Environmental Protection Authority
Te Mana Rauhī Taiao

APP201519 Submissions

29 April 2013

Under section 34 of the Hazardous Substances and New Organisms Act 1996
Volume 1 of 1

Importation and release of Neotyphodium siegelli, an endophytic fungus.

New Zealand Government

Contents

RECEIVED: 15 MARCH 2013

SUBMISSION: 102778

Environmental Protection Authority
Te Mana Rauhī Taiao

Once your submission has been received the submission becomes a public document and may be made publicly available to anyone who requests it. You may request that your contact details be kept confidential, but your name, organisation and your submission itself will become a public document.

Submission on application number:	APP201519
Name of submitter or contact for joint submission:	John Caradus
Organisation name (if on behalf of an organisation):	Grassslanz Technology Ltd
Postal address:	
Telephone number:	
Email:	

☐ I wish to keep my contact details confidential

The EPA will deal with any personal information you supply in your submission in accordance with the Privacy Act 1993. We will use your contact details for the purposes of processing the application that it relates to (or in exceptional situations for other reasons permitted under the Privacy Act 1993). Where your submission is made publicly available, your contact details will be removed only if you have indicated this as your preference in the tick box above. We may also use your contact details for the purpose of requesting your participation in customer surveys.

The EPA is likely to post your submission on its website at www.epa.govt.nz. We also may make your submission available in response to a request under the Official Information Act 1982.

RECEIVED: 15 MARCH 2013 SUBMISSION: 102778

☒ I support the application

☐ I oppose the application

☐ I neither support or oppose the application

The reasons for making my submission are[1]:

The genus Neotyphodium has been in NZ for more than 100 years (Craven et al. 2001), including N. uncinatum, which the proposed N. siegelii is very similar to (Christensen, pers. comm., 2012). N.uncinatum was first noted in Northland (NZ) by Mike Christensen (Christensen et al 1993) who believed that N.uncinatum and N.seigelii were biologically similar with the only difference being their spore morphology. Indeed Christensen considered them as all belonging to N. uncinatum and was only later that N. seigelii was considered a species in its own right by Craven et al 2001.

The meadow fescue ecotype that contained the N.uncinatum endophyte found in Northland was multiplied and the seed sown into a trial at Lincoln in 1998 where it was found that there was no difference in animal performance on nil or endophyte containing treatments. However, meadow fescue with its endophyte had significant agronomic advantage over the same grass lacking endophyte due to its tolerance of Grass grub (Popay et al 2003)

N. uncinatum and N. seigelii produce loline alkaloids which have no impact on animal performance or welfare (Patchett 2007; Bush et al 1997). Lolines when administered to sheep at maximum exposure level showed no effect (Patchett 2007).

Grass grub is a major below ground pest, and is the only pasture pest in NZ not able to be currently deterred by endophytes. Currently farmers only option of controlling grass grub is with the chemical Diazon, which can only be applied around rainfall events so is of limited use and effect. Owing to the limited impact of current endophytes and the restrictions around the use of Diazon, grass grub is a major limiting factor in NZ pastures affecting persistence. Currently there is only one known endophyte that confers some resistance to grass grub, this is U2 endophyte by Cropmark Seeds. Sales of this product have commenced in 2013, the success of this endophyte in the market is still unknown.

References:

Bush LP, Wilkinson HH and Schardl CL (1997). Bioprotective alkaloids of grass-fungal endophyte symbioses. Plant physiology 114: 1-7.

Christensen M.J., Leuchtmann A, Rowan D.D. & Tapper B.A. (1993). Taxonomy of Acremonium endophytes of tall fescue (Festuca arundinacea), meadow fescue (F. pratensis), and perennial rye-grass (Lolium perenne). Mycological Research 97, 1083-1092.

Craven K.D, Blankenship J.D., Leuchtmann A., Hignight K. & Schardl C.L. (2001). Hybrid fungal endophytes symbiotic with the grass Lolium pratense. Sydowia 53: 44-73.

Patchett, BJ (2007). Loline alkaloids: analysis and effect on sheep and pasture insects. PhD thesis. Lincoln University, New Zealand.

Popay, AJ, Townsend, RJ and Fletcher, LR. (2003). The effect of endophyte (Neotyphodium uncinatum) in meadow fescue on grass grub larvae. New Zealand Plant Protection 56: 123-128.

