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CROPS FOR THE FUTURE RESEARCH CENTRE INTERNATIONAL WORKSHOP SERIES

BamYield

Marriot Putrajaya, IOI Resort
11-12 December 2012

CROPS FOR THE FUTURE
RESEARCH CENTRE

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BAMBARA GROUNDNUT INTERNATIONAL STAKEHOLDER WORKSHOP

9-10 July 2012
Agrotechnology Research Station, UniMAP

UniMAP

CROPS FOR THE FUTURE RESEARCH CENTRE

BAMBARA GROUNDNUT INTERNATIONAL STAKEHOLDER WORKSHOP: 9-10 JULY 2012

9 JULY 2012

Welcome remarks and aims of the workshop

Prof Mohmad Nor Jaafar, Director of Institute of Sustainable Agrotechnology

Prof Sayed Azam-Ali, CEO CFFRC

Workshop aims and CFFRC PLUS programme

Dr Sean Mayes, Theme Director Biotechnology, Breeding and Seed Systems

Introductions by partners, capacity statements and research interests

UniMAP
Bogor Agricultural Univeristy
Brawijaya University
University Muhammadiyah Gresik
Kasetsart University
Songkla Crop Research Station
University of Nottingham
University of Nottingham Malaysia Campus
CFFRC – mandate, aims and plans

10 JULY 2012

Roundtable Discussions and Feedback Sessions - Molecular, Genetics and Breeding; Agronomy and Physiology; Products and End Users

Molecular, Genetics and Breeding

Group Members

Brawijaya University: Prof Dr Ir Kuswanto
Muhammadiyah Gresik University: Endah Sri Redjeki
Kasetsart University: Dr Prakit Somta
Songkla Crop Research Station: Dr Jira Suwanpraset
Brogor Agricultural University: Prof Dr Lr Satriyas Ilyas
University of Nottingham/CFFRC: Dr Sean Mayes
CFFRC: Prof Aik Chin Soh

Institutional capacity and interests

Muhammadiyah Gresik University:

- Traits of interest: early maturity and high yield.
- Seed coat (testa colour) -the seeds of varieties available in East Java are all black in colour.
- New varieties with desirable traits, estimated to take approximately 3 years (variety from Thailand has early maturity trait, as well as some potential material from Africa which has been crossed to Indonesian landraces).
- A number of F3 from crosses between African and Indonesian landraces available.

Crossing of Bambara groundnut landraces in CE rooms


Screening African landraces in Indonesia environment
A3
A1

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CROP IMPROVEMENT PROGRAM ON BAMBARA GROUNDNUT

BOGOR AGRICULTURAL UNIVERSITY
INDONESIA

Prof Dr Satriyas Ilyas

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CONVENTIONAL BREEDING FOR YIELD IMPROVEMENT OF BAMBARA GROUNDNUT

Dr Yudiwanti Wahyu EK

Division of Plant Genetics and Breeding, Department of Agronomy and Horticulture, Faculty of Agriculture, Bogor Agricultural University

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BAMBARA GROUND NUT – CELLULAR AND MOLECULAR ASPECTS

Prof Dr Sudarsono

Plant Molecular Biology (PMB) Lab, Department of Agronomy and Horticulture,

Faculty of Agriculture, Bogor Agricultural University

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CHARACTERIZATION AND IMPROVING PRODUCTION TECHNOLOGY OF BAMBARA GROUNDNUT

Dr Heni Purnamawati

Division of Plant Production, Department of Agronomy and Horticulture, Faculty of Agriculture, Bogor Agricultural University

SEED QUALITY IMPROVEMENT OF BAMBARA GROUNDNUT

Prof Dr Satriyas Ilyas

Division of Seed Science and Technology,
Department of Agronomy and Horticulture, Faculty of Agriculture, Bogor Agricultural University

CROP MODELLING OF BAMBARA GROUNDNUT

Dr Abdul Qadir

Division of Seed Science and Technology,
Department of Agronomy and Horticulture, Faculty
of Agriculture, Bogor Agricultural University

