

ENVIRONMENTAL RISK MANAGEMENT AUTHORITY
 NGĀ KAIWHAKATŪPATO WHAKARARU TAIAO



FORM NO2N

Application for approval to

IMPORT INTO CONTAINMENT ANY NEW ORGANISM THAT IS NOT GENETICALLY MODIFIED

under section 40 of the
Hazardous Substances and New Organisms Act 1996

Application Title: Importation of Herbarium specimens for improved understanding of the New Zealand flora.

Applicant Organisation: Manaaki Whenua - Landcare Research New Zealand Ltd

ERMA Office use only

Application Code:

Formally received: ___/___/___

ERMA NZ Contact: _____

Initial Fee Paid: \$

Application Status:

20 Customhouse Quay,
 Cnr Waring Taylor & Customhouse Quay
 PO Box 131, Wellington
 Phone: 04-916 2426 Fax: 04-914 0433
 Email: info@ermanz.govt.nz
 Website: www.ermanz.govt.nz

ENVIRONMENTAL RISK MANAGEMENT AUTHORITY
 NGĀ KAIWHAKATŪPATO WHAKARARU TAIAO



**Application for approval to import into
containment any new organism that is not
genetically modified, under Section 40 of the
Hazardous Substances and New Organisms Act
1996**

ER-AN-02N 10/02
FORM 2N

Page 1

IMPORTANT

1. An associated User Guide is available for this form. You should read the User Guide before completing this form. If you need further guidance in completing this form please contact ERMA New Zealand.
2. This application form covers importation into containment of any new organism that is not genetically modified, under section 40 of the Act.
3. If you are making an application to import into containment a **genetically modified organism** you should complete **Form NO2G**, instead of this form (Form NO2N).
4. This form, together with form NO2G, replaces all previous versions of Form 2. Older versions should not now be used. You should periodically check with ERMA New Zealand or on the ERMA New Zealand web site for new versions of this form.
5. You can talk to an Applications Advisor at ERMA New Zealand who can help you scope and prepare your application. We need all relevant information early on in the application process. Quality information up front will speed up the process and help reduce costs.
6. This application form may be used to seek approvals for importing more than one new (non-genetically modified) organism into containment where the organisms are of a similar nature.
7. Any extra material that does not fit in the application form must be clearly labelled, cross-referenced, and included as appendices to the application form.
8. Commercially sensitive information must be collated in a separate appendix. You need to justify why you consider the material commercially sensitive, and make sure it is clearly labelled as such.
9. Applicants must sign the form and enclose the correct application fee (plus GST). The initial application fee can be found in our published Schedule of Fees and Charges. Please check with ERMA New Zealand staff or the ERMA New Zealand website for the latest schedule of fees. We are unable to process applications that do not contain the correct initial application fee.
10. Unless otherwise indicated, all sections of this form must be completed for the application to be progressed.
11. Please provide an electronic version of the completed application form, as well as sending a signed hard copy.

You can get more information by contacting us. One of our staff members will be able to help you.

ERMA New Zealand
20 Customhouse Quay
PO Box 131
Wellington
NEW ZEALAND
Telephone: 64-4-916 2426
Facsimile: 64-4-914-0433
E-mail: info@ermanız.govt.nz
www.ermanız.govt.nz

20 Customhouse Quay,
Cnr Waring Taylor & Customhouse Quay
PO Box 131, Wellington
Phone: 04-916 2426 Fax: 04-914 0433
Email: info@ermanız.govt.nz
Website: www.ermanız.govt.nz

ENVIRONMENTAL RISK MANAGEMENT AUTHORITY
NGĀ KAIWHAKATŪPATO WHAKARARU TAIAO



**Application for approval to import into
containment any new organism that is not
genetically modified, under Section 40 of the
Hazardous Substances and New Organisms Act
1996**

ER-AN-02N 10/02
FORM 2N

Page 2

Section One – Applicant Details

1.1 Name and postal address in New Zealand of the organisation or individual making the application:

Name > Manaaki Whenua - Landcare Research New Zealand Ltd
on behalf of the New Zealand National Herbarium Network (members listed below):

Auckland War Memorial Museum Herbarium (AK)
Private Bag 92018
Auckland 1030

Museum of New Zealand - Te Papa Tongarewa (WELT)
PO Box 467,
Wellington 6015

Allan Herbarium (CHR)
Maanaki Whenua - Landcare Research
PO Box 69
Lincoln 8152
New Zealand

University of Canterbury Herbarium (CANU)
Department of Plant and Microbial Sciences
University of Canterbury
Private Bag 4800
Christchurch 8020

Lincoln University Herbarium (LINC)
Plant Sciences Group FSC Soil,
Plant & Ecological Sciences Division
P O Box 84
Lincoln University
Canterbury

Dame Ella Campbell Herbarium (MPN)
Institute of Natural Resources,
Massey University,
Palmerston North

