Darwin Initiative for the Survival of Species

Annual Report

http://www.darwin.gov.uk

Project Reference Number : 162/12/026

Towards sustainable management of alien invasive weeds in southern China

Project Leader and Author: Dr. Carol A. Ellison, 30th April 2004

Darwin Initiative for the Survival of Species

Annual Report

1. Darwin Project Information

Project Ref. Number	162/12/026
Project Title	Towards sustainable management of alien invasive weeds in southern China
Country(ies)	UK, China
UK Contractor	CABI Bioscience (CABI) (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 Guangdong Entomological Institute (GEI), Guangzhou, China
Darwin Grant Value	£177,508
Start/End dates	October 2003 / September 2006
Reporting period and report number	1st October 2003 to 31March 2004 Report 1.
Project website	*To be added to the CABI Bioscience website* http://www.CABI-Bioscience.org
Author(s), date	Dr. Carol A. Ellison, 30th April 2004

2. Project Background

- 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 classical biological control (CBC), has proven to be a efficacious, cost-effective, sustainable and safe option for the management of alien weeds. 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.

  As a leading international organisation in the field of biological control, CABI Bioscience, has received a number of independent requests from local scientists in China, concerning the sustainable control of invasive alien weeds (IAW). CAB International (parent organisation of Bioscience) has a history of collaborative development projects with China, and has recently established an office in Beijing. Although China has expertise in the biological control field, CBC of IAW

has yet to be fully exploited, and the use of pathogens is a totally new technology to China.

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 or Mikania). 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, by exploiting a similar programme already underway in India.

3. Project Purpose and Outputs

- The purpose of this project is to develop the capability of exploiting pathogens for the sustainable management of IAW in China. The project will specifically develop and apply the research already undertaken under a DFID-funded NRI-administered project for the classical biological control of Mikania in India, using the highly host specific, neotopical rust fungus *Puccinia spegazzinii*. Training activities and hands-on experience received during the project will empower Chinese scientists with the skills necessary to develop new collaborative proposals. The objective is to develop these proposals during the course of the programme, with support from CABI personnel, targeting other invasive weeds that are seriously affecting the biodiversity in native environments in China.

  Annex 1 is a report of the progress and achievements against the Logical Framework for Financial Year 2003/2004, the original project logical framework, follows this as Appendix 1.

- The personnel involved in the operational plan in China were modified, prior to the start of the project. The CV's of the two new personnel were provided to Secretariat and approved.

4. Progress

- The project commenced six months ago. Background given above.

- The project was initiated in October 2003. The Inception Workshop was held in November in China, and by this time the prospective rust release site Neiling Ding Island, Guangdong Province, off the coast of Southern China, had been established by GEI. At the workshop, the project work plan was discussed, the methodology for the assessment of the weed within the permanent sample plots agreed, and the release site for the rust visited by all collaborators. Two Chinese scientists (Han Shichou and Fu Weidong) came to CABI for training in February 2004 and the isolate of the rust to be imported into China was selected. This period of the programme culminated with the obtaining of an Import Licence by IBC, for the rust to be shipped to China, for testing in quarantine.

  Slippage: The shipment of the rust to China has been delayed from February 2004 (listed in project outputs) to May/June 2004. This will result in a potential delay in the field release of the rust, and associated activities. In addition, since a different isolate of the rust has been selected for China, to the one chosen for India, a longer host range list will need to be tested than if the same, fully tested isolate had been selected. The rainy season in Guangdong is between April and September. Consequently, it is highly probably that the rust will now be released in April 2005, since it is not logistically possible for the screening, obtaining of the release permit, and mass production of the rust at GEI, to be completed before the end of this rainy season.

- This project is progressing well, according to the planned activity milestones. The achievements of the project this year (October 2004- March 2005) can be considered under the following categories:

Planning
Inception Workshop Report provided in Appendix 1.

Training
A summary of the training programme for the two Chinese Scientists (Prof. Han Shichou and Ms. Fu Weidong*)* at CABI is provided below. A full report is currently being prepared in China by the trainees, and will be sent at a later date (still to be established).