[1] Further information can be appended to your submission, if you are sending this submission electronically and attaching a file we accept the following formats – Microsoft Word, Text, PDF, ZIP, JPEG and JPG. The file must be not more than 8Mb.

RECEIVED: 15 MARCH 2013

SUBMISSION: 102778

☒ I wish to be heard in support of my submission (this means that you can speak at the hearing)

☐ I do not wish to be heard in support of my submission (this means that you cannot speak at the hearing)

I wish for the EPA to make the following decision:

That EPA approve te application from DLF for the importation and release of N. siegelii into New Zealand.

RECEIVED 8 APRIL 2013

SUBMISSION: 102789

8 April 2013

Environmental Risk Advisor
Environmental Protection Authority
Private Bag 63002
Wellington 6140

By email:

Dear

New Zealand Plant Breeding and Research Association submission on the Application for fungus to protect grass (APP 201519)

I am writing on behalf of the New Zealand Plant Breeding and Research Association in response to the Environmental Protection Authority invitation to the public to make submissions on the Application for fungus to protect grass (APP 201519).

The Association represents plant breeders, intellectual property owners and marketers of proprietary seed.

The Association's members include: Cropmark Seeds Ltd, DLF Seeds Ltd, Genetic Technologies Ltd, Germinal Seeds NZ Ltd, Grasslanz Technology Ltd, New Zealand Agriseeds Ltd, PGG Wrightson Seeds Ltd and Seed Force Ltd.

The Association is an active champion of a regulatory environment favourable to research into, development of and trialling of new plant technology considered to be of potential benefit to New Zealand primary industries. The Association also champions greater freedom to import new plant material, within the boundaries of New Zealand's biosecurity measures, that is not detrimental to this country's human health, environment or international obligations and is considered to be of potential benefit to the New Zealand primary sector.

The Association supports the Application
The Association wishes to express its support for the application (APP 201519) made by DLF Seeds Ltd.

RECEIVED 8 APRIL 2013

SUBMISSION: 102789

The Association considers that the importation and release of the endophytic fungus, *Neotyphodium siegilli* could confer important advantages for some types of grass against insect pests and drought.

The endophyte genus *Neotyphodium* has already proven to be of significant economic benefit to New Zealand farmers through enhanced pasture productivity and animal performance. Use of *Neotyphodium siegelii* in pasture development has the potential to continue improving New Zealand forage production and persistence as well as reducing pesticide use.

The *Neotyphodium* genus that a number of our members are researching is contained within the host plant. Transfer from the host to other plants is considered extremely unlikely under natural conditions and only occurs in the laboratory with considerable difficulty. When transfer succeeds artificially it is to other closely related and imported temperate grasses such as ryegrass and tall fescue so that escape to the detriment of the environment is considered unlikely.

Neotyphodium siegelii is permitted for use in Australia, South America and the USA, and New Zealand farmers could be at a competitive disadvantage if it is not permitted to be used here.

The Association urges the EPA to seriously consider and approve the importation and release of *Neotyphodium siegilli.*

Yours sincerely

Thomas Chin
General Manager

NZ Plant Breeding & Research Association
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RECEIVED: 5 APRIL 2013 SUBMISSION: 102790

beef + lamb new zealand

5 April 2013

Mr Robert Forlong
Chief Executive
Environmental Risk Management Authority
By email to: submissions@ermanz.govt.nz

Dear Robert,

Import and release of *Neotyphodium siegelii*; an endophytic fungus [APP201519]
Beef + Lamb New Zealand Ltd (B+LNZ) welcomes the opportunity to make a submission on the proposed future import and release of *Neotyphodium siegelii* into New Zealand.

B+LNZ is an industry-good body funded under the Commodity Levies Act through a levy paid by producers on all cattle and sheep slaughtered in New Zealand. B+LNZ's activities aim to increase preference for New Zealand beef and sheep meat internationally and domestically; to maintain and extend trade access for New Zealand red meat; and to fund research and development to help improve the profitability of New Zealand farmers. B+LNZ represents the 12,400 New Zealand sheep and beef farm businesses responsible for approximately $7.0 billion in export receipts for 2012.

