Darwin Initiative for the Survival of Species

Final Report

1. Darwin Project Information

Project Reference No.	162/12/026
Project title	Towards sustainable management of alien invasive weeds in southern China
Country	China, UK
UK Contractor	CABI (formerly CABI Bioscience, an institute of CAB International), Silwood Park, Ascot, Berks. SL5 7TA
Partner Organisation (s)	Institute of Biological Control (IBC), Chinese Academy of Agricultural Sciences (CAAS), Beijing, China. (IBC is now part of the Institute of Environment and Sustainable Development in Agriculture [IESDA]). Guangdong Entomological Institute (GEI), Guangzhou, China.
Darwin Grant Value	£177,508
Start/End date	October 2003 / September 2006 (no cost extension until 30 September 2007)
Project website (web-page on CABI website is currently being up-dated)	http://www.cabi.org/ProjectsDetail.asp?ProjectID=304 '*Mikania micrantha* in Southern China. Towards sustainable management of invasive alien weeds'
Author(s), date	Dr. Carol A. Ellison, 18th January 2008

2. Project Background/Rationale

- *Describe the location and circumstances of the project*

  As a leading international organisation in the field of biological control, CABI received a number of independent requests from local scientists in China, concerning the sustainable control of invasive alien weeds (IAW). CABI has a history of collaborative development projects with China, and has an office in Beijing. Although China has expertise in the biological control field, classical biological control (CBC) of IAW has yet to be fully exploited, and the use of pathogens is a totally new technology to China.

- *What was the problem that the project aimed to address?*

  Invasive alien species (IAS) represent the greatest threat to the preservation of global biodiversity after habitat destruction. In the fight to safeguard the world's biodiversity against IAS, it is essential not only to assess their impact, but also to develop and employ control strategies that are not damaging to the environment. The use of co-evolved natural enemies, a strategy referred to as CBC, has proven to be an efficacious, cost-effective, sustainable and safe option for the management of IAW. The aim of this method of natural weed suppression is to select agents (arthropod and pathogen) from

the centre of origin of the target weed, and after intensive assessment and screening for specificity, release them in the invasive range.

Amongst those weed species that have been identified as having the highest environmental impact in China, is the pernicious, neotropical, composite *Mikania micrantha* (mile-a-minute weed, South American climber or mikania weed). This vine is a serious problem in Guangdong Province, particularly within the highly biodiverse National Conservation Areas. This project aims to implement a pilot project for the CBC of mikania weed, by exploiting a similar programme that has been undertaken in India.

- *Who identified the need for this project and what evidence is there for a demand for this work and a commitment from the local partner?*

  Chinese scientists from GEI, Guangzhou and IESDA, Beijing identified the need for this project, and approached CABI to provide the expertise and technology to help implement a sustainable management strategy. IAW have been identified by the Chinese Government as a growing threat to both biodiversity and agricultural productivity, and are developing a national strategy to address these issues. In addition, the Chinese Government has provided some funding to continue the work initiated under this Darwin Initiative (DI) project, and expand the work (eg Ministry of Science and technology funding). More substantially, the local Chinese partners are applying for significant international funding (eg from the Global Environment Facility), to intensify inputs in this field of work. These initiatives are discussed in detail below (**4. Scientific, Training, and Technical Assessment**).

3. Project Summary

- *What were the purpose and objectives (or outputs) of the project?* **Appendix V** is the amended logical framework updated October 2005.

  The purpose of this project was to develop the capability of Chinese scientists to exploit pathogens for the sustainable management of invasive alien weeds (IAW) in China. The project was specifically designed to develop and apply the research already undertaken under a Department for International Development (DFID)-funded Natural Resources International-administered project for the classical biological control (CBC) of *Mikania micrantha* in India, using the highly host specific, neotropical rust fungus *Puccinia spegazzinii*. Training activities and hands-on experience received during the project were aimed to empower Chinese scientists with the skills necessary to develop new collaborative proposals. The objective was to develop these proposals during the course of the project, with support from CABI personnel, targeting other invasive weeds that are seriously affecting the biodiversity in natural environments in China.

  The main outputs of the project are listed below:

  1) Chinese scientists have been trained in weed biological control using fungal pathogens, enabling them to successfully implement the mikania weed-pathogen pilot project, and potentially future project;
  2) Permanent mikania weed sample plots were established on Neilingding Island and weed density and impact determined. Unfortunately, the island had to be abandoned (**Appendix III***[5]), new plots were identified on Juizhou Island, about 20km from Neilingding. Sample plots were established on Juizhou Island and weed density determined;
  3) Permit to import the rust, *Puccinia spegazzinii*, into China issued;
  4) Rust imported into China and additional host specificity screening completed, under quarantine in Beijing;

5) Permit to release the rust in China issued, following successful awareness campaign for government policy makers in Beijing and Guangdong;
6) Rust released on Neilingding Island and subsequently Juizhou Island;
7) Awareness of the Darwin Initiative (DI) mikania weed-pathogen pilot project within the Chinese scientific community implemented;
8) New proposals in invasive alien weed control submitted, part-funding secured for three initiatives;
9) Rust establishment and monitoring studies initiated, Chinese Government funding secured to continue work after end of DI project funding;
10) Journal, book and media articles published;
11) Signing of Biodiversity Resolution in Argentina expedited.

- *Were the original objectives or operational plan modified during the project period?*

  There were no significant changes made to the original objectives, however, the progress of the fieldwork in China was interrupted in 2006, while consultations progressed between DI project scientists and the Argentine authorities concerning issues of intellectual property. The rust isolate that had been selected for introduction into China for the CBC of mikania weed, originated from Misiones Department of Argentina, and permission had been sought to use this rust isolate in China. Unfortunately, it did not prove possible to obtain the necessary official written permission (although all the authorities supported the concept in principle) during the time frame of the DI project. A no-cost extension was agreed by the DI Secretariat, thus, no changes was made to the design of the project, only to the timings of activities.

- *Which of the Articles under the Convention on Biological Diversity (CBD) best describe the project?*

  Article 8(h) best describes the project: "Prevent the introduction of, control or eradicate those alien species which threaten ecosystems, habitats or species". In addition, Article 15, which is concerned with fair and equitable access to a countries genetic resources'; and Article 12, concerning research and training, formed significant components of the DI project (**Appendix I**).

- *Briefly discuss how successful the project was in terms of meeting its objectives. What objectives were not or only partly achieved, and have there been significant additional accomplishments?*

  The project successfully achieved its main objective: "to develop the capability of Chinese scientists to exploit pathogens for the sustainable management of IAW in China". The objective of monitoring the impact of the rust in the field was only partly achieved, since only trial releases of the rust were possible on small islands, within the time frame of the DI project. The main releases on mainland China were not possible within the project timeframe, since official written permission from Argentina to release the rust has not yet been received. As a consequence of this, the Public Awareness campaign was only partly fulfilled, with a workshop being undertaken for scientists and extension workers, but the planned media campaign for the general public was necessarily modest, pending full releases of the rust.

  There were however, significant additional accomplishments, particularly the dialogue between CABI / British Embassy Buenos Aries / Darwin Secretariat / Misiones Government, which has resulted in the expediting of Resolution No. 509 on 24th October 2007, by the Ministry of Ecology, Renewable Natural Resources and Tourism. This resolution establishes a new regulation for access to genetic resources and related items in the Province of Misiones **(Appendix VI)**. In addition, there was an increased effort on

project development and dissemination activities, and a focus on establishing partnerships, than planned in the original project proposal.

4. Scientific, Training, and Technical Assessment

RESEARCH

Selection of Rust Isolate for Release in China

Research undertaken at CABI-UK by: Fu Weidong and Han Shichou, and repeated by C. Ellison.

Results presented in report: Training Programme and Research Results on: Biological Control of *Mikania micrantha* using the Rust Fungus *Puccinia spegazzinii* (**Appendix III *[1]**).

Peer reviewed paper: A paper is currently being prepared on the molecular characterization of world wide *Mikania micrantha* populations; those from Guangdong, China will be included.

Host Specificity Screening of Argentinean Isolate of the Rust

Research lead by Environment and Sustainable Development in Agriculture (IESDA): Fu Weidong, under quarantine conditions in Beijing.

Results presented in reports: Additional Host Specificity Screening of *Puccinia spegazzinii*, a Potential Biocontrol Agent for *Mikania micrantha* undertaken in China; and Interaction between *Puccinia spegazzinii* and *Helianthus annuus* (sunflower) (**Appendix III *[2] and *[3]**).

Peer reviewed paper: published on the results of the host specificity screening (**Appendix III *[4]**).

Field Release on Islands off the Chinese Mainland

Research undertaken in Southern China by: Han Shichou, Fu Wei-dong, Zhang Feng, Zan Qijie, Li Zhi gang, Li liying, Li Jun and Lu Jianwen, from Guangdong Entomological Institute (GEI), IESDA and CABI.

Results are presented in report: Trial Releases of *Puccinia spegazzinii* on *Mikania micrantha* Infested Islands off the South Coast of China (**Appendix III *[5]**).

Peer reviewed paper: published on the results of the field releases of the rust (**Appendix III*[7]**).

TRAINING AND CAPACITY BUILDING ACTIVITIES

Governmental Policy Development

China

China has a history of importing arthropod biological control agents for weeds (and arthropod pests), but not fungal pathogens: the import and release of the rust fungus *P. spegazzinii,* into China was the first example of its kind. The China Import and Export Inspection Bureau (IEIB) are the authority responsible for issuing the import and release permits for biological control agents. Fu Weidong (IESDA) was responsible for undertaking the awareness raising amongst the IEIB decision makers. Through her efforts she was able to secure the import permit and latter the release permit. She produced the dossier that was submitted to the IEIB containing all the information about the rust so they could make informed decisions. This project has established the framework for future pathogen introductions into China for weed control.

Before the release of the rust could be carried-out in Guangdong Province a release permit has to be issued by the Shenzhen Provincial Government and Guangdong Bureau of

Forestry. This was undertaken by Han Shichou from GEI. Again, this required awareness raising amongst the decision makers, and although successfully achieved, was not without problems (ie the need to cease activities on Neilingding Island, and move to Juizhou Island).

