Environmental Protection Authority
Te Mana Rauhī Taiao

DECISION

Date signed	17 April 2014
Application code	APP201254
Application type	To release any new organism under section 34 of the Hazardous Substances and New Organisms Act 1996
Applicant	Tomatoes New Zealand
Date application received	20 November 2013
Hearing	17 March 2014
Consideration	18 March 2014
Considered by	A decision-making committee of the Environmental Protection Authority (EPA) (the Committee)[1]; • Kevin Thompson (Chair) • Shaun Ogilvie • John Taylor • Kerry Laing • Max Suckling (special member)
Purpose of the application	To import and release *Macrolophus pygmaeus*
Organism	*Macrolophus pygmaeus* (Rambur, 1839)

1. Summary of decision

1.1 The application to release *Macrolophus pygmaeus* (Rambur, 1839) was lodged under section 34 of the Hazardous Substances and New Organisms Act 1996 (the Act).

1.2 The application was considered in accordance with the relevant provisions of the Act and of the HSNO (Methodology) Order 1998 (the Methodology).

1.3 The Committee has **declined** the application to release *Macrolophus pygmaeus* in accordance with section 38(1)(b)(ii) of the Act.

[1] The Committee referred to in this decision is the subcommittee that has made the decision on this application under delegated authority in accordance with section 18A of the Act.

2. Application and consideration process

Receipt of the application

2.1 The application was formally received for processing on 20 November 2013.

2.2 The applicant is Tomatoes New Zealand (TNZ), an affiliated Product Group of Horticulture New Zealand, representing the interests of commercial tomato growers in New Zealand.

Purpose of the application

2.3 The application sought the release of *M. pygmaeus* for use as an inundative biological control agent (BCA) for greenhouse whitefly (*Trialeurodes vaporariorum*) by commercial greenhouse tomato growers.

The organism

2.4 *Macrolophus pygmaeus* (Order: Hemiptera, Family Miridae) is a predatory polyphagous mirid. It is commercially available in Europe where it is used in tomato greenhouses as a BCA for greenhouse whitefly.

Legislative criteria for the application

2.5 The application was lodged under section 34 of the Act, for the release of a new organism, *M. pygmaeus,* without controls.

2.6 *Macrolophus pygmaeus* is a new organism for the purposes of the HSNO Act as determined through application ERMA200075 in August 2009.

Public notification of the application

2.7 Section 53(1)(c) of the Act provides that an application under section 34 of the Act must be publicly notified by the Environmental Protection Authority (EPA).

2.8 The application was publicly notified on 29 November 2013, and was open for submissions until 7 February 2014, in accordance with the timeframes set out in the Act.

2.9 In accordance with section 53(4) of the Act, letters or emails were sent, notifying the Minister for the Environment, the Ministry for Primary Industries (MPI), the Department of Conservation (DOC), and other government departments, crown entities, and local authorities who have expressed an interest in being notified about applications for non-genetically modified new organisms. Māori organisations, non-government organisations and stakeholders who have expressed an interest in being notified about applications for non-genetically modified new organisms were directly notified. All these parties had an opportunity to comment on the application as per section 58(1)(c) of the Act and clause 5 of the Methodology.

Submissions received through public notification

2.10 Thirty-four submissions were received during the submission period.

2.11 One late submission was received on 13 February 2014, from Mr Won Ha Park. The Committee accepted the submission and waived the timeframe in which to receive submissions under section 59(3)(a)(i) of the Act. The applicant and submitters consented to this time waiver as required by section 59(4) of the Act.

2.12 All submissions were made available on the EPA website.

Submissions in support of the application

2.13 Twenty-three written submissions were received in support of the application.

2.14 This included submissions from the following tomato growers and tomato industry employees: Frank van Rijen (Rembrant van Rijen Ltd); Reupena Kovati and Esta Kovati (Kovati-Tam Yam Gardens); Rochelle Trethowen (Karamea Tomatoes Ltd); Bhupinder Singh Gavri (Prash-Associates Ltd); René Kamminga (Great Lakes Tomatoes Ltd); Roelf Schreuder (Gourmet Mokai Ltd); EM and DC Duncan; Anthony Tringham; Tony Norton; Shaohua Tong (Kingbridge Ltd); Fred Abma (Abma Hothouse Tomatoes); Peter Fausett (PJ and MJ Fausett Partnership); S. McCulloch; Dirk Bier; Bruce Ellingham (Woodstock Growers); David Price (JS Ewers Ltd); Pierre Gargiulo (JS Ewers Ltd); Tony Boyd; and Geoff Lamont. They explained that greenhouse whitefly is a significant problem for the tomato industry, outlined their concerns around the lack of control options available to them for greenhouse whitefly, and requested that the application be approved. Many also wrote about their desire to move away from chemical control methods due to market access requirements, incompatibility of chemical sprays with BCAs and bumblebees used for pollination, and increasing whitefly resistance to the chemicals that are available. They also noted that that *Encarsia formosa*, a parasitic wasp introduced to New Zealand in the 1930s to control greenhouse whitefly, is not effective in controlling high levels of whitefly, and sprays needed to control whitefly can cause damage to the tomatoes and to workers.