B+LNZ does not currently have sufficient resources to scrutinise in detail the evidence and analyses supporting the information contained in the consultation summary. Provided the information presented by the applicant is substantively correct, then B+LNZ is supportive of the application. Specifically, we are encouraged by the suggestion that this endophyte may:

- contribute towards alleviating production and animal health disorders currently associated with toxic alkaloids that are not produced by *Neotyphodium siegelii*
- improve pasture resistance to pest attack
- afford tolerance against the impacts of drought

Please do not hesitate to contact me if you require further information or wish to discuss any aspect of this submission. B+LNZ does not wish to make further representation on this submission through the hearing process.

Yours sincerely,

Dr Christopher Houston
Senior Advisor – Technical policy

RECEIVED: 22 APRIL 2013

SUBMISSION: 102793

FEDERATED FARMERS OF NEW ZEALAND

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Environmental Protection Authority
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22 April 2013

RE: Application APP201519

Dear Applications Administrator

Federated Farmers supports the application by DLF Seeds Ltd to introduce to New Zealand, a new type of endophytic fungus, *Neotyphodium Siegelii*, for the improvement of pastoral perennial ryegrass and possibly other types of suitable forage grasses.

Novel endophytes, as they are known in the pastoral industry, have already proven to significantly increase the feed production potential of ryegrass based pasture by providing deterrence against key pastoral pests such as Argentine Stem Weevil and Black Beetle and by aiding persistence in times of moisture deficit. Knowledge of endophytes among New Zealand farmers and the scientific and agronomic communities that serve them is well advanced and New Zealand has been cited as a pioneer of the technology. While we note that this is a new type of endophyte, Federated Farmers accepts that its characteristics and behavior are sufficiently similar to existing endophytes, many in the same family, that no undue adverse affects will be observed by pastoral farmers, or by others.

The study and development of novel endophytes in New Zealand has shown that they cannot transfer between species and transfer between plants is only by presence in the seed and infection of the seedling so it appears unlikely that any adverse affects will be experienced through unanticipated spread.

By the statement that "all above-ground parts of the plant are colonized", the application indicates that the endophyte can be found in the pollen of ryegrass however, given that honey bees do not collect pollen from ryegrass plants, The Bee Industry Group of Federated Farmers is satisfied that there is no risk presented by the introduction of *Neotyphodium Siegelii* to non-target arthropods or other pollinators, important to agriculture.

Yours sincerely

Nick Hanson
Policy Advisor
Federated Farmers of New Zealand
DDI:
Email:

RECEIVED: 22 APRIL 2013 SUBMISSION: 102794

Department of Conservation
Te Papa Atawhai

DOC comments on EPA new organism for release application

22 April 2013

Application number: APP201519
Applicant: DLF Seeds Limited
Application purpose: to import and release *Neotyphodium siegelii*, an endophytic fungus that lives within ryegrass, which contributes to ryegrass and fescue persistence by protecting the plants from invertebrate pests and drought.

Thank you for the opportunity to comment on this application. Please note we do **not** wish to be heard at a public hearing in support of our comments.

Assessment of risk to conservation values

DOC'S knowledge limitations

1. Unfortunately the Department does not have internal endophytic capability specifically, and as such we can only offer very limited appraisal and comment to this application. We note the EPA's adverse effects assessment relies solely on the evidence provided by the applicant, references cited within the application, and additional information raised through public engagement, and as such we ask that the Authority takes our knowledge precincts into account when deciding whether suitable assessment has been done on this new organism's potential adverse effects to the environment. There is a concern that if EPA publicly notify such applications but do not receive any feedback from experts the default perception is that the application poses little or no risk. Within this context we recommend the Authority seeks input from an independent pathologist who could provide more qualified feedback than what we can offer. This approach would enable an appropriately informed, objective and independent decision on this application.

Comments on potential adverse effects

2. The applicant advises (in 6.1 of the full application) that the designated endophyte strain of *N. siegelii* is active only against invertebrate pests (specifically, Argentinian stem weevil, black beetle, root aphid, porina and mealy bug). This logic seems to assume that all phytophagous insects on ryegrass are pests, but this is not necessarily the case. New Zealand has a wide range of grass moth species (Crambidae) that feed on a range of grass species, including pasture grasses. In addition we have some rare, non-pest, species of porina (Hepialiade) which occur in more specialized bog habitats. However, it is accepted that any affects to these endemic species are likely to be minor.

3. The applicant states that the *N. siegelii* endophyte may adversely affect the native New Zealand grass grub, *Costelytra zealandica*, by reducing its reproductive performance in areas where this endophyte is used. However, this affect appears reasonably constrained given *N. siegelii* can only be introduced to grassland by seeding ryegrass seeds that host *N. siegelii*, restricting its use to arable land. As the grass grub's natural habitat is tussock and scrub, we agree that most of its habitat will remain unaffected.