Training Programme for Prof. Han Shichou and Ms. Fu Weidong:
'Biological Control of *Mikania micrantha* using the Rust Fungus *Puccinia spegazzinii'*
Held at CABI Bioscience, UK*: 29th January – 29th February 2004*
Co-ordinator*: Dr. Carol A. Ellison*

General training in:

- Quarantine procedures for the safe handling of pathogens in different grades of facilities.
- Plant inoculation techniques used in the culturing of rust fungi.
- Familiarisation with the UK standards for the safe handling of substances potentially hazardous to health (Control of Substances Hazardous to Health Regulations [COSHH], 1999). This is a legal requirement before any scientific work can be carried out in the UK. Specific assessments will be required for all procedures that are carried out using COSHH listed substances; for example fungal stains and chemicals used in molecular techniques.
- Microscopic analysis techniques and photography.
- Molecular techniques for analysis of genetic variation within species (Egham Site).

Experimental work:

- Selection of best rust isolate for introduction into China.
  The six pathotypes of *Puccinia spegazzinii* currently held in the CABI Bioscience collection will be tested for pathogenicity to the biotypes from China. If more than one isolate is infective (highly likely) these isolates will be screened for tolerance to higher temperatures during infection.
- Molecular characterisation of biotypes of *M. micrantha* from China.
  DNA will be extracted from the Chinese biotypes of the weed and compared with the genetic diversity of biotypes collected thought the exotic and native ranges of the species.
- Host range testing of closely related species.
  A selection of plant species closely related to *M. micrantha* will be tested with the selected rust isolate and microscopic analysis of the host-pathogen interactions observed. The Bruzzese and Hasan staining technique will be used for the microscopic observation.
- Preparation of report on training.

Other activities:

- Tour of CABI Bioscience Ascot and Egham sites, including discussions with scientists (as requested by participants).
- Visit to tourist sites (as requested by participants).

Research
Part of the training activities undertaken by Fu and Han during their stay at CABI involved an experiment, to enable the selection of the most suitable isolate, of the seven held at CABI, for introduction into China. It was established at the Inception Workshop that the optimum infection temperature (20^{o}C) for the isolate of the rust that has been imported in to India (from Trinidad) might prove to be too low for the prevailing conditions in China. It was therefore decided to find-out if one of the other six isolates has a higher temperature optimum. The results of this research suggest

that the isolate from Argentina has a higher optimum infection temperature (25°C). The results of this work will be reported in the full Training Report to follow. The results of this work are currently being confirmed by CABI collaborators, before shipping the rust isolate to China.

Assessment and Monitoring

Permanent Sample Plots:

The initial release site for the rust has been established as Neilingding Island, which is situated off the coast of China, near to Hong Kong (island to the right of Lingding Yang Island), see map below:

This island is a nature reserve, and comes under Guangdong Neilingding Futian National Nature Reserve Administration (Director Mr Lie-jie Zan). Mikania was introduced in China (Hong Kong) over 100 years ago, but was only first recorded on Neiling Ding Island in 1996, although it is likely to have been present at a low level for considerably longer. The whole island was surveyed for the presence of the weed in 2001, by the reserve administration, and this will form the base-line data for the rust impact study. A summary of the data is given below:

The Island is 548 ha in size, of which 400 ha are forested. Mikania was recorded to be infesting and causing damage to 300 ha of the island; 243 ha of which is forested land, where Mikania is causing serious damage and some times even tree death. At 6 - 160 m above sea level, Mikania covered 40 – 60% of the area.

The island has the following mean weather conditions:
- Temperature over a year 21.5oC (max. 28oC and min. 14 oC);
- Relative humidity over a year 80% (<80% in the winter from Oct to March, and >80% in the summer from April to September);
- Precipitation per year 2055.8 mm;
- Sunshine per year is 2281hrs.

- No significant difficulties were encountered during these first six months.
- No changes have been made to the design of the project over the reporting period.

