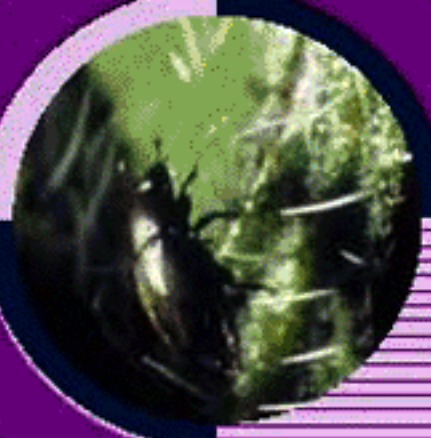


The Biological control of Paterson's curse

Pollen beetle

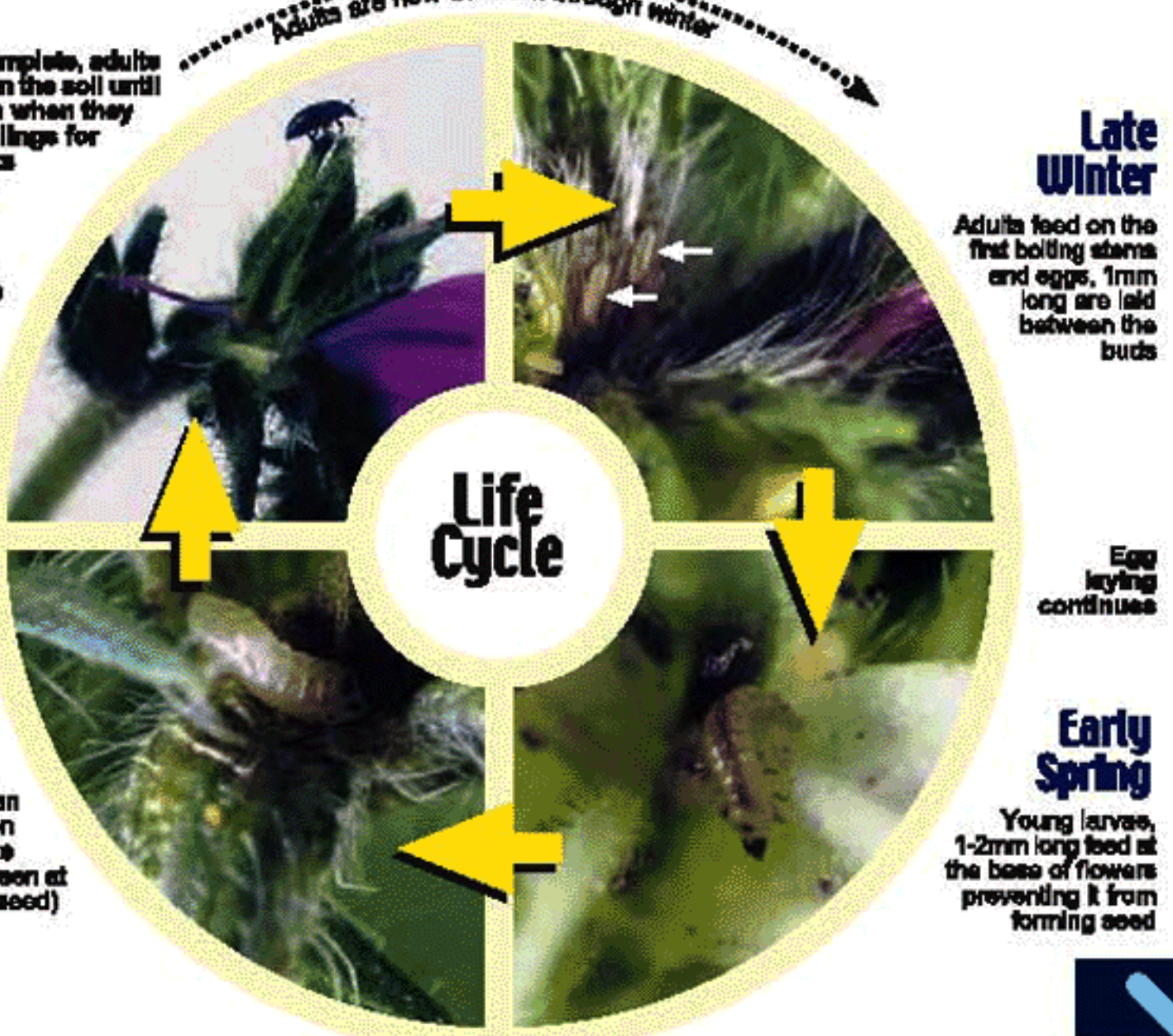
Meligethes planiusculus

Biological control aims to limit the dominance of Paterson's curse to a point that makes it economically insignificant to farmers; biocontrol is not an eradication program. It will take many years for the insects to reach their full potential although at some sites insect populations are growing and have spread 10 kilometres 8 years after release. Biocontrol typically requires more than one agent to control the target, for Paterson's curse there is a suite of four agents, each attacks a different life stage of the plant. Once all four agents have large widespread field populations, significant reductions in Paterson's curse seed production are most likely to occur. From this point it will take several years for the seed bank to reach a level that will limit Paterson's curse populations; however this process may be hastened through the establishment of competitive pastures.

