Environmental Protection Authority
Te Mana Rauhī Taiao

# APPLICATION FORM
**Containment**

# To obtain approval for new organisms in containment

**Send to Environmental Protection Authority preferably by email (neworganisms@epa.govt.nz) or alternatively by post (Private Bag 63002, Wellington 6140)**
Payment must accompany final application; see our fees and charges schedule for details.

**Application Number**

APP203157

**Date**

# Completing this application form

1. This form has been approved under section 40 of the Hazardous Substances and New Organisms (HSNO) Act 1996. It only covers importing, development (production, fermentation or regeneration) or field test of any new organism (including genetically modified organisms (GMOs)) in containment. If you wish to make an application for another type of approval or for another use (such as an emergency, special emergency or release), a different form will have to be used. All forms are available on our website.
2. If your application is for a project approval for low-risk GMOs, please use the Containment – GMO Project application form. Low risk genetic modification is defined in the HSNO (Low Risk Genetic Modification) Regulations: http://www.legislation.govt.nz/regulation/public/2003/0152/latest/DLM195215.html
3. It is recommended that you contact an Advisor at the Environmental Protection Authority (EPA) as early in the application process as possible. An Advisor can assist you with any questions you have during the preparation of your application including providing advice on any consultation requirements.
4. Unless otherwise indicated, all sections of this form must be completed for the application to be formally received and assessed. If a section is not relevant to your application, please provide a comprehensive explanation why this does not apply. If you choose not to provide the specific information, you will need to apply for a waiver under section 59(3)(a)(ii) of the HSNO Act. This can be done by completing the section on the last page of this form.
5. Any extra material that does not fit in the application form must be clearly labelled, cross-referenced, and included with the application form when it is submitted.
6. Please add extra rows/tables where needed.
7. You must sign the final form (the EPA will accept electronically signed forms) and pay the application fee (including GST) unless you are already an approved EPA customer. To be recognised by the EPA as an “approved customer”, you must have submitted more than one application per month over the preceding six months, and have no history of delay in making payments, at the time of presenting an application.
8. Information about application fees is available on the EPA website.
9. All application communications from the EPA will be provided electronically, unless you specifically request otherwise.

# Commercially sensitive information

10. Commercially sensitive information must be included in an appendix to this form and be identified as confidential. If you consider any information to be commercially sensitive, please show this in the relevant section of this form and cross reference to where that information is located in the confidential appendix.
11. Any information you supply to the EPA prior to formal lodgement of your application will not be publicly released. Following formal lodgement of your application any information in the body of this application form and any non-confidential appendices will become publicly available.
12. Once you have formally lodged your application with the EPA, any information you have supplied to the EPA about your application is subject to the Official Information Act 1982 (OIA). If a request is made for the release of information that you consider to be confidential, your view will be considered in a manner consistent with the OIA and with section 57 of the HSNO Act. You may be required to provide further justification for your claim of confidentiality.

# Definitions

| | |
|---|---|
| **Containment** | Restricting an organism or substance to a secure location or facility to prevent escape. In respect to genetically modified organisms, this includes field testing and large scale fermentation |
| **Controls** | Any obligation or restrictions imposed on any new organism, or any person in relation to any new organism, by the HSNO Act or any other Act or any regulations, rules, codes, or other documents made in accordance with the provisions of the HSNO Act or any other Act for the purposes of controlling the adverse effects of that organism on people or the environment |
| **Genetically Modified Organism (GMO)** | Any organism in which any of the genes or other genetic material:<br>• Have been modified by *in vitro* techniques, or<br>• Are inherited or otherwise derived, through any number of replications, from any genes or other genetic material which has been modified by *in vitro* techniques |
| **New Organism** | A new organism is an organism that is any of the following:<br>• An organism belonging to a species that was not present in New Zealand immediately before 29 July 1998;<br>• An organism belonging to a species, subspecies, infrasubspecies, variety, strain, or cultivar prescribed as a risk species, where that organism was not present in New Zealand at the time of promulgation of the relevant regulation;<br>• An organism for which a containment approval has been given under the HSNO Act;<br>• An organism for which a conditional release approval has been given under the HSNO Act;<br>• A qualifying organism approved for release with controls under the HSNO Act;<br>• A genetically modified organism;<br>• An organism belonging to a species, subspecies, infrasubspecies, variety, strain, or cultivar that has been eradicated from New Zealand; |

| | |
|---|---|
| | • An organism present in New Zealand before 29 July 1998 in contravention of the Animals Act 1967 or the Plants Act 1970. This does not apply to the organism known as rabbit haemorrhagic disease virus, or rabbit calicivirus<br><br>A new organism does not cease to be a new organism because:<br>• It is subject to a conditional release approval; or<br>• It is a qualifying organism approved for release with controls; or<br>• It is an incidentally imported new organism |
| **Project** | An individual or collaborative endeavour that is planned to achieve a particular aim or research goal |

