

# Government Response to Consultation

## Consultation on the potential introduction of the *Evippe* moth to control Mexican thorn on Ascension Island

May 2023

Ascension Island Government



## Introduction

Mexican thorn is one of the most damaging invasive species on Ascension Island; it threatens the infrastructure and biodiversity on the island. The Darwin Plus-funded project (DPLUS134) is taking a strategic and integrated approach to controlling Mexican thorn on Ascension including rigorous assessment of further biocontrol options and improved chemical and mechanical treatment.

The document describes the results of a public consultation undertaken by the Ascension Island Government (AIG) on the potential release of the *Evippe* moth as a biocontrol agent for Mexican thorn on Ascension.

## Context

Mexican thorn (*Prosopis juliflora*) was introduced to Ascension Island in the mid-1960s during the construction of Two Boats village with the aim to help consolidate soil. Since then, Mexican thorn has become a well-established invasive species across the island. This dryland specialist has the ability to form impenetrable thorny thickets that damage infrastructure while impeding access for regular maintenance. Mexican thorn will burn and considerable biomass now surrounds human settlements, military installations, and commercial sites posing a potentially significant fire risk.

The colonisation of Mexican thorn appears to have facilitated the spread of several problematic invasive species, including rats, mice, rabbits, and Indian mynah birds around Ascension's human settlements and within Nature Reserves. Mexican thorn is identified as a major threat in Ascension's Biodiversity Strategy and Action Plan and listed as a high-priority non-native species in the Ascension Island Government's Biosecurity Strategy. Without ongoing management, encroachment poses a risk to populations of the endangered green turtles (*Chelonia mydas*), sooty terns (*Onychoprion fuscatus*), and the endemic and critically endangered Ascension Island spurge (*Euphorbia origanoides*).

The Mexican Thorn Control Project is a Darwin Plus-funded project aimed at designing and conducting trials of chemical, mechanical and biological treatment methods for controlling Mexican thorn on Ascension. This process will allow AIG to produce an integrated Mexican thorn Control Plan, using several techniques, in an attempt to effectively manage and control the spread of this species. This plan will contain recommendations on the most effective treatments in different situations and will be made available to any interested parties that have to deal with controlling this invasive tree.

Mexican thorn is a tough plant and currently, multiple interventions are sometimes needed to kill a single tree. Mechanical and chemical control is usually physically demanding, labour intensive, slow, and therefore costly. Biocontrol is an entirely different way of controlling non-native species. It involves the release of a natural enemy (the biocontrol agent) from the problem species' home range. If successful, the biocontrol agent will become established and continue to keep the problem species in check with no further effort.

The Project acknowledges that integrated control strategies for the management of highly invasive plant species such as Mexican thorn deliver good results across the world. Therefore, AIG is proposing to release a new biological control agent, the *Evippe* moth, which could greatly help control and slow the spread of Mexican thorn across Ascension Island's delicate landscape. Research from Australia has shown that *Evippe* can cause over 90% defoliation within 12 months of its release and has since maintained similarly high rates of defoliation. As a result, Mexican thorn plants in Australia where *Evippe* has become established rarely produce much foliage. Repeated defoliation has contributed to the very low seed production and growth rates observed since 2000, and tree death is becoming apparent.

AIG has been working with the Centre for Agriculture and Bioscience International (CABI) to undertake a comprehensive risk assessment using a template created by the UK Government’s Department for Environment Food and Rural Affairs. This risk assessment includes a review of tests carried out by the Australian and South African authorities to assess the impact of *Evippe* on non-target plants and additional tests carried out by CABI for this project on high-value plants found on Ascension. The potential effects of releasing *Evippe* on native wildlife and the impact a reduction in the extent of Mexican thorn would have on the island are also being considered in detail in the risk assessment. The public consultation forms part of the risk assessment to ensure all public concerns are addressed. Once completed, the risk assessment will be published.

## Consultation process

The public consultation period ran from 10<sup>th</sup> to 31st May 2023. Articles in the Islander, public notices, and social media posts were used to invite views from the Ascension community. A public meeting was held on 10<sup>th</sup> May at Saints Club, which was attended by 11 people. A further meeting was held on 2<sup>nd</sup> June in the Saints Club for 27 members of the AIG Operations Directorate.

The AIG Conservation social media accounts are followed by many international stakeholders, who will have been made aware of the consultation via this channel.

The following responses were received:

Source	Type of response	Number
Ascension-based individuals	Social media	1
	Oral (at public or AIG Operations meeting and informal conversations with the AIG Project Officer)	14
	Written (email)	2
International individuals	Social media	13

Interactions on social media posts on Facebook were from:

Place	Number of individuals
Bermuda	2
Ulverston	1
South Africa	2
Wiltshire	1
Royal Tunbridge Wells	1
USA	2
St Helena	1
Ascension Island	1
Other	2

In addition to the comments made directly to AIG, further comments from 12 members of the Ascension community were provided through the Ascension Island Councillors. These were discussed

at a meeting between AIG and elected members of the Ascension Island Council on 1<sup>st</sup> June 2023.