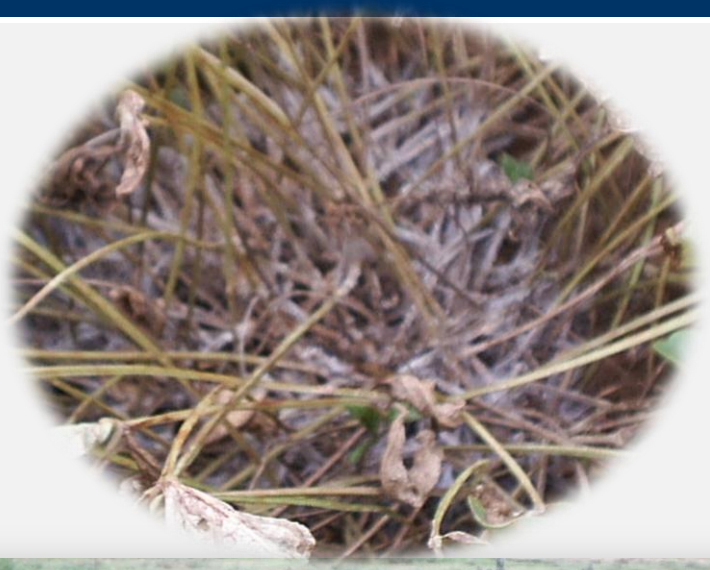
Institutional capacity and interests

Kasetsart & Songkla (Dr Prakit Somta & Dr Jira Suwanpraset)

- Traits of interest: resistance to disease (especially leaf blight) and days to maturity
- Currently disease resistance crosses are available (approximately 450 seeds per cross) and also crosses for days to maturity
- Aim to generate linkage map and identify genes controlling flowering dates
- Willing to provide materials
- Dr Somta currently has an application in to the Thai government for mapping in the created crosses and will know whether this is funded by the end of the month

Previous work was supported by Thai government.

Slides from: Kasetsart & Songkla (Dr Prakit Somta & Dr Jira Suwanpraset)



Leaf blight symptoms

in Thailand

Performance of progenies from Tvsu 138 x TVsu 1321

Slides from: Kasetsart & Songkla (Dr Prakit Somta & Dr Jira Suwanpraset)

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Performance of some moderate earliness and high yield accessions

Slides from: Kasetsart & Songkla (Dr Prakit Somta & Dr Jira Suwanpraset)

Tvsu 89

- 85–90 days to harvest
- Fresh pod yield 2.5 – 5.0 t/ha with 50 x 25 cm. spacing

Progress in varietal improvement

Recommended cultivar "Songkhla 1" (120 days to harvest) is selected from IITA accession TVsu 922

TVsu 89 (85 days to harvest), is in the variety release process

Progenies from the first hybridization study were selected and advanced to 23 F9 lines

From breeding activity 2008-2010, 35 F4 lines and 450 F2 seeds were maintained

TVsu 89

Genetic studies and breeding of Bambara groundnut in Thailand during the past ten years: generation of knowledge and improved lines ready for release to farmer as improved varieties.

Institutional capacity and interests

Brawijaya University (Prof Kuswanto)

- Traits of interest: high yield with disease tolerance/resistance
- The major pests are yet to be characterized in detail, but biotic stresses are thought to be the major problem
- Landraces collected from farmers and lines slected to become registered varieties
- Brawijaya is collaborating with Gresik/UoN on molecular characterisation of the collected material
- Field station, lab facilities, experienced staff and students are available
- Have student exchange programme with Kasetsart University with the living and accommodation fees supported by the host University.