Forest Research Herbarium (NZFRI and NZFRI-M)
Forest Research
Private Bag 3020
Sala St
Rotorua

20 Customhouse Quay,
Cnr Waring Taylor & Customhouse Quay
PO Box 131, Wellington
Phone: 04-916 2426 Fax: 04-914 0433
Email: info@ermanız.govt.nz
Website: www.ermanız.govt.nz

ENVIRONMENTAL RISK MANAGEMENT AUTHORITY
NGĀ KAIWHAKATŪPATO WHAKARARU TAIAO



**Application for approval to import into
containment any new organism that is not
genetically modified, under Section 40 of the
Hazardous Substances and New Organisms Act
1996**

ER-AN-02N 10/02
FORM 2N

Page 3

University of Otago Herbarium (OTA)
Botany Department,
University of Otago
464 Great King Street
PO Box 56,
Dunedin

New Zealand Fungal Herbarium (PDD)
Maanaki Whenua - Landcare Research
Private Bag 92170
Auckland 1030

University of Waikato Herbarium (WAIK)
Biological Sciences
University of Waikato
Private Bag 3105
Hamilton

The H.D. Gordon Herbarium (WELTU)
School of Biological Sciences,
Victoria University of Wellington,
PO Box 600
Wellington 6015

Postal Address > c/o Manaaki Whenua - Landcare Research NZ Ltd.
PO Box 69
Lincoln 8152

Physical Address > Canterbury Agriculture and Science Centre
Gerald Street
Lincoln

Phone > (03) 325 6700

Fax > (03) 325 2418

E-mail >

**1.2 If application is made by an organisation, provide name and contact details
of a key contact person at that organisation**

This person should have sufficient knowledge to respond to queries and have the authority to make decisions that relate to processing of the application.

**Application for approval to import into
containment any new organism that is not
genetically modified, under Section 40 of the
Hazardous Substances and New Organisms Act
1996**

ER-AN-02N 10/02
FORM 2N

Page 4

Name > Dr Aaron Wilton

Position > Allan Herbarium Manager

Address > PO Box 69
Lincoln 8152

Phone > (03) 325 6700

Fax > (03) 325 2418

E-mail > wiltona@landcareresearch.co.nz

1.3 If the applicant is an organisation or individual situated overseas, provide name and contact details of the agent authorised to transact the applicant's affairs in relation to the application

This person should have sufficient knowledge to respond to queries and have the authority to make decisions that relate to processing of the application.

Name > Not applicable

Position >

Address >

Phone >

Fax >

E-mail >

**Application for approval to import into
containment any new organism that is not
genetically modified, under Section 40 of the
Hazardous Substances and New Organisms Act
1996**

ER-AN-02N 10/02
FORM 2N

Page 5

Section Two – Purpose of the Application

This form is to be used for an application to import into containment any new organism that is not genetically modified. For an application to import into containment a **genetically modified organism**, use **Form NO2G**.

2.1 Give a short summary statement of the purpose of this application to be used on ERMA New Zealand's public register. (Maximum of 255 characters).

Briefly describe the organism(s) to be imported into containment, and the purpose(s) for which you wish to import the organism(s).

> To import into containment dried herbarium specimens of Kingdoms Plantae, Mycenae, Protista and Cyanobacteria, including seeds, pollen and spores, as reference material to study and improve understanding of the New Zealand flora.

2.2 Provide a short description of the background and aims of the project suitable for lay readers.

Describe the purpose of the importation and rationale for the overall project these organisms are to be used in so that people not directly connected with the research can understand why these organisms are required.

> Herbarium specimens from the Kingdom Plantae, Mycenae, Protista and Cyanobacteria that contain viable material (e.g., seed, pollen, spores) held in the herbaria of the New Zealand National Herbarium Network (www.nzherbaria.org.nz) are the primary resource used by scientists in determining the taxonomy and identification of what species occur in New Zealand. An important part of this work is the critical taxonomic comparison of morphological, anatomical, and DNA data of species in New Zealand with their overseas relatives. This research requires that at times dried herbarium specimens of taxa not already present or held in New Zealand are brought into the country from overseas by way of loans or gifts of specimens from herbaria in other countries, or from collections made by the herbarium staff when working on systematics overseas. The correct identification and taxonomic classification of New Zealand's native and introduced biota cannot be made without access to the overseas material.

Currently the 12 New Zealand herbaria (listed in section 1.1) hold over 1,390,000 specimens. These include historical collections – the oldest New Zealand specimens include the duplicate specimens collected by Banks and Solander during Captain Cook's first voyage to New Zealand (1769-70). Approximately two-thirds of the specimens are of species native to New Zealand. The remaining specimens are of species that are naturalised or cultivated in New Zealand, or represent species that do not occur in the New Zealand environment. Some of specimens may therefore represent species not otherwise known to be present in New Zealand. Specimens held in the herbaria are maintained as dried specimens and on occasion may contain viable seed, pollen or spores. Therefore strict containment measures are taken to prevent any material getting out into the uncontrolled environment.