# 1. Applicant details

## 1.1. Applicant

**Company Name:** (if applicable) AgResearch Limited, Hamilton

**Contact Name:** Nigel Bell

**Job Title:** Senior Scientist

**Physical Address:** AgResearch Limited, Ruakura Research Centre, 10 Bisley Avenue, Hamilton.

**Postal Address** (provide only if not the same as the physical)**:** AgResearch Limited, Ruakura Research Centre, Private Bag 3123, Hamilton.

**Phone (office and/or mobile):** 07 8385066

**Fax:**

**Email:** nigel.bell@agresearch.co.nz

## 1.2. New Zealand agent or consultant (if applicable)

**Company Name:**

**Contact Name:**

**Job Title:**

**Physical Address:**

**Postal Address** (provide only if not the same as the physical)**:**

**Phone (office and/or mobile):**

**Fax:**

**Email:**

# 2. Information about the application

### 2.1. Type of containment activity

Tick the box(es) that best describe your application

| Application type | Type of new organism |
|---|---|
| Import into containment | ☐ GMO |
| | ☐ Non-GMO |
| Develop in containment i.e. regeneration, fermentation or genetic modification | ☐ GMO |
| | ☒ Non-GMO |
| Field test in containment | ☐ GMO |
| | ☐ Non-GMO |

### 2.2. Brief application description

Approximately 30 words about what you are applying to do

We will set up and maintain a culture of the plant feeding nematode, *Meloidogyne minor*, obtained from the Ministry for Primary Industries who will collect specimens at an incursion location, in containment to determine its preference for valued plants in New Zealand.

### 2.3. Summary of application

Provide a plain English, non-technical description of what you are applying to do and why you want to do it

*Meloidogyne minor* nematodes will be maintained and grown on ryegrass plants to provide an inoculum to carry out a series of host range tests on a range of plant species that may include but is not limited to, white and red clover, Italian and perennial ryegrass, maize, tall fescue and beets. Isolating which plants can host *Meloidogyne minor* will assist in determining the impact this new to New Zealand species may have on New Zealand agriculture if it spreads to new locations from its incursion location which is presently confined to Christchurch.

### 2.4. Background and aims of application

This section is intended to put the new organism(s) in perspective of the wider activities that they will be used in. You may use more technical language but all technical words must be included in a glossary

*Meloidogyne minor* is a soil-borne plant-parasitic nematode that infects the roots of host plants. It was first observed in New Zealand in 2015 from Hagley Oval in Christchurch (Surveillance 2016; Zhao et al 2017). It appears to be limited to this location. Overseas it has been found largely associated with turf in the United Kingdom, Ireland, Netherlands (EPPO, 2006) the United States of America, Portugal (Fleming et al. 2016) and Chile (Weselmael et al 2014).. The EPPO - PRA of M. minor 2007 states *M. minor* is an emerging pest and has a list of plant hosts (page 19) that includes ryegrass, clover, potatoes, carrots, wheat, barley, oat, carrot and tomato. It is associated with yellow patch disease (Karssen et al 2004).

The organism will be transported either in infected plant root material or infected soil from the incursion site to the Ruakura containment facility, Hamilton, once EPA approval has been obtained. The plant or soil material will be double bagged and sealed in a polystyrene chilly bin (ie triple-packaged) and sent via overnight courier from Christchurch to Hamilton.

If negligible effects are found on economically important plant species then the current containment procedures in place at Hagley Oval can be deemed appropriate. The organism is not subject to an eradication plan by MPI, but has a regulated quarantine status on the MPI Biosecurity Organisms Register for Imported Commodities.

# 3. Information about the new organism(s)

### 3.1. Name of organism

Identify the organism as fully as possible

**Non-GMOs** - Provide a taxonomic description of the new organism(s).

*Meloidogyne minor.* This nematode does not have a common name.