In November 2004, a cooperative workshop, was held in Beijing; "Prevention and Management of Invasive Alien Species (IAS) in China: Building A Strategy for National, Regional and International Actions", organized by Administrative Office for Alien Species of Ministry of Agriculture (MoA), CABI and Chinese Academy of Agricultural Sciences (CAAS). Experts were invited from the Global Invasive Species Programme (GISP) and The Nature Conservancy (TNC) to present papers and provide technical inputs and advice. The objectives of the workshop were:

(1) To summaries of the current status and impacts of IAS in China, across all sectors (agriculture [including trade], forestry, fisheries, environment) - by Chinese scientists;
(2) To summaries of the current frameworks, methodologies and effectiveness on prevention and management of IAS in China;
(3) To deliver the global, regional, and national experience of IAS by external experts, covering the above fields and by utilizing case studies;
(4) To develop strategies, priority activities and plan for a framework of action in China.

Although this workshop is not a direct output of the Darwin Initiative (DI) project, it was strongly linked (and included as such in the DI Stage II Proposal):

- The workshop was attended by all DI project collaborators;
- The DI project was presented at this workshop as a case study on the management of IAS;
- The DI project concept, when first broached with CABI by China was based on a government directive on policy development of invasive alien species prevention and control, which this workshop was organised to address.

Argentina

The pathotype of the rust fungus *P. spegazzinii* that was selected for release in China (**Appendix III *[1]**) was originally collected in Misiones Department in Argentina, by CABI personnel, during an officially sanctioned survey. Under the terms of the Convention on Biological Diversity (CBD), permission was sought from the Argentinean National and Provincial authorities to use this rust pathotype in China. The UK-DI project personnel expected this to be a straight forward process since China and Argentina are:

- Signatories to the CBD for which Article 8h commits signatories to controlling invasive aliens species that threaten biodiversity;
- Members of the Food and Agricultural Organisation (FAO) who, under the International Plant Protection Convention have developed the Code of Conduct for the Import and Export of Classical Biological Control Agents. The spirit of this convention is the free exchange of agents for non-commercial exploitation;
- Receivers of biological control agents themselves for the control of invasive alien species.

Nevertheless, despite assurances from CABI contacts in Argentina that obtaining written permission would not be a problem; support from the National Parks Administration, Argentina[†]; and considerable inputs from the British Embassy in Buenos Aires, CABI and DI Secretariat, the situation is frustratingly yet to be fully resolved. The reason is centred on the lack of a policy framework in Misiones, to enable the documentation for permission to be issued. This is where the DI project has had an unplanned additional accomplishment. It came to light in 2007 though the British Embassy in Buenos Aires, that Misiones Provincial Government is utilizing a recently instated policy framework for dealing with biodiversity issues, to assess the request for China to use the rust. This Darwin Initiative project has thus provided the opportunity for the Misiones Government to implement this policy, and the fact this is a test case, explains the excessive delays in Misiones reaching a decision. The

efforts of this DI project have resulted in the expediting of Resolution No. 509 signed on 24th October 2007, by the Ministry of Ecology, Renewable Natural Resources and Tourism. This resolution establishes a new regulation for access to genetic resources and related items in the Province of Misiones (**Appendix VI**). This provides a procedure to follow in Misiones for future exploitation of biodiversity (commercial or not-for-profit), for the benefit of both Argentina and the collaborating country.

The main consequence of lack of written permission from Argentina, to use its biodiversity to protect Chinese biodiversity, is that formal mainland releases of the rust pathogen could not be undertaken within the time fame of the project. CABI is still committed to pursuing this issue; as are indeed the Chinese DI personnel to establishing the rust on mainland China. Trial releases of the rust were successful on Juizhou Island, although as reported in **Appendix III *[5]**, the rust was unable to persist under the prevailing conditions on the island. Although these releases could be considered controversial, in as much as the Juizhou Island is only a few kilometres off the mainland coast; a distance that microcyclic rust basidiospores are capable of surviving as wind blown spores. However, it is unlikely that a small population of rust infected plants would generate the density of spores to enable this spread to the mainland. The Chinese authorities consider these releases to be trial releases.

> (†Quote from Eng. Héctor M. Espina, Chairman of the Board, National Parks Administration, Argentina; 'Argentina is a federal country, and therefore each province has competence and jurisdiction over the provincial natural resources '…..'our country would be happy to co-operate for the benefit of the environment and global natural biodiversity'.)

UK Training Programme

Fu Weidong from IESDA and Han Shichou from GEI visited CABI Europe-UK from 29th January – 29th February 2004 to receive training, primarily in the techniques necessary to culture the rust fungus *P. spegazzinii* on *M. micrantha*. This was to enable them to undertake the necessary DI project work in China and future potential weed-pathogen natural enemy projects. A report was prepared by the participants, with support from CABI DI personnel, on the training received and the research undertaken while in the U.K. (**Appendix III *[1]**). This report was used as a 'reference manual' for the work subsequently carried-out in China with the rust.

Fu Weidong and Han Shichou were selected for this training as key DI project personnel, who would be overseeing the project work in China. Both are entomologists with substantial experience in biological control techniques, the training aimed to introduce them to the handing of pathogen weed natural enemies, which is new to China. Fu Weidong had support from a senior crop plant pathologist at CAAS in Beijing, throughout the host specificity screening work she managed; and Han Shichou attending pathology training from his local University in Guangdong, in order to support the training he received in the UK.

The assessment and accreditation of the training was realised though the successful culturing, host specificity studies and field release of the rust in China.

Workshops

Darwin Initiative Project Inception Workshop

The DI project was initiated in October 2003. The Inception Workshop was held in November in China, and by this time the prospective rust release site Neilingding Island, Guangdong Province, off the coast of Southern China, had been established by GEI. The workshop was attended by all DI project personnel and associates. At the workshop, the project work plan was discussed, the methodology for the assessment of the weed within the permanent sample plots on Neilingding Island agreed, and the release site for the rust visited by all collaborators. A summary report of the Inception Workshop in given in **Appendix III *[8]**.

Weed Biocontrol Workshop

A DI workshop on weed biological control was held at GEI Guangzhou, China; 25th - 28th, April 2006. The workshop participant's photo is shown below.

The programme is provided in **Appendix III *[9]**. The PowerPoint presentations that were given at the workshop were copied to discs and distributed to the workshop attendees (CABI has a copy of this disc).

The third day of the Workshop a field trip was made to Juizhou Island. The permanent sample plots were observed and mikania weed rust release strategies and monitoring methods were discussed.

Development of and proposals, follow-on projects and associated projects

Support and training was provided to the Chinese collaborators by CABI personnel to develop new collaborative proposals during the course of the project. There were three main facets to this development:

- To securing funding to continue the mikania weed rust release and monitoring programme in Guangdong and extend to other affected regions;
- To develop proposals targeting other invasive weeds which are seriously affecting the biodiversity in natural environments in China;
- To develop a generic programme to support the Chinese government invasive alien species policy; covering prevention, eradication and control.

In addition, *M. micrantha* is an Asia-wide invasive weed problem, and CABI is established as the leader in the classical biological control of this weed. Consequently, though the DI and the Department for International Development (DfID)-funded sister project in India there has been much interest in taking this technology to other affected countries.

1) Project development undertaken as part of the DI project, with the aim of securing funding for follow-up projects in invasive alien weed management in China.

Chinese government funding to continue work initiated under this DI funding

Collaborators from GEI managed to secure a small amount of funding from the Guangdong State Forestry Department to continue the mikania weed-rust work in 2007. Similarly, IESDA secured some funding from the Chinese government for 2007. IESA have also applied for funding to continue DI project from the Ministry of Science and Technology (MoST), China (application pending).

Classical biological control of *Ageratina adenophora* in China

Collaborators from CAAS, with inputs from CABI, were able to secure funding from MoST for the following project: 'Sustainable management strategy and control technology for the invasive alien weed, *Ageratina adenophora* (*Eupatorium adenophorum*) in China'. This project commenced in 2006, with an assessment of the impact of the weed in Yunnan Province. CABI China Office scientist undertook a farmer questionnaire survey as part of this project. *A. adenophora* originates from Mexico, and CAAS/CABI lead surveys were planned to search of natural enemies of *A. adenophora* in Mexico in 2007. Unfortunately these have been delayed pending funding being secured for CABI staff cover (only travel costs of international scientists are cover by the MoST funding). A paper was presented at the 12th International Symposium on the Biological Control of Weeds (ISBCW) (April, 2007, La Grande Motte, France) on this work, and 'in press' for publication in the proceedings (**Appendix III*[11]**).

CABI Partnership funding

Funding from the CABI Partnership Fund (internal funding) provided staff salary cover to support the project development activities, not covered under the DI.

Application for DI Post Project Funding

In January 2006, an application for post project funding was submitted to the DI; 'Evaluation and promotion of invasive alien weed sustainable management in the south China region'. The project aimed to expand and increase the work started under this DI project and provide overseas field survey training for Chinese scientists, for the control of *Ageratina adenophora*. This project was not funded.

Classical biological control of mikania in Taiwan

Prof. Tzean of Taiwan National University (TNU) requested CABI to supply *P. spegazzinii* to Taiwan, since mikania is an import invasive alien weed on the island. It was not possible for this to be directly requested from GEI or IESDA, due to the contentious political situation.

TNU secured funding from the Taiwan Forest Bureau (TFB) to cover the rust shipping costs, and travel costs for the CABI DI project leader to undertake a consultancy to Taiwan. The consultancy was organised for September 2006, to coincide with: the DI final project meeting in Guangdong; a donor visit by CABI to mainland China; and the Seventh International Workshop on Biological Control and Management of *Chromolaena odorata* and *Mikania micrantha*, held at Pingtung University of Science and Technology. The results of the DI project were presented and promoted at this meeting.