The function of the herbaria is to collect and permanently record the flora of New Zealand, and to make this information available to researchers, and regional and national authorities. An important function of the herbaria is to maintain a reciprocal programme of specimen exchange that operates

**Application for approval to import into
containment any new organism that is not
genetically modified, under Section 40 of the
Hazardous Substances and New Organisms Act
1996**

ER-AN-02N 10/02
FORM 2N

Page 6

internationally and nationally. This programme ensures that foreign specimens are available so that researchers have comparative material for identification and research (e.g., closely related species of indigenous species, specimens of weed species from their native range).

In addition to the permanent collections, the herbaria in New Zealand hold specimens that are borrowed from other herbaria within New Zealand and from overseas. This reciprocal loan system operates, in the same way as libraries, between internationally registered herbaria (Index Herbariorum, <http://sciweb.nybg.org/science2/IndexHerbariorum.asp>). These species are usually borrowed for periods of 12-24 months.

The specimens obtained through these exchange and loan programmes are an essential tool for the identification of material (e.g., material that is intercepted at the border or which requires verification upon import, and verification of new naturalisations), and provide comparative material that is critical for the research associated with the herbaria. Without this material systematic research and identifications would not be possible.

In this application, because of the range and diversity of the material involved it is impossible to list all taxonomic categories that would be involved and therefore the application covers herbarium specimens of the Kingdoms Plantae, Mycenae, Protista and Cyanobacteria that may contain viable material (e.g., seed, pollen, spores). Since the collection contains and receive materials of taxa new to New Zealand the purpose of this application is to regularise the activities of the herbaria under the HSNO Act by seeking a containment approval so that the historical activities can continue to be carried out to add to our knowledge and understanding of the nature and phylogeny of both the native and introduced flora. It is our wish for the application to be considered in accordance with the provisions of sections 27 and 27A of the HSNO Act that allows for approvals at any taxonomic classification.

Section Three – Information on the Organism(s) to be imported

If the application is for importation of more than one organism, this section must be completed separately for each organism. If there are commercial reasons for not providing full information here, alternative approaches must be discussed with and agreed by ERMA New Zealand.

3.1 Give the unequivocal identification of the organism(s) to be imported

These names will be on the public register and should clearly identify the organisms. Please provide details of the following:

Latin binomial, including full taxonomic authority:

>Not applicable because the application is for the importation of herbarium specimens of Kingdom Plantae, Mycenae, Protista, and Cyanobacteria.

Common name(s), if any:

> Herbarium specimens and associated substrate

Type of organism (e.g., bacterium, virus, fungus, plant, animal, animal cell):

> Plants, fungi, algae, slime moulds, and lichens.

**Application for approval to import into
containment any new organism that is not
genetically modified, under Section 40 of the
Hazardous Substances and New Organisms Act
1996**

ER-AN-02N 10/02
FORM 2N

Page 7

Taxonomic class, order and family:

>Kingdom: *Plantae, Mycetae, Protista, and Cyanobacteria*

Strain(s) if relevant:

>N/A

Other information, including presence of any inseparable or associated organisms:

> Importation into containment of herbarium specimens is likely to include other organisms and associated substrates. The Ministry of Agriculture and Forestry (MAF) has agreed that the herbarium specimens and any associated organisms and substrates will not be given Biosecurity clearance under the Biosecurity Act 1993 but Biosecurity direction to the containment facility. An additional control will be imposed which requires the package to be frozen for a minimum of 48 hours at -18°C or lower (following Bridson & Forman 1992 (attached as Appendix 4)) to kill any associated invertebrates. This is already standard herbarium procedure.

The specimens may have inseparable organisms in the form of endophytic fungi. The lichens are a symbiotic or dual organism of which the fungal component is inseparable while the algal and cyanobacterium components can live independently. However, the material is dried prior to import, so most of it is dead. Also associated with some herbarium material may be the substrate upon which the organism grew i.e. dead material including wood, soil, rock and rarely animal material (hair, chitin, bone). The associated material will have undergone the same drying treatment as the dried herbarium material and will be contained in exactly the same manner as the herbarium collection.

3.2 Characteristics of the organism(s) to be imported

Provide information on the biology, ecology and the main features or essential characteristics of each organism(s) to be imported. For example, note production of spores/seeds/pollen, conditions for growth and reproduction. Also provide information on affinities of the organism(s) with other organism(s) in New Zealand. This information should be relevant to the identification of the risks of the organism (section 5).

> Herbarium specimens subject to this application will be imported that may, on occasion, contain viable seeds, spores or pollen that are new organisms under the HSNO Act. There is no intention to ever grow viable material.

