

## Arrowhead – Biology and Control

### Introduction

Arrowhead (full scientific name: *Sagittaria graminea* var. *platyphylla*) is an aquatic weed that is a serious problem in channels and drains of Victoria's northern irrigation areas, as well as in natural systems of the region.

Arrowhead is an introduced weed, originating in the Americas, which was first detected in Victoria in the 1960s at Wunghnu. It currently seriously infests Goulburn-Murray Water's four eastern irrigation areas and is an increasing presence in the Torrumbarry and Pyramid-Boort Irrigation Areas.

To find a solution to the problem of arrowhead in our irrigation areas, Goulburn-Murray Water has instigated a research program into the biology of arrowhead. The investigation of aspects of arrowhead biology is important in the development of control programs in the future.



### Description

Arrowhead is a distinctive plant, typically with a narrowly ovate leaf and a three-petalled white flower. It can, however, differ in appearance in some conditions, taking on a narrow leaf and a grass-like appearance from a distance.

Arrowhead can spread rapidly, due to its multiple reproduction methods. Like most plants, it produces seeds. These can float for more than two weeks, allowing them to move with water flow and settle in new areas. They are often impeded by structures and can be seen in large numbers floating behind these structures.

Arrowhead can also spread vegetatively. Its robust underground root system allows it to survive the winter, when its shoots die off, and re-grow then spread in the following season. If these root sections are dislodged, just like the seeds, they can float downstream and colonise new areas.

As well as the spread of floating propagules, the actions of animals, such as wading birds, have been implicated in the spread of arrowhead.

### What Are We Doing About It?

Goulburn-Murray Water runs a control program for arrowhead every season. This includes herbicidal control and occasional excavation to clear channels of arrowhead and allow water delivery.

This program works in the short term, but is disadvantaged by the fact that current herbicide technology is not successful in killing the underground rootstock of arrowhead.

Excavation can work in some cases, as it helps remove some of this underground material, as well as standing plants. The disadvantages of this technique are that it can dislodge vegetative propagules that float downstream and it can cause damage to channel structure.

The current research being undertaken on arrowhead has the aim of improving our control of arrowhead and will lead to the development of a better control program.

The first step in this research is to learn more about arrowhead, such as the extent of its distribution and how far it is moving, its ecological requirements and its response to currently available herbicide technology.

Surveys over the last two years have established that arrowhead infestations in the River Murray are growing and that arrowhead is moving downstream. There is also a major infestation in the area where the Ovens River meets the Murray. These infestations are potential sources for arrowhead transfer into new areas in the irrigation areas of northern Victoria, and need to be monitored carefully and eventually controlled.

Investigations into the ecological requirements of arrowhead are also underway. These will identify the

conditions arrowhead needs to grow, with respect to temperature, light, water level and so on. Whilst not all of these areas will lead to control techniques, it is possible that some of these factors could be manipulated to disadvantage arrowhead and be included in a regime that includes herbicidal control, some excavation and some methods based on ecological information. Such an approach is known as Integrated Weed Management, or IWM.

IWM, as its name suggests, is an integrated approach to weed control. As such, it will probably always include an element of herbicide application. It is therefore important to continue research on herbicide application, including different herbicides and formulations of those herbicides, different application rates, different timings of application and different physical factors applied at the time of spraying. With co-operation from herbicide companies, this research is currently underway.

There are many areas to IWM that are important to investigate in the quest for arrowhead control. The end result of the research will be a practical and effective approach to arrowhead control.



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