FEDERAL UNIVERSITY OF TECHNOLOGY MINNA

LEGUMES AND RHIZOBIA: ONE OF NATURE'S PARTNERSHIPS FOR FOOD AND NUTRITION SECURITY OF THE POOR

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B.Agric (ABU), MSc (Reading), PhD (London)
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INAUGURAL LECTURE SERIES 33

9TH APRIL, 2015

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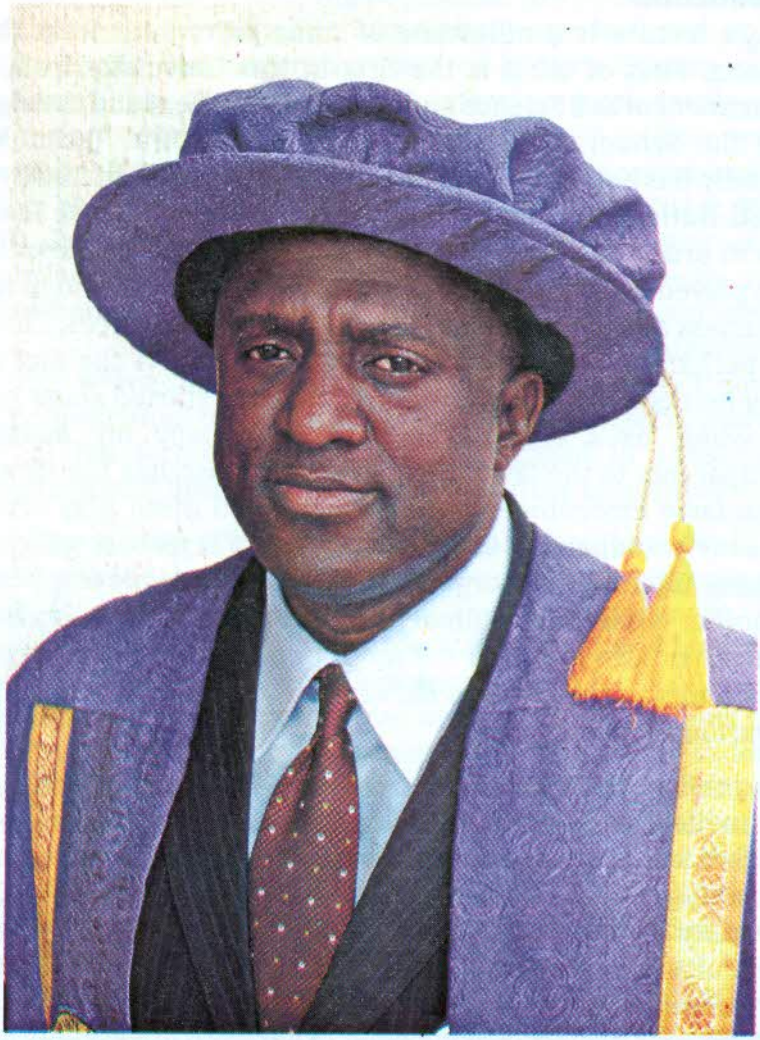

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Introduction

Today's lecture is a milestone of some sorts in at least three respects. First of all, it is the first in this University from the Department of Soil Science and Land Management and the eighth from the School of Agriculture and Agricultural Technology. Secondly, it is being presented in 2015, the year designated by the United Nations General Assembly as the International Year of Soils in order to draw the attention of the world to the critical roles played by soil in our lives and survival on earth and to raise awareness and promote sustainability of soil resources. Thirdly, and perhaps more important to me, however, is the fact that today marks a major landmark of a journey started some years ago when, as a child, I used to accompany my maternal grandparents to the farm. I recollect with nostalgia the serenity of the farm environment and how I would often play around while my grandparents toiled. It was nature at its best with birds chirping happily and energetically hopping from one tree branch to another while small animals crawled about in the bush. Being at the farm also afforded me an opportunity to eat a range of foods, fruits and vegetables harvested by my grandparents from the various parts of the field.

It was this seminal experience that in part shaped my decision later in life to read Agriculture in the University. The decision to read Soil Science, however, was purely accidental as I knew next to nothing about a course like that before getting to the University. As fate would have it, we spent the first three years in the Faculty doing general courses and it was only in our final year that we were allowed to select a department where we would do our final year project. Having been exposed to the various areas of specialisation in the first three years, my mind was made up to go for Soil Science, rather than the Agronomy I had initially wanted to read. The rest, as the aphorism goes, is history.