Timetable for reporting period April 2004 to March 2005

Time period	Output (output addressed in Logical Framework)	Activities	Personnel Responsible
April-June 2004	Clean rust culture produced (3)	Rust prepared for shipment to China	CABI Carol Ellison
May-June 2004	Rust shipped from UK to China (3)		CABI Carol Ellison
June-Nov. 2004	Dossier on rust prepared and submitted to China Import and Export Inspection Bureau (3)	Rust screened under quarantine in China	IBC Fu Weidong/ Jianqing Ding CABI to assist with preparation of dossier
Nov. 2004	Release permit issued (3)		IBC Fu Weidong/ Jianqing Ding
April –Nov. 2004	English translation of Island Survey (2) Report on weed infestation within sample plots (2) Functional rust propagation unit (3)	Survey carried out by Guangdong Neilingding Futian National Nature Reserve Administration, on Mikania infestation over whole of Neilingding Island, Guangdong, translated into English Data on weed infestation of permanent sample plots within release site gathered/analysed. Rust propagation unit and large number of potted Mikania plants prepared in advance of receiving rust culture from BCI	GEI Han Shichou/ Li Liying
Nov.2004-March 2005	Large numbers of rust infected plants prepared for field release (3)		GEI Han Shichou/ Li Liying
April 2005	Rust released on Neiling Ding Island, Guangdong Province (3)	Potted, living rust infected plants transported to Neiling Ding, and placed in field at start of rains	GEI Han Shichou/ Li Liying
Nov. 2004-March 2005	Public awareness campaign implemented (5)	China, Guangdong: Targeted information produced (leaflets, posters, and videos); media contacted (local and national T.V. and newspapers); popular articles produced China, Beijing: Policy makers awareness campaign UK: Press release made	GEI IBC CABI
Jan./Feb. 2005	Workshop held (1) Development of new proposals initiated (6)	Workshop held in China on the principles and practices of classical biological control Working group established for the development of new project proposals. Work plan, responsibilities and targets established.	GEI –hosting & organisation of workshop, teaching CABI & IBC – teaching IBC –lead organisation

Shaded area – next years output, but included for clarity.

5. Actions taken in response to previous reviews (if applicable)

- Not applicable.

6. Partnerships

- There has been excellent collaboration over the first six months of this project. No serious problems have been encountered, and all collaborators have established good working relationships with reliable communication pathways.

  Relations have been established with the China Import and Export Inspection Bureau (IEIB) by IBC, and the Inception Workshop was attended by a representative, Dr. Yanjin. The timely obtaining of the import licence by IBC project personnel, facilitated by Dr. Yanjin, is testament to the value of involving the IEIB, from the start of the project.

- Mikania is an Asia-wide invasive weed problem, and CABI is established as the leader in the CBC of this weed. Consequently, though the Darwin Initiative and the sister project in India (funded by DfID) there has been much interest in taking this technology to other affected countries. Nepal in particular has a massive problem with Mikania in the southern Tetri region, where it is decimating natural reserves. A number of organisations have independently been in contact with CABI about the Mikania invasion and are listed below:
  Himalayan Nature
  Bird Conservation Nepal
  IUCN Nepal country office, Kathmandu
  Department of National Parks and Wildlife Conservation, Kathmandu.
  World Pheasant Association, Conservation Director, UK

  A collaborative group is being established. The first meeting planned for late 2004 in Kathmandu, where all parties will discuss funding opportunities, and a visit made to the infested areas for assessment (current volatile political situation allowing).

7. Impact and Sustainability

- Although the project has only been running for six months, efforts have already been made to promote the work. The Inception Workshop was attended by a representative from the British Embassy (Robin Porter), the CAAS Bureau of International Collaboration (Zhang Yi) and the China Import and Export Inspection Bureau (Dr. Yanjin); a banner publicising the workshop was displayed at the IBC building on the CAAS campus where the workshop was held; and workshop bags were produced with the Darwin logo on them.

8. Post-Project Follow up Activities (max 300 words)

- Not applicable

9. Outputs, Outcomes and Dissemination

- The establishment of the rust in quarantine in China and the commencing of host range testing were scheduled for February 2004. The shipment of the rust has now been delayed until May/June 2004. The reason for this delay is that a different isolate of the rust, to the one that has been assessed and imported into India, has been selected for China (see **4. Progress**: slippage, for more detail). This selection was based on the work carried-out by Han Shichou and Fu Weidong during their UK-based training. It is therefore necessary to undertake additional work on this isolate in the UK before it can be shipped to China (checking of results, purification etc).

- This project has only been running for six months, and dissemination activities are not part of the outputs for this reporting period.