2.15 Peter Silcock, Horticulture New Zealand, noted that the lack of BCAs, such as *M. pygmaeus*, hinders the tomato industry in achieving their long term goals.

2.16 Mike Sim, BioBees Ltd, noted the importance of bumblebees as pollinators for the greenhouse tomato industry, and other horticultural sectors, and explained how the use of chemicals impacts on the effectiveness of bumblebees. He supported the introduction of *M. pygmaeus* as it would reduce the use of chemicals, and could also prove an effective control agent for the tomato-potato psyllid (TPP) (*Bactericera cockerelli*).

2.17 John Thompson (Bioforce Ltd and Chemtest Laboratories Ltd) provides technical advice to greenhouse growers in New Zealand, and supported the application to introduce *M. pygmaeus*. He considers that chemical pesticides are not acceptable or reliable as key plant protection tools, and the inclusion of *M. pygmaeus* into Integrated Pest Management (IPM) programmes would greatly assist sustainable management of many important pests including greenhouse whitefly. He noted that predatory mirids require many prey items to support fertility, and supplementary feeding is often needed in the greenhouse, therefore he expects that survival in the wild would be lower as

food supplies would be much less plentiful. He concluded that *M. pygmaeus* would enable a significant improvement in growing practices, substantially reduce pesticide use, and result in higher yield, and higher quality tomatoes.

Submissions that raised concerns about the application but did not state a position

2.18 John Liddle, Nursery and Garden Industry New Zealand, noted that they recognise the potential benefits of *M. pygmaeus* and suggested that there might be benefits to the nursery industry which also suffers from greenhouse whitefly. However the industry also has concerns around the potential for *M. pygmaeus* to establish outside of greenhouses, and the lack of evidence regarding potential non-target effects.

2.19 The Northland Regional Council submission, written by Dr Jenny Dymock, noted that while the introduction of *M. pygmaeus* will result in benefits for consumers through the reduction of pesticide use, the potential impacts of establishment outside greenhouses had been downplayed by the applicant. Dr Dymock considered that potential impacts on existing predator/prey relationships, non-target native species, and existing BCAs, and the phytophagous feeding behaviour of *M. pygmaeus* needed to be addressed. She concluded that host range testing should be undertaken before release is considered.

2.20 Paul Elwell-Sutton, Wilderness Trappers, was concerned that the applicant had not considered the effects of climate change when predicting the extent that *M. pygmaeus* might be able to establish outside greenhouses. He also considered that native species should be investigated as potential BCAs for whitefly before *M. pygmaeus* is introduced.

Submissions that opposed the application

2.21 The EPA received nine written submissions asking that the application to release *M. pygmaeus* be declined. The following themes were raised in eight of those submissions:

- *M. pygmaeus* will escape from greenhouses, disperse in the natural environment, and establish self-sustaining populations.
- *M. pygmaeus* is polyphagous, and poses significant risk to native invertebrates, ecosystems, and previously introduced BCAs.

2.22 Other common themes in the opposing submissions were:

- The application did not take into account climate change.
- The tomato industry should look at indigenous species as potential BCAs before introducing exotic species.
- No host range testing has been undertaken.
- The application does not explain how *M. pygmaeus* will be used in greenhouses.
- The application does not explain how the use of *M. pygmaeus* will be integrated with chemical control of TPP and other pests.
- The application is of poor quality, and literature references were incorrectly cited.

2.23 Dr Nicholas Martin (retired entomologist) had great concerns about the application, and noted that there was an apparent lack of understanding of the concept of IPM and how it applies to greenhouse tomatoes.

2.24 Landcare Research scientists Lynley Hayes, Dr Simon Fowler, Dr Quentin Paynter, and Dr Ronny Groenteman, advised that while they are committed to biological control, and are not fundamentally opposed to the use of generalist predators, they would prefer to see covered crop industries restrict themselves to agents that cannot survive outdoors, or predators already in New Zealand.

2.25 Margaret Hicks believes that the '*artificial industrialised cultivation methods'* used by commercial tomato growers have caused their whitefly problem and they should change the growing practices rather than import exotic species.

2.26 Dr Stephen Pawson, President of the Entomological Society of New Zealand, noted that the applicant's assessment did not include the potential export phytosanitary complications of introducing *M. pygmaeus*.

2.27 Gerry te Kapa Coates on-behalf of Te Rūnanga o Ngāi Tahu, noted that the absence of information on adverse effects does not mean there is no risk, and the Treaty of Waitangi responsibilities for active protection requires that the native environment be protected from the risks of introduced new organisms.