The likelihood of viable material being part of the specimens is extremely low – for instance, for viable seed to be present the specimen needs to be collected when the seed (or spore) was mature, then the seed must have survived the drying and pressing process, and any subsequent freeze-thaw cycles used by herbaria to prevent insect pest damage. Even when viable material is initially present on herbarium specimens, the length this material remains viable after collection will be short as herbarium conditions do not provide optimal condition to maintain viability of seeds, pollen and spores.

Section Four – The Proposed Containment System and its Effectiveness

4.1 Describe the proposed containment system (physical and operational) and the ability of the organism(s) to escape from this system. The adequacy of the containment regime is a principal consideration so you need to provide comprehensive information on the containment system. Containment facilities must be registered by MAF, and you should provide documentary evidence of this. Refer to relevant containment manuals as appropriate. Please also ensure that ERMA New Zealand has an up-to-date copy of the containment manual relating to this facility. Identify possible pathways of escape of the organism(s) from containment, including through lapses of security or sabotage. Describe the biological features of the organism(s) that might affect its ability to escape from containment.

> All herbarium specimens that are new organisms will be maintained in a physical containment level 1 (PC1) plant containment facility in accordance with the requirement of the MAF/ERMA New Zealand Standard 155.04.09: *Containment Facilities for New Organisms (including genetically modified organisms) of Plant Species*.

Each herbarium will develop a containment manual prior to seeking MAF approval of the facility as a PC1 containment facility for plants. A draft manual for the Allan Herbarium is provided (Appendix 1) as an example. These manuals will provide details such as the method of restricting entry into the containment by approved persons, transporting material to and from the facility, and disposal of waste that are suitable for the physical layout at each herbarium. These manuals will also detail the treatment of shipments of specimen on importation – the minimum standard being freezing upon arrival at the herbaria for 48 hours at -18°C or lower (following Bridson & Forman 1992 (attached as Appendix 4); Appendix 2).

The risk of viable material of new organisms escaping containment is considered proportional to the number of specimens that are going to be handled at a given time. In normal practice only a few specimens are opened on benches within the containment facility at any one time thereby reducing the possibility of escape. Many spore bearing organisms release their spores through moisture induced rupturing of cells or moisture induced movements which cannot operate in the dry conditions of the herbaria. Similarly the mechanisms for seed dispersal (i.e., wind, animal, and water) are unavailable in the herbaria. Dry conditions will prevent the release of seed requiring water for dispersal and containment within a storage facility will prevent wind and animal dispersal¹. The only pathways for escape are (1) through seed and spores dropping from the specimens onto the floor and being disposed of with general waste, (2) through spores and seeds

¹ Note: Herbarium vaults usually lack windows, or when windows are fitted they do not open. In other areas of a containment facility opening windows may fitted, however if they are fitted the Containment Manual for that Facility will specify measures to control movement of insects and particles through these windows. For example, Appendix 1 indicates at the Allan Herbarium all windows are sealed in the vaults and that insect screens will be fitted to opening windows in other work spaces.

**Application for approval to import into
containment any new organism that is not
genetically modified, under Section 40 of the
Hazardous Substances and New Organisms Act
1996**

ER-AN-02N 10/02
FORM 2N

Page 9

being deliberately removed from the herbarium, (3) through seeds or spores attaching to clothing, and (4) by sabotage. Pathway one will be controlled through the containment manual by specifying cleaning and waste disposal requirements. Pathway two will be controlled through the containment manual which will control and restrict access to and behaviour within the Herbaria. Pathway three will be controlled through the containment manual which will include the use of protective clothing when handling specimens that may be a new organism. Pathway four will be controlled through the containment manual and through general site surveillance; however, a determined saboteur will not be deterred.

It is important to emphasise here that no material is being propagated and that nearly all of the material is dead. Furthermore, any living materials, such as seed and spores, have a limited life span.

Section Five - Identification and Assessment of Risks, Costs, and Benefits

This section must include information on the beneficial 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. You should consider costs and benefits with respect to both non-monetary and monetary (dollar) terms and also consider the distribution of this incidence. Provide a brief 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.

5.1 Ability of organism(s) to establish a self-sustaining population.

Discuss the ability of the organism(s) to establish an undesirable self-sustaining population, should an escape from containment occur, and the ease with which such a population could be eradicated. You should consider the ability of the organism(s) to survive and reproduce if it did escape from containment.

> The only way that a self sustaining population could establish is in the event of escape from containment and this is considered extremely unlikely in view of the containment and operational regime proposed.

In the extremely unlikely event that material escaped from the containment facility the chances of that material being viable for germination are extremely low as conditions in the herbarium are not ideal for maintaining the long term viability of spores and seed. The chance of establishment is reduced even further because (1) many spores and seed require specific pre-treatments to induce germination (e.g., scarification, stratification or leaching) and these are unlikely to occur with an accidental release; and in addition to pre-treatment requirements (2) spores and seeds have to be released at a time when conditions are conducive for germination and find a suitable habitat in the area around the research centre (i.e., the seed or spore would need to be deposited in an environment with suitable temperature, light, moisture and substrate).

