EXPLORING THE GENETIC DIVERSITY OF GROUNDNUT-NODULATING RHIZOBIA IN MOIST AND DRY SAVANNAS OF NIGERIA FOR INCREASED SYMBIOTIC NITROGEN FIXATION AND PRODUCTIVITY.

A. A. Abdullahi[1,2], J. Howieson[1], G. O'Hara[1], J. Terpollili[1], R. Tiwari[1] and A. A. Yusuf[2]

1. Centre for Rhizobium Studies, Murdoch University, South Street, Murdoch, Western Australia 6150.
2. Department of Soil Science, Faculty of Agriculture/Institute for Agricultural Research, Ahmadu Bello University, Zaria, Nigeria

INTRODUCTION

Groundnut or peanut (*Arachis hypogaea* L.) is a very important leguminous crop in the tropics. Nigeria is the leading producer in Africa (Table 1), with production mostly in the hands of resource poor small-holder farmers. They harvest far less than the potential yield of the crop due to poor soils and difficulties in obtaining fertilizers (Ndjeunga *et al*., 2010). Use of rhizobia (root nodule bacteria) inoculants is a relatively easier, environment friendly and economically viable technology to improve the yield of the crop through symbiotic nitrogen fixation. The absence of local inoculants for the crop and the failure of the few imported ones due to environmental conditions (Yusuf *et al*., 2012) is of particular concern. Although there are widespread rhizobia of the "cowpea miscellany" that promiscuously nodulate groundnut in Nigeria, identifying the diversity of strains indigenous to the Nigerian savanna and selecting effective strains for the production of inoculants is shown to be the best solution (Machido *et al*., 2011). This poster outlines my progress during the first 9 months of my PhD.

OBJECTIVES

The specific objectives to be achieved are to:

1. Determine the genetic diversity of indigenous rhizobial strains nodulating groundnut in Nigeria.
2. Molecular characterization of the isolated strains.
3. Glasshouse experiments to Identify the most effective strains.
4. Determine the effect of soil type on the diversity of groundnut - nodulating rhizobia.
5. Evaluate the nitrogen fixing capacity of identified strains with SAMNUT 22 and SAMNUT 24 groundnut varieties.

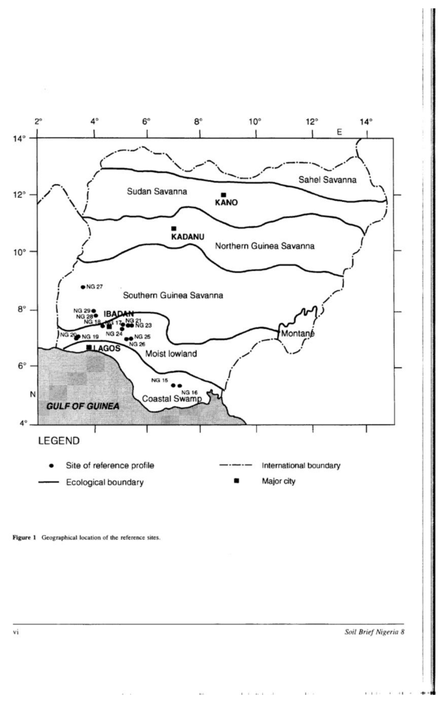

Figure 1. Map of Nigeria showing the Agro ecological zones.

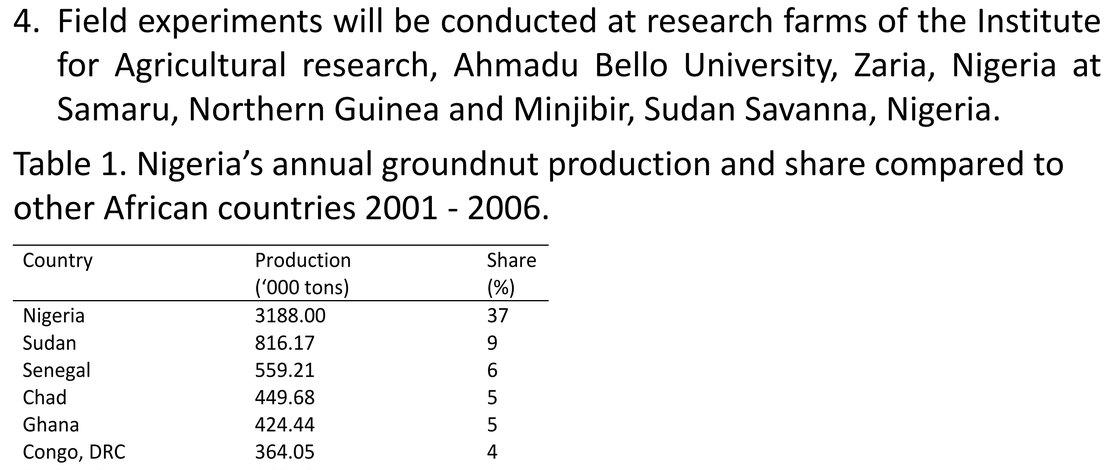

Figure 2. Contrast in moisture and vegetation between Igabi, in Kaduna state; in moist Northern Guinea Savanna (Left) and Minjibir in Kano state; in dry Sudan Savanna (Right) (Google earth 29/10/2013)

METHODOLOGY

The study involves:

1. Sampling of root nodules and soils from farmers' fields in Nigeria (Completed).
2. Isolation of rhizobia from nodules and soils, authentication and effectiveness testing of isolates in the glasshouse (in progress).
3. Molecular characterization of isolates.
4. Field experiments will be conducted at research farms of the Institute for Agricultural research, Ahmadu Bello University, Zaria, Nigeria at Samaru, Northern Guinea and Minjibir, Sudan Savanna, Nigeria.

Table 1. Nigeria's annual groundnut production and share compared to other African countries 2001 - 2006.

Country	Production ('000 tons)	Share (%)
Nigeria	3188.00	37
Sudan	816.17	9
Senegal	559.21	6
Chad	449.68	5
Ghana	424.44	5
Congo, DRC	364.05	4
Burkina Faso	278.28	3
Guinea	250.32	3
Mali	198.03	2
Cameroon	207.62	2
Egypt	193.90	2
Niger	175.77	2
Malawi	148.98	2

Adapted from Samtowe *et al*. (2009)

Figure 3. Groundnut grown without N fertilizer or inoculation in moist Northern Guinea Savanna (11/7/2013)

Figure 4. Groundnut intercropped with millet in dry Sudan Savanna (24/7/ 2013)

EXPECTED RESULTS

1. Higher genetic diversity of groundnut-nodulating rhizhobia in the moist northern Guinea than in the dry Sudan savanna.
2. Higher genetic diversity in fertile soils with higher organic matter, clay, cation exchange capacity and moderate pH than less fertile, sandier soils.
3. A large indigenous population of both effective and ineffective strains
4. Highly adapted effective promising strains suitable for inoculant development.

BENEFITS

The results will provide strains of rhizobia for development of inoculants to boost environmental safety, soil fertility, economy, food security, groundnut processing and inoculant producing industries in Nigeria and for the West African Guinea and Sudan Savanna regions

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