While in Taiwan a visit was made to The World Vegetable Centre (AVRDC), TNU and the Bureau of Animal and Plant Health Inspection and Quarantine (BAPHIQ). At AVRDC an assessment was made of their transgenic containment facility, for its suitability to quarantine the mikania weed rust. This facility is designed to prevent the escape of pollen, and thus has high efficiency particulate air (HEPA) filtration, which will contain fungal spores. Following this a courtesy visit was made to BAPHIQ to discuss the issues involved with importing the mikania weed rust into quarantine in Taiwan. Finally, a visit was made to the TNU in order to

discuss the mikania weed biological control project, and provide some training to the mycologists who will be doing the rust work at AVRDC. Host specificity testing is now complete and a rust release permit has been issued by BAPHIQ (January 2008).

Visit to donors in Beijing

The Canadian International Development Agency (CIDA) and the Australian Centre for International Agricultural research (ACIAR), China offices, Beijing were visited in September 2006. Funding priorities and opportunities in invasive alien species management were discussed. It was recommended that CABI prepare a concept proposal for consideration by ACIAR. This was undertaken, and discussions are in progress.

McArthur Foundation

A joint (CABI/CAAS) expression of interest concept note was submitted to the McArthur Foundation in June 2007; 'Developing a cross-sectoral approach to the management of invasive alien species for the conservation of biodiversity in protected areas in Yunnan Province, China'. Feedback is still pending.

Global Environment Facility (GEF) Proposal

In November 2007, a delegation of scientists from IESDA (included DI project collaborators) visited CABI UK to hold discussions on a GEF proposal they are developing. They have submitted concept proposal to the GEF; 'Building Capacity for Prevention and Management of IAS in China', and requested CABI to be the international consultant on the project. CABI's role will be to help with the development of the full proposal and provide technical support and information during project implementation, should it be successfully funded. This demonstrates a clear commitment of CAAS to controlling invasive species (of which classical biological control will form a significant part of), and demonstrates the success of the partnership promoted by the DI project.

2) Project development activities within the region where mikania weed is invasive: expanding on the work in China and India.

Classical biological control of mikania in South Pacific Islands

A project was funded by ACIAR to implement a classical biological control approach for mikania weed in Fiji and Papua New Guinea (PNG) (though the Secretariat of the Pacific Community). CABI was a partner institute, tasked with providing the rust pathogen (*P. spegazzinii*). The project ran during the course of the DI China project, and was expedited by the results of addition host specificity screening of the DI China project.

The CABI DI project leader attended the Roundtable for Nature Conservation in the Pacific and the Invasive Species Working Group (ISWG) meetings held in Alatau, PNG in July 2005. The DI mikania weed biological control results were promoted and other weed targets discussed.

Invasive alien weed management in Nepal

A stakeholder meeting was organised by CABI and Himalayan Nature, held at IUCN (The Conservation Union) Nepal country office, Kathmandu in November 2004, to discuss the mikania weed problem in the Tehri region of Nepal. The DI China project was reported at the meeting. The meeting was a great success, and was attended by representative from both conservation and agricultural organisations, who endorsed the principal of classical biological control for this weed. This would have lead on to a DfID short project (8 months), to ascertain impact of mikania weed in the Tehri and to develop a classical biological control programme, had the coup (against the King) not occurred in February 2005.

A DI funded project: 'Managing Wetlands for Sustainable Livelihoods at Koshi Tappu, Nepal' (Lead by Seb Buckton, Wildfowl & Wetlands Trust, Slimbridge, UK), has commenced. CABI

inputs concern invasive species management; mikania weed is the top invasive species present. A survey has been undertaken in Koshi Tappu to assess invasive weed species present.

5. Project Impacts

- *What evidence is there that project achievements have led to the accomplishment of the project purpose?*

The project purpose was to develop the capability of Chinese scientists to exploit pathogens for the sustainable management of invasive alien weeds in China. This was untaken by capacity building, and implementing a pilot project targeting and important invasive weed (*Mikania micrantha*) in Guangdong Province, Southern China. Training activities and hands-on experience received during the project were aimed to empower Chinese scientists with the skills necessary to develop new collaborative proposals. The evidence that the project achievements have led to the accomplishment of this purpose are:

- The rust pathogen *Puccinia spegazzinii* was imported, screened and a trial release carried-out on Juizhou Island. Following training from CABI and with a strong UK-China support system, this was carried-out by the host country project personnel. This was the first time that a fungal pathogen had been used for the classical biological control of a weed in China.
- Proposal have been prepared and submitted to obtain additional funding (**see 4. Scientific, Training, and Technical Assessment**). Most significantly, the project collaborators from Environment and Sustainable Development in Agriculture (IESDA) approached CABI in November 2007, to be the international consultant on a Global Environment Facility (GEF) proposal they have submitted, "Building Capacity for Prevention and Management of IAS in China". This demonstrates a clear commitment of Chinese Academy of Agricultural Science (CAAS) to controlling invasive species (of which classical biological control will form a significant part of), and demonstrates the success of the partnership promoted by the Darwin Initiative (DI) project.
- The most significant unexpected impact as a result of the DI project activities is the expediting of the signing of the Province of Misiones Resolution No. 509 on 24th October 2007 by The Ministry of Ecology, Renewable Natural Resources and Tourism, Argentina (**Appendix VI**).

- *To what extent has the project achieved its purpose*?

The project has helped China meet its objectives under the CBC by addressing Article 8(h): "Prevent the introduction of, control or eradicate those alien species which threaten ecosystems, habitats or species. This has involved

- Government policy frame work development on the importation of fungal biological control agents (**4. Scientific, Training, and Technical Assessment**);
- Capacity building of technical expertise (**Appendix III ***[1]) (also addressing Article 12);
- Developing proposal to tackle other invasive species, and prevent the introduction of more species (**4. Scientific, Training, and Technical Assessment**);
- Although not in the host country, the additional output of the expedition of the signing of Biodiversity Resolution in Argentina (**Appendix VI**) has helped this country meet its obligations under the CBD. This comes under Article 15 which is concerned with the fair and equitable access to countries genetic resources.

In the future it is anticipated that the rust will suppress mikania weed, thus mitigating the negative impact of an important invasive alien weed on biodiversity. The targeting of other

invasive weeds with biological control, under the new proposals, will also increase the impact of the project in the future.

Linked activities to this DI project whereby China and other countries have been helped to meet their obligations under the CBD included:

- CAAS / Ministry of Agriculture (MoA) / CABI / Global Invasive Species Programme (GISP) Beijing workshop (November 2004); "Prevention and Management of IAS in China: Building A Strategy for National, Regional and International Actions".
- Sharing information on the control of mikania weed with other affected countries in the Asian Pacific Region (Article 17, concerning exchange of information).

- *If there were training or capacity building elements to the project, to what extent has this improved local capacity to further biodiversity work in the host country and what is the evidence for this?*

There was a significant training and capacity building component to the project. This has improved local capacity in classical biological control, and thus invasive alien species management. Invasive species represent the greatest threat to the preservation of global biodiversity after habitat destruction. The evidence of the impact of the capacity building can be demonstrated by the success of the implementation of the biological control pilot project and the developing of proposals to tackle other weed targets, using the same technology.

Fu Weidong / Zhang Guoliang – continuing biological control work; leading the GEF invasive alien species proposal; maintaining culture of *P. spegazzinii* under quarantine at CAAS, Beijing.

Han Schichou – continuing biocontrol work at GEI, including monitoring of *M. micrantha* and *P. spegazzinii*.

- *Discuss the impact of the project in terms of collaboration to date between UK and local partner*?

The collaboration between UK and Chinese partners is continuing through the development of collaborative proposals, supported by the CABI South Asia-China office, based at CAAS in Beijing, particularly the GEF proposal. Representatives from the IESDA, including DI project collaborators, visited CABI Europe-UK in November 2007 to discuss the development of the GEF.

The DI project has lead to improved collaboration between the Chinese government (China Import and Export Inspection Bureau (IEIB), which is part of the Ministry of Agriculture) and IESDA; and local government in Guangdong province, and GEI.

- *In terms of social impact, who has benefited from the project?*

The impact of the pilot project on local communities is yet to be realised, ie reducing the density of mikania weed. Once the rust has been released on mainland China, it will take a number of years (5-10) before the impact of the rust is evident on the populations of the weed. However, the effect will be in perpetuity. Although mikania is an important environmental weed it is also a problem in agriculture and forestry. Therefore the social impact of the project will potentially be directly on local farmers as well as natural biodiversity, by reducing the amount of time they have to spend weeding or applying herbicides increasing the value of the affected crops.

6. Project Outputs

- *Explain differences in actual outputs against those in the agreed schedule*?

The table below compares the actual outputs against those in the agreed schedule. Those parts underlined indicate the deviation from the agreed schedule.

Schedule Outputs	Actual Outputs
1. Chinese scientists & weed control practitioners trained in weed biocontrol with pathogens	1. Chinese scientists have been trained in weed biological control using fungal pathogens
2. Permanent sample plots established & weed (*Mikania micrantha*) impact assessed in China	2. Permanent weed sample plots (10) were established on Neilingding Island and weed density and impact determined. Unfortunately, the island had to be abandoned (**Appendix III***[5]), new plots were identified on Juizhou Island, about 20km from Neilingding. Sample plots (3) were established on Juizhou Island and weed density determined.
3. Biocontrol agent imported & released in China	3. Permits to import and release the rust, *Puccinia spegazzinii*, into China issued.
4. Rust impact studies initiated	4. Rust imported into China and additional host specificity screening completed, under quarantine in Beijing. Trial release of rust on island undertaken; establishment and natural spread within field plants achieved. However, lack of written permission from Argentina, to use its biodiversity in China, has meant that formal mainland releases of the rust pathogen could not be undertaken within the time fame of the project. Rust impact assessment could only be initiated on Juizhou Island.
5. Public awareness campaign implemented	5. Permit to release the rust in China issued, following successful awareness campaign for government policy makers in Beijing and Guangdong. Awareness of the Darwin Initiative (DI) project within the scientific community and extension services implemented via biological control workshop in Guangdong and invasive species workshop in Beijing. Public Awareness campaign was only partly fulfilled, since the planned media campaign for the general public was necessarily modest, pending full mainland releases of the rust.
6. Results publicised & new project proposal developed	6. Journal, book and media articles published. Results presented at symposia/workshops. New proposals in invasive alien weed control submitted, part-funding secured for two initiatives. Local government funding secured to continue project work in field.
7.	7. Signing of Biodiversity Resolution in Argentina expedited.

