



Environmental  
Protection Authority  
*Te Mana Rauhi Taiao*

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## DISCUSSION DOCUMENT

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# Import and release of *Neotyphodium siegelii*; an endophytic fungus

February 2013



## Purpose of this document

In February 2013, an application was made to the Environmental Protection Authority (EPA) seeking to import and release *Neotyphodium siegelii*, an endophytic fungus that lives within ryegrass. This organism is thought to contribute to ryegrass and fescue persistence, protecting the plants from invertebrate pests and drought. The EPA is calling for public submissions on this application. This discussion document is produced by EPA staff to facilitate the submission making process. We discuss the information provided in the application and other readily available sources. This document is aimed at stimulating discussion around the topic and is not intended to be the sole resource used in making a submission. The EPA staff risk assessment is not complete until all submissions have been received and can be assimilated into the risk assessment process.

We encourage all submissions, particularly in relation to matters identified in the following paragraphs. The submission period ends on 22 April 2013.

## Submission process

In a submission you can provide information, make comments and raise issues. In this way, you contribute to the EPA decision making process on specific applications. We are particularly interested in hearing from you on the following matters:

- Adverse effects, especially adverse effects not identified in the application<sup>1</sup>; and
- Positive effects, especially positive effects not identified in the application<sup>2</sup>.

Further information on submissions can be found at: [www.epa.govt.nz/about-us/have-your-say](http://www.epa.govt.nz/about-us/have-your-say)

## Application summary

1. DLF Seeds has applied to the EPA to release a symbiotic endophytic fungus; *Neotyphodium siegelii*.
2. The applicant states that most ryegrass and fescue pastures in New Zealand contain endophytes. In association with the grass, endophytes produce a wide range of bio-active alkaloid compounds that deter insects, protecting the plant against common pasture pests. The applicant considers *N. siegelii* to be safe to animals and the environment.
3. The Application Summary and the full Application are available on our website [www.epa.govt.nz](http://www.epa.govt.nz).

## Background on *Neotyphodium siegelii*

4. *Neotyphodium* is a genus containing species of endosymbiotic<sup>3</sup> fungi. They are asexual, seed-borne symbionts<sup>4</sup> of cool-season grasses, and grow among the cells throughout the aerial tissues of their hosts. *Neotyphodium* endophytes produce at least four different classes of compounds (peramine, ergovaline, lolitrem B and lolines) that act against herbivory from insects and mammals (Roberts et al 2005). The

<sup>1</sup> Adverse effects can include any risks and costs associated with approving the release of these organisms.

<sup>2</sup> Positive effects can include any benefits associated with approving the release of these organisms.

<sup>3</sup> Any organism that lives within the body or cells of another organism

<sup>4</sup> An organism in a symbiotic relationship. In cases in which a distinction is made between two interacting organisms, the symbiont is the smaller of the two and is always a beneficiary in the relationship, while the larger organism is the host and may or may not derive a benefit.

endophytes gain shelter, nutrition, and dissemination via host seeds, and can contribute an array of host fitness enhancements including protection against insects, vertebrate herbivores, and root nematodes; enhancements of drought tolerance and nutrient status; and improved growth particularly of the root (Schardl et al 2004). All *Neotyphodium* species can only infect new grass plants by growing into the seeds of their grass hosts, and infecting the growing seedling.

## Adverse effects

5. We are interested in understanding all the possible adverse effects associated with the release of *N. siegelii*. These effects may include (but are not limited to): impacts on human health, the environment, the economy, and culture and society.

### Assessment of adverse effects

6. Our adverse effects assessment is based on the evidence provided by the applicant, references cited within the application, and any additional information raised through public engagement.

### Identification of adverse effects

7. The applicant has identified potential adverse effects associated with the release *N. siegelii* (see section 6.1 of the application).
8. The EPA is also interested in any information you may have on adverse effects relating to the displacement of native species within their native habitat, deterioration of natural habitats and the maintenance of New Zealand's inherent genetic diversity.

*Please let us know whether you consider that there are any adverse effects in addition to those identified in the application that we should be aware of.*

When identifying adverse effects it is important that you provide us with details of the effect identified, and the reasons why it occurs. Please consider:

- What other adverse effects are *likely* to be caused by the release of *N. siegelii*;
- How *likely* these adverse effects are and their potential scale;
- How you think the adverse effects could happen (i.e. the series of events that would have to happen for the adverse effects to occur);
- Options and proposals for managing the adverse effects; and
- Any uncertainty you have on the scope of the information used to assess the adverse effects.

## Positive effects

9. We are interested in understanding all the possible positive effects (or benefits) associated with the release of *N. siegelii*. These effects may include (but are not limited to): impacts on human health, the environment, the economy, and culture and society.

10. The applicant has identified a series of benefits resulting from the release of *N. siegelii*. These include:

- reduction in animal health disorders;
- improved animal performance;
- reduced insecticide use;
- greater pasture persistence and production; and
- drought tolerance.

11. The applicant considers that New Zealand is the world leader when it comes to utilising the beneficial properties of selected *Neotyphodium* strains to alleviate disorders caused by alkaloids produced in some *Neotyphodium*/grass associations and to prevent severe damage to forage grasses, in particular perennial ryegrass, from insect pests.

12. We consider that there may be some economic benefits accrued by pastoralists if they succeed in reducing pesticide applications.

*Please let us know whether you consider that there are additional positive effects that we should be aware of.*

When identifying positive effects, it is important that you provide us with information on:

- Other positive effects *likely* to be caused by the release of *N. siegelii*;
- How *likely* these positive effects are and their potential scale;
- How you think the positive effects could happen (i.e. the series of events that would have to happen for the positive effects to occur);
- Options and proposals for ensuring the positive effects occur; and
- Any uncertainty you have on the scope of the information used to assess the positive effects.

### **Making a submission**

We encourage you to make a submission on this application on this application, particularly if you can provide information on adverse or positive effects, regardless of how much detail you are able to put in to it. When the submission period closes, all submissions will be summarised and made available to the decision making committee. You can also request a hearing if you would like to strengthen your submission in person before the committee.

If you have any questions, you can contact the applicant directly, as well as the EPA. The applicant can address any questions you have about the science of the application or the information provided, and the EPA can advise you on how to prepare your submission.

- Applicant contact: Tom Bruynel, email [tb@dlfseeds.co.nz](mailto:tb@dlfseeds.co.nz) or phone 03 982 7333.
- EPA contact: Amy Rowe, email [Amy.Rowe@epa.govt.nz](mailto:Amy.Rowe@epa.govt.nz) or phone 04 474 5465.

## Declaration

This advice was produced by Amy Rowe, Environmental Risk Advisor, and Kate Bromfield, Senior Environmental Risk Advisor to the EPA. All information presented in this report is true and correct to the best of our knowledge.

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## References

- Roberts CA, West CP, Spiers DE, eds (2005). *Neotyphodium in Cool-Season Grasses*. Blackwell.
- Schardl CL, Leuchtman A, Spiering MJ (2004). "Symbioses of grasses with seedborne fungal endophytes". *Annu Rev Plant Biol* **55**: 315–340