In the extremely unlikely event that a viable seed or spore escaped, germinated and established it is highly likely to be observed due to the high density of expert scientists present at the sites, and would be rapidly and easily eradicated by physical and/or chemical destruction before their spread beyond the research centre.

5.2 Identify all potential adverse effects of the organism(s). Identify potential adverse effects associated with the organism(s) and with any inseparable organisms, both within containment, and outside of containment (should an escape occur). Consider effects on the environment, and human health and safety (e.g. of workers in the containment facility), and any ethical and cultural effects. It is important to think about the source of the risk, i.e. the way in which the risk is created (the exposure pathway), and then the consequences of exposure. Adverse effects should be identified for the following categories:

A. Potential adverse effects on the environment, in particular on ecosystems and their constituent parts (e.g. adverse effects on: life supporting capacity of air, water, soil

**Application for approval to import into
containment any new organism that is not
genetically modified, under Section 40 of the
Hazardous Substances and New Organisms Act
1996**

ER-AN-02N 10/02
FORM 2N

**Page
11**

and ecosystems; native and valued introduced flora and fauna; natural habitats and the intrinsic value of ecosystems; New Zealand's inherent genetic diversity; animal or plant health)

> It is recognised that the introduction of any new organism in a new environment is not without risk. However, in this particular case as noted in section 5.1 above, it is unlikely that a self sustaining population would establish and cause any adverse effects to the environment. Any specimen that may establish in the vicinity of the containment facility in the extremely unlikely event of escape will be destroyed and therefore their existence will be temporary and short lived.

B. Potential adverse effects on public health (including occupational exposure)

> There is no evidence that dried material in a herbarium has ever been the cause of a public health problem or had any affect on people working with them.

No public health effects are likely to eventuate as the herbarium specimens of new organisms will be kept in containment and handled by personnel expert in handling such specimens.

C. Potential adverse effects on the relationship of Māori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, valued flora and fauna and other taonga (taking into account the principles of the Treaty of Waitangi). For example, you should consider whether the organism(s) would have an effect on specific native flora or fauna if they escaped from containment.

> It is recognised that the introduction of any new organism into a new environment is not without risk, however, in this particular case as noted in section 5.1 and 5.2(a) above it is unlikely that a self sustaining population would establish to cause any adverse effects to Māori.

We acknowledge Māori concerns for the rights of indigenous peoples in other countries, and therefore note that we participate in the reciprocal loan and exchange process on the understanding that the material that we receive has been sent after due consideration by the institute sending the material of the rights of indigenous peoples, as well as the legislative requirements, in the region of origin.

It is noted that understanding the systematics of our native flora in relation to other floras of the world is likely to be beneficial to Māori by adding to our knowledge to help conserve our flora in terms of biodiversity, biosecurity and biosafety.

The application was initially discussed with the Manaaki Whenua-Ngāi Tahu liason at Landcare Research (Craig Pauling), then a draft of the application was submitted for comment to Te Rūnanga o Ngāi Tahu, and subsequently to the local rūnanga. The response from Ngāi Tahu is enclosed as Appendix 3.

D. Other potential adverse effects (such as New Zealand's international obligations, social or economic adverse effects, ethical issues)

> Maintenance of links with overseas repositories by exchanges of herbarium specimens for research and study is likely to enhance international cooperation rather than hinder it.

This material is essential for the understanding of our flora (assisting with New Zealand's obligations under the International Convention on Biodiversity) and for the identification of border intercepts, new naturalisations, and documentation of the New Zealand flora (relevant for maintaining our biodiversity, biosecurity, and biosafety).

We note Māori interest in the rights of indigenous peoples in section 5.2(c) above.

5.3 Provide an assessment of the adverse effects identified in Sections 5.2.

The assessment should include the nature, likelihood or probability of occurrence, and magnitude of each adverse effect (i.e. **the risk**), and the value (in monetary or non-monetary terms) of a particular adverse effect (i.e. **the cost**). The uncertainty bounds of the information contained in the assessment should also be discussed.

Adverse effects should be assessed in relationship to:

A. Potential adverse effects on the environment, in particular on ecosystems and their constituent parts (e.g. adverse effects on: life supporting capacity of air, water, soil and ecosystems; native and valued introduced flora and fauna; natural habitats and the intrinsic value of ecosystems; New Zealand's inherent genetic diversity; animal or plant health)

> Any potential adverse effects are considered to be extremely unlikely and any effects arising are considered to be temporary and short lived (see section 5.1 of this application). The cost of eradication would be very low (less than \$20 plus labour).

In the over one hundred years that herbaria have been operating in New Zealand there are no records of an accidental release.

B. Potential adverse effects on public health (including occupational exposure)

> Extremely unlikely (see section 5(2)(B) of this application).

