubbed out watties by the roadsides plus an annual weekend of work by the volunteer fire brigade in spraying some of the bigger infestations. Darlington was at that time something of a "sea of watsonia". The author was involved from the beginning with John, and when he subsequently became a Councillor, took over the annual program. The attention grabbing publicity of the early years has mostly ceased, but in its place we now have a remarkably well informed and supportive community, which can clearly see the results. In fact it is now difficult to convince new-comers how bad it used to be! Council continues its support through the supply of chemical each year.

Attempts have been made from time to time to widen the campaign outside Darlington, but with somewhat limited success. The author's involvement as a member and occasional committee member of the Eastern Hills Branch of the Wildflower Society has led to the Branch becoming involved in the campaign, and in recent years it has been seen to be a joint DRRA and Wildflower Society activity. The Society is, of course, better placed to promote the campaign over a wider area than a single community association.

Some years ago the Eastern Hills Branch applied strong pressure to CALM in an effort to get some control established over the massive watsonia problem in John Forrest National Park. Demonstrations of methods and techniques, along with an inspection of treated areas in Darlington were arranged for CALM officers. It is believed there is now an established annual control program in John Forrest.

There has been sporadic interest from people in other hills communities, but apart from our neighbours Glen Forrest and Boya, no soundly based programs appear to have started to date.

The following notes are based on the distilled experience of this 13 year campaign, and are offered in support of the growing concern of the Wildflower Society to encourage effective action on the problem throughout the south-west.

Control

The immediate objective of watsonia control is just that – control, not elimination. Each year that target must be kept firmly in view to avoid waste of effort and any sense of despair at the magnitude of the task. Control is achieved when there is no seed or cormil drop. In that sense, control has been achieved throughout most of Darlington and parts of Glen Forrest and Boya for some years.

There are two principal means of control:

i. destroy as many plants as possible which are mature enough to flower and set seed, before they can do so each spring, and
ii. remove any seed stems from plants that escape destruction before they drop their seed in early summer.

If these two processes are followed without fail each year, then eventually pseudo-elimination will be achieved as the total pre-existing seed stock will be used up.

It is now obvious that the most important of the two control processes is the second-removal of any set seed. Watsonia are unusual amongst weeds in that such seed removal is in fact a practical possibility. If for any reason the plants in a controlled area cannot be destroyed in a particular year, nothing is lost provided all seed stems are cut off before seed dispersal. That is the "bottom line". No new area of control should be started without that absolute commitment.

There will always be the possibility of re-introduction to controlled areas by people, animals and birds perhaps, and water via streams and surface water flow from uncontrolled areas. People obviously introduce and spread watsonia through gardening activities. However, there is also some evidence that the casual picking of a seed stem by bush walkers, perhaps as a fly swat, and later discarding it at a resting place, has caused new outbreaks. There is also some evidence that kangaroos eat the seed pods and possibly spread the seeds in their droppings.

Plant destruction

Watsonia plants may be destroyed by physical or chemical means. The former is suitable for smaller infestations and where the use of chemicals is not acceptable. Grubbing out can be back breaking, especially with larger clumps, but is effective provided the plants are carefully placed so that they do not re-root. Late in winter, and during or immediately after rain, watsonia plants will usually pop out of the ground with a gentle pull. Whether using physical or chemical means, always work from the highest infestation downslope as the seeds generally move down hill with water movement.

Chemical destruction is best achieved by the relatively innocuous chemical glyphosate, sold as "Roundup" or "Zero". The latter is one-third the concentration of Roundup and not generally economical, but does the same job with appropriate mix strength. The Shire of Mundaring supplies bulk glyphosate to the DRRA for this control work.

Glyphosate kills by blocking a plant's essential biochemical process. In effect, it starves to death, so signs may not be evident until a couple of weeks after treatment. Treatment is most effective when the plant is growing vigorously. For watsonia, this is when the flower spike is emerging, usually September to October, depending on aspect. However experience has shown treatment to be effective from late July to mid December, with the more exposed, drier areas treated first and the shadier, wetter areas last. Because plants must continue to try and function for the chemical to work, disturbance such as whipper-snipping must not take place until they are completely dead several weeks or months after treatment.

The chemical can only be taken in by a plant through its leaves, or by direct injection into the active parts of stems and trunks, and is then translocated to the root system. It is not taken up through the soil, and has no effect through dead wood or bark.

Glyphosate is not selective, and will kill or damage any plant. Naturally this is dependent on the quantity taken in, and a little spray on a few leaves of a large marri tree for example will have no observable effect. It is particularly effective on the simpler plants such as grasses. Most small native plants are quite susceptible, including particularly, blackboys.