4. We agree with the applicant that the *N. siegelii* endophyte will not displace native endophyte species given it cannot spread from infected to uninfected plants. However, even after 160 years ryegrass is unlikely to have reached the full extent of its prospective range, and as such there is potential for native species to still be displaced by ryegrass or fescue with endophyte due to host fitness.

Questions the Authority may wish to seek answers to prior to decision

5. After reading the full application the following area is still not clear:
   a. The applicant states that all other insects likely to be affected by *N. siegelii* are introduced species and are considered only as pests with no benefits to farming or natural ecosystems. What specific host testing has been done to support this claim, for example on endemic crambid species?

Comments co-ordinated on behalf of the Department of Conservation by:

Verity Forbes
Technical Advisor (Biosecurity), Science and Technical Group, Wellington

Contributors:
Clayson Howell (Scientific Officer), S & T Group, Wellington
Chris Green (Technical Advisor – Threats), S & T Group, Hamilton (based in Auckland)

RECEIVED: 22 APRIL 2013

SUBMISSION: 102797

Environmental Protection Authority
Te Mana Rauhī Taiao

SUBMISSION FORM

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Once your submission has been received the submission becomes a public document and may be made publicly available to anyone who requests it. You may request that your contact details be kept confidential, but your name, organisation and your submission itself will become a public document.

Submission on application number:	APP201519
Name of submitter or contact for joint submission:	Bevan Weir
Organisation name (if on behalf of an organisation):	
Postal address:	

Telephone number:

Email:

☐ I wish to keep my contact details confidential

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The EPA is likely to post your submission on its website at www.epa.govt.nz. We also may make your submission available in response to a request under the Official Information Act 1982.

☐ I support the application

☐ I oppose the application

☒ I neither support or oppose the application

The reasons for making my submission are[1]:

Positive effects:

The positive effects of Neotyphodium species in grasses are well documented and it is likely that this species will have the positive effects on agriculture outlined by the applicant.

Adverse effects:

Although the applicant states that sexual recombination does not occur, it is clear that Neotyphodium species are capable of hybridisation. In fact this organism was published as a hybrid (Neotyphodium x siegelii), with Epichloe festucae and E. bromicola suggested as the ancestral parents.

The applicant should address the possibility of hybridisation with indigenous Neotyphodium species, if these could spread into native grasses, and if this would impact on indigenous insect communities.

Lodge a specimen in a national collection:

If the application is approved, it would be useful to have a culture of the fungus in the national collection of living fungi (the ICMP). This is important because the specimen would validate the presence of the new organism in New Zealand, and provide a reference strain for future research.

For example in fungal ecological studies it is useful to know what has been introduced versus what is indigenous. Additionally if N. siegelii were to hybridise with indigenous fungi a vouchered reference specimen would be required to test for hybridisation. The specimen could also be referred to if there is future taxonomic change or reclassification in the Neotyphodium genus.

☐ I wish to be heard in support of my submission (this means that you can speak at the hearing)

☒ I do not wish to be heard in support of my submission (this means that you cannot speak at the hearing)

I wish for the EPA to make the following decision:

If approved require the applicant to lodge a specimen in a national fungus collection.

[1] Further information can be appended to your submission, if you are sending this submission electronically and attaching a file we accept the following formats – Microsoft Word, Text, PDF, ZIP, JPEG and JPG. The file must be not more than 8Mb.

RECEIVED: 23 APRIL 2013

SUBMISSION: 102738

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22 April 2013

Applications and Assessment: New Organisms
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DairyNZ submission on the application to import and release of *Neotyphodium siegelii*; an endophytic fungus [APP201519]

Summary

- DairyNZ is conditionally supportive of this application to import and release *Neotyphodium siegelii*. The research outlined in the application will be imperative to ensure that particular grass/endophyte combinations in a New Zealand setting provide the stated benefits while managing any unforeseen effects (including toxicity to cattle and residues in milk). DairyNZ also seeks a commitment from DFL to enrol the new endophyte/cultivar combinations in national forage programmes and to ensure their research results are referred to the Industry Endophyte Committee.

- DairyNZ urges the applicants and EPA to seek further expert views relevant science institutions in New Zealand.