C. Potential adverse effects on the relationship of Māori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, valued flora and fauna and other taonga (taking into account the principles of the Treaty of Waitangi). For example, you should consider whether the organism(s) would have an effect on specific native flora or fauna if they escaped from containment. If consultation with Maori has been undertaken, provide details of the process used and the outcome.

> Extremely unlikely (see section 5(2)(C) of this application).

D. Other potential adverse effects (such as New Zealand's international obligations, social or economic adverse effects, ethical issues)

> Extremely unlikely (see section 5(2)(D) of this application).

5.4 Identification of beneficial effects (benefits)

Identify and describe monetary and non-monetary benefits associated with importing the organism(s) into containment. Outline and discuss the purpose(s) for the importation and the potential use of the organism(s). Focus on the immediate benefits, as well as longer-term benefits. For example, "increase in scientific knowledge", "increased production of agricultural produce". Substantiate claims by reference to sources of information. Specify whether the benefits identified are environmental, public health or economic benefits; and/or are specific benefits to Maori.

> We seek approval to import and maintain in containment pressed herbarium specimens that may be new organism under the HSNO Act. We consider that scientific benefits are expected to be realised on a continued basis. We also consider that the economic benefits based on this research will also be realised on a continued basis. We consider that if this application is unsuccessful then it would be impossible to maintain the herbaria in their current form, which would curtail any research being carried out on defining the New Zealand flora.

The herbarium specimens are a crucial resource for research on the New Zealand flora (e.g., Foundation for Research Science and Technology (FRST) funded Outcome Based Investment (OBI) Defining New Zealand's Land Biota). The specimens are used by researchers to increase our knowledge and understanding of the biosystematics of our flora by applying a wide range of taxonomic techniques including the newer methodologies of cladistics and molecular biology. The research will clarify the relationships between species, genera, and families. This will lead to improved classification essential for the effective use, management, and protection of our flora. In order to fully understand the New Zealand flora, specimens collected in New Zealand must be compared with specimens of species from foreign regions that have biogeographic or taxonomic links to New Zealand.

The specimens are also used by the researcher in the development of new keys and descriptions that provide the means of accurately identifying specimens and allow reliable access to information – essential for example for border control. Better knowledge of seeds, anatomy, and chromosome numbers produced by this research will provide tools useful in other research areas such as vegetation history, archaeology, and forensic science. These tools, and the specimens, are also an important educational resource for teaching the next generation of research scientists.

Biosystematic information is published in Flora of New Zealand and Fungi of New Zealand volumes, monographs, and research papers, thus underpinning all the research and management systems that promote ecological, economic and social outcomes. This research is of benefit to a wide range of biosecurity and biodiversity end-users, and iwi.

5.5 Provide an assessment of the benefits identified in Section 5.4.

**Application for approval to import into
containment any new organism that is not
genetically modified, under Section 40 of the
Hazardous Substances and New Organisms Act
1996**

ER-AN-02N 10/02
FORM 2N

**Page
14**

Estimate the likelihood that the benefits will be realised, the magnitude of benefits associated with importing the organism(s) into containment, and any uncertainties associated with this assessment. You should also indicate who would receive the benefits and the expected time-course of delivery of the benefits.

- The benefits are expected to be realised on a continued basis.

The likelihood of these benefits being realised is extremely high as the benefits are already tangible in the long history of scientific and educational publication, and community involvement. The collection and supporting databases provide many of the tools required to maintain New Zealand biosecurity and are used by governmental agencies e.g. ERMA New Zealand, MAF, and the Department of Conservation (DOC).

The magnitude of these benefits is difficult to quantify, however biodiversity and biosecurity research cannot operate without the information provided by the herbaria. Without the importation and exchange of herbarium specimens for comparative purposes these collections will be unable to service the needs of biodiversity and biosecurity research and management, nor other users.

5.6 Overall evaluation of risks, costs, and benefits

This overall evaluation is the main task of the Authority. The Authority has to decide whether the beneficial effects of having the organism in containment outweigh the adverse effects of the organism and any associated inseparable organisms. The Authority must also be satisfied that the organism can be safely contained. You may wish to express a view on the relative importance of the different risks, costs and benefits and how they should be brought together in making a decision.

> As noted in section 5.5 above benefits are expected to be realised on a continued basis. The economic benefits will be created through research providing knowledge for maintaining New Zealand biodiversity and biosecurity, and providing underpinning knowledge for other scientific research.

No realistic adverse risks have been identified.

If this application is unsuccessful, there is considerable adverse risk to achieving positive ecological, economic and social outcomes.

Section Six – Additional Information

6.1 Do any of the organism(s) need approvals under any other New Zealand legislation or are affected by international obligations? For example, indicate whether the organism is subject to other New Zealand legislation, e.g. the Biosecurity Act 1993, or Animal Welfare Act 1999; or if the organism(s) are listed in CITES, then approval is required from both the importing and exporting countries.

