

The Rufford Small Grants Foundation Final Report

Congratulations on the completion of your project that was supported by The Rufford Small Grants Foundation.

We ask all grant recipients to complete a Final Report Form that helps us to gauge the success of our grant giving. The Final Report must be sent in **word format** and not PDF format or any other format. We understand that projects often do not follow the predicted course but knowledge of your experiences is valuable to us and others who may be undertaking similar work. Please be as honest as you can in answering the questions – remember that negative experiences are just as valuable as positive ones if they help others to learn from them.

Please complete the form in English and be as clear and concise as you can. Please note that the information may be edited for clarity. We will ask for further information if required. If you have any other materials produced by the project, particularly a few relevant photographs, please send these to us separately.

Please submit your final report to jane@rufford.org.

Thank you for your help.

Josh Cole, Grants Director

Grant Recipient Details	
Your name	Karthik Teegalapalli
Project title	Tracking an alien: a multi-scale approach to understanding the spread of <i>Mikania micrantha</i>
RSG reference	
Reporting period	January 2013 – July 2014
Amount of grant	£5500
Your email address	karthik@ncf-india.org
Date of this report	01-08-2014

1. Please indicate the level of achievement of the project's original objectives and include any relevant comments on factors affecting this.

Objective	Not achieved	Partially achieved	Fully achieved	Comments
To identify specific factors that may increase invasion by the <i>Mikania micrantha</i>			√	We identified roads and cultivation as major factors that facilitate arrival and spread of <i>Mikania micrantha</i> using analysis of local level factors. Further from the satellite imagery analysis of 2013, we found that sites around wet rice cultivation close to road are highly vulnerable to invasion by the species.
Predicting sites vulnerable to future invasion by <i>Mikania micrantha</i>		√		The satellite imagery from 2006 is yet to be analysed to understand the rate of spread of <i>Mikania micrantha</i> and the sites that are vulnerable to future invasion. This analysis will be taken in the next field session from March – May 2015.

2. Please explain any unforeseen difficulties that arose during the project and how these were tackled (if relevant).

One of the difficulties we came across was that single ground-truthed points, although they had extensive *Mikania micrantha* (hereafter, *Mikania*), were not very useful for determining if the species had a significant spectral signature in the satellite imagery that can be identified. Therefore, we mapped five relatively large patches that were completely infested with *Mikania* and used these polygons which were useful in identifying the signature of the species.

The resolution of the imagery initially used for the analysis (Landsat, resolution: 23.5 m) was not sufficient to differentiate sites that had *Mikania* present or absent. Therefore, LISS-IV imagery (resolution: 5.8 m) was purchased from National Remote Sensing Centre and used for the satellite imagery analysis.

Initially, only the '*Mikania* present' points and polygons were used, which did not result in appropriate classification. We then used '*Mikania* absent' ground-truthed points from the landscape which significantly improved the classification.

3. Briefly describe the three most important outcomes of your project.

Two of the local level parameters that had a negative effect on *Mikania* cover were native plant species richness and number of trees around the point. This indicates that retaining native plants and a few trees can make a site less susceptible to invasion by *Mikania*. However, it is also likely that the native species richness recorded from the plots did not have a causal effect but that plots that had less *Mikania* had more native species colonising. Experiments which can empirically test these

effects will be useful in understanding these correlations which in turn will be useful in managing the species.

From the local level analysis, we also found that sites close to roads and fallows (regenerating sites following shifting cultivation) were the most vulnerable sites to *Mikania* invasion. Therefore, future management efforts can be focused in these sites. From our analysis, although only three of the 29 plots that were sampled from forest had *Mikania* present, even forests that adjoin the regenerating sites were vulnerable to invasion by the species.

The satellite imagery analysis clearly indicated that while sites close to roads and cultivation had relatively more *Mikania* cover, sites that were near to both cultivation and to roads were the most vulnerable to invasion. This implies that there is a synergistic interaction between these two factors increasing the changes of invasion of a site by *Mikania*. These are the sites where future management practices to contain the spread of *Mikania* can be focussed.

