

Report on The First International Biochar Training Course held at Nanjing Agricultural University (NJAU) in Collaboration with University of New South Wales and Newcastle University



Top left; group exercise; top right and middle left lab practical; middle left testing drum oven emissions; left bottom testing stove emissions; bottom right field visit to salt stressed low lands.

1.0 Introduction

This training course was a joint effort by Nanjing Agricultural University, University of NSW and University of Newcastle. Inputs from Marta Camps (training materials), Johannes Lehmann, Saran Sohi and Ken Latham from Newcastle University (lectures), Prof Pan and

Prof Li from NJAU were greatly appreciated. Evaluation and course proceedings were developed implemented and transcribed by Helen Gould.

A range of peer reviewed papers and various chapters + IBI guidelines on testing biochars and pyrolysis kilns were sent to participants before the course commenced.

Participants were also sent a draft schedule and asked for input. A participatory training methodology was used whereby formal lectures were interspersed with presentations by participants, discussions on key topics with groups and practical exercises and a field trip to a working biochar and energy factory and a site where field experiments have been carried out for 3 years.

Aims

- 1) To provide an overview of what is known and what is not known about;
 - a) properties of biochars as a function of feedstock, process conditions and technology and
 - b) crop responses of different biochars, incorporated at different application rates and different pre and post treatments in different eco-systems.
- 2) To provide an understanding of the principles and practice of pyrolysis and biochar production
- 3) To provide a framework that allows the development and implementation of sustainable and self sustaining biochar projects and/or establishment of biochar businesses.
- 4) To develop training materials and practical exercises and have them evaluated by the participants
- 5) To provide an interactive environment where participants can exchange information and experiences.

Participants

Over 40 people applied to come to the course. 30 people found finance to attend

The participants came from China, Vietnam, Indonesia, Malaysia, Nepal, Pakistan, Brazil, Australia, Kenya, Nigeria, USA, Spain and France.

Another 6 people registered but were unable to attend at the last minute.



2.0 Course Content

The following activities and lectures were undertaken

1. Traditional practices of biochar manufacture and characterisation of these biochars. Agronomic data from one traditional practice in the Cameroons was also presented.

2. The physical, chemical and electrical properties of different biochars and wood vinegar. A review of the scientific literature and assessment of areas of uncertainty. Emphasis was placed on the effect of feedstock and process conditions/technology on properties.
3. Biochar stability and how do we measure it.
4. A review of the literature of different crop responses of different biochars applied at different application rates. A meta-analysis of the data was also presented as well as data from specific studies.
5. The role of biochar in land remediation, plant resistance to disease and other stresses and animal health and growth
6. Characterisation and testing of biochars. Participants spent one afternoon in the laboratories at NJAU.
7. A framework for choosing biochars for specific soils and plants. This topic was presented by Saran Sohi and there was considerable discussion afterwards on how the participants may choose specific biochar mixes to provide a range of benefits to plants and soils.
8. Undertaking field trials. A visit was paid to a field trial on degraded land; the trial had been started approximately 3 years ago.
9. The science of pyrolysis and the principles involved in the design of efficient low emissions pyrolytic stoves, ovens and kilns.
10. A brief summary of the biochar reactor designs in operation and a review of the IBI guidelines for evaluating kilns.
11. How to operate biochar stoves, ovens and kilns safely. An afternoon was spent operating a TLUD drum oven and two stoves brought from Vietnam. Emissions measurements were carried out and discussion on how to reduce emissions was undertaken around the stove and drum oven.



Top left; Participant presentation; Top right; Group exercise; Bottom left Sanli Gasifier; NJAU administrator Xinyan Yu performing traditional Chinese dance

12. How to develop and build a biochar business? A field trip was undertaken to Sanli New Energy company to see the production of biochar from mixed farm residues, the

production of electricity from the syngas and the refinement of wood vinegar. A visit to a field trial was undertaken and participants had an opportunity to meet people from the local village. Following this field trip participants spent an afternoon developing an outline business plan in groups of five people. The outline plan was presented in a group session.

13. Presentation of participants, experiences in either developing and field testing biochar production technology and the biochar that was produced using it, or producing a fuel charcoal from briquette
14. Biochar Systems and how we analyse them to determine possible projects that can result in carbon negative, sustainable and profitable outcomes.
15. Developing integrated biochar projects. Participants split into groups and developed 5 different projects. Individuals were then going to write specific project proposals when they returned home.
16. Presentation and discussions of the work being undertaken by participants.
17. Cultural and social activities.

Overall the organizers had very positive evaluations of the course are reviewing the in-depth evaluations for future developments.



Meeting with local village Women