



Environmental
Protection Authority
Te Mana Rauhi Taiao

EPA Advice to the Committee

Release of two rust fungi isolates,
Puccinia lantanae and *Prospodium
tuberculatum*, for the biological control of
lantana, *Lantana camara*

March 2012

1. The application process

Purpose of this document

- 1.1. In December 2011, the Northland Regional Council (NRC) made an application to the Environmental Protection Authority (EPA) seeking to release biological control agents to control lantana. The intention of the application is the release of two rust fungi, *Puccinia Lantanae* and *Prospodium tuberculatum* as biological control agents for lantana, *Lantana camara*, all three of which are native to South America.
- 1.2. This document is produced by the EPA to facilitate the decision making process. The document discusses information provided by the applicant, the submitters and other readily available sources.

Submission Process

- 1.3. Application APP201171 was publicly notified as required by section 53(1) (b) of the Hazardous Substances and New Organisms (HSNO) Act. The 30 working day notification period began on 13 December 2012, and closed 21 February 2012.
- 1.4. The EPA asked submitters to provide information, make comments and raise issues, particularly with regard to the following matters:
 - Methodology of the host range testing;
 - Risks other than those identified in the application; and
 - Benefits other than those identified in the application.
- 1.5. All submissions are summarised in Appendix 1.

Application Summary

- 1.6. Northern Regional Council (NRC) considers lantana to be an invasive weed of bush edges, pasture, roadsides, and wasteland where it displaces other vegetation.
- 1.7. NRC has been conducting research into the potential for two rust fungi to act as biocontrol agents for lantana. They have provided evidence that these act effectively on lantana and are virtually host specific (attack only *Lantana camara* and *Verbena officinalis*). They are confident that introduction of these rusts pose little risk to the New Zealand environment.

2. The organisms proposed for release

Background on *Puccinia lantanae*

- 2.1. *Puccinia lantanae* is a damaging pathogen of leaves, petioles and stems. It is likely to cause stem dieback and produce areas of dead tissue in stems and leaf stalks. Field observations in South America suggest that this species will prefer, and may be restricted to, warmer wet areas in the far north of New Zealand. *Puccinia lantanae* is wind borne and can cause significant damage to lantana.

Background on *Prospodium tuberculatum*

- 2.2. *Prospodium tuberculatum* is predominantly a leaf pathogen, causing leaf-death and defoliation. It is wind-borne, sub-tropical and is expected to be less dependent on high humidity and/or high rainfall. It has a wide geographical and altitudinal distribution in South America which suggests it can adapt to a range of sub-tropical climates.

3. Risks

- 3.1. The EPA considered all the possible risks associated with the release of these rusts. These include risks to: human health; environment; economy; society; and culture.
- 3.2. Biological control agents can take many years to establish widely and have an impact on the target species. There is uncertainty about whether these rusts will establish and disperse successfully, and how long this will take. If they do not establish, it can be assumed that there will be no effect (adverse or beneficial) from the release. Conversely, if they successfully establish, effects will occur at the highest level. Therefore, in conducting this risk assessment we have assumed that *Puccinia lantanae* and *Prospodium tuberculatum* will become widely established.

Host range testing

- 3.3. We have examined the host range testing information provided by Landcare Research on behalf of the applicant (See sections 2 and 4 of the application). Landcare Research has internally peer reviewed this information and we are satisfied that Landcare Research has appropriate scientific expertise and track record to make this information sufficiently robust.
- 3.4. It is generally accepted worldwide that targeted biological control is an effective means of contributing to weed management. The applicant has used an internationally accepted method of host range testing to ensure that there will not be any detrimental impacts on the New Zealand biota, and has included some New Zealand specific assessments of the effects

on native flora. The EPA is satisfied with the rigour of the host-range testing presented by the applicant and accepts that no native New Zealand species will be affected by the release of either of the rusts.