Domain:Eukaryota
Kingdom:Metazoa
Phylum:Nematoda
Family:Meloidogynidae
Genus:*Meloidogyne*
Species: *minor*
Taxonomic tree from Pest Risk Analysis (EPPO, 2006), Refer to Karssen et al. (2004))

**GMOs** – Provide a taxonomic description of the host organism(s) and describe the genetic modification.

**Both** -

- Describe the biology and main features of the organism including if it has inseparable organisms.

A soil borne plant parasitic nematode that infects the roots of host plants. The infective vermiform juvenile hatches from the egg and enters a susceptible plant root. It then forms a permanent feeding site where it undergoes several moults becoming a spherical female. An individual female produces egg masses that can contain over a hundred eggs. Symptoms include root galling and can cause yellow patches in turf.

- Describe if the organism has affinities (e.g. close taxonomic relationships) with other organisms in New Zealand.

There are currently six other species of *Meloidogyne* reported in New Zealand of which all are plant feeders (Zhao et al. 2017).

- Could the organism form an undesirable self-sustaining population? If not, why not?

Yes, it has already established at Hagley Oval and is under containment measures by MPI. If *M. minor* individuals were released onto host plants in sufficient numbers they could form a self-sustaining population.

- How easily could the new organism be recovered or eradicated if it established an undesirable self-sustaining population?

Eradicability or containment is dependent on population size and distribution at discovery. At Hagley Oval population reduction has been carried out via nematicide application. In general if the population is small and discrete, eradication by nematicide should be feasible.

### 3.2. Regulatory status of the organism

Is the organism that is the subject of this application also the subject of:

An innovative medicine application as defined in section 23A of the Medicines Act 1981?

☐ Yes ☒ No

An innovative agricultural compound application as defined in Part 6 of the Agricultural Compounds and Veterinary Medicines Act 1997?

☐ Yes ☒ No

# 4. Information about the containment

### 4.1. For field tests: The nature and method of the field test

Describe the nature and method of the field test and the experimental procedures to be used

### 4.2. Proposed containment of the new organism(s) (physical and operational)

Describe how you propose to contain the new organism(s) after taking into account its ability to escape from containment (i.e. the possible pathways for escape)

All cultures and testing experiments will be carried out in AgResearch PC2 facilities designated MPI #364 containment facilities at Ruakura Research Centre, Hamilton.

*M. minor* will be contained at MPI Facility 364 in accordance with the requirements of MAFBNZ and ERMA New Zealand Standard Containment Facilities for Invertebrates 2002 – 154.02.08.

The aforementioned standards outline the requirements for recording receipt and use of unwanted organisms, containment methods to prevent the escape of invertebrate, preventing contamination of facility personnel, excluding unauthorized people from the facility, training, inspection, and monitoring requirements. The standards also stipulate that the transfer of organisms between facilities will be carried out in accordance with IATA requirements using acceptable triple-packaging systems after approval is sought and gained from MPI inspectors.

Operational procedures will be implemented for conducting specific research work with a Risk Group 2 organism. Specific operating procedures will be established to address the following key risk areas:

1. Risks associated with the culturing, handling and disposal of *M.minor*;

   a) Storage, security and access will be limited to trained personnel only
   b) PPE, pathogen sanitation practices and correct disposal via autoclaving
   c) Safe handling techniques

2. Risks associated with researchers' awareness, familiarity and understanding of PC2 level invertebrate and containment practices;

   a) Clear signage (biohazard) and restricted access zones
   b) Specific training for all staff working with *M. minor* within the containment facility
   c) Restricted access to the facility
   d) PPE, pathogen sanitation practices, and disposal
   e) Visitors to be accompanied at all times by authorised staff
   f) Student access to be restricted and supervised

3. Risk associated with potential dispersion or spread of *M. minor* from research activities;

*M. minor* will only be cultured within the facility PC2 glasshouse; plant host testing will be carried out in the PC2 glasshouse. Plant material will only leave the glasshouse to be destroyed by autoclaving and will follow the usual PC2 practices for such a transfer (eg double-bagged). The glasshouse operates under all PC2 practices, which will ensure the nematode cannot be carried outside, with the addition of ensuring no water escapes the plant pots that could then be washed down drains, thus reducing the

risk of nematode dispersal via the waste water system (which is contained as part of the PC2 set up). The PC2 glasshouse operates under a MPI approved transitional and containment facility manual, this manual includes the requirement for a register of plant and invertebrate material present with in the facility. A register of nematode infected plants and the location within the facility of any extracted nematodes will be maintained.