Details of project outputs are given in the table in **Appendix II**.

Note: Government policy development was an important and key output to this DI project, however, there does not appear to be a suitable category with the DI Standard Output Measures.

- Full details of all publications and material that can be publicly accessed, are provided in **Appendix III.**

- *How has information relating to project outputs and outcomes been disseminated*?

The information relating to the project outputs has been disseminated via:

- Peer reviewed publications,
- Presentations at workshops and conferences;
- Training information, (which have been used within the DI project personnel and by scientists in Taiwan, Fiji and Papua New Guinea).

To date, the main target audience for the information has been the scientific community, post graduate students and Government Officials. However, the target audience will be expanded after project completion to include the general public, through press releases, the media, and farmer and forester field days. This will be funded by GEI and CABI press office.

7. Project Expenditure

- *Tabulate grant expenditure using the categories in the original application/schedule.*

	2003/2004	**2004/2005**	**2005/2006**	**2006/2007**	**TOTAL**
Rents, rates, heating, lighting, cleaning, overheads					
Office costs e.g. postage, telephone, stationery					
Travel and subsistence					
Printing					
Conferences, seminars etc					
Capital items/equipment					
Microscope (IESDA) Misting system (GEI)					
Other costs					
Quarantine rental Lab. and g/house consumables Awareness campaign					
Salaries					
TOTAL DARWIN COSTS					

- Highlighted figures show where a change in budget was made with agreement from the DI Secretariat. No overall change in expenditure was necessary. Figure in parenthesis show original budget distribution.

8. Project Operation and Partnerships

- *Local partners*

The 11 local partners are listed below:

Institute of Environment and Sustainable Development in Agriculture (IESDA);
Fu Wei-dong, Yang Ming-li, Ding Jian-quing, Zhang Guoliang, Tang Wenhua (plant pathology adviser).

Guangdong Entomological Institute (GEI);
Han Shichou, Li Zhi gang, Li liying, Li Jun, Lu Jianwen.

CABI South East Asia – China;
Zhang Feng.

This did not differ significantly from the initial plans of the partnerships. The principal partners were Fu Wei-dong and Han Shichou, and both were significantly engaged with the project activities. There roles in biodiversity issues concern reducing the impact of invasive alien species in natural and agricultural ecosystems. They were fully involved in project planning via project workshops and meetings, and e-mail communication and interaction with the Chinese national CABI facilitator, based at the Chinese Academy of Agricultural Sciences (CAAS), Beijing. Plans were drawn up with full local consultation, modifications occurred as necessary 'on the ground', after consultation with the UK-Darwin Initiative (DI) team. Examples of this included:

- The unplanned tested of a range of sunflower varieties by IESDA, in response to the requested by Import and Export Inspection Bureau (IEIB) (**Appendix III*[3]**). This increase in additional host specificity testing was enabled by GEI transferring some of their DI project funding to IESDA to cover this unplanned work.
- Changing the trial release site from Neilingding to Juizhou Island.

- *During the project lifetime, what collaboration existed with similar projects (Darwin or other) elsewhere in the host country? Was there consultation with the host country Biodiversity Strategy (BS) Office?*

As a result of the work on mainland China; a project was initiated in Taiwan, utilizing the results of the work in China (**see 4. Scientific, Training, and Technical Assessment**). This was undertaken through CABI rather than the Chinese collaborators, due to the contentious political situation. Indeed, Han Shichou (GEI) was unable to get a visa to travel to the Seventh International Workshop on Biological Control and Management of *Chromolaena odorata* and *Mikania micrantha*, held at Pingtung University of Science and Technology, Taiwan in September 2006 (**Appendix III*[10]**). CABI DI project leader represented the DI project at this meeting. The original aim had been for the India project scientist (working on the India mikania weed-rust project) attending the workshop, to meet the DI Chinese scientists and discuss project issues.

An analysis of ecological-economic loss caused by mikania weed on Neilingding Island, had been undertaken, prior to the start of the DI project (**Appendix III*[6]**) by collaborators from Zhongshan University, Guangzhou and Guangdong Neilingding Futian National Nature Reserve Administration, Shenzhen. GEI formed a collaborative relationship with Zan Qijie from the Reserve Administration regarding their monitoring of the mikania weed populations on Neilingdong Island.

China's biodiversity strategy office is the State Environment Protection Agency (SEPA), which is in charge of implementing the CBD. Ding Jianqing, the original Chinese project co-ordinator from CAAS, has since 2001, been an invited expert for the Biodiversity Working Group of the China Council for International Cooperation on Environment and Development (CCICED). CCICED has its secretariat in SEPA, under which, the Biodiversity Working Group is playing an important role in the implementation of CBD in China. Therefore, this

project had a direct link to the Chinese biodiversity strategy office, and the national focal point of the CBD in China.

- *How many international partners participated in project activities?*

CABI was the focal international partner on the project, with personnel based in the UK (Carol Ellison and Sean Murphy) and the CABI facilitator (Zhang Feng) who is a Chinese national based at our CAAS, Beijing office.

International associate institutes, not directly involved with the DI project, but benefiting from the results of the project are discussed in 'Development of proposals, follow-on projects and associated projects' under **4. Scientific, Training, and Technical Assessment**.

- *To your knowledge, have the local partnerships been active after the end of the Darwin Project*?

The local partnerships have been active after the end of the project, and are continuing the project work through local funding. Both IESDA and GEI are active in local biodiversity strategy and related activities as part their institutional linkages. More community participation will be initiated once the rust has been established on mainland China. There is unlikely to be a role for the private sector, since classical biological control in based on natural, persistent spread of the agent (in this case a biotrophic pathogen that cannot be mass-produced in culture), to all weed populations. Hence, it is difficult to perceive a profit perspective, of this weed management approach, which would interest private sector investment. Most classical biological control projects are government funded.

9. Monitoring and Evaluation, Lesson learning

- *Please explain your strategy for monitoring and evaluation (M&E) and give an outline of results.*

The monitoring and evaluation were built-in to the progression of the project, and progress reports had to be supplied by all collaborators on a six monthly basis, to allow the release of funds. For each output to be achieved a previous stage has to be successfully completed:

- The rust was imported in to China, once an import permit has been obtained from the Import and Export Inspection Bureaux (IEIB), which required a successful awareness campaign aimed at the Ministry of Agriculture (MoA) officials;
- Successful handling and additional host specificity screening was achieved, following the training at CABI Europe-UK of host country scientists, and the production of a training report for reference;
- The evaluation of mikania weed density and impact (baseline data) was undertaken once a site had been officially sanctioned, initially on Neilingding Island and subsequently on Juizhou island;
- The trial field release of the rust was only possible after a release permit had been provide by the IEIB and permission given by Guangdong local government, following the provision of an adequate dossier in support of the release;
- The success of the trial release on Juizhou Island was demonstrated by the successful spread and establishment of the rust on field mikania plants;
- Project development activities were undertaken, demonstrated by the submission of proposals and the securing of some follow-on funding.

Significant progress towards the Darwin Initiative (DI) goal was made during the timeframe of this project, and the purpose of this specific DI project: 'To develop the capability of exploiting pathogens for the sustainable management of invasive alien weeds in China'. This focussed on capacity building (technology transfer from UK to China in classical biological control of weeds using fungal pathogens), and a pilot project on the management of mikania weed with a rust pathogen. In future years, it is anticipated that the rust will lead to the

sustainable conservation of biological diversity, by the suppression of mikania weed and, as result of follow-on projects, other important invasive alien weeds. In addition, the unplanned achievement of expediting the Resolution in Misiones Department of Argentina, addresses the DI goal of fair and equitable sharing of the benefits arising out of the utilisation of genetic resources.

- *What were the main problems and what steps were taken to overcome them?*

There were three main problems encountered over the course of the project, which are discussed below:

Host specificity testing
Following the submission of the dossier by Institute of Environment and Sustainable Development in Agriculture (IESDA) to the IEIB, additional, unplanned and unbudgeted screening was requested of sunflower varieties. This was resolved by Guangdong Entomological Institute (GEI) transferring funding from their DI budget to IESDA.

Island trial release sites
A short time after the release of the rust on Neilingding Island, a new official order was issued by Guangdong Provincial Forestry Administration Bureau that all DI project activities should cease on the island, and the rust infected plots must be destroyed. The reasons given are that the Island is listed as a National Nature Conservation Park (preventing the release of new living things on the island) and it is a Military Forbidden Zone (all individuals must have special permission to enter). It was surprising that these issues had not come to light earlier. However, Han Shichou, from GEI, quickly responded to this predicament by securing another Island trial release site for the rust, after discussions with Zhuhai Bureau of Forestry: Jiuzhou Island.

Permission from Argentina
Despite the fact that Argentina is: a signatories to the Convention on Biological Diversity (CBD); member of Food and Agricultural Organisation (FAO); and a receivers of biological control agents (see **4. Scientific, Training, and Technical Assessment**, above for details); it was not possible within the time frame of the project to obtain official, written permission to undertake formal releases of the rust on mainland China. No objections were raised from any official organisation approached, but the lack of a policy framework in Misiones Department (where the mikania-rust was collected), to enable the documentation for permission to be issued, prevented success.

The situation was partially resolved in October 2007, by the passing of a Resolution in Misiones expedited by the persistence of the UK-DI project staff, British Embassy in Buenos Aires and DI Secretariat, in trying to resolve the issue. The Resolution (No. 509) establishes a new regulation for access to genetic resources and related items in the Province (**Appendix VI**). CABI is still committed to pursuing this issue; as are indeed the Chinese DI personnel to establishing the rust on mainland China, for which GEI and IESDA have local government funding.

- *During the project period, has there been an internal or external evaluation of the work* or are there any plans for this?

The work has been evaluated externally by the publishing of peer reviewed journal articles. The additional host specificity screening was evaluated by the MoA scientists from the IEIB, and from this, a release permit was issued. The work was evaluated by the local government in Guangdong and Beijing, which resulted in the provision of additional funding to continue the work.