## Format of Response

Equal weight has been given to all responses regardless of their source or type. All responses have been anonymised to respect the privacy of the consultees. Where respondents expressed similar views or covered similar ground, these have been grouped together and addressed collectively.

## Responses

The table below summarises the comments received during the consultation and the responses from AIG.

Topic	Question	Answer
The need for Mexican thorn control	1. Are further methods of control necessary? Can't we just continue to cut it and treat it with herbicide?	Mexican thorn is still in an expansion phase and will continue to spread into new areas and become denser where it is already present. Clearing Mexican thorn around roads, pipelines, houses, and Nature Reserves using cutting and herbicides already takes a lot of resources. This effort will need to increase in the future just to maintain the current situation. The use of biocontrol agents offers a lower-cost option that helps to keep Mexican thorn in check without the need for repeated treatments. If the biocontrol agent becomes established, then it keeps working with no further effort which means the resources available for clearance will have a greater impact.
	2. Was any habitat mapping done before the decision was made to use the moth as a biological control agent to help control Mexican thorn?	The decision to use the moth hasn't been made yet. This consultation and the risk assessment are part of the decision-making process.  We are working with JNCC in the UK to use satellite images of Ascension to map the spread of Mexican thorn. We have recently obtained an image from 2022, which will act as a baseline against which future changes can be measured. The resolution of the images is good enough to allow Mexican thorn to be identified in conjunction with some ground-truthing surveys that will be carried out by AIG Conservation.
	3. What is the objective of this project? Is it to remove Mexican thorn or is it to slow down the spread?	It will probably never be possible to remove all Mexican thorn from Ascension. The objective of the Mexican Thorn Control Project is to identify the most effective and efficient methods for controlling Mexican thorn (encompassing chemical, mechanical and biological control methods) and incorporate these into an Integrated Mexican Thorn Control Plan. This means the resources available for Mexican thorn control on Ascension will be used in the best way possible

		<p>and should be sufficient to clear important infrastructure and biodiversity sites.</p> <p>If released, the <i>Evippe</i> biocontrol agent would be part of that integrated plan. An effective natural predator of the Mexican thorn will reduce the plants' vigour and ability to spread, reducing its expansion and meaning cutting and herbicide treatment is more effective and leads to long-term clearance of areas without rapid regrowth.</p>
<p>The use of biocontrol agents on Ascension or St Helena</p>	<p>4. The presentation stated there was insubstantial control with the release of <i>Algarobius prosopis</i>, but we have seen signs of seed borer activity in most seeds we collected.</p>	<p>The presentation reported monitoring done by Liza White in 2009 that suggested the spread of the seed borers <i>Algarobius prosopis</i> was insubstantial, and <i>Neltumius arizonensis</i> were not present at all during their study period. However, signs of significant seed borer activity have been recorded in later years, suggesting that their numbers increased since 2009. Favourable climatic conditions may have contributed to that. Most seeds collected for the DPLUS134 project had signs of seed borer activity.</p> <p>A study done by the Ph.D. student, Anthony Roberts shows that even under optimal conditions, only 92% of seed is eaten by <i>Algarobius prosopis</i>. This leaves 8% to spread each year. The biocontrol has probably reduced the spread of Mexican thorn but has not completely prevented it on Ascension. Research suggests that seed-eating weevils need to work in tandem with other biological control agents if an invasion is to be reduced.</p>
	<p>5. Why should we release another biocontrol agent if the others didn't work?</p>	<p>It is not necessarily the case that the previous biocontrol agents didn't work and it may be that Mexican thorn would have spread even more quickly if they hadn't been present. It is the case that the presence of the existing biocontrol agents has not had sufficient impact to prevent Mexican thorn spreading. Mexican thorn is such a tough plant, that multiple biocontrol agents may be needed to slow it down.</p> <p>The <i>Evippe</i> moth would complement the existing biocontrol agents because they attack different parts of the plants, affecting their vigour and reproductive potential. Seed borers such as <i>Algarobius prosopis</i> and <i>Neltumius arizonensis</i> attack and damage the seeds to such an extent that the trees produce much fewer viable seeds (reducing the spread of the plant and density of populations). Sapsuckers such as psyllids and mirid bugs cause curled leaves, withered ends to branches, and bare branches, affecting the plant's ability to photosynthesize. The <i>Evippe</i> moth is a leaf tier that causes defoliation of the plant and weakens it. The results of <i>Evippe</i> releases in Australia and South Africa suggest it is more effective than the past biocontrol agents and so in combination with them will have a significant impact on the Mexican thorn.</p>