The register will include:

- the identity of the infected plant or nematode,
- the identity of the person responsible,
- a unique identification number for each plant, or container of extracted nematodes,
- date of import or accession in the facility,
- place of storage and date of final disposal.

If the organism escaped as pure culture (i.e. was accidentally or deliberately released into the immediate environment at Ruakura), the likelihood of it establishing a self-sustaining population is dependent upon finding a suitable host.

A self-sustaining population could be established if the organism was released on a suitable host. Given that cultures of the organism, and plants potentially infected with the organism, are to be strictly contained this risk is considered to be low.

## 5. Māori engagement

Discuss any engagement or consultation with Māori undertaken and summarise the outcomes. Please refer to the EPA policy 'Engaging with Māori for applications to the EPA' on our website (www.epa.govt.nz) or contact the EPA for advice.

No Māori consultation was undertaken for the application.

## 6. Risks, costs and benefits

Provide information of the risks, costs and benefits of the new organism(s).

These are the positive and adverse effects referred to in the HSNO Act. It is easier to regard risks and costs as being adverse (or negative) and benefits as being positive. In considering risks, cost and benefits, it is important to look at both the likelihood of occurrence (probability) and the potential magnitude of the consequences, and to look at distribution effects (who bears the costs, benefits and risks).

Consider the adverse or positive effects in the context of this application on the environment (e.g. could the organism cause any significant displacement of any native species within its natural habitat,

cause any significant deterioration of natural habitats or cause significant adverse effect to New Zealand's inherent genetic diversity, or is the organism likely to cause disease, be parasitic, or become a vector for animal or plant disease?), human health and safety, the relationship of Māori to the environment, the principles of the Treaty of Waitangi, society and the community, the market economy and New Zealand's international obligations.

You must fully complete this section referencing supporting material. You will need to provide a description of where the information in the application has been sourced from, e.g. from in-house research, independent research, technical literature, community or other consultation, and provide that information with this application.

In New Zealand, the organism has so far only been found at Hagley Oval on ryegrass plants. Overseas it has been found largely associated with turf in the United Kingdom, Ireland, Netherlands (EPPO, 2006) the United States of America and Portugal (mentioned in Fleming et al. 2016) and Chile (Weselmael et al 2014). The EPPO – PRA for *M. minor* 2006 states *M. minor* is an emerging pest and has a list of plant hosts (page 19) that includes ryegrass, clover, potatoes, carrots, wheat, barley, oat, carrot and tomato.

Our host range tests would help determine how susceptible our important agricultural plants such as ryegrass and clover are to this new nematode species, overseas information states host associations but not always what the damaging thresholds are for those plant hosts. With regard to perennial ryegrass and tall fescue, New Zealand farmers use cultivars that are infected with fungal endophytes that may or may not have an effect on a root-knot nematodes. Experience from Hagley Oval has shown the fungal endophyte present in infected ryegrass there did not preclude nematode damage but whether damage was reduced by endophyte presence is unknown. The host range tests will also include other plant species commonly used in agriculture and help determine the potential harmful impact a spread of the nematode could have on the pastoral sector. If the testing finds non-host plants to *M. minor* they could be used in management strategies, should the nematode become more widespread. This includes the possibility that some grass endophytes can deter attack from this nematode which may be useful in both agriculture and amenity sites.

If the organism escaped as pure culture (i.e. was accidentally or deliberately released into the immediate environment at Ruakura), the likelihood of it establishing a self-sustaining population is dependent upon finding a suitable host. A self-sustaining population could be established if the organism was released on a suitable host. Given that cultures of the organism, and plants potentially infected with the organism, are to be strictly contained this risk is considered to be low. If a new population was established in the vicinity of the PC2 glasshouse, eradication of such a discrete population should be readily achieved.

Eradication measures would include removal of infected soil, nematicide application and ongoing monitoring to detect any population resurgence. Such an approach has proven effective for small populations of nematodes overseas (Chitambar, J. 2008.). Therefore the consequences of a containment breach are likely to be small.

# 7. Alternative methods and potential effects from the transfer of genetic elements

This section is for developments of GMOs that take place outdoors and field tests of GMOs only

- Discuss if there are alternative methods of achieving the research objective.
- Discuss whether there could be effects resulting from the transfer of genetic elements to other organisms in or around the site of the development or field test.