- *What are the key lessons to be drawn from the experience of this project?*

- **Signatories to the CBD**. There should not be an assumption made that countries who are signatories to the CBD have regulations in place that allow for the CBD Articles to be supported and implemented. Many, if not most countries are still developing their legislation in support of the CBD, particularly in terms of sharing of genetic resources. This was found to be particularly relevant to this DI project involving classical biological control agents being introduced to one country from another. It is vital to have prior informed consent from the country of origin of an agent (in this case Argentina) before a classical biological control project is initiated in a target country (in this case China). The reliance on the fact that the 'biodiversity donor country' (in this case Argentina) is a signatory to the CBC was found not to be sufficient.
- **Protocol for the selection of the field work sites**. It is important to consider all possible issues when selecting sites for field work in the host country: has the owner provided permission; will the site be available throughout the project (and beyond); are there any legislative or legal issues that need to be resolved; is the local government/administrative authority in support of the work; is the site protected from interference from those not involved in the project? In the case of this DI project, the first trial rust release site was on a National Nature Reserve. It was only after the releases of the rust had been made that the local forestry authority vetoed the releases; the sites had to be destroyed. This experience also highlights the need to raise awareness in the authorities responsible for such decisions. Understanding will lead to change.
- **Involve all potential stakeholders from the beginning of the project**. The importance of involving all stakeholders connected to the DI project right from the outset proved essential to the success of the project. A representative from the IEIB was invited to the Project Initiation Workshop. This significantly helped in the issuing of the rust import and release permits. A representative from the Neilingding Futian National Nature Reserve Administration was also included in the project from the start which helped galvanise the permission to use the first trial rust release site, on Neilingding Island. (Although in this case the Guangdong Provincial Forestry Administration Bureau forced this permission to be withdrawn).
- **In-country facilitator**. Cultural differences and communication difficulties can impede progress on a project. It is invaluable for at least one person employed on the project to have an understanding of potential cultural problems that may arise between host and UK personnel. This, together with a key member of the host team having an excellent command of English (or visa versa), is critical. This DI project, had a Chinese national facilitator based in Beijing, which proved to be invaluable, in a country with many important customs and where English has not historically been widely spoken, even within the scientific community.

10. Actions taken in response to annual report reviews (if applicable)

- *Briefly summarise what actions have been taken over the lifetime of the project as a result of recommendations from previous reviews.*

All issues raised by the reviews of the annual report were addressed in the subsequent Darwin Initiative (DI) report in full. Issues were acted upon and discussed with collaborators as appropriate. Key issues raised are discussed below:

Permission from Argentina

The 04/05 Annual Report Reviewer raised the issue of not being able to achieve the goals of the project, if timely permission was not obtained from Argentina to use the rust in China. This remained an issue throughout the project. Following discussions at the Biological Control Workshop in China, in April 2006, it was concluded that an application would be made to DI Secretariat for a no-cost extension to the project. In effect, the project would be, as far as possible put on hold until the Argentinean issue had been resolved. The extension was permitted, but even with this added time, the issue has still not been fully resolved (January 2008). However, as was pointed out by the reviewer, there was an increase in other activities such as project development, preparation of publications and policy development, to counteract this shortfall and achieved a significant legacy in China (and Argentina).

Elucidation of issues involved with Terminating releases on Neilingding Island

The 05/06 Annual Report Reviewer raised the issue of the need to elucidate why it proved necessary to vacate Neilingding Island. This was discussed with the DI team from Guangdong Entomological Institute (GEI) and the reasons that lead to this demand from the Guangdong authorities is summarised in **Appendix III *[5]**:

> 'A short time after the release of the rust on Neilingding, a new official order was issued by Guangdong Provincial Forestry Administration Bureau that all DI project activities should cease on the island, and the rust infected plots must be destroyed. The reasons given are that the Island is listed as a National Nature Conservation Park (preventing the release of new living things on the island) and it is a Military Forbidden Zone (all individuals must have special permission to enter). It was surprising that these issues had not come to light earlier. However, Han Shichou, from Guangdong Entomological Institute, quickly responded to this predicament by securing another Island trial release site for the rust, after discussions with Zhuhai Bureau of Forestry: Juizhou Island'.

It was not possible to obtain any more information on this. However, it must be remembered that the use of pathogens for the biological control of weeds is a new technology in Asia, and consequently the authorities are very cautious ('pathophobia' is the term CABI staff use). Most likely an uninformed individual decided to stop the releases. This is ironic, since it is an invasive alien species that is destroying the biodiversity, but they will not allow a host specific alien species to be used to save the biodiversity.

Implications from none establishment of the rust on Juizhou Island

The 05/06 Annual Report Reviewer also raised the issue on the fact that the rust was unable to persist during the dry season on Juizhou Island. This is discussed in **Appendix III *[5]**:

> 'Juizhou Island is very small and dry, with no above ground persistent water sources; thus, mikania weed will mainly over-season as seeds, rather than plants (defoliated vines). Consequently, the rust may not over-season successfully on this island, and infection of mainland or large island mikania weed populations will be needed before the rust can perpetuate permanently. This does not mean that small island populations are going to be protected from the rust, since spores will potentially blow in each season, from high density populations of infection.
>
> In India, the critical issue at present is developing an optimum rust release strategy. In Kerala and Assam releases have lead to the spread of the rust in the field, but it apparently has died out during the dry season. From observation in the glasshouse and native range of the rust, over-season survival is dependent on the rust infecting plants in particular niches (e.g. along permanent steams), or as cankers on dormant but living stems. From this, CABI scientists believe that the rust must reach a sufficient density in the favoured over-seasoning situation, to elicit an epidemic early in the next growing season.'

Improved reporting of activities and outputs linked to the DI project

The Review of the 04/05 annual report pointed out that the new partnerships and projects (Nepal, Taiwan, South Pacific Islands) linked to the DI project are very relevant and should be emphasised more strongly. The results of the rust screening in China have been used to promote the new initiatives, and the experience gained form the 'experimental' field release have been directly used in their development. Since this review all linked project activities were fully reported

11. Darwin Identity

- *What effort has the project made to publicise the Darwin Initiative?*
  - A banner publicising the Darwin Initiative (DI) Project Initiation Workshop was displayed at the Institute of Environment and Sustainable Development in Agriculture (IESDA) building on the Chinese Academy of Agricultural Sciences (CAAS) campus where the workshop was held. The DI logo was on the banner, and the workshop bags.
  - A banner publicising the Biological Control Workshop was displayed at Guangdong Entomological Institute (GEI), and had the DI logo on it.
  - The DI project was reported at all meetings, symposia and workshops where mikania biological control was discussed, and the DI logo always included in PowerPoint presentations.
  - All visitors to CABI (UK and China) are told about the DI project
  - Study and release sites in Guangdong, China are sign-posted with the appropriate logos of collaborating organisations and funding bodies.
  - The door of the quarantine at CAAS acknowledged the DI.
  - Results published in peer-reviewed scientific journals acknowledge the assistance provided by the DI.
  - Reports concerned with the project, sent to relevant ministries in China, state the DI connection.

- *What is the understanding of Darwin Identity in the host country?*

The DI Identity was extensively promoted in China, and hence there is likely to be broad familiarity with aims of the DI, within certain communities. Below is listed some of the occasions for promotion:

- The DI Project Initiation Workshop, attended by representatives from, Import and Export Inspection Bureau (IEIB), British Embassy (Beijing) and Bureau of International Collaboration (CAAS) (**Appendix III*[8]**);
- The 'Building A Strategy for National, Regional and International Actions' workshop, attended by representatives from many sectors in China including agriculture [as well as trade], forestry, fisheries and environment (**4. Scientific, Training, and Technical Assessment**);
- The Seventh International Workshop on Biological Control and Management of *Chromolaena odorata* and *Mikania micrantha*, held at Pingtung University of Science and Technology, Taiwan (**Appendix III*[10]**);
- The DI Biological Control Workshop in Guangdong attended 60 post graduates;
- Project development activities to donor organisations eg presentations by DI staff at Canadian International Development Agency (CIDA) and Australian Centre for International Agricultural Research (ACIAR) Beijing offices;
- National and local government officials through the issuing of rust import and

release permits;

- General scientific community though peer reviewed publications;
- CABI South East Asian-China office promotion of CABI work in China.

CABI staff continues to refer to the DI in all presentations globally about mikania weed, and on its website.

There is evidence that people within the host country are familiar with the DI through continuing interactions with various CABI contacts in China.

- *Considering the project in the context of biodiversity conservation in the host country, did it form part of a larger programme or was it recognised as a distinct project with a clear identity?*

The project was originally requested by the main collaborators under the China National Invasive Alien Species Strategy, which was being developed when the project was initiated; and is now being implemented. In November 2004, a cooperative workshop, was held in Beijing; "Prevention and Management of IAS in China: Building A Strategy for National, Regional and International Actions", organized by Administrative Office for Alien Species of Ministry of Agriculture (MoA), CABI and CAAS (**4. Scientific, Training, and Technical Assessment;** Training and Capacity Building Activities**)**. The DI project was presented at this workshop as a case study on the management of IAS, and was attended by all DI project collaborators.

Although clearly part of the Chinese biodiversity strategy, the DI project was also a distinct project with clear identity. It had dedicated staff that received specialised, technical training in biological control using pathogens. This empowered them to implement the pilot project; mikania weed suppression using the rust pathogen *P.* spegazzinii, and has provided the necessary expertise to implement similar projects, in the future.

12. Leverage

- *During the lifetime of the project, what additional funds were attracted to biodiversity work associated with the project*?