	<p>6. Why was <i>Evippe</i> moth chosen as the biocontrol for release on Ascension?</p>	<p>Research from Australia and South Africa suggests that <i>Evippe</i> is very successful in controlling Mexican thorn populations. The climates in the regions of Australia and South Africa where it has been released are similar to those found on Ascension. The risk assessment process carried out in these countries prior to release also showed the <i>Evippe</i> is very specialist and only attacks Mexican thorn and very closely related species. This combination of effectiveness and lack of non-target impacts makes it an excellent candidate as a biocontrol agent for Ascension.</p>
	<p>7. Will the <i>Evippe</i> moth be enough to control Mexican thorn successfully? Would other species also need to be released in order to create a habitat more like that of its native range?</p>	<p>Other biological control agents have been released on Ascension Island in the past which have made some impact on the control of Mexican thorn. The addition of the <i>Evippe</i> moth will increase the likelihood of controlling Mexican thorn, especially if it is used in tandem with mechanical and chemical methods.</p> <p>Biocontrol agents take many years to develop. They are not simply enemies from the natural range of a problem plant – they need to be very specific to that plant so they won't have wider impacts. At present, <i>Evippe</i> is the only other 'off the shelf' biocontrol agent for Mexican thorn that has not been tried on Ascension. It is unlikely Ascension alone would develop another biocontrol agent, but we would look to developments in other countries. At present, the other countries where Mexican thorn is causing the most damage (Australia and South Africa) are reporting good results from <i>Evippe</i> and so are unlikely to embark on a costly programme to develop additional biocontrol agents in the near future.</p>
	<p>8. Biocontrol releases have caused harm in St Helena and should not be repeated on Ascension.</p>	<p>Biocontrol has been used for many decades on St Helena. AIG has been in contact with the biocontrol team within the St Helena Government to discuss past biocontrol releases. It is not clear what harmful releases people are referring to. Not all biocontrol agents released on St Helena have established and had a significant effect on the target pest, but none have caused wider environmental harm. Some, such as the <i>Hyperaspis</i> ladybird used to control jacaranda bugs in the precious remnant gumwood forests, have been extremely successful.</p> <p>Some respondents mentioned a worm released to control cactus. This is possibly the moth <i>Cactoblastis</i>, which is an established biocontrol agent for prickly pear (<i>Opuntia</i> spp.) that has been used on St Helena. The <i>Cactoblastis</i> has had some impact on the prickly pear population on St Helena and there are no records of it affecting other non-target host plants on St Helena or in other countries where it has been released. It is regarded as a safe and successful biocontrol agent.</p>

		It is important to distinguish between biocontrol releases and other introductions. Both Ascension and St Helena have suffered from past introductions of plants and animals that were either accidental or ill-advised deliberate attempts to 'improve' the islands. During the consultation, some people mentioned the army worm on St Helena. This is a non-native invertebrate that is present on St Helena and was presumably introduced accidentally. It was never released as a biocontrol agent. Parasitic wasps have been released on St Helena as biocontrol agents in an attempt to control army worm. These appear to have had only modest impact, but the presence of the army worm on St Helena is not an example of a harmful biocontrol release.
Mode of action of the <i>Evippe</i> moth	9. How much time does the moth spend on the tree?	The <i>Evippe</i> moth will preferentially spend its whole life cycle on the tree. It is the only plant species the caterpillars and adults eat and it is where the adults lay eggs and the larvae develop. The lifespan of each individual moth is about 35 days.
	10. How long will it take the moth to kill an average size tree?	This depends on the number of moths present, climate conditions and the health of the tree. Some trees will never die even where moths are abundant. Based on the experience of Australia, some trees will die after repeated defoliation over months or years. Many will remain alive, but with much reduced canopy size and vigour.
	11. How many moths would be needed on one tree to kill it?	This again depends on the underlying health of the tree and other environmental conditions – e.g. if there is a prolonged drought that weakens the trees then they will be more susceptible to the moth.
Preparation of risk assessment	12. What international release guidelines are being followed?	The risk assessment for the release is based on a template from the UK Government's Department for the Environment Food and Rural Affairs (DEFRA), which was developed through an EU-funded project. The risk assessment process is being guided by CABI, following protocols developed through a DEFRA-funded cross OT project.  Rhodes University are overseeing the release of <i>Evippe</i> in South Africa and providing guidance for Ascension.
	13. Did conservation consult St Helena Biosecurity about the introduction of the moth?	Yes, the St Helena Biosecurity lead is aware of the possibility that the <i>Evippe</i> moth will be introduced to Ascension to control Mexican thorn. Mexican thorn and its close relatives are not present on St Helena and so even if the <i>Evippe</i> did evade St Helena's rigorous biosecurity controls, the moth would quickly die and would have no impact on St Helena's biodiversity.
	14. What impact would the moth have on St Helena if it was accidentally introduced to the island through travel?	The moth needs Mexican thorn to complete its lifecycle, so it would not be able to develop any further on St Helena as there is no Mexican thorn on the island.
	15. The specialists and organisations that are providing advice have never been to Ascension – how can we be sure that	Norbert Maczey from CABI, who is advising on the risk assessment, has visited Ascension in the past and been part of multiple projects on both Ascension and St Helena. The

