New CM142 endophyte

Safer for livestock, hard on pests.

CM142 is a groundbreaking novel endophyte that delivers effective insect protection without compromising animal health. For the first time livestock producers can select ryegrass cultivars armed with industry-leading endophyte protection against major insect pests Porina, Black beetles and ASW without sacrificing livestock health and welfare – a giant leap forward for New Zealand's pasture industry.

Developed by the Cropmark Seeds science team in Canterbury, CM142 was discovered after screening thousands of ryegrass samples from around the world. This exciting new endophyte is ideally suited to the challenges of New Zealand farm environments - originating from a dry, semi-alpine region of Greece with a common latitude to the Waikato. It produces epoxy janthitrem alkaloids and is completely free from toxins lolitrem-B and ergovaline.

CM142 showed an excellent ability for seed transmission, allowing vigorous testing to continue in the latest ryegrass germplasm lines. Its inclusion in the Cropmark breeding programme quickly confirmed its compatibility, stability and suitability for commercial ryegrass seed production.

During early research the Cropmark science team recognised that CM142 provided ryegrasses excellent protection from insect pests. Independent entomologists were then contracted to conduct years of research and on-farm trials to test its efficacy. They concluded that CM142 provides effective protection against major insect pests, equivalent to AR37. This research was endorsed by the New Zealand Plant Breeding and Research Association in the 2025 insect ratings table.

A major leap forward for livestock producers came when Cropmarks science team discovered that CM142 combines its effective insect control with a very high level of animal safety.

CM142 is ergovaline-free so it does not cause heat stress, and its optimal alkaloid profile results in an extremely low risk of ryegrass staggers. Five years of rigorous animal safety testing has confirmed that CM142 offers substantially enhanced animal safety. It received the Plant Breeding and Research Association's highest animal safety rating in 2024, and our latest research shows it is significantly safer than AR37 and even AR1, an endophyte generally recognised as having a very high animal health status.

Livestock producers no longer need to juggle competing priorities of pest control and livestock health. Clinical and sub-clinical animal toxicosis can come with a hefty price tag for farmers, therefore finding a balance between animal safety and alkaloid production for insect deterrence is key. With CM142, there's an optimal concentration of the epoxy-janthitrem alkaloid, shown in trials to significantly reduce the frequency and severity of ryegrass staggers. CM142 delivers unique value to New Zealand farmers – high ryegrass performance and persistence without sacrificing livestock health and welfare[1].

[1]As CM142 has not been tested on deer or horses, no recommendation is made for these species.

"The groundbreaking new CM142 endophyte, matched with the latest ryegrass genetics, offers producers a unique combination of ryegrass productivity and improved animal health. CM142 alkaloid production is balanced for effective insect protection and minimal risk of negative animal health or production effects."

Dr Matthew Deighton, Cropmark Seeds Technical Manager

UNDERSTANDING ENDOPHYTES

- Ryegrass endophytes provide biological control of major insect pests. The endophyte is a symbiotic fungus that lives within the ryegrass plant and transmits to new plants inside the seed. Using endophytic ryegrasses for insect biocontrol is an effective alternative to expensive insecticide sprays, reduced pasture productivity and persistence.
- Endophytes produce alkaloid chemicals that in the right concentrations provide protection against insect feeding, but some can also impact the health of grazing herbivores and reduce pasture palatability. Different endophytes produce differing alkaloids and concentrations within their host grass.
- Selecting the best endophyte for each situation is important as this will affect the level of plant protection and amount of alkaloids consumed by livestock. Take into account the types of insects present, the level of insect damage occurring, its impact on pasture persistence and the type of livestock being farmed.
- New Zealand is a world leader in novel endophyte technology. Novel endophytes are selected to provide effective plant protection with the least possible negative effects for livestock. The new CM142 endophyte developed by Cropmark Seeds excels for its combination of strong efficacy against insect pests and minimal animal health impact.
- Endophytes are available within perennial, hybrid and some Italian ryegrasses. Cropmark has ryegrass containing various endophytes, including the naturally occurring and very persistent 'standard endophyte' (SE), novel endophytes CM142, NEA2, AR1 and U2. Seed with a specified endophyte from Cropmark has a minimum viable infection level of 70%. 'Low endophyte' (LE) seed with less than 70% viable endophyte and 'Nil endophyte' (NIL) is also available in some cultivars.

Diploid perennial ryegrass NZPBRA Endophyte insect control summary 2025-2026*

The following table summarises the results from over 100 replicated pot and field trials, where insect feeding has occurred, and the resultant insect damage was assessed.

Endophyte Brand	Argentine Stem Weevil	Pasture Mealy bug	Black beetle	Root aphid	Porina	Grass Grub	Field Cricket
Diploid perennial ryegrass							
AR1	++++	++++	+	-[2]	-	-	Not rated
AR37	++++[1]	++++	+++	++++	+++	+	Not rated
AR128	++++[1]	Not rated	(+++)	(++++)	Not rated	Not rated	Not rated
CM142	(++++)[1]	Not rated	(+++)	++++	(+++)	Not rated	Not rated
NEA2	+++	(++++)	+++	++	Not rated	-	Not rated
NEA4	+++	(++++)	+++	++	Not rated	Not rated	Not rated
NEA12	(++++)[1]	Not rated	(+++)	++++	(+++)	Not rated	Not rated
RGT18	(++++)[1]	Not rated	(+++)	++++	(+++)	Not rated	Not rated
Standard endophyte	++++	++++	+++	++	+	-	Not rated
Without endophyte	-	-	-	-	-	-	-

Notes on table

- No control.
+ Low level control: Endophyte may provide a measurable 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.
( ) Provisional result: Further results needed to support the rating. Testing is ongoing.
[1] AR37, AR128, CM142, NEA12, and RGT18 endophytes 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.

* See the PBRA website for more information www.pbra.co.nz.