2.28 The New Zealand Farm Forestry Association considered that the applicant has not given valid justification of the utility *M. pygmaeus* provides for the tomato industry.

2.29 Dr Margaret Stanley considered that the release of *M. pygmaeus* would be the equivalent to the stoat (*Mustela erminea*) in terms of a generalist predator introduced to control a primarily economic pest (rabbits).

2.30 The New Zealand Biosecurity Institute stated that '*further information is needed before the risks, costs and benefits of introducing Macrolophus can be adequately weighed up*'.

2.31 Janet Taiatini also asked that the application be declined as she does not believe that the introduction of 'organic pest eradication programmes' is in the best interests of the country, and she considered that the application did not comprehensively identify the adverse effects.

Comments from MPI and DOC

2.32 As required by the Act and Methodology, the Ministry for Primary Industries (MPI) and the Department of Conservation (DOC) were advised and provided with the opportunity to comment on the application.

2.33 DOC provided a detailed submission outlining a number of concerns with the application, particularly noting that the risks to New Zealand's native biota were not adequately identified, assessed or mitigated. DOC requested that the application be declined.

2.34 MPI did not make any comments on the application, but provided information under section 58(1)(a) of the Act as outlined in the EPA staff report.

Reports sought in relation to the application

EPA staff advice

2.35 The EPA staff report was published on the EPA website on 3 March 2014, and the applicant and submitters were informed of its availability.

Report from Ngā Kaihautū Tikanga Taiao

2.36 Ngā Kaihautū Tikanga Taiao (NKTT) prepared a report to the Committee to provide advice and assistance from a Māori perspective. The report acknowledged the consultation undertaken by the applicant, but noted that the concerns raised through that process were not fully addressed in the application, and that the application would have benefited from a broader perspective.

2.37 This report was also published on the EPA website on 3 March 2014.

Independent review of economic analysis

2.38 The EPA commissioned an independent review of the economic analysis provided by the applicant in the confidential appendix of the application. This review was provided by the New Zealand Institute for Economic Research (NZIER), and was also published on the EPA website on 3 March 2014.

Public hearing

2.39 A public hearing was held in accordance with sections 59(1)(d), 60 and 61 of the Act. The applicant requested that the hearing be held in Pukekohe. The hearing was held at the Counties Function Centre in Pukekohe on 17 March 2014.

2.40 At the hearing, the Committee heard oral submissions from the applicant, submitters, DOC, NKTT, and EPA staff as detailed below. In accordance with section 61(7)(b) of the Act, the Committee allowed submitters and the applicant to ask questions of clarification of the hearing participants, and the applicant was given the right of response after all oral submissions were made.

2.41 Matters that were discussed in the hearing have been addressed in the relevant sections of this decision.

2.42 The Committee would like to thank all the people who made submissions on the application and in particular those who participated in the hearing. Public submissions provide a focus for the Committee on points that need clarification, and the Committee found the submissions and the applicant's responses helpful in its consideration of the application.

2.43 The Committee acknowledge the constraints the applicant, submitters, and DOC are working under with regard to the limited knowledge available about native invertebrate biodiversity.

Applicant presentation

2.44 The applicant, TNZ, was represented by Helen Barnes, Manager of TNZ, who introduced Alasdair MacLeod, the independent Chair of TNZ, Nikki Johnson, and Dr David Logan.

2.45 Alasdair MacLeod spoke about TNZ and their aims to double the value of the sector by 2020 through export, and how all the growers belonging to TNZ supported the application. He affirmed that *M. pygmaeus* was selected as a candidate to control greenhouse whitefly, not the tomato-potato psyllid (TPP, *Bactericera cockerelli*).

2.46 Dr David Logan, scientist at the New Zealand Institute for Plant and Food Research, outlined the parameters of the climate modelling he was contracted to prepare for TNZ, and the limitations of such modelling. He noted that the data used was limited to records relating to the commercially available *M. pygmaeus*, and acknowledged that if a wide range of data were included, as suggested by the EPA staff report, the model would indicate a wider area suitable for *M. pygmaeus* establishment in New Zealand.