Table 1. Project Outputs (According to Standard Output Measures)

Code No.	Quantity	Description
8	2	Inception Workshop Beijing, China, for 5 days, two UK staff attended. Workshop attended by 12 people. Project work plan produced (see Appendix 2 and **4. Progress**).
14A	1	Inception Workshop Beijing.
22	10?	Permanent sample plots established on Neiling Ding Island, Guangdong Province, Southern China, to assess weed impact and for rust releases and monitoring of impact.
6A	2	Training of 2 Chinese scientist (Ms. Fu Weidong from IBC and Prof. Han Shichou from GEI) in handling rust at CABI, UK (summary provide under **4. Progress** above, full report to follow)
6B	4	Training period in UK, 4 weeks
-	-	Licence to Import rust isolate into quarantine in Beijing obtained.

Publications (Table 2)

None to report

10. Project Expenditure

Table 3: Project expenditure during the reporting period (Defra Financial Year 01 April to 31 March)

Item	Budget (see project schedule)	Expenditure	Balance

11. Monitoring, Evaluation and Lessons

- The monitoring and evaluation are built-in to the progression of the project. For each output to be achieved a previous stage has to be successfully completed:
  - The rust can now be imported in to China, since a permit has been obtained;
  - Successful handling, screening and release of the rust can be achieved now that the host country scientists have been trained;
  - The rust release site is officially sanctioned so evaluation of the weed can be made;
  - Reports must be supplied by all collaborators on a six monthly basis, to allow the release of funds.

There are four main outputs from the first six-month period of this project, given in the table below.

Project Outputs	**Method of Evaluation**	**Current Status**
Inception work shop	Report and work plan produced	Appendix 2 Images from workshop available
Establishment of permanent sample plots	Site visited by all project participants, images taken of weed infestation. Report produced containing the data from the evaluation of the permanent sample plots. The Guangdong Neilingding Futian National Nature Reserve Administration has surveyed island to establish level of weed infestation. Data to be translated into English.	Initial rust release site identified. Images available at CABI. Report on weed status within permanent sample plots under production. English translation under production.
Training in the UK	Report produced	Full report under preparation, summary in **4. Progress** above
Application for Import Licence	Licence obtained	Issued (copy held at CABI)

- The importance of clear exchange of information and expectations for all collaborators is paramount to success of this project. This needs to take into account language and cultural differences, as well as support and training needs. The establishment of communication pathways (mainly e-mail) and regular (yearly) meetings are essential. The latter of these can be achieved by both meetings funded under the Darwin Initiative and by the travelling of collaborators under other project funding (eg GISP – CAAS workshop planned for November 2004, in Beijing to be attended by both main UK collaborators).

12. OPTIONAL: Outstanding achievements of your project during the reporting period (300-400 words maximum)

None to report so early in the project.

Annex 1 Report of progress and achievements against Logical Framework for Financial Year: 2003/2004

Project summary	Measurable Indicators	Progress and Achievements April 2003-Mar 2004	Actions required/planned for next period
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	SHORT TERM: Permission from Chinese quarantine authority obtained to import rust into quarantine in Beijing (March 2004)	Prepare dossier on rust for submission to quarantine authorities as part of application for the obtaining of a release permit.
Outputs			
1. Chinese scientists & weed control practitioners trained in weed biocontrol with pathogens	1. Scientists visit UK & receive training; workshop held	Inception Workshop held at IBC and GEI (Nov. 2003) Fu Weidong (IBC) and Han Shichou (GEI) visited UK (Feb 2004) for training in weed pathology	Workshop for weed control practitioners, in biocontrol with pathogens, planned to be held in early 2005
2. Permanent sample plots established & weed impact assessed in China	2. Plots established & methodology agreed with collaborators	Rust release site visited by all collaborators during Inception Workshop. The setting up of	Provide English translation of data of weed infestation on whole of Island rust release site.

		permanent sample plots discussed	Provide report on level of weed infestation in sample plots.
3. Biocontrol agent imported & released in China	3. Permit for import & release applied	Permit for import of rust in to China obtained (March 2004)	Ship rust to China (May/June 2004). Apply for release permit once host range testing completed under quarantine in China.
4. Rust impact studies initiated	4. Methodology agreed with collaborators		Support will be provided by UK collaborators on the development of techniques for the monitoring of the pathogen in the field, and the establishment of suitable impact methodology.
5. Public awareness campaign implemented	5. Targeted information produced (leaflets, posters, videos); media contacted		The public awareness campaign will be initiated once the rust is established at GEI and ready for mass release (January 2005?).
6. Results publicised & new project proposal developed	6. Articles/proposals developed		The development of new project proposals will be initiated at the Biological Control workshop (early 2005). A national press release in UK.