> In addition to the requirements of the HSNO and the Biosecurity Acts some specimens may also be covered by

- CITES: some specimens may represent species listed in the CITES register. These specimens are only sent and received from/to CITES registered organisations. This is reported annually to DOC.
- Antiquities Act: some specimens are considered antiquities under this act. Prior to sending such material Antiquities Certificates are obtain from the Department of Culture and Heritage.
- Specimens of native New Zealand species being sent to overseas institutes may have been collected in accordance with a collecting permit issued by the Department of Conservation, and may be subject to conditions imposed by that permit.

6.2 Have any of the new organism(s) in this application previously been considered in New Zealand or elsewhere? For example, has the organism(s) been previously considered for import (e.g. under the Plants Act)?

> We are not aware of any relevant New Zealand applications.

Herbarium specimens have been considered by the Canadian Food Production and Inspection Branch Animal and Plant Health Directorate Plant Protection Division which does not require Permit to Import, nor a Phytosanitary Certificate. Past experience of the Canadians' has demonstrated that dried plant material presents little risk of introducing pests (see <http://www.inspection.gc.ca/english/plaveg/protect/dir/d-95-09e.shtml>).

The United States Department of Agriculture Regulation for Miscellaneous and Processed Products (Regulating the Importation of Miscellaneous and Processed Products Regulated by Plant Protection and Quarantine) states (on page 5-96 under the section titled "Herbarium Specimens and Other Preserved Plant Materials (various genera and species of plants)") that "Herbarium specimens are considered low risk, low enough to release material that would be prohibited ordinarily, because such specimens are:

- Usually fumigated before being put into an herbarium,
- Permanently filed in an herbarium case where they receive special care and have limited circulation, and
- Used by systematists who have little interest in propagation"

6.3 Is there any additional information that you consider relevant to this application that has not already been included?

- New Zealand herbaria are maintained in accordance with processes and procedures used in herbaria internationally. These processes aim to maintain the collections as a permanent resource for future research. The procedures used in herbaria therefore aim to prevent damage to specimens (deliberate or accidental), removal of material from specimens, and contamination of specimens. These processes therefore provide a comprehensive framework that will work to prevent escape of viable material from herbaria.
- Herbarium specimens are prepared and sent to New Zealand in the following methods of preparation
 - (1) dried herbarium specimens
This is the preferred and most common method of preparing and shipping specimens because it preserves the characteristics of the specimen most fully. Preparing the specimens by drying effectively kills specimen, with the exception of some mature seeds, spores and pollen and some vegetative material in non-flowering plants.
 - (2) partly prepared specimens treated with ethanol.
This form of shipment is very rarely used – it is only used on overseas collecting trips when the infrastructure is not available to fully dry the material prior to shipping to New Zealand. Soaking and transporting the specimens in ethanol ensures that the material is maintained in a good state until it can be pressed and dried thoroughly at a herbarium in New Zealand. All material on these specimens is rendered inviable by the ethanol treatment.
Herbarium material may also be sent to New Zealand as permanently mounted microscope slides or ethanol collections. These treatments render all the material on these specimens inviable.
- Reproductive structures are an essential component of herbarium specimens. These structures (e.g., flowers, seeds, pollen, spores) provide many key characteristics that are used for systematic research and identification of material. Without these structures accurate identification and many aspects of research are not possible.
- **Treatment of herbarium specimens with irradiation**
Irradiation of herbarium specimens is inappropriate because of the effects of radiation on the specimens and associated materials. Of particular concern is the effect of irradiation on the DNA molecules and mounting materials (e.g., backing paper).
Research has shown that radiation causes damage to a range of natural chemicals that is unacceptable for long term collections such as libraries and museums. This is summarised in a recent paper by the Smithsonian Center for Materials Research and Education (see Appendix 5).
Under section 4 they summarise
 - “Materials of cellulosic composition, especially plant fibers and paper, will be quite seriously affected. They will lose significant tensile strength and will become more brittle, while the induced chemical changes, chain scission and oxidation, will accelerate their aging processes. Discoloration is also to be expected. Oxidation also will result from interaction with ozone formed in air during the irradiation; while one may expect efficient

**Application for approval to import into
containment any new organism that is not
genetically modified, under Section 40 of the
Hazardous Substances and New Organisms Act
1996**

ER-AN-02N 10/02
FORM 2N

**Page
17**

ventilation at the radiation equipment, ozone also will be formed within the enclosures of the mailed materials, where the concentration could range in the tens of ppm.”