	they fully understand the unique set-up of the island?	risk assessment is being coordinated by the AIG Mexican Thorn Project Officer, Chrisna Visser, who is an expert in Mexican thorn control and has lived on Ascension for the past 18 months. She is drawing on advice from international experts, but her lead role ensures that this guidance is appropriate for the Ascension context.
	16. What is the exit plan if this is found to be ineffective?	Once the moth is released, we will not be able to recapture it if it does not work. This is why it is so important to carry out a rigorous risk assessment and make sure it won't have any unintended harmful effects before it is released.
	17. Can the Risk Assessment be made available to the public?	Yes, both the Risk Assessment and the Government Response document will be published after the consultation period has been finalised.
Impact of <i>Evippe</i> on non-target plants	18. What if the moth eats the lettuce grown at Hydroponics personal vegetable crops?	The host range testing undertaken by Australia, South Africa (Appendix 1) and Ascension (Appendix 2) has shown that <i>Evippe</i> only attacks Mexican thorn and very closely related species. This is typical of leaf-tying moths that evolve to be very specialised and associated with one particular host plant. It is extremely unlikely <i>Evippe</i> would attack lettuce. However, to address this concern raised by the community, CABI is conducting additional testing in their UK quarantine facilities using the lettuce varieties grown on Ascension. The results of this testing should be available within four weeks.
	19. Will the moth affect the plants growing in people's garden, or personal crops?	No, the host range testing carried out ahead of the Australian and South African releases (Appendix 1) and the additional testing undertaken for Ascension (Appendix 2) looked at the effect of the moth on a broad range of plant species. The moth only affected Mexican thorn and very closely related species. The results of the testing show that the only plant species present on Ascension that could possibly be affected other than Mexican thorn is horse tamarind. In the Australian and South African host range testing, some leaf mining by young <i>Evippe</i> larvae was observed on this species, though later-stage leaf-tying was not observed. However, even this limited impact was not seen when horse tamarind grown from Ascension seeds was included in the host testing conducted by CABI in the UK.
	20. What were the results of the host range tests on Ascension's important plants?	Specific host range testing for important plants on Ascension was conducted by CABI at their quarantine facilities in the UK. The plants were grown from seed supplied from Ascension or from plants available in the UK. The plants were exposed to a culture of <i>Evippe</i> moths imported from South Africa and reared in Mexican thorn grown from seed collected on Ascension. The plant species tested and their source is shown in Appendix 2.  The moth had no impact on any of the species tested other than Mexican thorn. No leaf mining or leaf-tying was



		<p>observed and the plants grew well in the presence of the moth.</p> <p>The only plant species CABI repeatedly failed to germinate was guava, <i>Psidium guajava</i>. Guava is not closely related to the Mexican thorn, and it is extremely unlikely to support the development of any stage of the <i>Evippe</i> moth. It is also an invasive weed on Ascension and so the risk of impact from <i>Evippe</i> is negligible.</p>
	21. Were tests done on seedlings or mature plants? Would this make a difference in the results of the host range tests?	The tests were done on well-established plants that were big enough to support a culture of moths. <i>Euphorbia</i> plants in the cultivation facility were developing flowers by the time the moth was introduced to them, which is an indication of the plants reaching adulthood.
	22. Will the moth affect plants such as horse tamarind as previous studies from Australia suggest it completed one of its lifecycles on it?	<p>Tests conducted in South Africa and Australia showed in rare cases the development of initial leaf mines caused by the first instar caterpillars during testing of horse tamarind. It did not develop any further instar stages on the horse tamarind when the most damaging leaf-tying activity occurs. There was no sign of any instar development during the host range testing on this species conducted at CABI UK for Ascension.</p> <p>Horse tamarind was introduced to Ascension and is regarded to be invasive.</p>
	23. Will the moth jump to other plants once Mexican thorn has all died and disappeared?	No, the <i>Evippe</i> moth is a very specialised moth that can only survive and complete its lifecycle on Mexican thorn and very closely related species. It is very unlikely that all the Mexican thorn on Ascension will die out. If the number of Mexican thorn trees reduces, then the abundance of moths will also reduce in response. The trees and the moths are closely linked and so their populations will fluctuate together. The moth has evolved to complete its lifecycle on Mexican thorn and cannot switch to a different host.
Impact of <i>Evippe</i> on Ascension's wildlife	24. How will the removal of Mexican thorn influence the land crabs and other animals?	Ascension's native wildlife, including the land crabs and endemic invertebrates, became established on the island and evolved in the absence of Mexican thorn. They, therefore, do not require it for their survival. There may be some negative effects such as the loss of shade for migrating land crabs, but this will be balanced by the reduction in cover for non-native predators/competitors such as rats and there are other sources of shade for land crabs to use. If climate change or other factors result in high mortality of land crabs due to desiccation, then artificial shading could be considered on key migration routes.
	25. How will the removal of Mexican thorn affect the donkey population?	Donkeys have other sources of food and it is usually only the seedpods of Mexican thorn that they eat during the periods when these are available. The donkey population is feral and unmanaged meaning it will expand up to the limit imposed by food resources. An ephemeral food resource such as Mexican thorn seedpods will not result in fewer