Glyphosate is not registered as a poison (no "S" number), and is not known to have any effect on persons using it with normal good care, nor on animal life in general. There seems to be little veterinary concern, for example, over horses being enclosed with sprayed watsonia which they may nibble. Nevertheless it is only sensible to handle the chemical, particularly the concentrate, with caution: keep off the skin and wash away any spillage with plenty of water. Follow the manufacturer's instructions.

Glyphosate is rapidly inactivated in soil, especially clayey soil. It becomes bound tightly to soil particles and is then broken down over a few weeks or months.

Glyphosate may be applied by spraying or "wiping". Spraying is suitable for larger areas and where the watsonia is not interspersed with desirable plants. The most suitable sprayers are the 5 litre plastic pressure type with quick and reliable trigger on and off control. Experience shows it is best to buy a quality sprayer for long term reliable use in the field. One person can cover a remarkably large area with one of these, but another option for broadacre spraying is a micro-drop applicator as used in horticultural practice, the big saving being in not having to carry the water into the site. Do not use galvanized metal containers for glyphosate.

Dilute the concentrate 100:1 for spraying i.e. 50 mL for a 5 litre container. Do not add wetting agent as it is already included. Fill the container with water first, then add the concentrate to avoid foaming. Use a course spray jet and wet down into the centre of the plant. It is not necessary to wet the whole plant. Keep the spray nozzle low to avoid spray drift and do not spray on very windy days. The chemical must dry on the foliage for at least 2–3 hours. Do not spray if rain is expected within this time. Chemical can be washed off any wanted plant which has been accidentally sprayed, without ill effect, provided it is done thoroughly and immediately.

The alternative means of chemical application is wiping a smear of glyphosate onto one side of one leaf. A "sticky" mix of about 10:1 is used and a small (0.5 litre) trigger spray bottle fitted with a foam pad over the nozzle is ideal. This method is essential when the watsonia are growing up through native plants in the bush, and are relatively few in number. It is extremely reliable and surprisingly quick to do. This applicator can be carried on bush walks, with a plastic bag over the nozzle, and used to treat isolated plants as they are found quickly and easily. Rubber household gloves must be worn to avoid hand contact with the concentrated solution.

Seed removal

Watsonia generally flowers between September and November, depending on species, location and season. While flowering they are, of course, very visible, and this makes it easy to find and cut off the stems which will carry seeds or cormils later on. However, if done too early, new seed stems will form causing a waste of effort. Furthermore, all plants do not flower at exactly the same time, so that a given patch might have to be worked over several times. Generally it is better to wait until all flowering is finished.

There are two main types of "seed" on watsonia species. The orange flowered species which has very tall stems and generally inhabits streams and wet areas has several dozen "cormils" which mature into brown spiky clusters along the stems. These often do not drop until the stem itself falls over, which may be a year after forming. These stems must be cut very low down to avoid cormils being formed on the remaining stump. All other species have a multitude of small seeds in pods along the stems. These pods swell while maturing then open from late December to mid January, spreading hundreds of seeds over an area of several square metres. From a control point of view, these are obviously a far bigger problem.

Provided the seed stems are cut off well before seed or cormil maturity, there is no risk in dropping them where cut. Later in the season it is best to at least remove the stems to a single heap in a known safe place, preferably in a hollow, so that any germination will be confined and able to be dealt with the following year. If time has got away and cutting is being done late in the season, the stems must be handled very gently to prevent seeds being shaken out.

Cutting is best done with a pair of single handed grass shears. In very large operations, hedge clippers can be used for dropping in situ. Secateurs, with their small opening and awkward hand position are too slow to be useful for anything but a very limited amount of stem cutting.

Bush regeneration and burning

In most cases the reason for seeking to control watsonia is to allow regeneration of the previous natural plant communities. It is important, therefore, to be aware of the major factors governing this regeneration. These are the timing and frequency of burning, and the presence of weeds (other than watsonia).

Most people are familiar with the burst of new growth in the bush after a fire. This is of two types: growth from rootstock of burnt-off plants, and new germination from the seed bank in the soil (fire cracks the hard seed coat). Once this has occurred, the area is vulnerable until new flowering and seed drop replenishes the soil seed bank over several years.

Consideration of this leads to the obvious conclusion that watsonia in bush should be treated by spraying only where the bush is "old" and has not been burnt for some time. The spraying will in many cases kill or damage some of the native plants, but there will be a good store of seed in the soil. After spraying, a fire can be put through, preferably the following Autumn. This will cause the germination of that native seed bank to replace older, destroyed plants. The following season, very careful chemical application should be undertaken on the remaining watsonia, to avoid any damage to the new germination of native plants. No further burning must occur until the flowering and seeding cycle has replenished the seed in the soil. The big 'no-no' is to burn first, then broad-scale spray, even though it is tempting as it obviously makes access much easier.

Where an area has for any reason been burnt ahead of proposed watsonia control, it is useful to thoroughly lop the flower stalks, as described in the above section on "Seed removal", for several years, while waiting for native plant seed to build up. This causes the progressive aging of the watsonia seed bank, reducing its viability and subsequent germination.

