WHAT ARE ENDOPHYTES?

Endophytes in grass play an important role in resisting insect attack in pasture but there is a price to pay in ryegrass staggers and reduced animal performance. Cropmark is developing "novel endophytes" that protect the grass against a greater range of insect pests, with no negative impacts on ruminant health or performance.

Grass plants may contain an internally growing fungus called endophyte. Different strains of endophyte are available in many of the grass cultivars. The Standard strain implies that the cultivar contains a wild type endophyte which will help resist insect attack (eg Argentine stem weevil, Black Beetle), and help to prevent over-grazing but may, particularly in dry summer conditions, cause ryegrass staggers and reduce animal growth rates.

Low endophyte implies low or nil endophyte infection levels in the seed and its use is best suited to areas of low insect predation generally associated with high summer moisture. Novel strains are now being developed which may or may not cause ryegrass staggers but generally have some level of toxicity to some of the pasture insect species. Insect response to these strains is variable dependent on the strain of novel endophyte and the reaction of the grass cultivar to it.

Endophyte levels in seed generally decline in seed lines stored for more than a year under normal ambient conditions.

Endophyte viability can be improved by storing seed under conditions of low humidity and temperature. Seed lines can be tested for current and viable endophyte level.

The following table developed by the Seed Industry for ryegrasses and festuloliums (inter-species crosses between ryegrass and fescues), outlines the effects of the various endophytes on insect pests.

	ARGENTINE STEM WEEVIL	PASTURE MEALY BUG	BLACK BEETLE ADULT	ROOT APHID	PORINA	GRASS GRUB	FIELD CRICKET
DIPLOID PERENNIAL RYEGRASS							
AR1	++++	++++	+	-2	-	-	Not tested
NEA2	+++	(++++)	+++	++	Not tested	-	Not tested
AR37	++++1	++++	+++	++++	+++	+	Not tested
SE	++++	++++	+++	++	+	-	Not tested
WE	-	-	-	-	-	-	Not tested
TETRAPLOID PERENNIAL RYEGRASS							
AR1	(+++)	(++++)	+	-2	-	-	Not tested
NEA2	++	(++++)	+++	++	Not tested	-	Not tested
AR37	(+++)1	(++++)	+++	++++	(+++)	+	Not tested
WE	-	-	-	-	-	-	Not tested
FESTULOLIUM							
U2	++++	(++++)	++++3	++++	(++)	+++	+++
ITALIAN AND SHORT TERM (HYBRID) RYEGRASS							
AR1	++	(++++)	+	-2	Not tested	-	Not tested
NEA	Not tested	(++++)	+++	Not tested	Not tested	-	Not tested
AR37	+++1	(++++)	+++	Not tested	Not tested	-	Not tested
WE	-	-	-	-	-	-	Not tested

See next page for Key and Notes to Table

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KEY TO TABLE

-	No control
+	Low level control: Endophyte may provide a measureable effect, but is unlikely to give any practical control.
++	Moderate control: Endophyte may provide some practical protection, with a low to moderate reduction in insect population.
+++	Good control: Endophyte markedly reduces insect damage under low to moderate insect pressures. Damage may still occur when insect pressure is high.
++++	Very good control: Endophyte consistently reduces insect populations and keeps pasture damage to low levels, even under high insect pressure.

NOTES RELATING TO TABLE

1 AR37 endophyte controls Argentine stem weevil larvae, but not adults. While larvae cause most damage to pastures, adults can damage emerging grass seedlings. In Argentine stem weevil prone areas it is recommended to use treated seed for all cultivars with novel endophyte.

2 AR1 plants are more susceptible to root aphid than plants without endophyte.

3 Also active against black beetle larvae