		hungry donkeys or support a larger population size in this long-lived species. The Mexican thorn trees do provide shade for donkeys, but there are other areas of shade available to them.
	26. Would the removal of Mexican thorn be damaging to native or endemic invertebrates?	<p>The only endemic invertebrate that may be affected is the psocid <i>Indiopsocus mendeli</i>. In terms of their ecology, they may lay their eggs on the foliage but are most likely to feed on fungus or decaying matter. Therefore, Mexican thorn is unlikely to be significant to its survival, and it should be able to utilise other plants on the island.</p> <p>Only very generalist native species such as a couple of indigenous bark flies have a loose association with Mexican thorn. Again, the absence of Mexican thorn should not affect them. The only invertebrate species that have a strong association with Mexican thorn are invasive non-native species, such as ants, abundant web spinners, and sac spiders, many of which are damaging to native invertebrates.</p>
	27. Would the removal of Mexican thorn be beneficial to native or endemic invertebrates?	The removal of Mexican thorn would be beneficial to native and endemic invertebrates. Where Mexican thorn has invaded, there are fewer endemic and native invertebrate species present. This is likely due to the invasive ant and spider species that thrive on the Mexican thorn and will predate the endemic invertebrates. Preventing the spread of Mexican thorn into coastal areas that are still the stronghold for endemic invertebrates will benefit Ascension's biodiversity.
	28. Will the moth hybridise with other moths on the island?	No, it is not possible as the moth is not closely related to any other moths found on Ascension.
	29. Is there any chance of the <i>Evippe</i> moth interacting with native invertebrates	They belong to a family of non-predatory moths. It is extremely unlikely that the <i>Evippe</i> moth will compete with native species. Many moths of the same family are not known to feed as adults. If they do, it is on high-sugar substances as a short-term energy boost rather than any substantial protein-based feeding. They may be predated on by non-native ants such as <i>Monomorium subopacum</i> , which may influence their establishment rates on Ascension.
Impact of moth on community	30. Will the moth move into the settlements?	<i>Evippe</i> is a small so-called micro moth, which in the natural environment will encounter humans and other vertebrates rarely. It will not actively fly into houses and is not reported to be attracted to light.
	31. Do we need new fly screens with smaller holes to stop them from coming into people's houses?	No, the current fly screens should be sufficient to keep the moth out of people's houses.
Impact of a reduction in Mexican thorn cover	32. Ascension experienced heavy rain these past couple of months. Will the decline in trees not contribute to more soil erosion?	The release of the moth would not cause Mexican thorn trees to die immediately or on mass. Soil erosion is unlikely because the trees' root systems will remain in the soil. We anticipate that Mexican thorn will remain present to a certain degree, albeit with a lower canopy density where it

	<p>can still function as a wind break to lower dust levels and in part reduce soil erosion.</p> <p>Periods of heavy rainfall on Ascension have resulted in erosion and damage to roads and other infrastructure. This has occurred in the presence of Mexican thorn. To protect infrastructure, engineering solutions that can be targeted at priority sites will be required.</p>
33. Will the trees die quickly and then collapse?	No, it will be a slow process and will be determined by how many leaf ties develop on each tree. With time, the trees respond to the impact of the moth by developing smaller canopies, and their root systems will still remain intact.
34. What other invasive plants are like to take place of Mexican thorn?	It is anticipated that plants such as tree tobacco ( <i>Nicotiana glauca</i> ), yellow boy ( <i>Tecoma stans</i> ), tamarind ( <i>Tamarindus indica</i> ), and horse tamarind ( <i>Leucaena leucocephala</i> ) may move into these opened areas. If this happens, it would still be regarded as an improvement as these species are much less vigorous and easier to control with chemical and mechanical methods than Mexican thorn.
35. What will the landscape look like once the moth is released? Will it become barren? Many people expressed their appreciation of the greening effect of Mexican thorn in the low-lying areas of Ascension.	Experiences from Australia indicate that the presence of the moth will not result in the death of all Mexican thorn trees, but the frequent defoliation is expected to make the canopies less dense. The defoliation will look similar to that seen during recent drought periods on Ascension. Other non-native plants are expected to move into areas where Mexican thorn dies back, but this may take many years. It is unlikely the lowlands of Ascension will return to their natural barren state, but they will become less green than they are currently, at least in the short term.
36. How would the removal of Mexican thorn impact soil quality or moisture?	<p>Mexican thorn is a pioneer species moving into barren landscapes where many other plants are unable to grow. The leaf litter it creates can lead to the development of soil in previously rocky habitats. Signs of this early soil development are evident on Ascension. Reducing the cover of Mexican thorn would slow or halt the development of soil, making it more difficult for other invasive species to colonise these areas.</p> <p>Mexican thorn has a long and extensive root system that draws water from a large area, drying the soil and reducing the amount of water available for other plants. A reduction in the cover of Mexican thorn will lower this water extraction and possibly lead to higher soil moisture at depth, but Ascension does not have a water table that would be affected.</p>
37. Would removing Mexican thorn impact the mist or rainfall levels on the island?	Reduction in the cover of Mexican thorn would cause a reduction in transpiration rates from the Mexican thorn trees, but this is unlikely to have an impact on Ascension's weather overall since the effect will be dwarfed by evaporation coming from the ocean surrounding Ascension.

