

# Endophytes



Isolated endophyte growing on agar medium

Endophytes are fungi that exist inside ryegrass plants as well as in some other closely related species.

Endophytes exist in a symbiotic relationship where by they are provided the nutrients needed to exist from the plant and in return provide benefits to the host plant such as protection from insect attack. However some of the compounds produced by endophyte infection to provide this protection also have negative effects on grazing animals.

The naturally occurring endophyte strain in New Zealand and consequently the most common produces these compounds. Infection with endophyte is the natural state for most grasses in New Zealand.

Endophyte infection results in the production of many alkaloids of which those thought to be of most significance currently are:

- Peramine, which provides the plant protection from Argentine Stem Weevil attack primarily and some resistance to Black Beetle.
- Lolitrem B, which provides some protection against some insect pests but is a neurotoxin that causes ryegrass staggers in stock
- Ergovaline, which provides some protection against black beetle attack, but causes heat stress in stock.

There is thought to be an interaction between the effects of ergovaline and lolitrem B worsening the impacts on stock. The most common effect of these compounds is to reduce animal performance, although in extreme cases, death through misadventure can result.

Most grazing animals will preferentially graze endophyte free pasture over comparable endophyte infected pasture.

There are now endophyte strains available commercially that provide some of the same insect attack protection without all the negative side effects.

Endophyte type	Alkaloids produced			
	Peramine	Ergovaline	Lolitrem B	Lolines
Standard	*	*	*	
Nil				
AR1	*			
AR6	*	*		
NEA2	*	*	*	
MAX P	*			*

A plant cannot become endophyte infected, to be infected it must grow from seed containing endophyte. Endophyte is carried in the seeds of infected plants and as plants develop from these seeds so does the endophyte. The levels of these compounds produced by endophyte infection vary within a plant for example; concentrations are generally highest in the plant stem. Factors such as; growth stage, plant cultivar and stress on the plant also effect these concentrations. Knowledge of this variation can provide some degree of management control to farmers to mitigate the effect of endophytes on stock.

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