2.47 Nikki Johnson, a technical advisor on the *M. pygmaeus* project, responded to matters raised in submissions and the EPA staff report as follows:

a) *M. pygmaeus* is marketed as a 'specialist whitefly control', but is polyphagous so eats a variety of invertebrates, not just greenhouse whitefly.
b) TNZ have been researching potential agents, including *M. pygmaeus*, for greenhouse whitefly control since 2007, and have found no alternative agents suitable for use by the sector.
c) *M. pygmaeus* may be able to feed on TPP, but is not suitable for controlling TPP or the associated *Liberibacter* in greenhouses. This is because TPP needs to be kept at very low levels to prevent plant damage; therefore it is treated locally (on an individual plant) as it is identified. Greenhouse whitefly can be present without causing significant damage to the crop provided the level is kept low.
d) IPM from the perspective of greenhouse tomato growers involves pest monitoring and a range of techniques including beneficial insects, and soft and hard chemistry.
e) TNZ is aware that the use of organophosphate compounds (OPs) is incompatible with BCAs, but they need to retain access to chemicals such as dichlorvos (insecticide) for 'clean up' at the end of the growing season. TNZ consider that the current restrictions imposed on OPs mean that they cannot be used in greenhouses when the crop is present, even for localised control (on a single plant).
f) TNZ does not consider that the use of *M. pygmaeus* in greenhouses would result in any impediments to trade, and that existing screening programmes for TPP would detect any *M. pygmaeus* in tomatoes for export.
g) TNZ agree with the EPA staff report that *M. pygmaeus* will not have a significant impact on the environment, and note the submitters did not address the issue of significance.
h) TNZ is aware that *M. pygmaeus* was illegally released in New Zealand in 2007, and note that while large numbers of individuals were released none have been detected in New Zealand

since 2009, when MPI undertook an incursion response. This suggests that *M. pygmaeus* cannot establish in New Zealand; however no full scale survey has been carried out.

i) The economic analysis in the application was based on a confidential growers' survey, and used a baseline of continuing current practice. The benefits accrue from improved crop through reduced spraying rather than a change in the products sprayed. An additional possible benefit is use of *M. pygmaeus* to control *Tuta absoluta* (a leaf mining moth with strong preference for tomatoes), which is not currently present in New Zealand, but is a future risk to the industry.

EPA staff presentation

2.48 Dr Kate Bromfield, Senior Advisor New Organisms presented the EPA staff report, and highlighted areas of concern outlined in that report. Dr Bromfield discussed the modelling parameters and the potential for establishment of *M. pygmaeus*. She also touched on the effect *M. pygmaeus* might have on existing biological control programmes if it established widely, the value of the economic review undertaken by NZIER, and the human health benefits that could be achieved through use of *M. pygmaeus*. Following that, Dr Bromfield explained how risk and benefit were evaluated in the EPA's risk assessment.

2.49 Asela Atapattu, Applications Manager New Organisms, discussed the HSNO decision making framework, including the minimum standards and weighing risks and benefits.

NKTT presentation

2.50 Dr Nick Roskruge, deputy-chair of NKTT, spoke on behalf of NKTT. He reiterated the NKTT report, acknowledging the consultation prior to the application being lodged with the EPA, and in particular the use of a Māori reference group (MRG) to identify issues. Dr Roskruge highlighted the following concerns:

- there is a high potential for *M. pygmaeus* to establish outside of greenhouses, and a high level of uncertainty about what the effects of this would be, including effects on native whitefly
- releasing *M. pygmaeus* will compound issues on our ecosystems
- the economic benefits did not identify any benefit to Māori
- the application could have benefited from representing a wider applicant group.

2.51 Based on the information available, NKTT are of the view that the application should be declined.

DOC presentation

2.52 Dr Chris Green, Technical Advisor – Threats at DOC, reiterated the position that the application should be declined. He stated the reasons as being that *M. pygmaeus* is likely to establish widely and cause significant adverse effects on the environment, including displacement of native species, deterioration of natural habitats, and have adverse effects on New Zealand's inherent genetic diversity. Dr Green highlighted examples of 'at risk' native invertebrates such as *Pimeleocoris viridis*, a native mirid that is only found on a single host plant species in a small area near Kaitaia.

2.53 Dr Green noted that there is a poor understanding of endemic invertebrate fauna, and that this lack of knowledge coupled with the absence of any host range testing by the applicant contributed to the scientific and technical uncertainty associated with the application. Dr Green also noted that the use of a zoophytophagous predator, such as *M. pygmaeus*, as a BCA is not consistent with international best practice on the basis of 'biosafety risk', and approval of this application would compromise New Zealand's international scientific reputation and 'clean, green image'.

2.54 The Committee found Dr Green's presentation informative and gave particular regard to the views and information provided by DOC.

Information from submitters presented at the hearing

2.55 Eleven submitters appeared in person at the hearing and one submitter participated via telephone, all highlighting points from their submissions and responding to the EPA staff report.

Margaret Hicks (by telephone)

2.56 Margaret Hicks highlighted a number of concerns with the application, noting that commercial year-round growing practices provide the perfect breeding ground for pests. She expressed concern that success in Europe does not necessarily translate to success in New Zealand, and that *M. pygmaeus* is an inappropriate BCA to solve the whitefly problem because it will survive outside greenhouses. She noted that *M. pygmaeus* could become a pest, and it could wipe out native insects and have a flow-on effect on native birds. She concluded that TNZ have no idea what the long term effects might be and the rest of the country should not be put at risk to solve their issues.