  - Chinese Government funding was obtained by Guangdong Entomological Institute (GEI) from the Guangdong State Forestry Department; and the Institute of Environment and Sustainable Development in Agriculture (IESA) from Chinese Academy of Agricultural Sciences (CAAS); to continue work initiated under this Darwin Initiative (DI) funding (amount not disclosed).
  - Collaborators from CAAS, with inputs from CABI, were able to secure funding from the Ministry of Science and Technology (MoST), China for the following project: 'Sustainable management strategy and control technology for the invasive alien weed, *Ageratina adenophora* (*Eupatorium adenophorum*) in China'. (Amount for CABI ~£10K, full project funding not disclosed)
  - Funding from the CABI Partnership Fund (internal funding) provided staff salary cover to support the project development activities, not covered under the DI (~£10K).
  - Prof. Tzean from TNU secured internal funding from the Taiwan Forest Bureau (TFB) to cover the rust shipping costs from UK and travel costs for CABI to undertake a consultancy to Taiwan (~£6k).

- *What efforts were made by UK project staff to strengthen the capacity of partners to secure further funds for similar work in the host country and were attempts made to capture funds from international donors?*

One of the outputs of this DI project was to undertake collaborative proposal preparation. The Chinese project partners lead on the proposals aimed at China government funding (eg MoST). CABI was able to provide particular insight and capacity building for the international donor liaison (eg visit to Canadian International Development Agency and Australian Centre for International Agricultural Research, in Beijing) and proposal development (McArthur Foundation and potentially the Global Environment Facility). Full details are provided in **4. Scientific, Training, and Technical Assessment;** Training and Capacity Building Activities**.**

13. Sustainability and Legacy

- *What project achievements are most likely to endure?*

The project has achieved a significant legacy in China:

- Training of scientists in biocontrol technology using fungal pathogens;
- Development of government policy on importation of fungal biocontrol agents;
- Awareness raising within government, scientific establishment and donors;
- Securing follow-on projects.

In addition, there was the unexpected legacy in Argentina:

- Providing an opportunity for the Misiones Government to implement the province's recent policy on biodiversity protection and exploitation.

Both the Institute of Environment and Sustainable Development in Agriculture (IESDA) and Guangdong Entomological Institute (GEI) have successfully obtained Chinese government funding to continue work on the mikania weed rust, beyond the finish of the Darwin Initiative (DI) project; this ensures that the project purpose is fully achieved. The Ministry of Science and Technology (MoST) funding (*Ageratina adenophora*) will enable continued collaboration between CAAS and CABI, although this will be difficult to sustain until funding to cover international salaries have been secured. Project partners will thus continue to work together at least in short term. If one of the applications for international donor (McArthur Foundation, Global Environment Facility) funding is secured, long-term collaboration will be sustained, and the capacity building activities of the Darwin Initiative (DI) project further exploited.

- *Have the project's conclusions and outputs been widely applied?*

The project outputs have been applied though:

- Policy development in China through the incorporation of fungal natural enemies into the Import and Export Inspection Bureau (IEIB) importation and release policy. This should ensure that future applications to import fungal natural enemies will be straightforward;
- The expediting of the Resolution No. 509 in Argentina to establish a new regulation for access to genetic resources and related items in the Province of Misiones;
- Including the assessment of fungi as potential natural enemies for invasive alien weed control in the proposals developed under this DI project.

The legacy could have been improved if Argentina had been in a position legislatively to allow the rust to be released on mainland China within the timeframe of the DI project. However, the long-term legacy will potentially be the suppression of mikania weed in China.

- Are additional funds being sought to continue aspects of the project?
  - Australian Centre for International Agricultural Research (ACIAR) to expand work to other invasive alien weed problems in China;
  - McArthur Foundation and GEF to undertake a generic approach to the prevention and management of invasive alien species.

Full details are provided in **4. Scientific, Training, and Technical Assessment;** Training and Capacity Building Activities**.**

14. Value for money

It is considered that this Darwin Initiative (DI) project has been excellent value for money. This is supported by the significant outputs listed below:

1) Chinese scientists have been trained in weed biological control using fungal pathogens, enabling them to successfully implement the *Mikania micrantha-Puccinia spegazzinii* pilot project, and potentially future projects;
2) The process involved with importing and releasing fungal weed biological control agents has been established in China;
3) Permanent mikania weed sample plots were established on Neilingding Island and subsequently Juizhou Island (and mikania density and impact recorded);
4) Permits to import and release the rust, *P. spegazzinii*, in China were issued, following successful awareness campaign for government policy makers in Beijing and Guangdong;
5) Rust released on Neilingding Island and subsequently Juizhou Island.
6) Awareness of the mikania pilot project within the Chinese scientific community implemented;
7) New proposals in invasive alien weed control submitted, part-funding secured for three initiatives;
8) Rust establishment and monitoring studies initiated;
9) Journal, book and media articles published;
10) Signing of Biodiversity Resolution in Argentina expedited.

The legacy of this project will potentially increase over time; once the rust is impacting on the mikania weed density, and new projects using the same technology implemented. The interest demonstrated by all collaborators in continuing and expanding the work started under this DI project, is clear by their successful applications for Chinese government funding and the development of new international donor proposals.

This project has been a valuable learning process, for all collaborators. Despite the fact the classical biological control using fungal pathogens is a proven technology in a number of countries around the world, with major success stories; it is still a relatively new technology, and the first introduction into a country will always be difficult. Now that the process is in place within the relevant government departments, and a precedence set, new projects will not encounter the same delays or prejudices.

List of Acronyms

ACIAR	Australian Centre for International Agricultural Research
AVRDC	The World Vegetable Centre
BAPHIQ	Bureau of Animal and Plant Health Inspection and Quarantine (Taiwan)
CABI	CAB International (formally the Common wealth Agricultural Bureau)
CAAS	Chinese Academy of Agricultural Sciences
CBC	Classical biological control
CBD	Convention on Biological Diversity
CIDA	Canadian International Development Agency
DfID	Department for International Development (UK)
DI	Darwin Initiative
FAO	Food and Agricultural Organisation
GEF	Global Environment Facility
GEI	Guangdong Entomological Institute
GISP	Global Invasive Species Programme
IAW	Invasive alien weeds
IAS	Invasive alien species
IBC	Institute of Biological control
IESDA	Institute of Environment and Sustainable Development in Agriculture (CAAS)
IEIB	Import and Export Inspection Bureaux (China)
IUCN	The Conservation Union
MoA	Ministry of Agriculture
MoST	Ministry of Science and Technology (China)
TFB	Taiwan Forest Bureau
TNC	The Nature Conservancy
TNU	Taiwan National University

15. Appendix I: Project Contribution to Articles under the Convention on Biological Diversity (CBD)

Please complete the table below to show the extent of project contribution to the different measures for biodiversity conservation defined in the CBD Articles. This will enable us to tie Darwin projects more directly into CBD areas and to see if the underlying objective of the Darwin Initiative has been met. We have focused on CBD Articles that are most relevant to biodiversity conservation initiatives by small projects in developing countries. However, certain Articles have been omitted where they apply across the board. Where there is overlap between measures described by two different Articles, allocate the % to the most appropriate one.

Project Contribution to Articles under the Convention on Biological Diversity		
Article No./Title	**Project %**	**Article Description**
6. General Measures for Conservation & Sustainable Use	5	Develop national strategies that integrate conservation and sustainable use.
7. Identification and Monitoring	5	Identify and monitor components of biological diversity, particularly those requiring urgent conservation; identify processes and activities that have adverse effects; maintain and organise relevant data.
8. In-situ Conservation	25	Establish systems of protected areas with guidelines for selection and management; regulate biological resources, promote protection of habitats; manage areas adjacent to protected areas; restore degraded ecosystems and recovery of threatened species; control risks associated with organisms modified by biotechnology; control spread of alien species; ensure compatibility between sustainable use of resources and their conservation; protect traditional lifestyles and knowledge on biological resources.
9. Ex-situ Conservation		Adopt ex-situ measures to conserve and research components of biological diversity, preferably in country of origin; facilitate recovery of threatened species; regulate and manage collection of biological resources.
10. Sustainable Use of Components of Biological Diversity	10	Integrate conservation and sustainable use in national decisions; protect sustainable customary uses; support local populations to implement remedial actions; encourage co-operation between governments and the private sector.
11. Incentive Measures		Establish economically and socially sound incentives to conserve and promote sustainable use of biological diversity.
12. Research and Training	25	Establish programmes for scientific and technical education in identification, conservation and sustainable use of biodiversity components; promote research contributing to the conservation and sustainable use of biological diversity, particularly in developing countries (in accordance with SBSTTA recommendations).

13. Public Education and Awareness	10	Promote understanding of the importance of measures to conserve biological diversity and propagate these measures through the media; cooperate with other states and organisations in developing awareness programmes.
14. Impact Assessment and Minimizing Adverse Impacts		Introduce EIAs of appropriate projects and allow public participation; take into account environmental consequences of policies; exchange information on impacts beyond State boundaries and work to reduce hazards; promote emergency responses to hazards; examine mechanisms for re-dress of international damage.
15. Access to Genetic Resources	15	Whilst governments control access to their genetic resources they should also facilitate access of environmentally sound uses on mutually agreed terms; scientific research based on a country's genetic resources should ensure sharing in a fair and equitable way of results and benefits.
16. Access to and Transfer of Technology		Countries shall ensure access to technologies relevant to conservation and sustainable use of biodiversity under fair and most favourable terms to the source countries (subject to patents and intellectual property rights) and ensure the private sector facilitates such assess and joint development of technologies.
17. Exchange of Information	5	Countries shall facilitate information exchange and repatriation including technical scientific and socio-economic research, information on training and surveying programmes and local knowledge
19. Bio-safety Protocol		Countries shall take legislative, administrative or policy measures to provide for the effective participation in biotechnological research activities and to ensure all practicable measures to promote and advance priority access on a fair and equitable basis, especially where they provide the genetic resources for such research.
Total %	**100%**	**Check % = total 100**

16. Appendix II Outputs

Please quantify and briefly describe all project outputs using the coding and format of the Darwin Initiative Standard Output Measures.