Note: Please do NOT expand rows to include activities since their completion and outcomes should be reported under the column on progress and achievements at output and purpose levels.

APPENDIX 1: LOGICAL FRAMEWORK

1. Please enter the details of your project onto the matrix using the note at Annex B of the Guidance Note.

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 Training	**Activity Milestones (Summary of Project Implementation Timetable)** **Yr 1**: Inception workshop for all collaborators, China (10 days); two Chinese scientists to visit UK (4 weeks). **Yr2**: 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 2**: Rust released in Guangdong; establishment and spread monitored. **Yr 3**: 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 2**: 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.		

APPENDIX 2: SUMMARY REPORT OF INCEPTION WORKSHOP

Reported by Fu Weidong and Carol Ellison

Towards sustainable management of invasive alien weeds in southern China.
Held at the Institute of Biological Control, CAAS, Beijing, China.
24-27th November 2003.

Meeting participates

Dr. Carol Ellison, project coordinator, CABI Bioscience, project team, UK
Dr. Sean Murphy, project advisor, CABI Bioscience, project team, UK
Dr. Yan Jing, Import and Export Inspection Bureau (IEIB), General Administration of Quality Supervision Inspection and Quarantine, China
Dr. Robin Porter, Councilor, Science and Technology, British Embassy, Beijing
Ms. Wan Ming, CABI Regional Office, Beijing
Mr. Zhang Feng, CABI Regional Office, Beijing
Ms. Zhang Yi, Chinese Academy of Agricultural Science (CAAS), Bureau of International Collaboration
Prof. Yang Huaiwen, Director, Institute of Biological Control (IBC), CAAS
Mr. Xia Shan Long, Director, Main Office, IBC, CAAS
Prof. Tang Wenhua, project advisor, scientist-in-chief, project team, China
Ms. Fu Weidong, lead scientist, IBC, project team, China
Prof. Han Shichuo, lead scientist, Guangdong Entomological Institute (GEI), project team, China
(Prof. Li Liying, senior project adviser, GEI, project team, China – joined the participants at GEI)

Aims of the Workshop

- To exchange scientific information about the *Mikania micrantha* invasion in China and progress on integrated control of this weed. The particular focus was on the research already undertaken by CABI for the classical biological control of Mikania with highly host specific rust fungus, *Puccinia spegazzinii*.
- To define and evaluate working plan.
- To investigate field experiment site in Guangdong province.

Activities

24th-25th November Meeting at Biological Control Institute, Beijing
Day 1: 24th
Chairperson: Xia Shanlong
9:00 *Opening Ceremony*: Welcome address given by Mr. Xia Shanlong
9:10 Yang Huaiwen

9:20 Sean Murphy, coordinator for Invasive Species Program, CABI
9:30 Robin Porter

9:40 *Coffee break*

Session 1

10:00 Carol Ellison: Overview of classical biological control of *Mikania micrantha*
11:00 Ding Jianqing, Fu Weidong and Tang Wenhua (presenter): Overview of the major collaborative work undertaken between IBC and CABI in the field of sustainable management of invasive alien weeds in China

12:00 *Lunch Break*

Session 2

14: 00 Sean Murphy: Release and impact assessment of biological control agents
14: 30 Han Shichou (presenter) and Li Liying Impact and control of *Mikania micrantha* in Guangdong Province

15: 00: *Coffee break*

15:20-17:00 *Group discussion*

Day 2: 25th

Chairperson: Mr. Xiao Shanlong

Session 3

9:00 Carol Ellison: Isolate selection and host specificity testing of the rust, *Puccinia spegazzinii*
9:30: Ding Jianqing, Fu Weidong and Tang Wenhua (presenter): First Working Plan of IBC Team on Darwin Project: Oct. 2003-June, 2004

10:00 *Coffee break*

10:20 Group discussion on host range testing list for *Puccinia spegazzinii*

12:00 Lunch

Session 4

14:00-17:00: Continued group discussion of work plan for 2004

November 25th-27th Visit to Guangdong Province

Day 3: 26th

Field trip to Shenzen City environs and Neilingding Island, Guangdong province to see Mikania infestations (see image below of the vine-like weed covering native forest). The project team was accompanied by Mr. Zan (Guangdong Neilingding Futian National Nature Reserve Administration).