- 3.5. DOC considers the natives *Teucrium parvifolium* and *Vitex lucens* belong to Verbenaceae along with Lantana. This is debated by Paynter 2007, who noted that while they were once in Verbenaceae, they have recently been assigned to a Lamiaceae. Ellison and Cortat (2011) also assigned *T. parvifolium* and *V. lucens* to Lamiaceae.
- 3.6. Both DOC and the EPA are satisfied that despite differences in the taxonomic classification of these natives, *T. parvifolium* was tested directly for target effects and does not act as a host to either *Puccinia lantanae* or *Prospodium tuberculatum*, and the use of *Vitex trifolia* was a suitable surrogate to use for testing the susceptibility of *V. lucens* to either rust.
- 3.7. Based on the host range testing we are satisfied that *Puccinia lantanae* and *Prospodium tuberculatum* would not damage any native or valued flora.

Risks

- 3.8. The applicant and the submitters have provided us with identification of risks from the release of *Puccinia lantanae* and *Prospodium tuberculatum* and these are analysed in Appendix 2.
- 3.9. Based on the host range testing we are satisfied that the risks from the release of *Puccinia lantanae* and *Prospodium tuberculatum* to human health, environment, economy, society and culture are negligible.

4. Minimum standards

- 4.1. The EPA assessed whether *Puccinia lantanae* and *Prospodium tuberculatum* are likely to cause the following effects:
 - Significant displacement of any native species within its natural habitat;
 - Significant deterioration of natural habitats;
 - Significant adverse effects on human health and safety;
 - Significant adverse effects on New Zealand's inherent genetic diversity; or
 - Could cause disease, be parasitic or become a vector for human, animal or plant disease, unless the purpose is to cause disease, be parasitic or become a vector for human, animal or plant disease.

- 4.2. The EPA considers that both *Puccinia lantanae* and *Prospodium tuberculatum* meet the minimum standards. The EPA notes that both rusts are intended to cause disease in plants and that this does not prevent them from being approved for release.

5. Benefits

- 5.1. The applicant and the submitters have identified benefits from the release of *Puccinia lantanae* and *Prospodium tuberculatum* and these are presented in Appendix 2.
- 5.2. The EPA considers that the people of New Zealand generally value weed control. Use of biological controls for a weed is generally supported in the country when people are satisfied that the introduced biological control agent is unlikely to harm native or valued species.
- 5.3. The EPA understands that there is also a part of the community that opposes the use of biological controls no matter how safe they are considered.
- 5.4. If *Puccinia lantanae* and *Prospodium tuberculatum* become established in New Zealand, they are likely to cause a significant reduction in the spread of lantana by reducing the vigour of plant growth and slowing the rate of spread. Therefore, the EPA considers that the benefits of releasing *Puccinia lantanae* and *Prospodium tuberculatum* are non-negligible.

6. Submissions

- 6.1. Eight submissions were received in response to the application. Five submissions were in support of the application and three submissions were opposed to the application being approved. All submissions are summarised in Table 2. Comments from MAF and DOC are included in this summary.

Submissions in support of the application

- 6.2. Five submitters are in support of the application and consider Lantana to be undesirable. DOC strongly supports the application.

Submissions in opposition to the application

- 6.3. Four submitters opposed approval of the application. Their opposition is based on the following concerns:
- The introduction of alien species is detrimental to the ecological integrity of New Zealand;
 - Unknown risks dictate that the precautionary approach be used;
 - Prevalence of lantana;

- Host-range testing and the effects on ornamental members of the Verbenaceae family;
- Stock poisoning;
- Questions about why mechanical or chemical methods cannot be used to control lantana;
- Concerns about biosecurity.

EPA response to the submission in opposition

The introduction of alien species is detrimental to the ecological integrity of New Zealand

- 6.4. The EPA recognises that the introduction of any new organisms to New Zealand has the potential to cause harm to its ecological integrity. Having reviewed the host range testing and the biology of these two rusts the EPA is satisfied that they are not harmful to New Zealand's ecological integrity.
- 6.5. Also the EPA would like to note that not controlling Lantana is having a detrimental effect on the ecological integrity of the country.

Unknown risks dictate that the precautionary approach be used

- 6.6. The EPA is aware of the potential risks from unforeseen damage to native flora. However, the EPA recognises that the results of the host range testing conducted by Landcare Research on behalf of the applicant are robust and establish that both these rusts can be released into New Zealand without affecting native flora.
- 6.7. It has also been clearly established that there are known risks and costs associated with the spread of lantana, which include;
- threats to the natural biodiversity of New Zealand,
 - degradation of native wilderness,
 - costs to agriculturalists, and
 - costs to public service providers like regional councils who are responsible for public land management.

Prevalence of lantana

- 6.8. Four North Island Regional Councils have made submissions asserting that lantana is widely enough spread across the North Island to warrant the inclusion of lantana on their regional pest management strategies. The EPA considers that the councils are well placed to comment on the widespread threat of lantana as a weed.

Host-range testing and the effects on ornamental members of the Verbenaceae family

- 6.9. The EPA recognises that some members of the family Verbenaceae, for example *Verbena officianalis* and *Aloysia citrodora*, may be affected when they occur in proximity to lantana, but these risks are expected to diminish over time, as lantana becomes less well established. Ellison and Cortat (2011) stated that *Verbena officianalis* was only weakly susceptible to infection from *Puccinia lantanae*.
- 6.10. The EPA also notes that domestic gardeners have the opportunity to buy anti-fungal agents to protect their ornamentals from rusts, in exactly the same way as they currently buy fungicides to protect ornamentals from other rust species.

Stock poisoning

- 6.11. The EPA recognises that lantana is a known poison to livestock. The Department of Primary Industries in Australia release alerts to farmers, stressing vigilance to the following symptoms:
- excessive skin sensitivity to sunlight (photosensitisation);
 - liver damage;
 - jaundice of the whites of the eyes and gums, and skin of the nose and mouth;
 - reddening and inflammation of unpigmented skin; muzzle inflamed, moist, ulcerated and very painful (pink nose) and slough (fall off);
 - swelling of ears and eyelids if unpigmented;
 - reddening and discharge from the eyes (conjunctivitis);
 - ulceration of the tip and under surface of the tongue (if unpigmented);
 - blow fly and bacterial invasion of raw, exposed flesh, in chronic cases; affected skin may slough leaving raw ulcerated surfaces;
 - photophobia;
 - lack of appetite;
 - appear sluggish, weak and depressed;
 - urinate frequently;
 - become constipated (most commonly) or have diarrhoea with strong-smelling black fluid faeces in severely affected animals; and/or
 - dehydration.
- 6.12. Unless treated quickly, the animal may die within ten days of consuming the plant.

- 6.13. KidsFriendly New Zealand also produce a flier warning parents of the dangers of lantana to children, and comment that stock in New Zealand have died as a result of consuming the plant.
- 6.14. Finally, the EPA notes a report from the Auckland Animal Health Laboratory describes a case involving 12 of 150 cows seeking shade, jaundiced and severely emaciated. Two later died and post mortem examination revealed jaundice and large pale friable livers. Lantana toxicity was confirmed by typical histopathological changes in liver, kidney and heart and by the presence of Lantana in the paddock being grazed (Connor 1977).

Why mechanical and chemical methods cannot be used to control lantana

- 6.15. All four of the submissions from Regional Councils mention the ongoing costs of manual and chemical control of lantana. Waikato Regional Council in particular mentioned the ineffectiveness of manual removal, as they point out that lantana can regrow from cut roots left behind after removal. Chemical use can be costly to the regional councils, with the Bay of Plenty Regional Council quoting up to \$375,000 per annum in weed management. The EPA recognises that this is a significant ongoing cost burden to the councils.

Concerns about biosecurity

- 6.16. Biosecurity issues are covered under the Biosecurity Act and are enforced by MAF. The EPA works in conjunction with MAF to ensure that approved organisms do not pose a threat to the biosecurity of New Zealand. All approved organisms also require biosecurity clearance from MAF before importation.

7. Potential impacts to Māori culture

Impacts on Taonga

- 7.1. One of the outcomes of importance to Māori is the productive and life sustaining quantity and quality of a range of taonga or valued resources. Of particular relevance to this application is the potential for adverse effects to native and/or valued species (taonga koiora and/or taonga tuku iho) and to the integrity and availability of taonga.
- 7.2. Whakapapa (the shared genealogy of Māori with native flora and fauna species) is core to the importance and significance of taonga. Whakapapa is the mātauranga Māori (Māori knowledge) framework by which the nature of relationships between people and the environment is explained. Any disruption to this framework of relationships poses potentially significant risk to Māori due to the highly interdependent nature of its components.

- 7.3. Māori continue to raise concerns that the introduction of an exotic species might disrupt the delicate nature of these relationships and have requested assurances that the release of biological control agents poses no threat to taonga species and ecosystems.
- 7.4. Specifically, Māori noted concerns about the potential impacts of *Puccinia lantanae* and *Prospodium tuberculatum* on native flora and fauna and that if Māori resources are affected, so are the people. They queried the use of introduced species as a biocontrol agent rather than using native species and also questioned the host specificity of the two rust fungi.
- 7.5. Although some respondents to consultation were not opposed to the introduction of the two rust fungi, as with other biological control agents, they advised that a cautionary approach should be taken when introducing any new organisms into New Zealand. We consider these concerns were adequately responded to in sections 6 and 8 of the application.
- 7.6. Ngā Kaihautū Tikanga Taiao state their concerns in a previous biological control application that whilst they acknowledge that each application is made and determined in isolation, within Te Ao Maori the ecosystem is viewed as a whole and the prospect of agents being introduced to control a weed presents a scenario which should be considered with the appropriate caution. Ngā Kaihautū also state that Māori continue to stress that we need to be cognitive of how little we actually know about our ecosystem and that much of the biodiversity that exists within Aotearoa, especially at the microbe and fungal level, remains relatively unknown.
- 7.7. After assessing the information provided by the applicant and considering the responses from Māori, we consider the likelihood for disruption to whakapapa and mauri to be low. Given this assessment we anticipate a minimal effect on taonga species to be highly improbable. The level of effect is therefore deemed to be negligible (Level A).

Impacts on Kaitiakitanga responsibilities

- 7.8. This application poses potential adverse effects to kaitiakitanga through unanticipated impacts on the mauri of native and valued species, ecosystems and the traditional values and practices of Māori in relation to taonga.
- 7.9. Mauri is a key element of kaitiakitanga. Within a Māori world view, it is the responsibility of iwi/Māori to exercise kaitiakitanga to protect the mauri of significant resources to ensure their sustainability and availability for generations to come.
- 7.10. Māori continue to note concern that the release of the organisms could adversely affect mauri. This is often expressed as a concern for the ability of iwi to maintain rongoa stocks

(traditional medicines), mahinga kai (traditional practices associated with food gathering), ngā tini ō Papatūānuku me ngā rerenga koiora (biodiversity), and waahi tapu.

- 7.11. Māori have consistently requested that applicants be rigorous in their pre-application research to provide the greatest degree of certainty regarding the potential adverse effects to the mauri of the taonga over which they have kaitiakitanga responsibilities. In addition they continue to encourage expert Māori peer review and involvement at all levels of the research and decision-making.
- 7.12. It was noted by one respondent that ongoing management by Māori of their cultural and natural resources relies on kaitiakitanga, so we must be certain of the potential impacts of the rust fungi on our resources.
- 7.13. The applicant accepts that biological control changes relationships between species in ecosystems and affects their mauri but notes that lantana is having an increasingly adverse effect on natural ecosystems and that the invasion of lantana into Māori-owned lands diminishes the ability of owners to exert kaitiakitanga over their resources.
- 7.14. The EPA considers the host specificity testing undertaken by the applicant to have been sufficient to provide useful information for assessment. Given this information we consider a minimal effect on the kaitiakitanga responsibility of Māori to be highly improbable. Therefore the level of effect is considered negligible (Level A).

Treaty of Waitangi

- 7.15. In accordance with the requirements of section 8 of the HSNO Act 1996 the EPA has considered any potential impact posed to the principles of the Treaty of Waitangi (Te Tiriti o Waitangi) and has considered the principle of active protection identified by the Court of Appeal decision in *New Zealand Māori Council v Attorney General* 1987 to be relevant.
- 7.16. Active protection has been defined as “not merely passive but extends to active protection of Māori people in the use of their lands and waters to the fullest extent practicable” (Cooke, 1987).
- 7.17. The assessments provided in this section and in other parts of the report, indicate a negligible adverse effects to lands, native species and ecosystems so we consider that the application provides sufficient information to take into account the principle of “active protection”. Therefore this application is considered to be consistent with the principles of the Treaty of Waitangi.

8. Recommendation

- 8.1. After reviewing the relevant information, the EPA considers that the benefits of releasing *Puccinia lantanae* and *Prospodium tuberculatum* would outweigh the risks.
- 8.2. The EPA recommends that the release of *Puccinia lantanae* and *Prospodium tuberculatum* be approved.

9. References

Connor HE (1977). The poisonous plants in New Zealand. Wellington. Government Printer.

Ellison, C.A., and G Cortat (2011). Assessment of the suitability of the rust fungus *Puccinia lantanae* for release as a classical biological control agent against *Lantana camara* in Australia. Final Report CABI Europe-UK, United Kingdom

Paynter Q (2007) Selection of a test plant list for the lantana rust fungus *Prospodium tuberculatum* a candidate biological control agent for *Lantana camara* L. in New Zealand.

http://www.dpi.qld.gov.au/documents/Biosecurity_EnvironmentalPests/IPA-Lantana-Poison-Flyer.pdf

<http://www.kidsfriendlynz.com/Regulars/pt%206%20danger%20in%20the%20garden.html>

Appendix 1. Summary of Submissions

Submission	Submitter/ Organisation	Support/ Oppose	Submitter comments
102506	Clinton Care	Oppose	<ul style="list-style-type: none"> Concerns about the impact on native plants.
102511	Waikato Regional Council	Support	<ul style="list-style-type: none"> Acknowledges Landcare's history of host-range testing and successful biocontrol releases. Host-range testing of these rusts appears robust and in keeping with international best practice. Non-target risks insignificant. Lantana is a serious weed in the North Island. Managing lantana is difficult. Repeated control is required and chemicals are more effective than manual removal as cut roots regrow. Biocontrol has the potential to reduce the invasiveness of lantana.
102517	Whakatane District Council	Support	<ul style="list-style-type: none"> Lantana is present in the eastern Bay of Plenty and has the potential to become a significant pest. Biological control reduces reliance on chemical and physical methods of control. Notes that some natives in the same order as lantana (Lamiales) occur in similar habitats and recommends post release monitoring.
102522	Bay of Plenty Regional Council	Support	<ul style="list-style-type: none"> Lantana is a Containment category plant under the BoP Regional Pest Management Plan. Lantana is well established in coastal region of the Bay of Plenty Annual cost to the council to undertake the eradication of lantana would be \$375,000 p/y. Difficult to control with herbicides. Cattle have been fatally poisoned by consuming wilted plants after a farmer used manual eradication methods. Successful biocontrol will reduce plant vigour and seed production.
102523	Margaret Hicks	Oppose	<ul style="list-style-type: none"> Acknowledges that once established lantana is a serious invasive weed. Disputes how widespread lantana is and advocates for local response to local issues. Uncomfortable with the host-range testing and the effects on ornamental members of the Verbenaceae family. Disputes claims of stock poisoning.

Submission	Submitter/ Organisation	Support/ Oppose	Submitter comments
			<ul style="list-style-type: none"> Promotes mechanical and chemical control of lantana. Concerned about biosecurity.
102524	DOC	Support	<ul style="list-style-type: none"> DOC strongly supports the application. <i>Puccinia lantanae</i> and <i>Prospodium tuberculatum</i> pose negligible risk to native flora. Dispute taxonomic classification by the applicant that results in there being "no New Zealand natives in that family (page 12 of the application)". However, the department is comfortable with use of surrogates in host range testing and does not dispute the results.
102526	MAF	No position stated	<ul style="list-style-type: none"> Agree that Landcare has the appropriate expertise to make host-range testing robust. Adverse effects on native species are likely to be insignificant. However, while the risks are low, <i>P. lantana</i> may have some effect on native species as not all natives were tested.
102527	Cliff Mason	Oppose	<ul style="list-style-type: none"> Introduction of organisms damages the ecological integrity of NZ.
102528	Federated Farmers	Support	<ul style="list-style-type: none"> Recognises the potential advantage of the release. Trusts the EPA to undertake thorough risk assessment.
102529	Greater Wellington Regional Council	Support	<ul style="list-style-type: none"> Lantana is a National Pest Plant Accord species and is listed on the WC regional pest management strategy. Lantana is becoming a weed on the Kapiti Coast. Release of these rusts will control lantana and lessen future risks. National control of lantana is vital due to its threat to biodiversity and agriculture. Biocontrol reduces the need for manual and chemical control. Current control methods are labour intensive, chemically reliant and expensive. Understand concerns for local gardeners but feels benefits outweigh risks. Acknowledge that host-range testing shows these rusts are both host-specific.
102533	Nursery and Garden Industry Association	Oppose	<ul style="list-style-type: none"> Concerns about effects on introduced ornamental plants like <i>Verbena officinalis</i> and Lemon verbena (<i>Aloysia citrodora</i>).

Appendix 2. Assessment of potentially significant adverse and beneficial effects from the release of *Puccinia lantanae* and *Prospodium tuberculatum*

Potentially significant effect	Risk/Benefit	Discussion
<p>Potentially significant adverse effect on the environment.</p> <ul style="list-style-type: none"> Potential for native flora to be damaged by either or both rusts. Threats to introduced ornamental garden plants such as lemon verbena (<i>Aloysia citrodora</i>) and <i>Verbena officianalis</i> 	<p>Significance: negligible</p> <p>Significance: negligible</p>	<ul style="list-style-type: none"> Host range testing clearly demonstrates that the likelihood of New Zealand's native flora be damaged by these rusts to be highly improbable. Host range testing shows that there is likely to be localised and reversible impacts on some ornamental garden plants. However, as these can be mitigated by the use of commercial fungicides, the significance is negligible.
Potentially significant adverse effect on human health and safety	None identified	
Potentially significant adverse effect on Māori culture and traditions:	None identified	
Potentially significant adverse effect on the market economy:	None identified	
Potentially significant adverse effect on society and the community:	None identified	
<p>Potentially significant beneficial effects on the environment:</p> <ul style="list-style-type: none"> Reduced invasive potential of a noxious weed. Reduced addition of pesticides into the environment. Increased potential for native flora regrowth as lantana is suppressed in native forests. 	Significance: non-negligible	<ul style="list-style-type: none"> Biocontrol of lantana using the combined effects of both rusts is likely to reduce the ability of lantana to spread. Lantana growth can be rampant and shade out natives. The EPA expects there to be minor localised advantages to some native plant communities which will not have to compete with lantana for space.
<p>Potentially significant beneficial effects on human health and safety:</p> <ul style="list-style-type: none"> Reduced handling of pesticides used in current control of lantana 	Significance: non-negligible	<ul style="list-style-type: none"> The EPA supports the considered use of pesticides, and feels there are likely to be minor health benefits to isolated groups
Potentially significant beneficial effects on Māori culture and traditions:	None identified	

Potentially significant effect	Risk/Benefit	Discussion
Potentially significant beneficial effects on market economy: <ul style="list-style-type: none">• Reduce costs allocated to control of lantana	Significance: non-negligible	<ul style="list-style-type: none">• Any reduction in the cost of controlling lantana can be diverted to other weed control programmes.
Potentially significant beneficial effects on society and the community :	None identified	