Code	Total to date	Detail
Training Outputs		
1a	Number of people to submit PhD thesis	
1b	Number of PhD qualifications obtained	
2	Number of Masters qualifications obtained	
3	Number of other qualifications obtained	
4a	Number of undergraduate students receiving training	
4b	Number of training weeks provided to undergraduate students	
4c	Number of postgraduate students receiving training (not 1-3 above)	60 - Postgraduate training in biological control at workshop in Guangdong
4d	Number of training weeks for postgraduate students	0.4 (2 days)
5	Number of people receiving other forms of **long-term** (>1yr) training not leading to formal qualification(i.e not categories 1-4 above)	
6a	Number of people receiving other forms of **short-term** education/training (i.e not categories 1-5 above)	5 - Training of 2 Chinese scientists (Ms. Fu Weidong from IESDA and Prof. Han Shichou from GEI) in handling rust at CABI, UK; 3 Chinese scientists training in proposal preparation.
6b	Number of training weeks not leading to formal qualification	5 – (4 weeks 2 Chinese scientists in UK; 0.8 weeks, 11 Chinese scientists trained in aspects of biological control and project management; 0.2 weeks 3 Chinese scientists in proposal preparation).
7	Number of types of training materials produced for use by host country(s)	3 - training report from UK training programme; PowerPoint presentations distributed at biological control workshop; scientific papers and book.
Research Outputs		
8	Number of weeks spent by UK project staff on project work in host country(s)	4.2 - Workshops and meetings over course of project
9	Number of species/habitat management plans (or action plans) produced for Governments, public authorities or other implementing agencies in the host country (s)	2
10	Number of formal documents produced to assist work related to species identification, classification and recording.	
11a	Number of papers published or accepted for publication in peer reviewed journals	3
11b	Number of papers published or accepted for publication elsewhere	3
12a	Number of computer-based databases established (containing species/generic information) and handed over to host country	
12b	Number of computer-based databases enhanced (containing species/genetic information) and handed over to host country	
13a	Number of species reference collections established and handed over to host country(s)	1 - Facilities established for holding of fungal rust culture for reference
13b	Number of species reference collections enhanced and handed over to host country(s)	
Dissemination Outputs		
14a	Number of conferences/seminars/workshops organised to present/disseminate findings from Darwin project work	5 - Inception Workshop Beijing; unscheduled project meeting Beijing (2); Biological Control Workshop Guangdong; Final Project meeting in Guangdong.
14b	Number of conferences/seminars/ workshops	6 –CAAS/CABI/MoA/GISP Invasive Alien Species

Code	Total to date	Detail
	attended at which findings from Darwin project work will be presented/ disseminated.	Meeting, Beijing, 2005, DI activities presented and all key DI project staff attended. CABI/Himalayan Nature/IUCN stakeholder meeting in Nepal November 2004; Roundtable for Nature Conservation in the Pacific and the Invasive Species Working Group meetings held in Alatau, PNG in July 2005; VII International Workshop on Biocontrol and Management of *Chromolaena odorata* and *Mikania micrantha*, at National Pingtung University, Taiwan, September 2006; XII International Symposium on the Biological Control of Weeds, Montpellier, France, April 2007. All four meetings were attended by UK-DI project staff and project activities presented.
15a	Number of national press releases or publicity articles in host country(s)	2 – UK-DI personnel interviewed on invasive alien species for 2 Chinese National Newspapers: The 'China Daily' (English Edition) published a front-page article on the China IAS Strategy process and CABI's inputs.
15b	Number of local press releases or publicity articles in host country(s)	
15c	Number of national press releases or publicity articles in UK	
15d	Number of local press releases or publicity articles in UK	
16a	Number of issues of newsletters produced in the host country(s)	
16b	Estimated circulation of each newsletter in the host country(s)	
16c	Estimated circulation of each newsletter in the UK	
17a	Number of dissemination networks established	
17b	Number of dissemination networks enhanced or extended	1 - Establish web-page on DI project on CABI website
18a	Number of national TV programmes/features in host country(s)	2 – UK DI personnel interviewed on invasive alien species for China CTV7, and a television news round.
18b	Number of national TV programme/features in the UK	
18c	Number of local TV programme/features in host country	
18d	Number of local TV programme features in the UK	
19a	Number of national radio interviews/features in host country(s)	
19b	Number of national radio interviews/features in the UK	
19c	Number of local radio interviews/features in host country (s)	
19d	Number of local radio interviews/features in the UK	
Physical Outputs		
20	Estimated value (£s) of physical assets handed over to host country(s)	
21	Number of permanent educational/training/research facilities or organisation established	
22	Number of permanent field plots established	13 - Permanent sample plots established on Neilingding Island and Juizhou Island (Zhuhai), Guangdong Province, Southern China.
23	Value of additional resources raised for project	>£26K –CABI Project development fund (£10k); Chinese Local Government funding for continuation of DI project activities(undisclosed); Taiwan National University to import rust culture to Taiwan (£6K); Chinese Ministry of Science and Technology to support work on *Ageratina adenophora* (full amount undisclosed, approx. £10K to CABI).

17. Appendix III: Publications

Provide full details of all publications and material that can be publicly accessed, e.g. title, name of publisher, contact details, cost. Details will be recorded on the Darwin Monitoring Website Publications Database that is currently being compiled.

Mark (*) all publications and other material that you have included with this report

Type * (e.g. journals, manual, CDs)	**Detail** (title, author, year)	**Publishers** (name, city)	**Available from** (e.g. contact address, website)	**Cost £**
*[1]Report	Training Programme and Research Results on: Biological Control of *Mikania micrantha* using the Rust Fungus *Puccinia spegazzinii*. [†]Fu WeiDong, [†]Han Shichou, [†]Carol Ellison, [†]Alan Buddie 2004	Unpublished report	Fu Wei-dong, Institute of Environment & Sustainable Development in Agriculture, CAAS, Beijing, 100081, China C.A. Ellison, CABI Europe-UK, Silwood Park, Ascot, Berks. SL5 7TA UK.	Free
*[2]Report	Additional Host Specificity Screening of *Puccinia spegazzinii*, a Potential Biocontrol Agent for *Mikania micrantha* undertaken in China [†]Fu Wei-dong, [†]Yang Ming-li, [†]Ding Jian-quing 2005	Unpublished report – but data published in paper (*[3]) below (in Chinese)	Fu Wei-dong, Institute of Environment & Sustainable Development in Agriculture, CAAS, Beijing, 100081, China C.A. Ellison, CABI Europe-UK, Silwood Park, Ascot, Berks. SL5 7TA UK.	Free
Dossier (available in Chinese only)	Supplementary Dossier on the Biology and Host Specificity of *Puccinia spegazzinii*, a Potential Biocontrol Agent for *Mikania micrantha* in China [†]Fu Wei-dong, [†]Yang Ming-li, [†]Ding Jian-quing 2005	Unpublished dossier,	Fu Wei-dong, Institute of Environment & Sustainable Development in Agriculture, CAAS, Beijing, 100081, China	Free
*[3]Report	Interaction between *Puccinia spegazzinii* and *Helianthus annuus* (sunflower) [†]Fu Wei-dong, [†]Yang Ming-li, [†]Ding Jian-quing	Unpublished report	Fu Wei-dong, Institute of Environment & Sustainable Development in Agriculture, CAAS, Beijing, 100081,	Free

Type * (e.g. journals, manual, CDs)	Detail (title, author, year)	Publishers (name, city)	Available from (e.g. contact address, website)	Cost £
	2005		China C.A. Ellison, CABI Europe-UK, Silwood Park, Ascot, Berks. SL5 7TA UK.	
*[4]Journal (in Chinese, English abstract included)	Biology and Host Specificity of *Puccinia spegazzinii*, a Potential Biocontrol Agent for *Mikania micrantha* †Fu Wei-dong, †Yang Ming-li, †Ding Jian-quing 2006	Chinese Journal of Biological Control 22(1): 67-72 Beijing, China	Fu Wei-dong, Institute of Environment & Sustainable Development in Agriculture, CAAS, Beijing, 100081, China	Free
Book (available in Chinese only)	Invasion Ecology and Management of Alien Weed *Mikania micrantha* H.B.K. Wang Bo-sun, Wang Yong-jun, Liao Wen-bo, †Zan Qi-jie, Li Ming-guang, Peng Shao-lin, †Han Shichou, Zhang Wei-yin, Chen Rui-ping. 2004	Science Press, China, 239pp	Han Shichou, Guangdong Entomological Institute, Guangzhou 510260, China	unknown
*[5]Report	Trial Releases of *Puccinia spegazzinii* on *Mikania micrantha* Infested Islands off the South Coast of China †Han Shichou, †Fu Wei-dong, †Zhang Feng, †Zan Qijie, †Li Zhi gang, †Li liying, †Li Jun, †Lu Jianwen, †Carol Ellison 2006	Unpublished report	C.A. Ellison, CABI Europe-UK, Silwood Park, Ascot, Berks. SL5 7TA UK.	
*[6]Full English translation of Chinese Journal paper	Analysis of ecological-economic loss caused by weed *Mikania micrantha* on Neilingding Island, Shenzhen, China. Zhong Xiao-qing, Huang Zhuo, Si Huan, †Zan Qi-jie 2004	Journal of Tropical and Subtropical-Botany 2004 12(2): 167-170	C.A. Ellison, CABI Europe-UK, Silwood Park, Ascot, Berks. SL5 7TA UK.	
*[7]Journal (in Chinese, English abstract	Pathogenicity of *Puccinia spegazzinii* in South China. †Li Zhi gang, †Han Shichou, †Li liying, †Li Jun, †Lu	China Journal of Biological Control 23 (supplement) 57-59	Han Shichou, Guangdong Entomological Institute, Guangzhou	Free