Dr Nicholas Martin, retired entomologist

2.57 Dr Martin reiterated the points made in his written submission which opposed the release of *M. pygmaeus*. In particular Dr Martin noted that *M. pygmaeus* could establish widely and would not necessarily be limited to 'hairy plants' so it would find plenty of potential host plants in New Zealand. He also noted that there would be a wide range of endemic prey species available, including native predators, and species that are not well known or characterised. Dr Martin proposed that other options for controlling greenhouse whitefly should be explored, including crop hygiene, altering greenhouse environment to make use of *E. formosa* more reliable, and fungal BCAs.

Dr Jenny Dymock, Northland Regional Council

2.58 Dr Dymock noted that Northland is the area most likely to be significantly impacted by the release of *M. pygmaeus* as it is the area most suitable for establishment with respect to climate. Dr Dymock noted that there is extensive outdoor crop production in Northland and plenty of potential prey species, including native insects and introduced BCAs. She concluded that *M. pygmaeus* is likely to establish and there is insufficient understanding of its host and prey range to allow release, therefore the application should be declined.

Dr Margaret Stanley

2.59 Dr Stanley, a Senior Lecturer in biodiversity, biosecurity, and conservation at the University of Auckland, also opposed the release of *M. pygmaeus*. Dr Stanley noted that *M. pygmaeus* is a generalist predator, which will establish outside of greenhouses, and will likely adversely impact upon existing introduced biological control programmes, crop production, and native species and ecosystems. Dr Stanley also highlighted examples of other predator pests in New Zealand including wasps and Argentine ants, and outlined the potential consequences of indirect effects from *M. pygmaeus*.

2.60 The Committee noted the difference between invasive social insects like wasps and solitary insects like mirids such as *M. pygmaeus*.

Dr Nick Waipara, New Zealand Biosecurity Institute

2.61 Dr Waipara, spoke on behalf of Rebecca Kemp, President of the New Zealand Biosecurity Institute (NZBI). Dr Waipara restated the NZBI position that the application should be declined, as *M. pygmaeus* will escape from greenhouses, establish in the environment, adversely impact on non-target species, and reduce existing biocontrol programmes. NZBI believes that the applicant has not followed best practice in proposing the release of a generalist predator as a BCA.

Dr Oliver Sutherland, Ngāi Tahu

2.62 Dr Sutherland, speaking on behalf of Gerry te Kapa Coates who wrote the Ngāi Tahu submission, expressed appreciation to the applicant for their early engagement with Māori and co-funding of the Māori Reference Group, and acknowledged the strength and comprehensive nature of the DOC submission. Ngāi Tahu support use of IPM and alternatives to chemical control, however in this case there is little hard data to support TNZ claims that *M. pygmaeus* won't establish or cause adverse effects. Ngāi Tahu considers that there will be significant adverse effects on native species, therefore *M. pygmaeus* does not meet the minimum standards and should be declined.

Frank van Rijen, Rembrandt van Rijen Limited

2.63 Mr van Rijen spoke about the problems facing tomato growers, and in particular to his family owned and run business which employs 26 people. He noted that while they prefer natural pest controls and soft chemicals[2], they have not had great success controlling greenhouse whitefly using *E. formosa*; and they are finding whitefly increasingly resistant to sprays. The consequences of this include reduced crop quality and yield, and reduced plant health; and on a personal level, increased stress, adverse health effects and reduced business confidence. This situation would be greatly improved if an effective tool to control greenhouse whitefly, such as *M. pygmaeus* were to be approved for use in New Zealand.

[2] Soft Chemicals have low toxicity to humans and bees, for example horticultural soaps, spraying oils, and botanical insect growth regulators.

Don MacLeod, New Zealand Gourmet

2.64 Don MacLeod, spoke on behalf of submitter Roelf Schreuder, Gourmet Mokai. Mr MacLeod noted that New Zealand Gourmet is a global supplier, with markets around the world, producing a range of crops particularly tomatoes and capsicums in New Zealand. He spoke about the illegal importation of *M. pygmaeus* in 2007, which resulted in *M. pygmaeus* being sold to a number of tomato growers for the control of greenhouse whitefly for a 30 month period. He noted the distribution of over 95,000 jars of 1,000 insects each.

2.65 MPI undertook an incursion response for *M. pygmaeus* in 2009, and two successful prosecutions were laid in relation to the illegal import. Mr MacLeod noted that no information about the scale of the distribution of *M. pygmaeus* between 2007 and 2009 was included in the application or EPA staff report, and that while no monitoring for *M. pygmaeus* has been undertaken, *M. pygmaeus* does not seem to have established outside greenhouses. Therefore, Mr MacLeod considered that *M. pygmaeus* does not pose any risk to the environment and should be approved.