Introduction

1 DairyNZ appreciates the opportunity to comment on this application to import and release *Neotyphodium siegelii*.

2 DairyNZ is the industry good organisation representing New Zealand's dairy farmers. Funded by a levy on milksolids and through government investment, our purpose is to secure and enhance the profitability, sustainability and competitiveness of New Zealand dairy farming. We deliver value to farmers through leadership, influencing, investing, partnering with other organisations and through our own strategic capability. Our work includes research and development to create practical on-farm tools, leading on-farm adoption of best practice farming, promoting careers in dairying and advocating for farmers with central and regional government.

3 The primary contact for this issue is:

Elizabeth Dixon
Policy Manager
DairyNZ

Telephone
Fax
email: e

Comments on the application documentation

4 DairyNZ is broadly supports the objectives outlined in the application documentation. As New Zealand's dairy industry is predominantly pasture-based, we support the development of new means to enhance pasture resistance to drought and pests. As a secondary consideration, we support the use of endophytes as an alternative to chemical control of pests. We see much benefit to industry of the introduction of new endophytes such as *Neotyphodium siegelii*, provided any risks are clearly identified and managed.

5 DFL Seeds Ltd propose carrying out a series of research trials as per the recognised protocols for evaluation of new grass/endophyte combinations including animal safety and production trials (outlined on p 12). This work will be costly but is essential to ensure farmers gain the potential benefits from the introduction of *Neotyphodium siegilii* into New Zealand in the main forage species, perennial ryegrass, and other species such as Italian ryegrass or possibly tall fescue. This endophyte may reduce attack by grass grub on the roots of grasses as it produces lolines which previous research suggests deters feeding by grass grub larvae (and are not toxic to animals grazing herbage containing lolines). If this is the case, it will provide another possibility of controlling grass grub populations as is claimed by Cropmark Seeds for their product GrubOUT U2 in recent advertising brochures. Current novel endophytes (e.g. AR1, AR37, NEA2) and the wild-type endophyte have minimal or no effect on grass grub feeding. Other major insect pests such as Argentine stem weevil and African black beetle will also potentially be controlled by *Neotyphodium siegelii*.

6 The application could have better quantified the potential scale of benefit to New Zealand. With respect to the potential host species in New Zealand, the application one the one hand indicated that the only known associate was meadow fescue. Elsewhere the applicant refers to the endophyte being useful for ryegrass. Our understanding is that *Neotyphodium siegelii* has been successfully introduced into perennial ryegrass and tall fescue and where the alkaloid production is the same as in meadow fescue, that is, the production of lolines. In New Zealand, meadow fescue is not an important pasture species (except perhaps in Northland). Tall fescue is an important pasture species but the importance of perennial ryegrass as a forage species, far outweighs the other two.

7 Prior to any release of the endophyte we would seek assurances that any risks or unforeseen effects have been identified and resolved or managed. DairyNZ is supportive of introducing new endophytes only where it has been proven that these have no toxicity to cattle and any issues around residues in milk. We have not identified any adverse effects that have not been referred to in the submission. However, the research referred to on page 12 of the application will be necessary to ensure that particular grass/endophyte combinations do provide the benefits without unforeseen adverse effects.

8 To maximise benefit to industry we also seek a commitment from DFL seeds to enrolling the new endophyte/cultivar combinations in National Forage Variety Trials and Forage Value Index, and to supply the results of their research to the Industry Endophyte Committee for inclusion in agreed industry tables.

9 DairyNZ encourages the applicant and EPA to seek further expert views from Dr Alison Popay (Entomologist, AgResearch, Ruakura) and Mr Lester Fletcher (Animal Scientist, AgResearch, Lincoln) who would make valuable comments on this application.

Specific comments

10 The US Patent No 6,815591 B1 (dated 9 November 2004) referring to the introduction of *Neotyphodium siegelii* into the non-native host perennial ryegrass (native host is meadow fescue, Festuca pratensis) states that the endophyte does not produce the alkaloids lolitrem B, ergotamine, ergovaline or peramine (but does produce lolines). Thus, the last sentence of the second paragraph under "Summary of application" p3, referring to the production of peramine and lolines is factually incorrect. DairyNZ seeks assurances that this does not have a material bearing on the substance (and in particular the risk/benefit assessment) of the application.

11 We would be happy to discuss our comment with either the EPA or the Applicant.