4. Briefly describe the involvement of local communities and how they have benefitted from the project (if relevant).

Local communities were involved in collection of the data and their knowledge of the landscape was used for the study. Invasion by *Mikania* also has negative effects for shifting cultivation farmers since certain sites that are suspended following shifting cultivation reach a stage of 'arrested succession' with only *Mikania*. Other non-invaded sites go through successional stages with various native species and recover to a secondary forest that is again clear-felled for shifting cultivation after about 10 years. Farmers avoid sites invaded by *Mikania* since they believe that the crop productivity will be low in such sites. Therefore, this study will benefit farmers by providing information to them about the specific sites where they could concentrate their farm management.

From the management point of view, for the villagers to avoid further spread of *Mikania*, it is better to choose sites for shifting cultivation as far from the road as possible. However, the wet rice cultivation sites that are located on the gentle slopes close to the road are also infested by *Mikania* at the boundaries and this is unavoidable since opening a patch for wet rice cultivation involves substantial financial and physical effort.

Our analysis also shows that retaining few trees in a cultivated site may reduce the chances of *Mikania* invasion, however this may not be practical since shade may deter or reduce productivity of rice, which is the main crop grown by the *Adi* community.

5. Are there any plans to continue this work?

The map that was generated with potential *Mikania* distribution was verified using a limited number of ground-truthed points and Google Earth. In the next phase of the study, we will test if the points that were predicted as *Mikania* are actually invaded by the species on the ground.

We also have access to a LISS-IV satellite image from 2006. Since we do not have any ground-truthed points from that year, we will conduct interviews from villagers to georeference the points where the species was present then. Using these points we will again build a potential map for the species and compare it with the year 2013. This will provide us information regarding the rate of spread of

the species and the sites that are preferred for invasion. This information can significantly help management of the species in the landscape.

6. How do you plan to share the results of your work with others?

The findings of the study will be published as a scientific paper, a popular article will be published and a report will be submitted to the local Forest Department in Jenging (Upper Siang district), to the Agricultural Department in Pasighat (East Siang district) and to the Arunachal Pradesh Forest Department and Agricultural Department in Itanagar.

7. Timescale: Over what period was the RSG used? How does this compare to the anticipated or actual length of the project?

Fieldwork using the RSG was undertaken between January 2013 and April 2014. The analysis was undertaken from May to July 2014.

8. Budget: Please provide a breakdown of budgeted versus actual expenditure and the reasons for any differences. All figures should be in £ sterling, indicating the local exchange rate used.

Item	Budgeted Amount	Actual Amount	Difference	Comments
Per diem for researcher (@ £51 per month for 12 months)	612	612		
Salaries for field assistants (2 @ £57 per month for 12 months)	1368	1368		
Field laptop	850	900	50	The laptop was more expensive than budgeted and an extra battery was purchased.
Portable hard disk (1 TB)	80	80		
Solar charger for laptop	170	45	-125	
Battery charger with batteries	23	23		
Field boots	23	22	-1	
Travel to field site & return (@ £230 per trip for 3 trips)	690	750	60	The travel was costlier than budgeted.
Local travel (@ £40 per month for 8 months)	320	400	80	Local travel included fuel and maintenance for two-wheeler.
Medical expenses for researcher and field assistants (@ 25 per month for 8 months)	200	200		

Satellite imagery acquisition (@ £85 per image for 4 IRS LISS IV images)	340	240	-100	We purchased only two imageries instead of 4
Accommodation in field site (@ £30 per month for 8 months)	240	240		
Communication: Internet and telephone (@ £22 per month for 12 months)	264	300	36	The communication cost was more expensive than budgeted
Contingency	320	320		
Total	5500	5500		

9. Looking ahead, what do you feel are the important next steps?

Comparison of *Mikania* distribution in 2006 with the present distribution will be a useful step since this can provide insights into the rate of spread of the species and the areas where the species has spread over the last 7 years. This information can be used for management of the species by focusing on sites that are more susceptible to future invasion. We also plan to undertake experiments to test if the correlations we found were causal which will have useful implications for management of the species.

10. Did you use the RSGF logo in any materials produced in relation to this project? Did the RSGF receive any publicity during the course of your work?

The RSGF logo has not been used yet but will be used in the report that will be submitted to the Forest Department.