Biology

The pollen beetle (*Meligethes planiusculus*) is a small and black beetle (2-2.6mm long) that becomes active in early spring when Paterson's curse rosettes start to bolt and flower. Adults can be seen congregating on the first flowering plants feeding on the unopened flower buds. After a week of feeding females become sexually mature and lay on average 130 eggs, between the unopened buds of Paterson's curse. Larvae hatch from the eggs and mine into the flower bud where they feed on the pollen and ovules (the female part of the flower), destroying the bud and preventing it from producing seed. Larvae then move between flowers feeding on immature green seeds preventing them from forming viable hard seeds. When larval feeding is complete, larvae drop from the flowering plant and pupate in the soil. After 1 - 2 weeks new adults emerge from the soil and can feed on the buds and immature green seed until the end of flowering. This lifecycle enables the pollen beetle to attack the first flowers through to the last seed produced by Paterson's curse. At the end of flowering adults enter the soil and become dormant to escape the heat of summer until autumn rain stimulates germination of Paterson's curse. Adults then emerge from the soil and feed on the young rosette leaves before entering winter hibernation until spring.

Life Cycle of the Paterson's curse pollen beetle



Release and establishment of the pollen beetle

Spring is the only time to release pollen beetle when adults emerge from winter hibernation. Releases of 500-1000+ beetles into "**nursery sites**" are recommended to ensure a good level of attack in the first season. A nursery site is an area kept free of grazing, cultivation and chemicals for at least 3-4 years to allow the beetles to breed rapidly and become self-sustaining. Grazing will kill most eggs and larvae in the flowers. Nursery sites need only be 0.5 Ha in size (though bigger is better) and are easily created by fencing off the corner of a paddock thick with Paterson's curse, particularly non-arable land where the weed is difficult to control. Nursery sites are best located next to paddocks of permanent or long pasture rotations. At release, a nursery site is important for the pollen beetle as larvae feed in flowers and can be eaten by livestock (particularly sheep) in spring.

Once a pasture is locked up, perennial grasses can quickly dominate and exclude annuals like Paterson's curse. If this starts to occur in your nursery site, grazing livestock can be introduced to the nursery site over summer (once the Paterson's curse is dead) to open up the pasture and promote Paterson's curse germination in the following year. If you are in a summer rainfall zone an application of herbicide can also open up the pasture. A little grazing or herbicide use at this time of year will have minimal impact on the pollen beetles, as they are dormant in the ground and leaf-litter.

Managing the pollen beetle in pasture

Once a good level of beetle activity has been observed in the nursery site (many adults and larvae feeding on the flowering plant), spelling or any reduction in grazing pressure in the adjacent curse infested pastures in autumn will encourage wider impact of the beetles. Adult beetles are active on the rosettes after autumn rain and can be eaten by livestock, particularly sheep. A simple guide for a suitable grazing pressure is when the crown of Paterson's curse is being grazed; reducing the grazing pressure will benefit the insects (and desirable pasture species). In spring, heavy grazing will limit the number of pollen beetle larvae that will complete their development and reducing grazing pressure will again benefit the insects. In paddocks that are entering a cropping phase, minimum tillage in autumn will offer the best protection for dormant adults.

Targeting an area on your property usually next to your nursery site for biological control gives you the flexibility to continue controlling the weed in other infested paddocks. Managing Paterson's curse on the rest of the property must continue, as the insects will take many years to have a significant impact. While use of herbicides has no direct effect on beetle activity, killing a plant with herbicide will cause under-developed larvae to starve. The use of insecticides can significantly depress the numbers of beetles and should be used with caution on the paddock you are managing for beetle activity. If insecticide or herbicide must be sprayed in an area where insects are active contact your State officer for advice.

Managing Paterson's curse in pasture

For more information on controlling Paterson's curse with herbicides, grazing and pasture improvement, go to **'Tips and Tools'** at the Meat and Livestock Australia; **www.mla.com.au** or phone **1800 675 717**. For more detailed information the book **'Pasture management for weed control'** is available through MLA or NSW DPI phone **1800 028 374**.

Contacts for collaborating organisations

State	Organisation	Contact Person	
NSW	DPI, Tamworth	Paul Sullivan	(02) 6763 1175
Victoria	DPI, Frankston	Kerry Roberts	(03) 9785 0135
South Australia	SARDI, Adelaide	Ken Henry	(08) 8303 9540
Western Australia	WA Agriculture, Perth	Paul Wilson	(08) 9368 3758
Nationally	CSIRO Entomology, Canberra	Matthew Smyth	(02) 6246 4249

Your local contact

CSIRO Entomology, GPO Box 1700, Canberra ACT 2601, AUSTRALIA.
Tel: (02) 6246 4001 **Fax:** (02) 6246 4000
www.csiro.au/weeds/

Designed by Soussanith Nokham, CSIRO Entomology Graphics Unit, Canberra ACT

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