Rationale for the Chosen Title

Statistics from various agencies of the United Nations estimate

that nearly fifty per cent of the population in sub-Saharan Africa lives below the poverty line while about one in three, or 250 million people, are undernourished or hungry. Coming closer home, more than 70 per cent of Nigerians are poor, earning less than the equivalent of $1.25 daily and about 20 million people have inadequate access to food for their wellbeing, with nearly 11 million being malnourished. (FAO, 2010; UNDP, 2014; WHO, 2015). Paradoxically, while an estimated 70 per cent of the people living in Africa are employed directly or indirectly in the agricultural sector; the annual food import bill of the continent is about 350 billion US dollars. These are indeed depressing statistics, which suggest that there is a large mass of poor, hungry and malnourished people in Africa, and indeed Nigeria, and that most of the farmers are poor and engaged in subsistence agriculture with little resources to invest on the enterprise.

According to the World Health Organisation, poverty is the primary cause of hunger, but hunger also causes poverty due to ill health, low energy level and even mental impairment, thus diminishing peoples' ability to work and learn and leading to more hunger (WHO, 2015). Thus hunger and poverty are two sides of the same coin that entrap individuals in a vicious cycle that can only be broken by exogenous interventions that address the multi-dimensional nature of the problem. It is this scenario and the many partnerships or alliances forged over the years to help grow Africa's agriculture and improve farmers' incomes and livelihoods that have inspired the title of this inaugural lecture. Some of these partnerships include but not limited to the following:

* The Alliance for a Green Revolution in Africa (AGRA) – Created in 2006 as a strategic partnership between Bill and Melinda Gates Foundation (BMGF) and Rockefeller Foundation to dramatically improve African agriculture and to do so as rapidly as possible (agra-alliance.org).

* The New Alliance for Food Security and Nutrition – launched in 2012 by NEPAD (New Partnership for African

Development), some of its goals are to help lift 50 million people out of poverty in Africa by 2022 and achieve sustained, inclusive agriculture-led growth in Africa (new-alliance.org).

* Africa Climate-Smart Agriculture Alliance (CSA) – This aims to build the food and nutrition security of the rural poor so that farm families have access to enough nutritious food at all times, even in the face of a changing climate. Six million smallholder farmers in sub-Saharan Africa are to be empowered by 2021. (africacsa.org)

* Africa-Brazil Agricultural Innovation Marketplace – This is an initiative of the Brazilian Agricultural Research Corporation (Embrapa) and the Forum for Agricultural Research in Africa (FARA), with support from international donor agencies, including the World Bank, the United Kingdom's Department for International Development (DfID), the International Fund for Agricultural Development (IFAD) and the BMGF. The initiative aims at linking Latin American, African and Caribbean (LAC) experts and institutions to develop cooperative research projects for development (www.africa-brazil.org).

Given the plethora of past and present initiatives aimed at reducing hunger in Africa and the little progress made over time, I am tempted to draw the audience's attention to a mutually beneficial relationship between two remarkable partners – one a bacterium and the other a plant- that nature has blessed mankind with, which if properly harnessed, will go a long way in engendering food and nutrition security to the continent and indeed Nigeria. The title, therefore, serves as a metaphor for progress in the fight against hunger and poverty hinged on functional and sustainable partnerships within the Nigerian context in particular and Africa in general.

Soil and its Composition

Soil may mean different things to different people but, for a soil scientist, it is defined as ***'the unconsolidated mineral and/or organic material on the immediate surface of the Earth that serves as a natural medium for the growth of land plants'***. It is a product of the combined effects of living organisms, genetic and climatic factors (including rainfall and temperature), conditioned by topography, acting on the parent material over a period of time. The upper limit of soil is the boundary between soil and air, shallow water, or plant materials that have not begun to decompose. However, its lower boundary hugely differs, depending on the nature of soil and the interactive effects of the soil-forming factors, but soils generally transition, at the lower boundary, to a hard rock or a region of non-biological activity. Most soils do not go beyond a depth of 200 cm, which is the limit arbitrarily used for the purpose of soil classification.

Soil is chiefly composed of five components, namely minerals, organic matter, water, air and living organisms. The mineral matter, which is largely responsible for the solid matrix of the soil, constitutes about 50% by volume of soil and is made up of sand, silt and clay. The minerals, in general, provide physical support for plants and are the original source of most essential plant nutrients in the soil. The organic matter is the product of decayed remains of plants and animals and, although it constitutes less than 5% of soil volume, it supplies large portions of the nutrients essential for plant growth. Soil water resides in the pore spaces that exist between aggregates of mineral and organic matter and, although variable, may account for 20-30% of the soil volume. Water carries most of the nutrients essential for plant growth as dissolved salts in forms readily available for plant uptake. The soil air resides in the rest of the soil pores not occupied by water and has similar composition as the atmosphere, but with lower amounts of oxygen and higher concentrations of carbon dioxide and water vapour.