Day 4: 27th

Visited Guangdong Entomological Institute and met with Prof. Li Liying. A meeting was held to update GEI project personnel on discussions held in Beijing, and discuss the GEI workplan for 2004. A tour of facilities at GEI and a discussion on the requirements for the production and release of the rust was conducted.

Conclusions and agreements from workshop:

1. *Mikania micrantha* is a dangerous invasive weed of tropical and subtropical regions, in many parts of Asia. It has become a big problem in southern China, particularly Guangdong Province. On Neilingding Island, Mikania is killing many kinds of trees that are necessary food for a number of rare species of animal that are protected on the island. Consequently, local government and other groups are focussing on control options for this weed. However, none of the methods employed in China have been successful or are prohibitively expensive. It is urgent to find a new effective and safe method to manage the problem.

2. Extensive research conducted by CABI, has shown that a new approach to control *M. micrantha* using rust a pathogen, *Puccinia spegazzinii*, should be considered for the control of this weed in China. The fungus is obligate parasite with very narrow host range. According to information on host range testing conducted in the UK, the fungus can not infect any plant species other than *M. micrantha*. This pathogen has been tested and imported into India for release. It is hoped that this project will provide a sustainable method to manage this weed that is causing significant environmental and economic damage in China, and threatening many more regions in this country.

2. A representative of IBC team recounted the historical development of the IBC Weed Laboratory (CAAS) and presented a working plan for the safety evaluation of the rust pathogen, targeted at plant species of particular relevance to China. A list of candidate plants and technology used for safety evaluation were provided and reviewed. In order to guarantee a successful pre-release screening programme, under quarantine in China, two Chinese collaborators have been selected to go to CABI Bioscience, UK. Han Shichou and Ms. Fu Weidong will be spending 1 month learning and practicing skills necessary for the screening and release strategy for the rust. This will build on their extensive experience in biological control using arthropod agents.

3. Prof. Han Shichou, the representative of GEI, provided detailed information about damage caused by *M. micrantha* on Neilingding Island and in Guangdong province. He also presented results obtained from investigation and experiments on the control of *M. micrantha* with dodder and two kinds of insects imported from Indonesia for the control of another invasive alien weed *Chromoleana odorata; Actinote anteas* and *A. thalia pyrrha*. He also reported on the presence of a pathogen infecting *M. micrantha* in the field in China *Pseudocercospora* sp..

4. Dr. Yan Jing (Animal and Plant Quarantine Institute) described the Chinese Quarantine Regulation in detail, and the standard requirements for a pathology quarantine laboratory. Dr. Yan offered his help in the application for permission to import of rust pathogen into China, which was gratefully acknowledged by all participants of the workshop.

5. The trip to Neilingding Island, by project collaborators, enabled all those involved in the project to witness the devastation that Mikania is causing in Southern China. It was agreed that Neilingding Island is the best place for initial release of the rust pathogen, since it enabled easy monitoring of spread and impact, and the whole island had already been surveyed for the level of infestation of the weed.

6. The low night-time temperature optimum (20^{o}C with a +/- 5^{o}C minimum and maximum) of the isolate of the rust that has been selected for release in India, was muted by Chinese collaborators as a potential limiting effect on the efficacy of the rust in China. It was decided that Fu Weidong and Han Shichou would include the testing of the other 6 isolates of the rusts (collected from all over the South American native range of Mikania) held in the CABI collection, during their UK visit. It was noted that if an isolate with a higher temperature tolerance was selected for

introduction into China (rather than the fully screened isolate from Trinidad, that has been introduced into India), then additional work would be required to assess the isolate in the UK and China. This would be likely to include additional screening in China, to ensure its safety, before release.

7. Project reporting is every six months. Reports to be sent to Carol Ellison for compilation and editing.

8. Participates were very happy that the Darwin Initiative Inception Workshop had been such a success. It was concluded that in order to manage the weed as early as possible, all collaborators would do their best for this project.