2.66 The Committee noted that there was no concrete information available regarding the extent of the illegal import and distribution, and no information had been brought forward through the application or the public submissions regarding the effectiveness of *M. pygmaeus* in controlling greenhouse whitefly during the period it was sold in New Zealand. The Committee considered that *M. pygmaeus* could be present at low levels, and detection of this organism in the wider environment at low levels would be very difficult. Furthermore, the Committee noted that MPI's incursion response in 2009 was a result of *M. pygmaeus* being illegally imported and distributed, not because MPI considered it was a pest at the time.

Tony Norton

2.67 Tony Norton talked about the challenges growers like himself face when trying to control greenhouse whitefly. Those challenges include greenhouse whitefly resistance to chemicals, need to limit spray applications, limited effectiveness of existing BCAs such as *E. formosa*, and increased demand for spray-free produce. Mr Norton asked that the application be approved.

Peter Silcock, Chief Executive, Horticulture New Zealand

2.68 Peter Silcock spoke in support of the application. He noted the importance of new tools to control pests for not only the greenhouse tomato industry, but also the other commercial fruit and vegetable growers represented by HortNZ. He also explained that BCAs such as *M. pygmaeus* are essential to the industry in meeting its strategic goals and market expectations for low or no chemical residues on produce.

John Thompson, BioForce Limited and Chemtest Laboratories Limited

2.69 John Thompson reiterated his support for the release of *M. pygmaeus*. He noted that growing tomatoes requires a daily presence in the greenhouse, and at present that means workers are exposed to the chemicals used to control pests. A reduced or chemical-free growing regime would

benefit both the workers through reduced chemical exposure, and the growers who can charge a premium for spray-free produce. In order to implement a reduced or spray-free growing regime the replacement system must be both easy to use and effective, and an effective system requires that multiple tools are available. A generalist predator such as *M. pygmaeus* has additional benefits, as it can be effective against a range of 'occasional pests' such as caterpillars and TTP, as well as the target pest. Mr Thompson also outlined how *M. pygmaeus* is used in Europe, noting that a supplementary diet (sugar) is used to support establishment in the greenhouse as it does not survive on plants only. Mr Thompson also noted that if the New Zealand tomato industry developed an effective BCA based IPM model, they would be used as a model for other industries in New Zealand and the world.

Mike Sim, BioBees

2.70 Mike Sim also spoke in support of the application, as he noted that a single BCA (*E. formosa*) is not sufficient to control greenhouse whitefly. He supported the release of *M. pygmaeus* as the best option for controlling greenhouse whitefly, explaining that there is no convenient, host-specific, effective alternative agent for use on tomatoes known anywhere in the world. Mr Sim also noted that entomopathogenic agents, such as fungal sprays, cannot be used in a preventative way (before the pest is established), and none that he is aware of are reliably effective. Mr Sim noted that most chemicals available to control greenhouse whitefly are not compatible with *E. formosa* or the bumblebees used for pollination.

Consideration of the application

Information available for the consideration of the application

2.71 The information available for the consideration comprised:

- the application and references provided therein
- the submissions received through public notification
- comments received from DOC
- the EPA staff report
- the Ngā Kaihautū Tikanga Taiao (NKTT) Report
- the NZIER Report
- information obtained during the hearing.

2.72 The Committee acknowledged that EPA staff, and a number of submitters, highlighted gaps in the information provided by the applicant. While some of those gaps were addressed by the EPA staff report, the written submissions, and presentations at the hearing, the Committee considered that some questions remained unanswered. The Committee noted that the applicant did not request an opportunity to provide further information, and considered that it was unlikely that additional information would become available. Therefore the Committee concluded that they must assess the application based on the information provided.

2.73 The Committee closed the hearing on 18 March 2014.

Matters considered

2.74 The application was considered in accordance with section 38 of the Act, taking into account the matters specified in sections 36 and 37, relevant matters in Part 2 of the Act, and the Methodology. The Committee took into account matters raised in submissions and at the hearing.

2.75 The following matters are addressed in this decision: the potential for *M. pygmaeus* to establish in New Zealand, the potential risk, costs and benefits of releasing *M. pygmaeus*, and the minimum standards for approval.

3. Potential for establishment in New Zealand

3.1 The Committee considered that in order to consider the potential effects of *M. pygmaeus*, they must first consider whether or not it could establish in New Zealand.

3.2 The Committee noted that the intended purpose of releasing *M. pygmaeus* is for use as a BCA for whitefly in greenhouses. They further noted that if the application were approved *M. pygmaeus* would not be confined to greenhouses, and would be able to be used for any purpose. In addition, the Committee noted that if used in greenhouses, there is a very high probability that *M. pygmaeus* would escape from greenhouses.

3.3 The applicant contended that *M. pygmaeus* may be able to survive in areas of the North Island for some parts of the year, but would only be able to establish in a small area north of Kaitaia. The applicant's contention was primarily based on CLIMEX[3] and habitat suitability modelling.

3.4 The EPA staff report outlined a number of concerns with the interpretation of the modelling, and argued that there is insufficient accurate data available to produce a reliable model. The EPA staff report concluded that the models indicated a wider geographical range with climate suitable of establishment of *M. pygmaeus* than asserted by the applicant. The Committee noted that DOC and a number of submitters also presumed that a wider extent of New Zealand would be climatically suitable for *M. pygmaeus* to establish. This was shown to be possible in the alternative CLIMEX modelling presented by Dr Logan at the hearing, which included a broader range of data.

3.5 The Committee acknowledged that there are a number of potential host plants such as *Solanum* spp, present in New Zealand that could facilitate the wide dispersal of *M. pygmaeus* throughout the country. The Committee also recognised that *M. pygmaeus* is polyphagous and there are a myriad of potential native and introduced invertebrate prey species in the New Zealand environment.

3.6 The Committee concluded that it is likely that *M. pygmaeus* would establish self-sustaining populations in the New Zealand environment, if released.

[3] CLIMEX is a model for predicting and mapping potential distribution of an organism based on climate similarities.

3.7 The Committee considered the potential for eradication of any such undesirable populations of *M. pygmaeus*. They concluded that while small localised populations could be killed using insecticides, it is improbable that *M. pygmaeus* could be eradicated if it established widely. This is due to the lack of a delimitation tool.

4. Assessment of risks, costs, and benefits

Positive effects

4.1 The Committee considered the potential positive effects (benefits) that could result if *M. pygmaeus* were released into New Zealand, focusing on effects on human health and safety, the environment, society and communities, relevant aspects of Māori culture and traditions, and the market economy.

4.2 The Committee noted the benefits outlined in the application and the EPA staff report; being the use of *M. pygmaeus* to control greenhouse whitefly, a reduction in potential exposure to chemical sprays, and economic benefits to the tomato sector.

4.3 The applicant proposed the release of *M. pygmaeus* to control greenhouse whitefly, as part of an IPM programme, stating that *M. pygmaeus* would be reared and periodically released into greenhouses in large numbers to achieve immediate control of whitefly when needed. Growers speaking in support of the application explained that greenhouse whitefly are becoming increasingly resistant to chemical control methods, and *E. formosa* is not entirely effective; therefore additional agents are needed. The applicant also stated that the use of *M. pygmaeus* to control greenhouse whitefly will "*reduce reliance on non-selective sprays*", thus reducing the potential adverse health effects in greenhouse workers.

4.4 The applicant's contention that *M. pygmaeus* will be an effective BCA against greenhouse whitefly appears to be based on the experience of the Dutch greenhouse tomato industry, which uses a range of BCAs, including *M. pygmaeus*, to control greenhouse pests without the use of sprays during the growing season. However, the Committee considers that the applicant did not provide concrete evidence to support these observations.

4.5 The Committee acknowledged that greenhouse whitefly is a significant problem for the greenhouse tomato industry, and that the industry would benefit from additional effective tools to manage this pest. The Committee accepted that effective biological control of greenhouse whitefly is likely to result in reduced use of chemical control methods, and subsequently reduced exposure to those chemicals for greenhouse workers. It may also benefit the tomato industry in enhancing their access to markets where consumers desire low or no chemical residue on their tomatoes.

4.6 The Committee noted that the applicant provided a confidential economic impact assessment, but noted that this was of limited value for the reasons set out in the EPA staff report and the independent review by the NZIER. The Committee accepted that there are potential economic benefits for both the New Zealand tomato industry, and associated industries such as BCA supply

companies. However the Committee considered that it was difficult to ascribe a value to the potential benefit based on the information available. They further considered that the potential benefits would accrue only for that limited section of the New Zealand population.

4.7 The Committee noted that other potential benefits were raised by some submitters at the hearing, such as potential for use as a control agent for TPP in potatoes, and other pest invertebrates. The Committee considered that there was little evidence present to corroborate those benefits, therefore did not consider those potential effects further.

Adverse effects

4.8 The Committee considered the potential adverse effects of the organism, including any risks and costs associated with the release of the organism, on human health and safety, the environment, society and communities, Māori culture and traditions, the principles of the Treaty of Waitangi (Te Tiriti o Waitangi), and the market economy. In considering the potential adverse effects the Committee noted that it is likely that *M. pygmaeus* will establish self-sustaining populations outside of greenhouses.

4.9 The applicant noted that *M. pygmaeus* feeds on a range of invertebrates beyond greenhouse whitefly, including aphids, two-spotted mite, insect eggs, caterpillars, thrips, and leaf miner larvae. However the applicant considered the potential adverse effects from feeding on natives and beneficial invertebrates would be limited due to its inability to establish self-sustaining populations outside the restricted areas indicated by the climate modelling, and limited dispersal outside highly modified environments.

4.10 The Committee noted that this assertion was countered by the EPA staff, DOC, and the following submitters: the Entomological Society of New Zealand, Landcare Research, Janet Taiatini, Margaret Hicks, Dr Margaret Stanley, the New Zealand Biosecurity Institute, the New Zealand Farm Forestry Association, Ngāi Tahu, Dr Nicholas Martin, and the Northland Regional Council.

4.11 The Committee considered that it is likely that *M. pygmaeus* would feed on a wide range of native and introduced invertebrate species outside of a greenhouse environment. They noted that *M. pygmaeus* feeding preferences appear to be density dependent, although no preference testing has been carried out on New Zealand native species, or existing introduced BCAs. The Committee considered that the level of impact *M. pygmaeus* feeding would have, at a population or species level, would depend on the individual species.

4.12 The Committee noted that *M. pygmaeus* requires suitable host plant material to complete its lifecycle, as it lays eggs in the stem of the host plant. The Committee also noted that *M. pygmaeus* is a phytophagous species, and will eat plant material if invertebrate prey is not available, however *M. pygmaeus* is unable to survive on plants alone.

4.13 The Committee noted that the potential adverse effects on native and valued species also result in potential adverse effects on the relationship of Māori to the environment through impacts on

indigenous invertebrates and plants, and because the principle of active protection is not provided for in this case.

4.14 The Committee noted the potential for *M. pygmaeus* to lay eggs in the stem of tomatoes, and the concern that this might impact on trade with some countries. The Committee noted that neither the applicant, nor any tomato growers present at the hearing believed that this would significantly impact on the health of the tomato plants, or limit their access to off-shore markets. Therefore the Committee did not consider this matter any further.

Weighing positive and adverse effects

4.15 The Committee considered that the potentially significant positive effects of releasing *M. pygmaeus* include the use of the organism as a BCA for greenhouse whitefly, and the subsequent economic and health benefits to the greenhouse tomato industry. The Committee considered that the potentially significant adverse effects of *M. pygmaeus* include off-target feeding on native and valued invertebrates.

4.16 The Committee found that based on the information available they were unable to assign specific values to the potential beneficial and adverse effects for the purpose of comparing and weighing those effects. However, the Committee considered that overall the potential positive effects did not outweigh the potential adverse effects; therefore the application must be declined.

5. Minimum standards for release

5.1 The Committee noted that in order to be approved the organism would also need to meet the minimum standards as set out in section 36 of the Act. The minimum standards specify that the shall be declined if it is likely to:

(a) cause any significant displacement of any native species within its natural habitat; or

(b) cause any significant deterioration of natural habitats; or

(c) cause any significant adverse effects on human health and safety; or

(d) cause any significant adverse effects to New Zealand's inherent genetic diversity; or

(e) cause disease, be parasitic, or become a vector for human, animal, or plant disease, unless the purpose is to import or release an organism to cause disease, be a parasite, or a vector for disease.

5.2 The Committee did not draw a conclusion on the minimum standards but noted that a number of submitters asserted that *M. pygmaeus* did not meet the threshold and would cause significant adverse effects. The Committee considered that there is limited information available regarding potential impacts on the environment, and in particular native species, on which to assess significance.

6. Decision

6.1 After reviewing all of the information contained in the application, the Committee is satisfied that the application met the requirements of section 34 of the Act. In any event, in accordance with section 59(3)(a)(ii), the Committee waives any information requirement that has not been met as requested by the applicant in its application.

6.2 In doing so the Committee acknowledge that there is a lack of information available regarding invertebrate biodiversity in New Zealand, and that such information would have been valuable in the consideration of this application. As such, the Committee recommends that more research be carried out in this area, and applauds any efforts to develop a more comprehensive knowledge and understanding of New Zealand ecosystems.

6.3 The Committee took account of all the available information and considered the application in accordance with section 38 of the Act, taking into account the matters specified in sections 36 and 37, relevant matters in Part 2 of the Act, and the Methodology. The Committee concluded that the application did not meet the threshold for approval under section 38 of the Act. Therefore the Committee decided to exercise its discretion and **decline** the application to release *M. pygmaeus* under section 38(1)(b)(ii) of the Act, as they consider that the adverse effects of the organism outweigh the positive effects.

6.4 The Committee is satisfied that this decision is consistent with the purpose of the Act.

6.5 The Committee would like to thank all the people who provided information that has been used in making this decision.

	17 April 2014
Kevin Thompson **Chair, Decision Making Committee** **Environmental Protection Authority**	**Date**