The presence of significant weeds, other than watsonia, only makes the problem of bush regeneration more difficult. The correct timing of chemical treatment and

burning, and the need for follow-up is critical to a successful outcome.

Record keeping

As has already been emphasized, establishing effective control over watsonia is a long term project requiring the methodical and reliable application of some simple ground rules. When working over a number of infestations, over several years, and probably with changing personnel, memories are quite inadequate and written records are essential. Even from day to day, for example where many visits may be needed to cover a large reserve, daily records are necessary.

Some means of identifying each area is required. The road access can be a prime key, and within large reserves "blocks" may have to be established by using firebreaks, streams, or other suitable features. For each activity, the location, date, personnel, hours spent, type of work (spray, wipe, lop, etc.), litres of chemical used, together with comments on the condition of the site, should be recorded.

Each year, the previous years' records serve as a reminder of the sites to be checked, and the order in which they should be tackled. Over a number of years these records become invaluable as a guide to the effectiveness of the overall program. The use of a computer database system can significantly enhance the ease with which a large amount of data can be accessed, and this is being developed for the Darlington control program.

Community information

It is essential that the relevant community be kept informed of a control program, its objectives, current activity and achievements. People need to have confidence in what is being done, and ideally to provide additional help when required. To this end, a regular monthly news sheet or column in an appropriate local paper is an excellent means of keeping in touch. Beyond that, one has to be willing to spend time in the field explaining the program to residents leaning over the fence, to bush walkers, and to those who stop their cars to ask what is going on!

Research and further developments

As indicated earlier, not a lot is known about watsonia, or wasn't when the Darlington program commenced. Hopefully, this Workshop will go some way towards addressing this deficiency. Numerous questions seem to offer themselves for research projects: e.g. do insects or mammals feed on watsonia, and are seeds transferred or destroyed by that; are there any pathogens relevant to watsonia; how long does seed remain viable; when does seed become viable as it matures; how does pollination occur; and so on. If universities are looking for topics that could be of significant benefit to environmental management in the south west, there seems to be plenty here.

Some of the wider issues that will require attention if watsonia control is to become a significant part of vegetation management programs, are:

i. the possible declaration of watsonia as environmental pest plants by local or other authorities,
ii. selling of watsonia through shops and nurseries and
iii. widespread public education and dissemination of information.

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Watsonia control in John Forrest National Park

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Introduction

John Forrest National Park lies 26 kilometres east of Perth on the crest of the Darling Escarpment. It consists of approximately 2815 hectares. It is bordered by the Toodyay Road with some land to the north and Great Eastern Highway to the south. Running through the Park are two drainage systems, the main drainage lines being Mahogany Creek and Jane Brook.

As these creek systems run through private property to the east of the Park it is most probable that the watsonia seed and corms have floated downstream and populated the banks of the creek systems within the Park. People and birds could also have contributed towards the spread of watsonia throughout the Park.

History of watsonia weed control

There are no records to show that any watsonia weed control measures were taken until 1983 when some control was undertaken around the main picnic area and camp site at the old Hovea Railway Station. In 1988 a Weed Control program was put in place.

Weed control program

How would we tackle the problem? It was decided that by starting on the eastern boundary of the Park and working our way downslope into the major creek system we could at least stop the spread of watsonia further into the Park bushland.

To facilitate this we have divided the Park into blocks so we can work systematically at control. This gives us an opportunity to monitor and maintain the control we have already carried out. Then by working from the north and south boundaries the concept is to gradually control the spread of watsonia until it is concentrated mainly along Jane Brook.

Once this was done, all of our effort could then be concentrated to at least bring some control of watsonia along Jane Brook. At this time our aim is to control not eradicate the watsonia weed.

There **must** be a follow up of the chemical control program for at least three years going over previous years' control area. If there is no follow up, it is a waste of time and effort.

The program that has been implemented at John Forrest National Park can succeed, provided we can receive help from outside volunteers such as:-

- community groups such as clubs etc.
- private property owners bordering the Park: their contribution is to control watsonia on their own land.

Even with this type of help the watsonia Control Plan will be spread over many years, but with any luck will be successful.

Equipment used to control watsonia

i. Mechanical spray unit.
ii. Back pack, used for follow up control.
iii. Weed wand with wick applicators.
iv. Hand held sprayer, for odd single plants in picnic areas.

As it is CALM policy not to spray within 20 metres of a running stream, wick applicators will have to be used along Jane Brook. This makes watsonia control much longer to be achieved as it entails a lot of physical labour and time. This is where volunteers and interested community groups could be utilized.

Chemical used

The chemical used is Glyphosate 360 (Roundup) at a mix of 100:1, i.e. 10 mL per litre of water.