# 8. Pathway determination and rapid assessment

This section is for the imports of GMOs only

Under section 42B of the HSNO Act your application may be eligible for a rapid assessment. The pathway for your application will be determined after its formal receipt, based on the data provided in this application form. If you would like your application to be considered for rapid assessment (as per the criteria below), we require you to complete this section.

### 8.1. Discuss whether the GMO(s) to be imported fulfil the criteria

The criteria are:

- The host organism(s) are Category 1 or 2 host organisms as per the HSNO (Low Risk Genetic Modification) Regulations
- The genetic modifications are Category A or B modifications as per the HSNO (Low Risk Genetic Modification) Regulations and the modifications are not listed in the Schedule of these Regulations
- The minimum containment of the GMO(s) will be as per the HSNO (Low Risk Genetic Modification) Regulations (PC1 or PC2 as per AS/NZS2243.3:2002)

# 9. Other information

Add here any further information you wish to include in this application including if there are any ethical considerations that you are aware of in relation to your application.

# 10. Checklist

This checklist is to be completed by the applicant

| **Application** | | **Comments/justifications** |
|---|---|---|
| All sections of the application form completed or you have requested an information waiver under section 59 of the HSNO Act | ☒ Yes ☐ No<br>(If No, please discuss with an Advisor to enable your application to be further processed) | |
| Confidential data as part of a separate, identified appendix | ☐ Yes ☒ No | |
| Supplementary optional information attached: | | |
| • Copies of additional references | ☒ Yes ☐ No | |
| • Relevant correspondence | ☐ Yes ☐ No | |
| **Administration** | | |
| Are you an approved EPA customer? | ☒ Yes ☐ No<br>If Yes are you an:<br>Applicant: ☐<br>Agent: ☐ | |
| If you are not an approved customer, payment of fee will be by: | | |
| • Direct credit made to the EPA bank account (preferred method of payment)<br>Date of direct credit: | ☐ Yes ☐ No<br>☐ Payment to follow | |
| • Cheque for application fee enclosed | ☐ Yes ☐ No<br>☐ Payment to follow | |
| Electronic, signed copy of application e-mailed to the EPA | ☒ Yes | |

## Signature of applicant or person authorised to sign on behalf of applicant

☒ I am making this application, or am authorised to sign on behalf of the applicant or applicant organisation.

☒ I have completed this application to the best of my ability and, as far as I am aware, the information I have provided in this application form is correct.

25 Feb 2019

**Signature** **Date**

## Request for information waiver under section 59 of the HSNO Act

☐ I request for the Authority to waive any legislative information requirements (i.e. concerning the information that has been supplied in my application) that my application does not meet (tick if applicable).

Please list below which section(s) of this form are relevant to the information waiver request:

## Appendices and referenced material (if any) and glossary (if required)

Chitambar, J. 2008. Status of ten quarantine "A" nematode pests in California: *Radopholus similis* (Cobb) Thorne, Burrowing nematode pp. 70-71. In: California Plant Pest and Disease Report 24. (January - December 2007). Ed. Gaimari, S. Plant Pest Diagnostics Branch, CDFA,

EPPO (European and Mediterranean Plant Protection Organization) – Pest Risk Assessment for *M. minor* 2006

Fleming TR, McGowan NE, Maule AG, Fleming CC (2016) Prevalence and diversity of plant parasitic nematodes in Northern Ireland grassland and cereals, and the influence of soils and rainfall. Plant Pathology. doi:10.1111/ppa.12525

Karssen G, Bolk RJ, van Aelst AC, van den Beld I, Kox LFF, Korthals G, Molendijk L, Zijlstra C, van Hoof R, Cook R (2004) Description of *Meloidogyne minor* n. sp. (Nematoda: Meloidogynidae), a root-knot nematode associated with yellow patch disease in golf courses. Nematology 6: 59-72

Surveillance 43 (2) June 2016, Pest Watch.

Wesemael WML, Moens M, Viaene N, Taning LM (2014) Life cycle and damage of the root-knot nematode *Meloidogyne minor* on potato, *Solanum tuberosum*. Nematology 16: 185-192. doi:10.1163/15685411-00002756

Zhao, Z. Q., W. Ho, et al. (2017). "First record of the root knot nematode, *Meloidogyne minor* in New Zealand with description, sequencing information and key to known species of *Meloidogyne* in New Zealand. Zootaxa **4231**(2): 203–218