

## Frequently Asked Questions - Novel Endophytes

**Q: What is endophyte?**

**A:** Endophyte is a naturally occurring fungus, whose entire lifecycle occurs within its grass host. Endophytes of interest to agriculture include a strain that infects perennial and long rotation ryegrass, one that infects Italian ryegrass, and one that infects tall fescue. Endophyte lives in a symbiotic (win-win) relationship with its host plant, obtaining nutrients from it, and in return providing protection from insect pests and from overgrazing by animals.

**Q: What is a novel endophyte?**

**A:** A novel endophyte is a naturally occurring endophyte that has been identified as having properties that make it more useful in agriculture than other ('standard/high') endophytes. These properties usually include better insect protection for its host plant, and /or reduced side effects on grazing animals, e.g. AR1, AR37, MaxP, Endo5.

**Q: What is the minimum infection rate required in a novel endophyte seed lot, to make it eligible for sale?**

**A:** Seed lots containing AgResearch owned novel endophytes (AR1, Endo5, AR37, and MaxP) are required to have a novel endophyte infection rate of at least 70% at the time of sale. This means that for every 100 seeds in the lot, at least 70 must be infected with viable (live) novel endophyte.

**Q: How is the level of viable endophyte in a seed lot determined?**

**A:** By a 'squash test' or a 'viable test'

**Q: What are the 'squash' and 'viable' tests?**

**A:** A 'squash test' determines whether endophyte is present or absent in each seed examined. However it cannot determine whether that endophyte is alive (viable) or dead. Endophyte in seed less than six months old is (almost) always viable, so a 'squash test' can be used to determine the percentage of viable endophyte in a seed lot that is less than 6 months old. The advantage of a 'squash test' is that it only takes 24 hours to perform, and allows seed to be released into market quicker in ex harvest situations.

A 'viable test' (sometimes called a 'grow out test') determines whether viable endophyte is present in a seed. A viable test is always performed on seed older than 6 months, as endophyte infection rates may have started to drop, and a 'squash test' may no longer provide an accurate result. A 'viable test' takes between 3 and 6 weeks to perform, depending on the technology used.

For both test types, time taken to receive results can be longer than the test times given above, if a backlog of samples is present at the lab.

**Q: How long are these tests valid for?**

**A:** Six months from date of testing, providing that the seed lot is stored in cool, dry conditions from harvest. (See best practise below)

**Q: What is the best practice for storing seed containing novel endophytes?**

**A:** Endophytes are a living organism. It is not as long lived as the seed it resides in, so during storage, the endophyte will eventually die while the seed can remain viable. To maximise the life span of the endophyte in a seed line, the following guidelines should be observed.

## **PURCHASE**

Purchase freshly harvested seed, or seed that has been stored in a temperature and humidity controlled cold store. This seed will have the longest endophyte viability.

## **TEMPERATURE**

Keep seed as cool as possible:

- Store out of direct sunlight.
- Do not store close to the roof where temperatures are highest.
- Good ventilation minimises heat build up in storage sheds. Keep the seed storage area well ventilated.

## **SEED MOISTURE CONTENT**

- If possible, do not store the seed in areas with high humidity (north and west of both North and South Islands). High humidity will increase seed moisture content, and decrease endophyte life span.
- Ventilation will not usually reduce humidity (but it may decrease temperature).
- Storing seed in large stacks that minimise air contact with the seed will help to reduce increases in seed moisture content.
- Store away from doorways, and store on pallets, to minimise risk of rain or flooding affecting the bags.

## **STOCK TURNOVER**

- Keep storage time to a minimum.
- Ensure regular turnover of seed in stock – first in, first out principle.

## **RETESTING ENDOPHYTE VIABILITY**

- Novel endophyte seed lots that have been stored for 6 months in cool, dry conditions, will need to be retested with a 'viable test', to ensure that live endophyte is present in the seed at greater than 70% infection.
- Best policy is to sell the seed before retesting is required.

**Q: Is endophyte viability a new issue associated with endophyte?**

**A:** No this has been an issue with all endophyte, even prior to the introduction of novel endophytes.

Seed companies and the owner of the technology have been aware of these issues and have put in place within their agreements and systems processes to manage this. This is managed by ensuring that seed supplied is either stored in cool storage or direct from harvest and is also sold with a current test.

Since the introduction of novel endophytes (AR1) in 2001, best practise guidelines around storage and retesting have been part of the education process. There have also been specific retailer and consultant seminars to further educate people on these matters.