		The introduction of plants on Green Mountain was intended to trap fog and precipitation that naturally collects there and increase this through transpiration of the plants. This does seem to have been effective. However, the same would not be true in the lowlands of Ascension since the altitude and topography would not support cloud or fog formation.
Other methods of control	38. Will we still need to do mechanical and chemical control of Mexican thorn?	Yes, we will still need to control the spread of Mexican thorn. Experiences from Australia indicate that the release of the moth will not result in the death of all plants, but the frequent defoliation will weaken the plants and slow down the Mexican thorn's population growth. The presence of the moth will mean that the use of cutting or chemicals should have much longer-lasting effects with the Mexican thorn unable to bounce back so quickly. It will become much easier to achieve long-term clearance of Mexican thorn from sensitive areas using these conventional methods. Integrating chemical, mechanical, and biological control methods will deliver the best results for controlling Mexican thorn in the long term.
	39. If the moth potentially takes years to kill trees, then it won't meet people's expectations of immediate clearance.	It is important to manage expectations. Even if the moth establishes successfully, it will not result in the immediate death of trees. It will, however, reduce the vigour of Mexican thorn trees and their ability to regrow after being cut or sprayed. To achieve rapid clearance, other methods such as cutting and uprooting will still need to be used, but the presence of the moth should mean this needs to be done less frequently and there will not be such a strong invasion pressure from Mexican thorn into the settlements, infrastructure sites and protected areas.
Likelihood the <i>Evippe</i> moth will become established	40. Will the moth survive on Ascension?	The experience of Australia and South Africa suggests there is a good probability that the <i>Evippe</i> moth will survive and be effective on Ascension. Some potential problems with predators and day length are discussed below.  If the moth is released on Ascension but fails to become established, it would be disappointing, but would not pose any risk to the island and would essentially leave Ascension in the same position it is currently. Funding for the Mexican thorn project is provided through the UK Government's Darwin Plus Programme and so no AIG resources would have been spent on the attempt. If it is decided that the moth could provide benefits to Ascension, then there is no downside to attempting a release even if it is not guaranteed to work.
	41. Do we expect any predators to feed on the moth?	Yes, we anticipate that predators, in particular, non-native ants ( <i>Monomorium subopacum</i> ), rats, and mynah birds may feed on caterpillars and pupae. This could potentially hamper establishment and the impact caused by the <i>Evippe</i> moth, but its effect on the ant, rat, or mynah bird

		<p>populations will be negligible given the high abundance of other non-native invertebrates that they also feed on.</p> <p>If the release of <i>Evippe</i> goes ahead on Ascension, then ant and rat control measures will be undertaken at the release sites to aid the initial establishment of the moth.</p>
	42. Is the Ascension climate suitable for the moth?	<p>Yes. Results from Australia and South Africa indicate the moth performs best where conditions are warm to hot all year round with a mean average monthly temperature of 19.8 to 30.1 °C. Ascension should provide the perfect temperature environment for <i>Evippe</i>. Humidity rates on Ascension are slightly higher than ideal, but these have been measured in culture facilities and the actual humidity levels experienced by the moths when exposed to the wind and sun on Ascension should be more suitable.</p> <p>The main concern is the lack of seasonal variation in day length experienced on Ascension. The moths use longer day lengths as a cue to end their diapause (hibernation) and it is possible the almost constant 12-hour daylight seen on Ascension will fail to trigger the end of diapause. How the moths adapt to the light regime on Ascension can only be determined if they are released.</p>
Practicalities of release	43. Where will the moth be released?	The plan is to release the moth within Donkey Plain. The culture facility will also be built within this area for easy monitoring.
	44. How fast will the moth spread?	The <i>Evippe</i> moth spread approximately 1.3 to 3.6 km per year in the Pilbara region of Australia. Projections suggest that if released the <i>Evippe</i> moth would spread across the Mexican thorn-covered areas of Ascension within two years.
	45. How many moths will be released and how many re-introductions are you planning to do?	<p>An estimate of 300 late instar caterpillars and pupae concealed within leaf ties on small branches of Mexican thorn would be transferred to Ascension from the CABI Egham quarantine facilities. Culturing of the <i>Evippe</i> moth will take place under controlled conditions at the small facility the project would construct on Ascension. This would consist of net cages around Mexican thorn plants. The rearing of plants and the biological control agent itself will follow the guidelines provided by Cowie (2022).</p> <p>We will keep a small number of moths as a reserve in the UK in case the cultivation on Ascension does not go according to plan and we need to replenish the culture.</p>
	46. How will the effectiveness of the release be quantified?	Monitoring to confirm the establishment of the moth will be conducted at least once a month after the release and once a year thereafter as it may take several years before significant impacts may be detectable on the Mexican thorn. High-resolution satellite images will be used to assess long-term changes in the extent of Mexican thorn on Ascension.

	47. Who will be releasing the moth? Is it the Conservation Department and other organisations involved in this project?	The AIG Conservation Team would release the moth with the help and support of CABI. Rhodes University is also interested in the results of any release and may provide support in the future.
--	---	---

## Next steps

- Publish this Government Response to Consultation document
- Publish final Risk Assessment document
- Chief Biosecurity Officer to make recommendation to the Governor on licensing a release of *Evippe* on Ascension.

Appendix 1 – Plants included in host range testing ahead of *Evippe* releases in Australia and South Africa.

<b>Family Leguminosae</b>
<b>Subfamily Mimosoideae</b>
<b>Tribe Mimoseae</b>
<i>Prosopis pallida</i> (Humb. & Bonpl. ex Willd.) Kunth
<i>Prosopis velutina</i> Wooton
<i>Prosopis juliflora</i> (Sw.) DC.
<i>Prosopis</i> spp. (? <i>velutina</i> hybrid) (ex. Bloemhof (P1))
<i>Prosopis africana</i> (Guill. & Perr.) Taub.
<i>Prosopis farcta</i> (Banks & Sol) J.F. Macbr.
<i>Prosopis cineraria</i> (L.) Druce
<i>Elephantorrhiza burkei</i> Benth.
<i>Adenanthera pavonina</i> L.
<i>Desmanthus virgatus</i> (L.) Willd.
<i>Dichrostachys cinerea</i> (L.) Wight & Arn.
<i>Dichrostachys spicata</i> (F. Muell.) Domin
<i>Leucaena leucocephala</i> (Lam.) de Wit
<i>Mimosa pudica</i> L.
<i>Neptunia gracilis</i> Benth.
<i>Neptunia major</i> (Benth.) Windler
<i>Neptunia monosperma</i> F. Muell.
<i>Neptunia dimorphantha</i> Domin
<i>Entada phaseoloides</i> (L.) Merr.
<i>Entada rheedii</i> Spreng.

<b>Tribe Ingeae</b>
<i>Albizia lebeck</i> (L.) Benth.
<i>Archidendron lucyi</i> F. Muell.
<i>Cathormion umbellatum</i> (Vahl) Kosterm.
<i>Parachidendron pruinsum</i> (Benth.)
<i>Paraserianthes lophantha</i> (Willd.) I.C.Nielsen
<i>Samanea saman</i> (Jacq.) Merr.
<b>Tribe Acacieae</b>
<i>Acacia farnesiana</i> (L.) Willd.
<i>Acacia baileyana</i> F. Muell.
<i>Acacia deanei</i> (R.Baker) Welch, Coombs & McGlynn
<i>Acacia irrorata</i> Sprengel
<i>Acacia oshanesii</i> F. Muell. & Maiden
<i>Acacia spectabilis</i> Benth.
<i>Acacia aulacocarpa</i> Benth.
<i>Acacia leiocalyx</i> (Domin) Pedley
<i>Acacia mangium</i> Willd.
<i>Acacia falcata</i> Willd.
<i>Acacia fimbriata</i> G. Don
<i>Acacia macradenia</i> Benth.
<i>Acacia pulchella</i> R.Br.
<i>Acacia complanata</i> Benth.
<i>Acacia simsii</i> Benth. N
<i>Acacia stenophylla</i> Benth. N
<i>Faidherbia albida</i> (Delile) A.Chev.



<i>Senegalia galpinii</i> (Burtt Davy) Seigler & Ebinger
<i>Senegalia caffra</i> (Thunb.) P.J.H.Hurter & Mabb.
<i>Senegalia mellifera</i> (M. Vahl) Seigler & Ebinger
<i>Senegalia nigrescens</i> (Oliv.) P. J. H. Hurter
<i>Vachellia farnesiana</i> (L.) Wight & Arn.
<i>Vachellia erioloba</i> (E.Mey.) P.J.H.Hurter
<i>Vachellia karroo</i> (Hayne) Banfi & Galasso
<i>Vachellia nilotica</i> (L.) P.J.H.Hurter & Mabb
<i>Vachellia tortilis</i> (Forssk.) Galasso & Banfi
<i>Vachellia robusta</i> subsp. <i>robusta</i> (Burch.) Kyal. & Boatwr.
<i>Vachellia sieberiana</i> (DC.)
<i>Vachellia xanthophloea</i> (Benth.) P.J.H.Hurter
<b>Subfamily Caesalpinioideae</b>
<b>Tribe Amherstieae</b>
<i>Schotia brachypetala</i> Sond.
<i>Tamarindus indica</i> L.
<i>Azelia quanzensis</i> Welw.
<b>Tribe Caesalpinieae</b>
<i>Erythrophleum chlorostachys</i> (F. Muell.) Baillon
<i>Gleditsia triacanthos</i> L.
<i>Caesalpinia decapetala</i> (Roth) Alston
<i>Caesalpinia pulcherrima</i> (L.) Sw.

<i>Peltophorum africanum</i> Sond.
<i>Peltophorum pterocarpum</i> (DC.) K.Heyne N
<b>Tribe Cassieae</b>
<i>Chamaecrista mimosoides</i> (L.) Greene
<i>Petalostylis labicheoides</i> R.Br.
<i>Burkea africana</i> Hook.
<i>Ceratonia siliqua</i> L.
<i>Cassia abbreviata</i> Oliv.
<i>Senna artemisioides</i> (DC.) Randell
<i>Senna petersiana</i> (Bolle) Lock
<b>Tribe Cercideae</b>
<i>Bauhinia galpinii</i> N.E.Br.
<i>Lysiphyllum hookeri</i> (F. Muell.) Pedley
<b>Subfamily Papilionoideae</b>
<b>Tribe Aeschynomene</b>
<i>Arachis hypogaea</i> L.
<i>Stylosanthes hamata</i> (L.) Taub cv verano
<b>Tribe Bossiaeeae</b>
<i>Hovea acutifolia</i> G. Don
<b>Tribe Desmodieae</b>
<i>Desmodium tortuosum</i> (Sw.) DC.
<b>Tribe Galegeae</b>
<i>Swainsona maccullochiana</i> F. Muell.
<b>Tribe Mirbelieae</b>

<i>Pultenaea villosa</i> Willd.
<b>Tribe Phaseoleae</b>
<i>Cajanus cajan</i> (L.) Millsp.
<i>Centrosema pubescens</i> Benth.
<i>Glycine max</i> (L.) Merr.
<i>Lablab purpureus</i> (L.) Sweet
<i>Macroptilium atropurpureum</i> (DC.) Urb.
<i>Vigna mungo</i> (L.) Hepper
<b>Tribe Tephrosieae</b>
<i>Pongamia pinnata</i> (L.) Pierre
<b>Tribe Viciaeae</b>
<i>Pisum sativum</i> L.
<b>Family Rosaceae</b>
<i>Eriobotrya japonica</i> (Thunb.) Lindley
<i>Fragaria X ananassa</i>

Appendix 2 – Plants included in Ascension host range testing conducted by CABI.

Scientific names	Common names	Source
<b>Ascension Island endemics</b>		
<i>Pteris adscensionis</i>	Feather fern	~5000 spores imported from Ascension Island
<i>Nephrolepis sp.</i>	Sword fern	~1000 spores imported from Ascension Island
<i>Euphorbia origanoides</i>	Ascension Spurge	50 seeds imported from Ascension Island
<i>Sporobolus caespitosus</i>	Hedgehog grass	100 seeds imported from Ascension Island
<b>Ascension Island natives</b>		
<i>Portulaca oleracea</i>	<i>Common Purslane</i>	Seeds obtained from commercial supplier in UK
<i>Ipomoea pes-caprae</i>	<i>Beach Morning Glory</i>	Seeds obtained from commercial supplier in UK
<b>Ascension Island horticulturally cultivated/introduced ornamental</b>		
<i>Delonix regia</i>	Flame Tree	40 seeds imported from Ascension Island
<i>Tamarindus indica</i>	<i>Tamarind</i>	Seeds obtained from commercial supplier in UK
<i>Tecoma stans</i>	Yellowboy	~600 seeds imported from Ascension Island
<i>Ficus benjamina</i>	Rubberplant	Obtained from garden centre in the UK
<i>Ficus robusta</i>	Rubberplant	Obtained from garden centre in the UK
<i>Psidium guajava</i>	Guava	Seeds obtained from commercial supplier in UK
<i>Rubus idaeus</i>	Raspberry	Obtained from garden centre in the UK
<b>Ascension Island invasives</b>		
<i>Prosopis juliflora</i>	Mexican Thorn	~300 seeds imported from Ascension Island
<i>Leucaena leucocephala</i> (syn. <i>L. glauca</i> )	Horse Tamarind	~400 seeds imported from Ascension Island