- Samples of interest because of their genetic information can be compromised, to an extent depending on the type of questions being addressed by the research in which they are to be used, because of large scale destruction of DNA molecules, accompanied by recombinations.”
- In addition to these procedures we also propose to implement the following measures.
 - No genetically modified organism will be knowingly imported.
 - All material will be imported as dried herbarium specimens and held in a containment facility.
 - All new dried material that is a new organism will be maintained in containment and will not be propagated in any way.
 - A register of all importations will be maintained and provided to ERMA New Zealand and MAF at the end of each calendar year.
 - Any material held in containment that is a new organism will only be transferred to another New Zealand herbarium that is registered as a containment facility or transferred overseas to a registered herbarium. Packaging and labelling of these shipments will follow NZNHN Standard for the Transfer of Herbarium Specimens (see Appendix 2).
 - Only approved users will have access to the material that is a new organism.
 - Any breach of containment will be dealt with in accordance with the contingency plan that will be a part of the containment manual and any such unlikely event will immediately be reported to MAF and ERMA New Zealand.

6.4 Provide a glossary of scientific and technical terms used in the application.

- scarification: abrasion or nicking of the seed coat to break dormancy
- stratification: chilling seeds for a period of time to break dormancy

6.5 List of appendices. List any appendices included with this application. Any information that is commercially sensitive, or additional material included with the application (such as details of consultations, referenced articles) should be contained in appendices. The main application should refer to the relevant appendices but be able to be read as a stand-alone document.

- Appendix 1: Draft Containment Manual for Allan Herbarium and the Plant Biosystematics Laboratory.
- Appendix 2: New Zealand National Herbarium - Standard for the Transfer of Herbarium Specimens
- Appendix 3: Response from Ngāi Tahu to draft application.
- Appendix 4: Bridson, D.; Forman, L. (eds.) (1994) *The Herbarium Handbook*. Revised Edition. Whitstable Litho Printers Ltd., Great Britain. Pages 24 and 25.
- Appendix 5: Smithsonian Center for Materials Research and Education (2001) The effects on research specimens and museum collection items from electron beam irradiation of mail by the US Postal Service.
http://www.si.edu/scmre/about/mail_irradiation.htm.

**Application for approval to import into
containment any new organism that is not
genetically modified, under Section 40 of the
Hazardous Substances and New Organisms Act
1996**

ER-AN-02N 10/02
FORM 2N

**Page
18**

Section Seven – Application Summary

Summarise the application in clear, simple language that can be understood by the general public. Include a description of the organism(s) to be imported into containment, and any risks and benefits associated with their importation. This summary will be used to provide information for those people and agencies who will be notified of the application (e.g., Ministry of Agriculture and Forestry, Department of Conservation, Crown Research Institutes) and for members of the public who request information. Do not include any commercially sensitive information in this summary.

> Specimens held in New Zealand's herbaria are the primary resource used by scientists in determining the taxonomy and identity of species occurring in New Zealand. An important part of this work is the critical taxonomic comparison of the New Zealand flora with their overseas relatives. This research requires that at times specimens not already present or held in New Zealand are brought into the country from overseas by way of loans or gifts of specimens from herbaria in other countries. New Zealand herbaria do this as part of a reciprocal loans and exchange programme that operates in the same way as library loan systems. The correct identification and taxonomic classification of New Zealand's native and introduced flora cannot be made without access to the overseas material.

This application covers the importation of herbarium specimens of species of the Kingdom Plantae, Mycena, Protista and Cyanobacteria that contain viable material (e.g., seed, pollen, spores). Since the collection contains and receives materials of organisms new to New Zealand the purpose of this application is to regularise the activities of the herbarium under the HSNO Act by seeking a containment approval so that the historical activities can continue to be carried out to add to our knowledge and understanding the nature and phylogeny of our flora.

In asking for approval to import into containment such a wide classification of organisms, the herbarium is mindful of its responsibilities to ensure that the specimens already in the collection as well as those that may be added to it in the future always remain and are handled in containment. For this purpose we have developed a containment manual attached as Appendix 1 to this application.

The risk of the contained material that is a new organism escaping containment is considered negligible. No adverse effect to the public, environment, or Māori culture has been identified.

If this application is unsuccessful we anticipate significant adverse effects because the research that requires these specimens would not be possible. This research provides critical information for the management of biodiversity and biosecurity, and underpinning scientific data and knowledge of our flora. This is important for positive ecological, economic and social outcomes.

**Application for approval to import into
containment any new organism that is not
genetically modified, under Section 40 of the
Hazardous Substances and New Organisms Act
1996**

ER-AN-02N 10/02
FORM 2N

**Page
19**

Checklist

Please check and complete the following before submitting your application:

All sections completed	Yes
Appendices enclosed	Yes
Confidential information identified and enclosed separately	NA
Copies of additional references attached	Yes
Cheque for initial fee (incl. GST) enclosed	No
If "yes", state amount:	\$.....
Direct credit made to ERMA bank account:	Yes
If "yes" give date of direct credit ...20/6/05... and amount deposited:	\$1125.00
Application signed and dated	Yes
Electronic copy of application e-mailed to ERMA New Zealand	Yes

*NA – not applicable

Signed:

Date: