Environmental Protection Authority
Te Mana Rauhī Taiao

Decision

September 2018

Date	12 September 2018
Application code	APP203542
Application type	To import for release and/or release from containment any new organism under section 34 of the Hazardous Substances and New Organisms Act 1996
Applicant	Horehound Biocontrol Group
Date application received	15 May 2018
Date of Hearing	16 August 2018
Date of Consideration	16 August 2018
Considered by	A decision-making committee of the Environmental Protection Authority (the Committee)[1]: • Dr Louise Malone (Chair) • Dr Ngaire Phillips • Dr Kerry Laing
Purpose of the application	To release two moth species (*Wheeleria spilodactylus* and *Chamaesphecia mysiniformis*) for the biological control of horehound (*Marrubium vulgare*)
The new organisms approved	*Wheeleria spilodactylus* Curtis 1827 *Chamaesphecia mysiniformis* Boisduval 1840

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

Summary of decision

1. Application APP203542 to import for release and/or release two moth species, *Wheeleria spilodactylus* and *Chamaesphecia mysiniformis*, was lodged under section 34 of the Hazardous Substances and New Organisms (HSNO) Act 1996 (the Act). The aim of the application is to enable the release of the two moths as biocontrol agents for the plant horehound, *Marrubium vulgare*.

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

3. The Committee has **approved** the application in accordance with section 38 of the Act.

Application process

Application receipt

4. The application was formally received for processing on 15 May 2018.

Purpose of the application

5. The applicant, Horehound Biocontrol Group, applied to introduce two moth species, *Wheeleria spilodactylus* and *Chamaesphecia mysiniformis*, as biological control agents for the weed horehound (*Marrubium vulgare*).

Public notification

6. Section 53(1)(ab) of the Act requires that an application under section 38 of the Act must be publicly notified by the Environmental Protection Authority (EPA) if the application has not been approved under section 35.

7. The application was publicly notified by placing a notice on the EPA website on 29 May 2018.

8. 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 also directly notified. All these parties had an opportunity to comment on the application in accordance with section 58(1)(c) of the Act and clause 5 of the Methodology.

9. Section 59(1)(c) of the Act requires an application to be open for the receipt of submissions for 30 working days from the date of public notification. The submission period closed on 11 July 2018.

Submissions from members of the public

10. The EPA received 40 submissions during the public notification period.

11. Thirty-nine submitters supported the application. One submitter opposed the application.

Comments from MPI and DOC

12. In accordance with section 58(1)(c) of the Act, the Ministry for Primary Industries (MPI) and the Department of Conservation (DOC) were advised of, and provided with the opportunity to comment on, the application.

13. MPI supported the application. MPI noted the negative impact of chemicals on the environment and the long-term benefits biocontrol would offer.

14. DOC supported the application. DOC noted the high host specificity of the two moths. DOC however noted that they do not support a general approach of host testing undertaken on surrogate species only and not on New Zealand natives.

15. The Committee is satisfied that the submissions from DOC and MPI have been considered in making this decision.

Reports providing advice to the Committee

16. The EPA Staff Assessment Report was provided under section 58(1)(a) of the Act. It was published on the EPA website and the applicant and submitters were informed of its availability on 1 August 2018.

17. Ngā Kaihautū Tikanga Taiao (NKTT) elected not to prepare a report on the application.

Hearing

18. Section 60(c) of the Act requires that a hearing be held if a person who has made a submission stated in that submission that he or she wishes to be heard. Eight submitters indicated they wished to be heard.

19. Section 59(1)(d) of the Act requires that the hearing commence not more than 30 working days after the closing date for submissions. The hearing was held on 16 August 2018 at the Chateau on the Park, 189 Deans Avenue, Riccarton, Christchurch.

20. Peter Beyers and Sandra Clair (Artemis Brands Ltd), Daniel Maxwell (Hurunui Adverse Events Committee), David Black (Mendip Hills Stations), Simon Williamson (Federated Farmers of New Zealand Inc.), Matthew Taylor (Lorne Peak Station) and Donald Young appeared at the hearing to speak to their individual submissions. Donald Young presented the views of Denis Fastier who also submitted on the application.

21. Submitter Peter Barrett (Linnburn Station Ltd), who indicated that he wished to attend the hearing and speak to his submission, was not able to travel to the hearing from overseas in time. The Chair of the Decision-making Committee used her discretion and decided that Mr Barrett's submission would not be read at the hearing since he was not present to speak to the document.

22. The applicant was represented by Mr Gavin Loxton (Horehound Biocontrol Group) and Dr Ronny Groenteman (Manaaki Whenua Landcare Research).

Information available for the consideration

23. The information available for the consideration comprised:

- the application
- the EPA Staff Assessment Report
- submissions
- comments received from DOC and MPI

- information obtained during the hearing.

24. The Committee considered that it had sufficient information to assess the application. The Committee waived any requirements where the application may not have met legislative information requirements.

Matters for consideration

25. The Committee 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.

26. Each point is addressed in the following sections of this decision.

27. Specific points raised by submitters (either in their submission or during the hearing) are addressed where appropriate throughout this decision.

Summary of appearances and information discussed at the hearing

Presentations from the applicant party at the hearing

28. Gavin Loxton (Horehound Biocontrol Group) farms in the Mackenzie Region near Lake Tekapo. Mr Loxton noted that whilst they have always had horehound on the farm, horehound only became a serious problem when they switched to lucerne grazing in the mid-1990s. Lucerne is an efficient drought tolerant fodder plant. Chemicals are used to control horehound, although using small quantities of herbicides over large areas makes it difficult to calibrate spray rigs. The spraying of horehound leads to erosion because all herbicide non-tolerant plants are also killed.

29. Mr Loxton set up the Horehound Biocontrol Group in 2016 to find new solutions to control horehound. They applied successfully to the MPI Sustainable Farming Fund to obtain funding to progress the development of a biocontrol programme against horehound.

30. Horehound grows in low but also high fertility soils and has a huge seed bank. Farmers are shifting to lucerne in dryland farming to prepare for climate change. Horehound is unpalatable to stock and its burrs become stuck in the fleece of sheep.

31. Mr Loxton visited Australia on a number of occasions to study and visit horehound biocontrol sites. Horehound has not been eradicated from Australia as it can still be found in horse paddocks (for example). In Tasmania, Mr Loxton visited a horehound patch on a farm where they discovered the clearwing moth *Chamaesphecia mysiniformis* when the roots were dug up, indicating that the moth can survive in cooler climates.

32. Mr Loxton ended his presentation by noting that farmers need the two moths as there is no alternative option for control currently available.

33. Dr Groenteman noted that horehound has established in a number of locations worldwide. The only location where horehound is controlled by biocontrol agents that were intentionally released is Australia. The host specificities of the two moth species were tested in Australia in the 1990s. The test protocol followed the accepted method of centrifugal phylogenetic testing. Dr Groenteman identified a number of sub-families that are related to each other in the mint family. A number of culinary herbs are in the sub-family Nepetoideae; horehound is in a different sub-family, the Lamioideae. There are five native New Zealand species in the mint family, each is in a different genus, covering four different sub-families. One of the New Zealand native species is

also present in Australia and was tested. However, the other four are not and so the results of Australian tests with other species, closely related to each native species (same genus or tribe) were used in the applicant's assessment of the potential impact of the two moth species on non-target native species in New Zealand. The tested species were considered to be suitable surrogates and sufficiently representative of New Zealand species by Manaaki Whenua Landcare Research.

34. Dr Groenteman summarised the results of the testing by stating that results from the Australian experiments demonstrate the two moths are sufficiently host specific for introduction to New Zealand. No further tests were required on New Zealand native species and additional testing would not improve understanding of the host range of the two moths or make any significant contribution to the risk assessment of the two species.

35. Dr Groenteman next discussed the environmental impact of horehound. The two main environmental impacts of horehound relate to its chemical control. First, the herbicides that are used against horehound have long residual times. Second, the herbicides are non-specific and leave bare ground which causes erosion. Furthermore, these areas are readily recolonised by horehound, which has a large seed bank, germinates readily and can outcompete other plants. Mr Loxton noted that Roundup does not kill horehound. He added that metsulfuron is the most economically viable herbicide that is used against horehound.

36. Dr Groenteman noted the benefits and costs related to horehound biocontrol and considered who would bear the costs in New Zealand. Horehound control presents a conundrum to medical herbalists who value horehound for its medicinal properties and it has economic value to their businesses. Horehound, on the other hand, poses significant risks to, and economic impacts on farming operations and communities. The long term benefits to farmers from horehound biocontrol can be cautiously estimated based on a survey. There is a potential ceiling to the benefits of lucerne-based farming to farmers regionally as some farmers have indicated that they may choose to terminate lucerne farming if the horehound problem cannot be ameliorated. This will limit horehound expansion in the future. Further, the benefits of horehound biocontrol are proportional to the level of horehound suppression by the two moths. The economic impact on medical herbalists is difficult to estimate as there is little information about the value and size of horehound to the industry, how fast horehound populations would decline and whether this would adversely impact the supply of horehound.

37. The Committee asked the applicant if only one of the two agents established in New Zealand what effect would that have on efficacy. Dr Groenteman noted that climatically *W. spilodactylus* may do better in New Zealand compared with Australia because we have a wetter climate. In Tasmania, *C. mysiniformis* has established indicating that it may successfully establish in New Zealand too. She noted that there are other candidate insect species that could be introduced for control of horehound if these moths fail to establish or are ineffective, but the process for testing them would be longer than that needed for the two moths under consideration.

38. Dr Groenteman noted that small populations of the moths would be released first. Manaaki Whenua Landcare Research will work with Australian colleagues to identify release sites to optimise the chance of successful establishment.

Presentation by EPA Staff

39. Aubanie Raynal (Advisor, New Organisms) presented a summary of the EPA Staff Assessment Report focussing on the benefits, risks and costs of *W. spilodactylus* and *C. mysiniformis* and assessing the moths against the minimum standards in the HSNO Act. The staff assessment discussed the information provided in the application, information readily available in scientific

literature, and information submitted to the EPA via public submissions. The EPA staff assessed the potential benefits and positive effects of introducing the two moths, in particular the benefits to the environment and to the market economy. The report also considered potential risks and costs (adverse effects) associated with their introduction. The potential adverse effects assessed included the risk of the moths attacking non-target plants and adversely affecting food webs. The EPA also assessed the effects of the two moths on the relationship Māori have to their environment. The staff assessment concluded that the benefits of releasing the moths to control horehound outweigh any identified risks and costs. The staff assessment also concluded that *W. spilodactylus* and *C. mysiniformis* meet the minimum standards as stated in the Act.

Record and summary of presentations from submitters at the hearing

Peter Beyers, Operations and Finance Manager, and Sandra Clair, Founder, Artemis Brands Ltd

40. Artemis Brands manufactures products from medicinal plants sourced in New Zealand and around the world. The business has grown markedly, especially in Asia.

41. Mr Beyers noted that the release of the two moths would endanger the supply of horehound herb. Artemis appreciates that farmers have a different agenda than their own and are pleased to see alternative methods to herbicides are explored to combat horehound. However, they do not wish to see horehound disappearing from the environment if that was the consequence of the release of the two moths. The moths cannot be recalled once released. This may destroy other industries that use medicinal plants.

42. Horehound has a long history of treating coughs and respiratory illness in children and adults. Artemis sells a range of traditional medicinal remedies and currently uses horehound in products that open airways and improve breathing. Sales are growing rapidly with sales forecasted to be $3m within 18 months for one horehound-based tonic. Horehound growing in Central Otago has not been tested yet for its potency but is expected to show similar high levels of active constituents as have been found in thyme and St. John's wort grown in this area.

43. Mr Beyers noted the effects of the St John's wort beetle, a biocontrol agent against St John's wort, on the availability of St John's wort which is the key constituent of top-selling medicinal products for which Artemis has harvested the plant in Central Otago for over 20 years. The impact of the biocontrol agent against St. John's wort has reduced the volumes of herb that can be harvested. The beetle has been highly effective at reducing the availability of St. John's wort for harvesting in this region. Artemis believes that there is limited potential for building a commercial St. John's wort business due to the effects of the biocontrol agent. Mr Beyers further noted that the release of the two biocontrol agents against horehound could have similar detrimental effects. In terms of market opportunities, Mr Beyers noted there are limited market data available, however, indicative numbers were provided. In America, horehound was the top selling herbal supplement in 2016 with sales of US$126m, growing 9.3% over the previous year. In Asia-Pacific, there is growth in over-the-counter herbal remedies for cough, cold and respiratory disorders.

44. Artemis reiterated its concerns that it would not be able to establish a viable business using New Zealand-sourced horehound if the two moths are approved for release. They consider the release of the agents appears to be shortsighted, as in their opinion New Zealand should diversify its income base for industry, and they believe that horehound provides an opportunity in this respect.

45. Mr Beyers noted in response to a question from the Committee about access to, and production of, horehound that the plant is not grown on a commercial scale and Artemis does not have an appreciation of the market potential for growing horehound. He noted that Artemis is working with

sheep farmers, vineyard owners and, in some instances, DOC to access horehound but it does not have commercial relationships with these landowners. Horehound is harvested by hand.

46. Ms Clair noted that they harvest the flowering stage of the horehound plant which reduces the release of seeds. That has beneficial effects on neighbouring Merino farms.

47. In response to a questions from the Committee regarding integration of different management approaches to achieve horehound harvesting in certain areas when the biocontrol agents are released, Ms Clair noted that a biocontrol agent is indiscriminate and cannot be pulled back as was seen with St. John's wort. The biocontrol agents will eventually have effects on horehound everywhere. She further noted that harvesting may become unpredictable and difficult to organise once a biocontrol agent is released.

Daniel Maxwell, Hurunui Adverse Events Committee

48. Mr Maxwell, a meat and wool farmer in Cheviot, noted that North Canterbury's climate is prone to drought which is exacerbated by climate change. Dryland farmers in North Canterbury grow lucerne to mitigate drought effects. Lucerne flourishes in dry conditions and provides high quality feed for longer periods than traditional pasture grasses. Horehound has become more widespread during and after North Canterbury's recent three-year drought.

49. Horehound is a problematic weed for farms in the Hurunui District. When lucerne is dormant in the winter horehound plants establish and grow out of control. Lucerne paddocks which were expected to last for ten years when sown fail well before then as horehound takes over. Current options to control horehound in lucerne are inefficient. Grubbing is time consuming, expensive and frustrating as horehound plants reappear in those areas within 12 months. Spot spraying costs $70/ha annually. This is expensive and puts lucerne at risk. Mr Maxwell presented a number of examples where horehound has been unsuccessfully controlled using chemical or physical measures in pastures. Horehound has significant adverse effects on wool because the plant produces seeds that get into wool and are extremely difficult to remove. This can devalue the wool by as much as 50%.

50. The financial impact of horehound on the local and national economy is high. It cannot be managed economically and practically in lucerne. The Hurunui Adverse Events Committee and Hurunui Dryland Landcare Group believe for continued successful establishment of lucerne a biological control against horehound is desperately needed.

51. Following a question from the Committee, Dr Groenteman noted that the estimated $6.85m per year costs associated with horehound is a gross underestimate. It is the minimum projected costs associated with horehound presently.

52. Mr Maxwell noted the emotional impact on farmers and stress horehound causes. Horehound is the single biggest issue holding lucerne development back.

David Black, Mendip Hills Station

53. Mr Black farms 300 ha of lucerne in north Canterbury. Lucerne tap roots can grow up to 3 m deep. If it rains in winter, farmers can grow fodder well into summer without receiving any rain in summer. An inch of rain on lucerne converts to one tonne of dry matter, whereas, an inch of rain on pasture converts to nothing when pasture is dead due to drought. Lucerne grows optimally at 30^{o}C and pasture at 20^{o}C.

54. New Zealand is getting hotter. Access to fodder plants with deep tap roots is important to mitigate the effects of climate change. Lucerne is also a very efficient fixer of nitrogen.

55. Horehound has appeared in the lucerne on his farm. It is impossible to manage the horehound with currently available methods. Stock will not eat horehound as it is unpalatable.

56. Mr Black explained that farming is a multi-generational family business for him and that he sees lucerne as an important way to lift productivity in the face of climate change so that he can leave a viable business to the next generation.

Simon Williamson, President North Otago and Chair South Island High Country, Federated Farmers of New Zealand

57. Horehound is a serious weed and probably the most serious weed to-date that is not a tree. It has been spreading rapidly over the last five to six years, especially given the three years of drought they have experienced in the region. Horehound will taint the meat of sheep with repercussions for the meat industry. Its burrs make it easy to spread in fleece, allowing it to be dispersed from hill country into paddocks. It devalues the price of wool dramatically. In Mr Williamson's case, they are paid $11 to $12 per kg clean wool, however, with up to 3 to 4% vegetable matter the wool is devalued to $6 per kg. There are extra processing steps required to remove the horehound material. Mohair becomes valueless as horehound burrs cannot be removed from the hair of Angora goats.

58. Horehound has been found to be particularly invasive on fertile ground such as in sheep camps. It has adverse effects on native biodiversity. Mr Williamson noted whilst on a recent visit to Bendigo Station in Central Otago on Department of Conservation land he observed thick infestations of horehound compared to minor infestations four to five years ago.

59. Horehound on hills is sprayed with metsulfuron by helicopter at a huge cost to farmers. The withholding period of re-sowing after metsulfuron application is 18 months. Metsulfuron is non-selective and kills clovers, grasses and other woody weeds. After 18 months, following re-sowing, horehound is the first plant to grow back.

60. Horehound is known as a medicinal herb. Mr Williamson noted there is no information available on how much horehound is processed each year for this use in New Zealand. The biocontrol programme in Australia has not had negative impacts on the availability of horehound for medicinal use.

Matthew Tayler, Lorne Peak Station

61. Mr Tayler farms in Southland. He noted that in the last five years they have established 300 ha of lucerne in response to a challenging climate alongside poor persistence and profitability of traditional pasture species. He further noted that they will establish an additional 300 ha lucerne over the next three years. Lucerne confers a number of benefits, including a reduction in the reliance on nitrogen fertilisers since lucerne fixes nitrogen and is superior in that respect to white clover in drier climates, it preserves soil structure, enhances soil organic matter and reduces soil erosion. He also noted that lucerne results in more efficient lamb growth. Growing lucerne is a better option than irrigating or developing high country pastures on his farm.

62. Horehound has always been present on the hills in limited amounts and has only marginally impacted on quality of their wool clip. However, Mr Tayler went on to state that in the last two years they had to start controlling horehound in lucerne. In 2017 they spent approximately 12 hours grubbing and applying herbicide prills to horehound in 20 ha of lucerne. A year later it was present in 50 ha of their oldest lucerne and required 20 hours of control. He anticipates that at least 150 ha will need attention in the coming season whilst the infestation in the first 50 ha is becoming thicker. Mr Tayler noted that control of horehound, which would eventually infest the

600 ha of lucerne established after three years since it is expanding at an exponential rate, will be uneconomic and infeasible. Mr Tayler believes the cost of horehound becoming widespread has been substantially understated at $6.85m.

63. Mr Tayler noted that isolation and confined growing areas, for example tunnel houses, along with limited insecticide use to control the two moths would enable horehound to be grown for medicinal use.

64. Mr Tayler concluded the biocontrol agents of horehound are essential to allow farmers to respond to climate change by transitioning to more suitable forage species such as lucerne.

65. Mr Tayler responded to a question from the Committee that if lucerne does not remain a viable crop because of horehound infestation what other crops can farmers grow that would be resilient to horehound. He noted that farmers would need to irrigate their pastures with significant capital cost in the absence of a dryland fodder. He further noted that they would have to pair a legume with grass to fix nitrogen as most grass pastures are nitrogen deficient.

Donald Young

66. Mr Young presented on behalf of himself and Denis Fastier who also submitted on the application.

67. Mr Young noted that progressive farmers are having the most problems with horehound due to the shift to lucerne pastures. Horehound is the worst weed on Mr Young's farm in the Cromwell district. It is invading dry land lucerne and steep sunny gullies. Metsulfuron spraying kills horehound but it also kills other plant species. Horehound grows back first after spray. He has written off 10 or 12 ha because he cannot compete with horehound. He farms a 5000 head flock of Merino sheep. It is very difficult to keep the sheep away from horehound burrs which contaminate wool. Merino wool buyers use this as a reason to drive down the price. Mr Young also noted that horehound taints meat and that this could have a significant impact on New Zealand meat's reputation in export markets.

Final questions to the applicant from the Decision-making Committee

68. Dr Groenteman (Manaaki Whenua Landcare Research) noted in response to a question from the Committee that they have two sites where they are monitoring populations of horehound. The monitoring pre-approval of the biocontrol agents allows for baseline data of horehound abundance to be captured. Dr Groenteman further noted that Manaaki Whenua Landcare Research has developed a protocol to monitor the release, establishment and dispersal of biocontrol agents and that they will use the protocol to monitor the two moths.

69. The hearing was adjourned and closed on 16 August 2018.

70. The Committee would like to thank all people who submitted the information that was used in making this decision. Public submissions provide a focus for the Committee on points that need clarification, and the Committee found the submissions and the applicant's responses very helpful in its consideration of the application.

Organisms description

71. The organisms approved for release are:

Taxonomic Unit	Classification
Class	Insecta
Order	Lepidoptera

Family	Pterophoridae
Genus	*Wheeleria*
Species	*spilodactylus* (Curtis, 1827)
Common name	horehound plume moth

Taxonomic Unit	Classification
Class	Insecta
Order	Lepidoptera
Family	Sesiidae
Genus	*Chamaesphecia*
Species	*mysiniformis* (Boisduval, 1840)
Common name	horehound clearwing moth

Inseparable organisms

72. No inseparable organisms associated with *W. spilodactylus* and *C. mysiniformis* were identified.

Assumptions for risk assessment

73. The Committee noted that there is uncertainty about whether or not *W. spilodactylus* and *C. mysiniformis* will successfully establish, disperse to horehound populations and have an impact on populations of the weed in the New Zealand environment. The Committee considered that if neither moth establishes, there will not be any significant effects from their release. Conversely, if *W. spilodactylus* and *C. mysiniformis* successfully establish any effects would be at their greatest. Therefore, the Committee assessed the benefits and risks and the minimum standards associated with the release of the two moths based on the establishment of self-sustaining populations of both moths in the environment.

Identification and assessment of potentially significant adverse effects

74. The Committee considered the potential risks and costs of the release of *W. spilodactylus* and *C. mysiniformis*, including any potentially significant adverse effects on the environment, public health, people and communities, the market economy, and Māori culture, traditions, and the principles of the Treaty of Waitangi (Te Tiriti o Waitangi).

Potential adverse effects on the environment

75. The Committee considered the potential for *W. spilodactylus* and *C. mysiniformis* to cause adverse effects if the actions by the moths damage and reduce populations of native plants and interfere with trophic webs.

Risks to non-target including native plants

76. The Committee considered the host range experiments that had been undertaken to examine if *W. spilodactylus* and *C. mysiniformis* could feed and reproduce on non-target plants.

77. The Committee noted that host range tests, which were conducted in Australia, included a number of plants taxonomically related to horehound as well as plants of economic importance.

The Committee further noted that of the five native New Zealand species in the same family as horehound, only one species was tested for its susceptibility to the two moths. Species in the same genera as the four natives were tested and they were identified as appropriate surrogate species for the New Zealand species. The Committee questioned the applicant regarding its decision not to pursue additional testing with New Zealand native species at the hearing, upon which Dr Ronny Groenteman from Manaaki Whenua Landcare Research answered they considered the Australian testing to be sufficiently robust to adequately circumscribe the host range of both moths.

78. The Committee noted the host range testing demonstrated that there are no native species related to horehound that would be at risk from the introduction of the two biocontrol agents. The Committee also noted the moths have shown no adverse effects to date on non-target plants in Australia, where they were released more than 20 years ago.

79. The Committee concluded that native New Zealand plants are not at risk of attack by *W. spilodactylus* and *C. mysiniformis*.

Interference with ecosystem interactions and food webs

80. The Committee considered the role of horehound as a source of food and ecosystem services to invertebrate fauna in New Zealand. Dr Groenteman noted that a report on the invertebrate fauna associated with horehound in New Zealand was recently completed and said that a total of 39 herbivore species were found on horehound vegetation, albeit at low numbers. The exotic sage leaf hopper was the only insect that was found at high numbers. No native species was found to benefit from horehound and a few species of predators and parasitoids were surveyed, although they were present at very low numbers. It was concluded that the horehound ecosystem does not support significant complex food webs.

81. The Committee noted that biological control of horehound is unlikely to have adverse effects on invertebrates which may use horehound occasionally for food or shelter. The Committee noted that *W. spilodactylus* and *C. mysiniformis* may take time to establish in the New Zealand environment and any impacts on horehound vegetation will be gradual, allowing other insects to switch to neighbouring plants for food or shelter.

82. The Committee considered that there are no native *Wheeleria* or *Chamaesphecia* moths present in New Zealand. It is therefore unlikely that the two biocontrol agents will cross-breed naturally with native insects.

83. The Committee concluded that the release of *W. spilodactylus* and *C. mysiniformis* is unlikely to have adverse impacts on ecosystem interactions and food webs.

Potential adverse effects on the economy

84. The Committee considered the potential of the two agents to reduce the availability of horehound vegetation for use by herbalists and thereby adversely affect the New Zealand medical herbal industry.

85. The Committee noted that the release of the two moths will help to reduce populations of horehound rather than eradicate it. The moths would need to be used in conjunction with other control methods to be highly effective in pastoral and hill country environments. In unmanaged habitats, the two biocontrol agents would be the only means of controlling horehound and are not likely to lead to significant reductions in horehound vegetation, allowing herbalists to continue to collect foliage. The Committee further noted that farmers (and others) and herbalists could come

to agreements regarding access to and management of horehound infested areas to allow harvesting.

86. The Committee considered that currently there is little information on whether or not there is a competitive market available for New Zealand horehound. The market potential is based on the premise that locally sourced horehound would be highly valued internationally.

87. The Committee concluded that the release of *W. spilodactylus* and *C. mysiniformis* is unlikely to have adverse effects on the New Zealand medicinal herbal industry.

Potential adverse effects on Māori culture, traditions, and Te Tiriti o Waitangi

88. The Committee took into account the possible 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, and the principles of the Treaty of Waitangi (Te Tiriti o Waitangi).

89. The Committee noted that the applicant engaged with Māori via regional consultation with iwi and Treaty Settlement authorities in the South Island, the Ngāpuhi and Ngāi Tahu HSNO Committees, via the EPA's Te Herenga network and a Māori Reference Group convened in 2015 to deliberate on the key cultural principles that apply to biocontrol applications. The Committee considered the application to be broadly consistent with the principles of the Treaty of Waitangi (Te Tiriti o Waitangi) including the principle of active protection.

90. The Committee noted that no risks to native or taonga species, ecosystems and traditional Māori values, practices, health and well-being were identified in the application.

91. After assessing all the information, the Committee did not identify any 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.

Potential adverse effects on public health and people and communities

92. The Committee did not identify any significant adverse effects on public health and people and communities from the application to release *W. spilodactylus* and *C. mysiniformis*.

Identification and assessment of potentially significant beneficial effects

93. The Committee considered the potential benefits of the release of *W. spilodactylus* and *C. mysiniformis*, including any potentially significant beneficial effects on the environment, public health, people and communities, the market economy, and Māori culture, traditions, and the principles of the Treaty of Waitangi (Te Tiriti o Waitangi).

Potential benefits to the environment

94. The Committee considered whether *W. spilodactylus* and *C. mysiniformis* would reduce the size and density of horehound populations, which will reduce the ability of the weed to spread within existing sites and to new habitats.

95. The Committee also considered whether control of the weed by the two agents will lead to significant reductions in herbicide use.

Limiting the risk of the spread of horehound and invasion into new sites will improve biodiversity values

96. The Committee considered that through the action of the two agents on horehound plants the expansion of horehound into unmanaged and natural habitats would be curtailed. The Committee noted that horehound has not yet reached its full range in New Zealand and the use of the two moths is likely to decrease its entry into and rate of invasion of ecologically sensitive habitats, e.g. tussock, which border hill country farming areas in Canterbury, Otago and Southland.

97. The Committee noted the introduction of the two moths had adversely impacted the numbers of flowers and seeds of horehound in pastures in Australia.

98. The Committee concluded that it is likely the release of *W. spilodactylus* and *C. mysiniformis* would reduce the vigour and abundance of horehound in New Zealand, thus reducing its progressive invasion of new habitats and sustaining biodiversity in sensitive habitats which may be at risk from future horehound infestation.

Reductions in herbicide use

99. The Committee noted the comments received from farmers regarding the use of metsulfuron to control horehound in pastures. Metsulfuron is non-selective and a significant cost to farmers. Its application can trigger erosion and horehound routinely grows back first after application.

100. The Committee noted that whilst biocontrol by the two moths is likely to lead to reductions in herbicide applications, they did not consider that significantly less metsulfuron would be used once the two moths are released. However, they noted that in the absence of a sustainable control method, such as biocontrol, herbicide use would eventually increase where horehound expands its range.

101. The Committee commended farmers for considering the impact of climate change on their farming practices, the role of nitrogen fixation and ecosystem-wide effects from horehound control.

102. The Committee concluded that the release of *W. spilodactylus* and *C. mysiniformis* would have future beneficial environmental effects by reducing collateral damage from the use of herbicides that can kill native or other beneficial plants that support ecosystems.

Potential benefits to the market economy

103. The Committee considered the economic benefits of the release of the two moths to be the reduction in the invasion of productive land by horehound concomitantly reducing production losses. The Committee also considered whether or not the release of the two moths would reduce damage to wool from matting with horehound burrs.

104. The Committee considered the submissions from farmers which noted that horehound is adversely affecting productivity of their pastures. The Committee noted the release of the two moths is likely to reduce infestations of pastoral areas and, as a result, support legume crops including lucerne to grow livestock on.

105. The Committee noted that horehound burrs contaminate sheep fleece. The wool must be cleaned first before it can be processed. This adds an extra cost to the processing of wool which diminishes the value of wool.

106. The Committee considered that there are likely to be benefits to sheep farmers from the control of horehound by *W. spilodactylus* and *C. mysiniformis*. The Committee considered these benefits will vary across different areas, based on horehound abundance and controls that are being employed.

107. The Committee concluded that there would be benefits to the market economy from the biological control of horehound.

Potential benefits to people and communities

108. The Committee noted the large number of farmers, local residents and community groups that supported the application across Canterbury, Otago and Southland. The Committee deemed that the release of the two moths would benefit people and their communities who are impacted by the effects of horehound on farms. The Committee noted the submitters' contention that having biological control as an option for horehound control would reduce the stress farmers currently endure in dealing with this weed. They also noted submissions from farmers describing how increased farm profitability from growing lucerne had enabled them to employ more workers and add vitality to declining rural communities, and that effective horehound control would allow this to continue.

Potential beneficial effects on public health and on Māori and their relationship with the environment

109. The Committee did not identify direct benefits to public health or benefits that relate to Māori and their relationship with the environment specifically.

Weighing of beneficial and adverse effects

110. The Committee concluded that the potential risks and costs of releasing *W. spilodactylus* and *C. mysiniformis* are **negligible** while the potential benefits are **non-negligible**.

111. Therefore, the Committee found the benefits outweighed the risks of releasing *W. spilodactylus* and *C. mysiniformis.*

Minimum Standards

112. The Committee considered whether *W. spilodactylus* and *C. mysiniformis* meet the minimum standards as specified in section 36 of the Act; specifically whether *W. spilodactylus* and *C. mysiniformis* could:

(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.

Potential to cause significant displacement of any native species within its natural habitat

113. The Committee considered the potential for *W. spilodactylus* and *C. mysiniformis* to cause significant displacement of any native species within their natural habitats.

114. The Committee considered that this could occur if the moths attacked non-target plants. The Committee noted host range testing on *W. spilodactylus* and *C. mysiniformis* showed that there are no native plant species related to horehound that would be at risk from the introduction of the two biocontrol agents.

115. The Committee further noted that it is unlikely for *W. spilodactylus* and *C. mysiniformis* to have significant indirect effects on ecosystems including food webs where they would establish in or around horehound stands. Horehound was found not to support native ecosystems and there is only a limited diversity and number of insect species that use horehound vegetation for food or shelter in New Zealand.

116. The Committee concluded that *W. spilodactylus* and *C. mysiniformis* are not likely to cause significant displacement of any native species within its natural habitat.

Potential to cause significant deterioration of natural habitats

117. The Committee considered the potential for *W. spilodactylus* and *C. mysiniformis* to cause significant deterioration of natural habitats.

118. The Committee noted the two moths are specific to horehound and there are no native species in the same genus in New Zealand. The Committee further noted it is unlikely for *W. spilodactylus* and *C. mysiniformis* to have any significant indirect adverse effects on ecosystems and food webs as any effects are likely to be constrained to horehound populations which does not support native biodiversity or ecosystems in New Zealand.

119. The Committee concluded that the effects of the two moths on horehound biomass are unlikely to cause significant deterioration of natural habitats.

Potential to cause significant adverse effects on human health and safety

120. The Committee considered the potential for *W. spilodactylus* and *C. mysiniformis* to cause significant adverse effects on human health and safety. The Committee noted that there are no known mechanisms of interaction between humans and the agents

121. The Committee concluded that *W. spilodactylus* and *C. mysiniformis* are not likely to cause any significant adverse effects on human health and safety.

Potential to cause significant adverse effects on New Zealand's inherent genetic diversity

122. The Committee considered the potential of *W. spilodactylus* and *C. mysiniformis* to cause adverse effects on New Zealand's inherent genetic diversity. The Committee considered that this could occur through cross-breeding with native *Wheeleria* or *Chamaesphecia* moths.

123. The Committee noted that there are no native *Wheeleria* or *Chamaesphecia* moths present in New Zealand. Therefore, the Committee considered that *W. spilodactylus* and *C. mysiniformis* will not be able to cross-breed with any New Zealand species.

124. The Committee concluded that *W. spilodactylus* and *C. mysiniformis* are not likely to cause any significant adverse effect to New Zealand's inherent genetic diversity.

Potential to cause disease, be parasitic, or become a vector for disease

125. The Committee considered the potential for *W. spilodactylus* and *C. mysiniformis* to cause disease, be parasitic, or become a vector for human, animal, or plant disease, resulting in damage to species other than horehound.

126. The Committee noted that neither agent is known to cause disease or become a vector for animal, plant or human disease in their native range.

127. The Committee concluded that neither *W. spilodactylus* nor *C. mysiniformis* is likely to cause disease, be parasitic, or become a vector for disease.

Conclusion on the minimum standards

128. The Committee was satisfied that *W. spilodactylus* and *C. mysiniformis* meet the minimum standards set out in section 36 of the HSNO Act.

Ability of the organisms to establish undesirable self-sustaining populations

129. In accordance with section 37 of the Act and clauses 10(e) and (f) of the Methodology, the Committee took into consideration the ability of *W. spilodactylus and C. mysiniformis* to form undesirable self-sustaining populations, and the ease of eradication of such populations.

130. The Committee noted that the intention of the importation and release of *W. spilodactylus and C. mysiniformis* is to establish and develop self-sustaining populations, in order to control horehound. Further, they considered that in order for a self-sustaining population of *W. spilodactylus* or *C. mysiniformis* to be undesirable, it would need to cause undesirable adverse effects.

131. The Committee considered that any population of *W. spilodactylus and C. mysiniformis* will be desirable since that is the foundation of a classical biological control strategy, and that neither agent would be likely to cause adverse effects in the New Zealand environment.

132. The Committee concluded that it is highly improbable that *W. spilodactylus and C. mysiniformis* would form undesirable self-sustaining populations.

Achieving the purpose of the Act

133. The purpose of the Act is to protect the environment, and the health and safety of people and communities, by preventing or managing the adverse effects of hazardous substances and new organisms (section 4 of the Act).

134. In order to achieve the purpose of the Act, when considering the application the Committee recognised and provided for the following principles (section 5) of the Act:

a. the safeguarding of the life-supporting capacity of air, water, soil and ecosystems

b. the maintenance and enhancement of the capacity of people and communities to provide for their own economic, social and cultural well-being and for the reasonably foreseeable needs of future generations.

135. The Committee took into account the following matters when considering the application in order to achieve the purpose of the Act (sections 6, 7 and 8 of the Act):

a. the sustainability of all native and valued introduced flora and fauna

b. the intrinsic value of ecosystems

c. public health

d. the relationship of Māori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, valued flora and fauna, and other taonga

e. the economic and related benefits and costs of using a particular hazardous substance or new organism

f. New Zealand's international obligations

g. the need for caution in managing adverse effects where there is scientific and technical uncertainty about those effects

h. the principles of the Treaty of Waitangi (Te Tiriti o Waitangi).

136. The Committee is satisfied that this decision is consistent with the purpose of the Act and the above principles and matters. Any substantive issues arising from the legislative criteria and issues raised by submitters have been discussed in the preceding sections of this decision.

Decision

137. After reviewing all of the information contained in the application, the Committee was 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.

138. The Committee considered that the threshold for approval under section 38 of the Act has been met. It is satisfied that the organisms meet the minimum standards set out in section 36 of the Act, and that the beneficial effects of the organisms outweigh the adverse effects of the organisms, taking into account all of the following:

- all the effects of the organisms and any inseparable organisms,
- the matters in section 37 of the Act,
- the relevant matters in Part 2 of the Act; and
- the Methodology.

139. The Committee decided to exercise its discretion and **approve** the import for release and/or release from containment of *Wheeleria spilodactylus* and *Chamaesphecia mysiniformis* under section 38(1)(a) of the Act. The Committee noted that in accordance with section 38(2) of the Act, the approval has been granted **without controls**.

140. The Committee noted that under section 38(3) of the Act, if *Wheeleria spilodactylus* and *Chamaesphecia mysiniformis* have not been released within five years of the date of this decision, this approval for release will lapse. However, any person may apply before the expiry of the time limit for an extension of that time limit for a further period of up to five years.

141. The Committee has waived the requirement under section 38(4) of the Act, to notify the Authority of the release of *Wheeleria spilodactylus* and *Chamaesphecia mysiniformis*.

Environmental Protection Authority
Te Mana Rauhī Taiao

12 September 2018

Dr Louise Malone Chair, Decision Making Committee Environmental Protection Authority	**Date**

Organisms	Approval code
Wheeleria spilodactylus Curtis	NOR100166
Chamaesphecia mysiniformis Boisduval	NOR100167