Brawijaya University

- Bambara groundnut research is not in the main agenda for UB
- UB Programmes : food security and agroforestry
- Untill now → 5 research areas
  - Collecting of local lines
  - Description of local line
  - Variability for qualitative and quantitative characters → selection
  - Genetic variability analysis
  - Identification of pests and diseases

Collecting of Local Lines

- Java is the centre of bambara groundnut, mainly West Java, Banten and East Java
- 50 local lines/varieties
- All lines planted at UB Experimental Station

Bambara groundnut pests and diseases






Bambara groundnut Pests

Bambara groundnut pests and diseases

Institutional capacity and interests

UoN (Dr Sean Mayes)

Genetical genomics approach

- Traits of interest: drought tolerance, photoperiod, yield
- Currently making crosses to address the genetics of these traits
- A microarray based mapping approach is being tested in a controlled cross
- Diversity Array Technology (DArT) Seq is being tested, which should provide large numbers of markers for mapping and would be accessible to any researcher
- Highly controlled tropical glasshouses are available in the UK for testing work
- A 454 Pyrosequence-based leaf transcriptome has been developed

UoN is happy to share generated markers, e.g. SSR, DArT and marker sets.

X

DipC

Tiga Necaru

Current mapping population DipC X Tiga Necaru shows strong segregation for morphological variation.

77 lines at F5

Molecular, Genetics and Breeding

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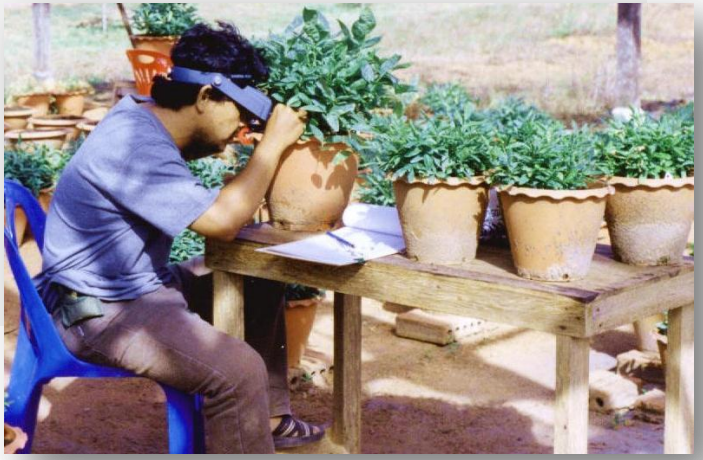
A working multi-centre breeding programme, with each partner responsible for their own major traits of interest, but willing to share information and materials.



Agronomy and Physiology

Group Members

Prof Sue Walker	UFC/CFFRC
Dr. Festo Massawe	UNMC
Dr. Asha Karunaratne	SUSL/CFFRC
Dr. Ibraheem Alshareef	CFFRC
Mr. Yusuf Muhammad	UNMC
Abd Razak	UniMap
Zakaria Wahab	UniMap
Rohani Farook	UniMap
Harbant Singh	UniMap
Satriyas Ilyas	IPB

Li-6400 XT
Photosynthesis system

Agronomy and Physiology Key research areas

Abiotic stress (Environmental stress): The abiotic stress (Water stress, temperature stress, salinity, shading and nutrient stress) is one of the major areas of research on bambara groundnut.

Biotic stress (plant health and weeds): pests and deceases, is one of the potential areas of research on bambara groundnut, especially in the humid areas.

Cropping system: the value of bambara groundnut in the cropping system and also the performance and the yield of bambara groundnut in the cropping system.

Seed quality; harvesting system; experimentation and crop climate modelling.

Agronomy and Physiology – research interests

Eight research topics identified:

