

# Pasture Research

## Purpose

Develop pasture grasses and clovers which are:

- healthier for sheep and cattle
- able to grow in poor quality soils
- hayfever free.

## Location

Victorian Department of Primary Industries  
Horsham, Bundoora and Hamilton.

## Research overview

### Picking the right fungus for the job

Understanding the kinds of fungi that live inside grasses may soon provide a means of producing more vigorous and hardy pastures.

Fungi come in all shapes and sizes. From the mushrooms we eat to the mould that can grow in your bathroom, all are different kinds of fungi. One special kind of fungus you may not have heard of grows inside many of the grasses we see around farms, yards and parks everyday. Known as 'endophytes' ('endo' meaning inside and 'phyte' meaning plant), these fungi can have a big effect on the growth and health of the host grass.

In return for food and shelter, the endophyte can produce chemicals that improve the host plant's seedling vigour, drought tolerance, resistance to insects and ability to survive under pressures from climate and grazing. Often the relationship is 'mutualistic', meaning that both host and endophyte benefit. But some endophytes produce chemicals that can cause grazing animals to fall ill with conditions such as 'ryegrass staggers'. So how do we harness the good aspects of endophytes and avoid the bad?

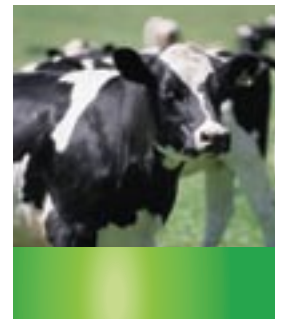
Researchers at the Molecular Plant Breeding Cooperative Research Centre (MPB) are studying the genetic makeup of fungal endophytes to understand more about their biology and the way they interact with their hosts. Armed with this knowledge, researchers will one day be able to produce grasses with beneficial endophytes for healthier pastures and livestock.

### Healthier cows from better quality pastures

Many plants have defences to prevent animals from eating them, and pasture grasses are no exception. Pasture grasses have a number of structural defences in place to lower their digestibility to grazing animals. One such defence is lignin: the part of a plant's cell wall responsible for strength and rigidity. As a grass plant matures, the amount of lignin increases, leading to a stiff, wiry plant that is less nutritious to livestock.

MPB researchers are working to alter lignin composition and content to improve digestibility. The genes controlling the key enzymes for lignin production in perennial ryegrass have been isolated, and plants have been produced that have their genes for lignin production 'turned down'.

Once appropriate field testing has been conducted, these pastures will provide a healthier, more nutritious food source for Australia's livestock industries.



A reverse application of this technology is to produce tough grasses for turf use by increasing the lignin production.

## No more tears, hayfever-free ryegrass is here!

MPB researchers are working to produce grasses that are free from the pollen protein that causes hayfever.



Ryegrass is the grass of choice for turfs, lawns and pastures across much of Australia. It is also a major source of pollen allergens that cause hayfever – the sneezing and itching condition suffered by millions of Australians every Spring.

This world first research has produced ryegrass plants which have the genes producing the proteins that cause hay fever 'switched off'. Field trials are currently taking place in the United States.

## Better forage = more milk Increasing fructan in pasture grasses

Fructan is a naturally occurring carbohydrate in pasture grasses. When exposed to abiotic (non-biological) stresses such as drought and cold, grasses increase the amount of fructan they produce. The benefit for dairy farmers is that fructan is an excellent energy source for cattle. In fact, milk production is much higher among cattle fed a diet high in fructan-rich forage.

MPB researchers have identified the genes responsible for fructan production in perennial ryegrass. Using gene technology, they are currently working to produce new lines of pasture grasses with high levels of fructan production for the Australian dairy industry.

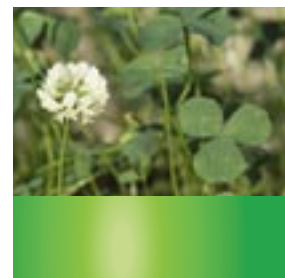
## Putting plant breeding into fast forward

Plant breeders are constantly looking to develop varieties that are better suited to the needs of farmers, industry and consumers; but it can be a slow process. Breeding a new variety can take as long as 14 years. This is partly because you can usually only test a plant to make sure it has the characteristics you're looking for when it's fully grown. Molecular markers can cut this time in half.

Molecular markers are segments of DNA that act like 'signposts', telling us that a gene of interest is close by. Because DNA is in all plant material, we can test a single seed to check whether it has the characteristics we're looking for. We don't even need to grow it!

MPB researchers are in the process of evaluating hundreds of molecular markers for useful traits in pasture grasses and clovers.

Some of the traits currently being researched include herbage quality, lignin production and fructan production. These marker technologies will be provided to breeders to help increase the speed and efficiency of plant breeding.



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For further information visit [www.molecularplantbreeding.com](http://www.molecularplantbreeding.com)

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