Type * (e.g. journals, manual, CDs)	Detail (title, author, year)	Publishers (name, city)	Available from (e.g. contact address, website)	Cost £
included, full English translation in preparation)	Jianwen 2007		510260, China (Full English translation available from C.A. Ellison, CABI Europe-UK, Silwood Park, Ascot, Berks. SL5 7TA UK. in early 2008)	
*[8]Workshop Report	*[8]Summary report of Darwin Initiative inception workshop; 'Towards sustainable management of invasive alien weeds in southern China' [†]Fu Wei-dong, [†]Carol Ellison 24-27th November 2003.	Unpublished Report	C.A. Ellison, CABI Europe-UK, Silwood Park, Ascot, Berks. SL5 7TA UK.	Free
*[10]Workshop Proceedings (Abstract only included)	Sustainable control of *Mikania micrantha* – implementing a classical biological control strategy in India using the rust fungus *Puccinia spegazzinii* [†]C.A. Ellison, K.C. Puzari, P. Sreerama Kumar, Usha Dev, K.V. Sankaran, R. J. Rabindra and [†]S. T. Murphy 2006	International Organization for Biological Control of Noxious Animals and Plants (IOBC) Proceedings of the Seventh International Workshop on Biological Control and Management of *Chromolaena odorata* and *Mikania micrantha*, Pingtung University of Science and Technology, Taiwan, September 2006.	Will be available online in early 2008 (in press): http://www.ehs.cdu.edu.au/chromolaena/siamhome.html Paper also available from C.A. Ellison, CABI Europe-UK, Silwood Park, Ascot, Berks. SL5 7TA UK.	Free
*[11]Symposium Proceedings (Abstract only included)	Sustainable management, based on biological control and ecological restoration, of an alien invasive weed, *Ageratina adenophora* (Asteraceae), in China [†]F. Zhang, W.-X. Liu, F.-H. Wan and [†]C.A. Ellison. 2008	CABI Publishing, Oxon, UK. (in press) Julien, M.H., Evans, H.C., Sforza, R. (Eds.), Proceedings of the XIIth International Symposium on Biological Control of Weeds. Montpellier, France, 2007	Proceedings currently in press, paper available from C.A. Ellison, CABI Europe-UK, Silwood Park, Ascot, Berks. SL5 7TA UK.	
Book (Copy of book to be provided	Chapter 10. Policy Frameworks for the Implementation of a Classical Biological Control	CABI Publishing, Oxon, UK.	Book currently in press, paper available from C.A. Ellison, CABI	Book will available free to developing world

Type * (e.g. journals, manual, CDs)	Detail (title, author, year)	Publishers (name, city)	Available from (e.g. contact address, website)	Cost £
to the Chinese Government policy makers in invasive species prevention and management)	Strategy: the Chinese Experience †Ding Jianqing In: *Invasive Alien Plants in Asia: Problems and Solutions.* Edited by †ST Murphy, †CA Ellison and R Murphy (in press).		Europe-UK, Silwood Park, Ascot, Berks. SL5 7TA UK.	stakeholders and for purchase by others. Cost to be decided.

†Darwin Initiative staff and associates

18. Appendix IV: Darwin Contacts

To assist us with future evaluation work and feedback on your report, please provide contact details below.

Project Title	Towards sustainable management of alien invasive weeds in southern China
Ref. No.	162/12/026
UK Leader Details	
Name	Dr. Carol A. Ellison
Role within Darwin Project	Training and consultancy in invasive weed management; focusing on implementation of classical biological control
Address	CABI Europe-UK, Silwood Park, Ascot, Berks. SL5 7TA UK.
Phone	
Fax	
Email	
CABI China Facilitator Details	
Name	Dr. Zhang Feng
Role within Darwin Project	Facilitator, translator, interpreter
Address	C/o CAAS-CABI Project Office, Internal Post Box, 56 Chinese Academy of Agricultural Science, 12 Zhongguancun Nandajie Beijing 100081, China
Phone	
Fax	
Email	
Partner 1	
Name	Jianqing Ding (recently left Invasive Alien Species Programme programme, Beijing; now at the Invasion Ecology and Biocontrol Lab, Wuhan Botanical Garden, Chinese Academy of Sciences, Wuhan, 430074 China) new leader is Dr. Zhang Guoliang
Organisation	Invasive Alien Species Programme, Pest Plant Biological Control Group (Formerly, Institute of Biological Control), Institute of Environment and Sustainable Development in Agriculture
Role within Darwin Project	Importation, screening and release of biocontrol agent for *Mikania micrantha*, liaison with national quarantine authorities responsible for import and release of biocontrol agents in China.
Address	Chinese Academy of Agricultural Sciences (CAAS), 12 Zhongguancun Nandajie, Beijing, 100081, P. R. China
Fax	
Email	
Partner 2 (if relevant)	
Name	Prof. Han Shichou
Organisation	Guangdong Entomological Institute (GEI),
Role within Darwin Project	Establishing and Monitoring of *Mikania micrantha* field sites and rust releases. Lead - public information campaign
Address	Xingang West Road 105, Guangzhou 510260, P. R. China.
Fax	
Email	

19. Appendix V: LOGICAL FRAMEWORK –Updated October 2005

Project summary	*Measurable indicators*	*Means of verification*	*Important assumptions*
Goal: To draw on expertise relevant to biodiversity from within the United Kingdom to work with local partners in countries rich in biodiversity but poor in resources to achieve • the conservation of biological diversity, • the sustainable use of its components, and • the fair and equitable sharing of the benefits arising out of the utilisation of genetic resources			
Purpose To develop the capability of exploiting pathogens for the sustainable management of invasive alien weeds in China.	SHORT TERM: *Puccinia spegazzinii* (rust) established in the field in China LONG TERM: *Mikania* weed controlled & conservation areas protected. Conservation authorities adopt classical biological control using fungi as an alternative strategy for the management of alien invasive weeds.	*Mikania* weed no longer an ecological threat. New proposals employing pathogens as classical biological control agents developed; technical reports, scientific papers and publicity generated.	Government of China does not change current policy on introduction and release of exotic biocontrol agents. China maintains its commitment to the CBD. Assumes political situation in China does not prevent project activities.
Outputs 1. Chinese scientists & weed control practitioners trained in weed biocontrol with pathogens 2. Permanent sample plots established & weed impact assessed in China 3. Biocontrol agent imported & released in China 4. Rust impact studies initiated 5. Public awareness campaign implemented 6. Results publicised & new project proposal developed	1. Scientists visit UK & receive training; workshop held 2. Plots established & methodology agreed with collaborators 3. Permit for import & release applied 4. Methodology agreed with collaborators 5. Targeted information produced (leaflets, posters, videos); media contacted 6. Articles/proposals developed	1. Reports from trainees & in-country institutions 2, 4 & 6 Project report/ scientific papers; proposals submitted 3. Document from CAAS 5. Media broadcasts/ popular articles published	Suitable participants available for training courses Import Licence issued Biocontrol agents perform according to expectations Technology transfer allows the scientists to implement the strategy effectively Media uptake
Activities	**Activity Milestones (Summary of Project Implementation Timetable)**		
Training	**Yr 1**: Inception workshop for all collaborators, China (10 days); two Chinese scientists to visit UK (4 weeks). **Yr3**: Workshop held in China on the principles and practices of classical biological control, run by CABI Bioscience (5 days); new project proposals developed (5 days). **Yr 4**: End of project workshop for all collaborators to discuss results & follow on activities (5 days); finalization of new project proposals (5 days).		
Implementation of biocontrol strategy	**Yr 1**: Permanent sample plots set up in nature reserve, China; weed impact assessed; rust imported into China for completion of additional host specificity screening; dossier submitted to China for release of rust. **Yr 3**: Rust released in Guangdong; establishment and spread monitored. **Yr 4**: Rust spread monitored. **Yr 4**: Impact within sample plots assessed; capacity put in place for long-term monitoring of rust impact.		
Promotion of programme	**Yr 3**: Public awareness campaign implemented in Guangdong; policy maker's awareness campaign implemented Beijing. **Yr 4:** Scientific paper prepared and published; assessment report written for Chinese government policy makers.		

20. Appendix VI: English Summary of the Province of Misiones Resolution No. 509; Date: 24 OCT 2007

The Ministry of Ecology, Renewable Natural Resources and Tourism resolves the following:

Article 1 – This resolution is hereby established as the new regulation for access to genetic resources and related items in the Province of Misiones.

Article 2 – All applicants for access to genetic resources, extraction of samples and genetic modification of organisms within the jurisdiction of the Province of Misiones will be required to submit Annex 1 (instructions, forms 1,2 and 3); Annex 2 (glossary); Annex 3 (sworn declaration); and Annex 4 (authorisations).

Article 3 – The application form will be submitted to the Ecology Department and the Biodiversity Department in the Ministry of Ecology, Renewable Natural resources and Tourism. If the intended research is to take place in Protected Natural Areas, guidance will be requested from the Ministry's Protected Natural Areas Department, which will be responsible for issuing the relevant permit/s.

Article 4 – A register of applications for access to genetic resources, sample extraction and genetic modification of organisms in Misiones is hereby set up, and each application will be given a registration number.

Article 5 – Royalties from the exploitation of any local biodiversity resource will be distributed as follows: 50% to the Province (represented by the Ministry of Ecology, Renewable Natural Resources and Tourism) and 50% to the permit holder.

Annex 1

Requirements to apply for access to genetic resources in the Province of Misiones

- Form 1 should be completed in all cases. If the intended research includes sample-taking, Form II is also compulsory. In the case of modification, production and industrialisation, Form III should be completed. If the purpose is to continue with a project already authorised by the Ministry, this should be specified as it will speed up the process.
- Under Law No. 2970 of Administrative Proceedings, it is essential for applicants to provide a domicile of choice within the jurisdiction of Misiones.
- Applicants will submit a detailed, clearly systematised research project on paper.
- Applicants will be required to provide details of a research-oriented scientific or academic organisation endorsing the project, with CVs for each of the people involved.
- Applicants will submit a detailed timetable of activities and a report on possible environmental impact on the ecosystems and species concerned.
- Applicants will provide a list of measures and actions that will be taken to minimise the possibility of negative impacts during research, development and/or production, as well as their intended risk and impact control strategy.
- Applicants will undertake to submit a final report to the Ministry of Ecology, Renewable Natural Resources and Tourism at the end of the research period. If the project is supported by a university, a museum, CONICET (National Council for Scientific and Technical Research) or other public organisations, progress reports as well as the final report submitted to these organisations will be required. In addition, at least 3 copies will be submitted of any kind of scientific production (publications, book chapters, summaries, posters, etc.) based from the information collected in the province.
- If the activities are carried out in Protected Natural Areas, applicants will be required to show their access permit, issued by the Ministry of Ecology, Renewable Natural Resources and Tourism, to the nearest Park Ranger.