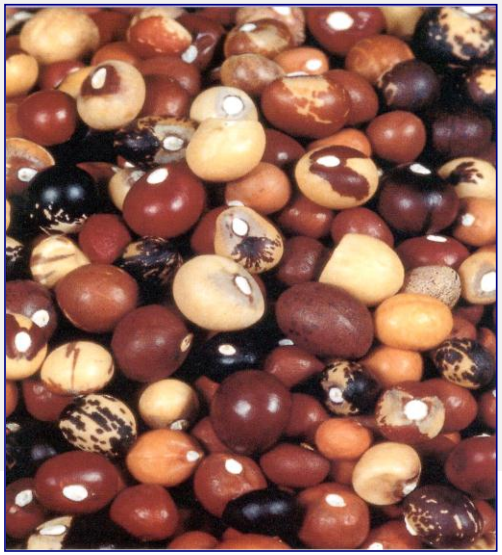
- Bambara groundnut and water relations (drought, water logging and use) (UNMC, IPB, CFFRC)
- The value of bambara groundnut in cropping system (UNMC, UniMap, CFFRC)
- Pest and disease management of bambara groundnut (UNMC, IPB, UniMap, CFFRC)
- Seed quality improvement of Bambara groundnut (IPB, CFFRC)
- Efficient harvesting system of bambara groundnut (UniMap, UNMC, CFFRC)
- Modelling the growth and yield of bambara groundnut, the climate change scenarios and global mapping (UNMC, UFS, IPB, CFFRC)
- Soil acidity and nutrients availability (UNMC, UniMap, IPB, CFFRC)
- Nitrogen fixation in bambara groundnut (Partners needed)

- **Bambara groundnut production guide book (UNMC, UniMap, IPB, CFFRC)**

Agronomy and Physiology

UniMap and Bogor University agreed to provide the facilities (Field plots, controlled environments and instruments)

UniMap has collaboration with some private sectors. They will search for support from their private partners.



Agronomy and Physiology

Li-6400 XT
Photosynthesis system

Group Members

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Dr. Festo Massawe	UNMC
Dr. Asha Karunaratne	SUSL/CFFRC
Dr. Ibraheem Alshareef	CFFRC
Mr. Yusuf Muhammad	UNMC
Abd Razak	UniMap
Zakaria Wahab	UniMap
Rohani Farook	UniMap
Harbant Singh	UniMap
Satriyas Ilyas	IPB

Eight topics identified for research collaborations

Products and End Users

Group Members

Prof. Dr. Ridzwan Abdul Rahman	UniMAP
Assoc Prof. Dr. Zanaib Hamzah	UniMAP
Prof Sayed Azam Ali	CFFRC
Assoc. Prof. Mahmad Nor Jaafar	UniMAP
Assoc. Prof. Dr. Othman Hashim	UniMAP
Ms Endah Sri Redjeki (Joined for part of the discussion)	Muhammadiyah Gresik Uni
Patrick O'Reilly	CFFRC
Dr Prakit Somta (Joined for part of the discussion)	Kasetsart
Dr Jira Suwanpraset (Joined for part of the discussion)	Songkla

Products and End Users

Scoping studies relating to the nutritional bio-availability, variability and the feasibility of developing novel fish feed at UNIMAP to support animal feeding trial at CFFRC and other partner institutions.

Mechanisation/engineering solutions at all stages of bambara groundnut production including; planting, harvesting, post harvest processing, products

Two aspects of product research were identified as being of immediate interest.

- Nutritional composition
- Product development/food engineering

Bambara groundnut statistics: knowledge regarding bambara groundnut production and markets.

Products and End Users

Resources

All partners possess specific strengths in relation to these areas of research as well as material and other resources that could be employed on specific projects.

These include:

- Active contacts with existing grower communities in Thailand and Indonesia.
- Experience and local/expert knowledge in relation to existing markets, products and processing techniques in Thailand.
- Access to different seed stocks.
- Potential for growing, market and animal trials.
- Capacity for engineering and product development.

Products and End Users

Group Members

Prof. Dr. Ridzwan Abdul Rahman	UniMAP
Assoc Prof. Dr. Zanaib Hamzah	UniMAP
Prof Sayed Azam Ali	CFFRC
Assoc. Prof. Mahmad Nor Jaafar	UniMAP
Assoc. Prof. Dr. Othman Hashim	UniMAP
Ms Endah Sri Redjeki (Joined for part of the discussion)	Muhammadiyah Gresik Uni
Patrick O'Reilly	CFFRC
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Bambara Groundnut Projects to Date

BAMGROW

BAMFOOD

BAMLINK

DFID Marketing

FAO Mapping

FAO Aquacrop

BAMYIELD

1990

2000

2012

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- CFFRC

11-12 December 2012 Workshop

Linking research and knowledge systems in South-East Asia and Africa