FEDERAL UNIVERSITY OF TECHNOLOGY
MINNA

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INAUGURAL LECTURE SERIES 58

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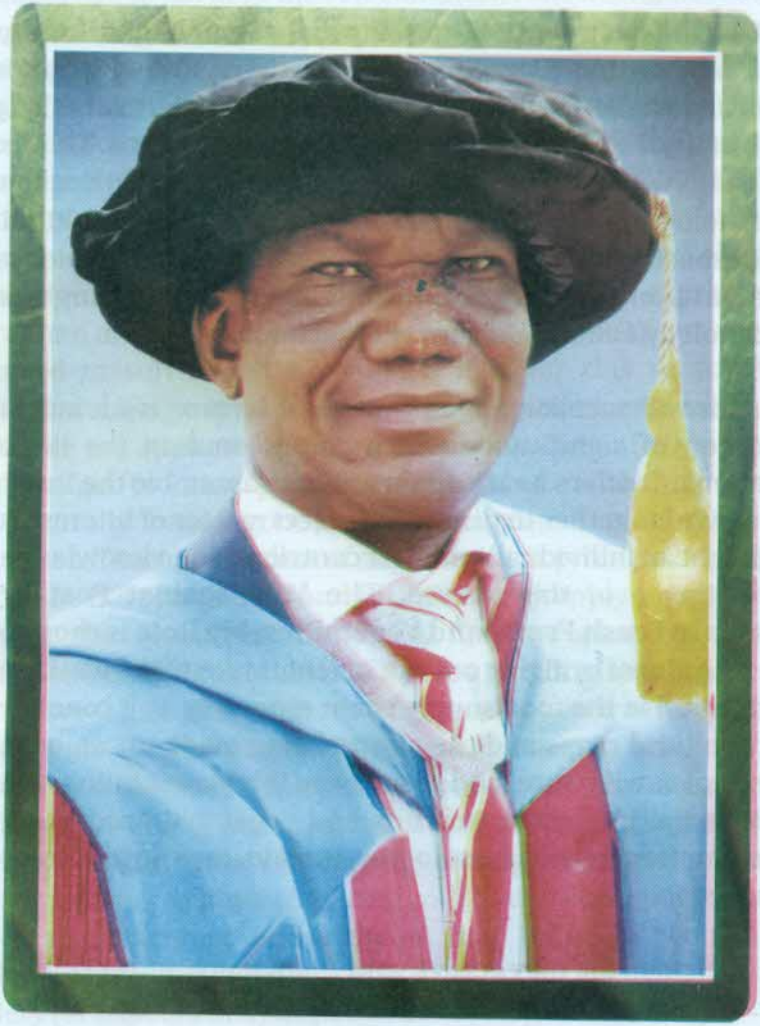

Professor Peter Aba Idah

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Professor of Agricultural and Bioresources Engineering

Preamble

It is with deep sense of humility and immense gratitude to God Almighty that I stand before this distinguished gathering of men and women to deliver the 58th Inaugural lecture of this great University, Federal University of Technology, Minna. This lecture is the 16th from School of Engineering and Engineering Technology, the 5th from the Department of Agricultural and Bioresources Engineering and the 1st from one of the pioneering students of the School of Engineering and Engineering Technology, Federal University of Technology, Minna.

The Vice-Chancellor Sir, an Inaugural lecture is an auspicious occasion of significance which comes once in the life of an academic. It offers a rare opportunity to assemble the "town and the gown" together to discuss a subject matter of interest and to highlight an individual's modest contribution to knowledge. The main theme of this lecture: **The War against Postharvest Losses in Fresh Fruits and Vegetables: My Role** is chosen with the sole aim of bringing out the salient issues of the wastage that is going on in the food supply chain especially as it concerns the horticultural crops and the efforts being made to combat these losses so as to ensure food security. In this presentation, we shall look at the introduction, fruits and vegetable production and consumption, postharvest losses, tomato, my contributions and conclusion.

Mr. Chairman Sir, may I crave your indulgence and permission to present today's lecture.

1.0 INTRODUCTION

Agricultural and Bioresources Engineering as a Profession

Man was created with a catalogue of materials of both living and non-living things intended to provide comfort for him. Man's

ability to recognize this fact cannot be underestimated and thus, the expertise to harness the relevant materials in engineering to bring about this comfort. Because each of the catalogues of human problem and desires would require a unique approach to solving it, it will therefore require the use of many engineering branches, some of which are Building, Civil, Electrical, Computer, Chemical and Mechanical engineering. The problems often encountered in agriculture are such that the expertise of a single branch of engineering, some of which are enumerated above is insufficient to provide the needed solution. The expertise of more than one of the branches and varied combinations may be required to solve such a problem. It is for this reason that Agricultural Engineering emerged. Agricultural engineering is therefore the application of any or all branches of engineering knowledge to any process associated with producing agriculturally based goods and management of our natural resources. The whole intent of engineering is problem solving to better the life of mankind and this it does by applying science to convert the resources of nature. This is what led to the emergence of Agricultural and Bioresources Engineering. Hence, Agricultural and Bioresources Engineering often referred to as Biosystems Engineering integrates engineering sciences and design and applied biological sciences for the solution of problems involving plants, animals and natural environment. It deals with patterns of relationship among organisms and their environments, engineering design to develop and manage processes, machines and systems that influence, control or utilize biological materials and organisms for the benefit of the society (Wikipedia Encyclopedia, 2013; Field *et al.*, 2007).

It can be seen that the Agricultural Engineer has a great concern with Bioresources. This concern can be seen in the following light as effort in training, research and public service can conveniently be categorized within three major themes:

1. **Agricultural Systems Engineering**: creating safer, more efficient and environmentally sustainable production system for plants and animals; machinery design for agriculture, horticulture, aquaculture and forestry; building systems for livestock, laboratory and storage of agricultural and food product; instrumentation, monitor and control; standard and safety.

2. **Bioprocessing Engineering**: improving and converting biological materials; added value processing (drying, binding, separating etc) of agricultural crops and animals for use as food, fibre, energy and pharmaceuticals; primary processing of waste materials for land application; quality control in processing operations; handling systems for granular and fibrous materials; energy conservation and utilization; computer image analysis; engineering in support of biotechnology.

3. **Natural Resources Engineering**: managing and protecting resources; soil and water conservation; water management for agricultural use; irrigation and drainage, soil reclamation; utilization of waste materials in plant-soil systems; modeling environmental systems; decision support and simulation.

Engineering combines creativity and practicality on scientific basis. When scientific basis borders on living things, their by-product or their natural resource base, the resulting branch of engineering is variously called Agricultural, Biological, Biosystems, Bioresources and/or Bioenvironmental. Some of such living things and natural resources of great importance are the horticultural crops, especially **fruits and vegetables**.

2.0 FRUITS AND VEGETABLES

Fruits and vegetables are of great nutritional value. They play a very important role in nutrition and health, especially as they

contain substances which regulate or stimulate digestion, act as laxatives or diuretics, pectin and phenoic compounds which play a part in regulating the pH of the intestines (Ibeawuchi *et al.*, 2015). They are important sources of vitamins and minerals, thus essential components of human diet. Consequent upon this, there had been increased trade/commercial activities surrounding these commodities (Egharevba, 1995). Vegetable production forms a substantial percentage (about 25%) of the major food crops cultivated in the tropics and so it is the source of livelihood for a considerable section of the population (Kra and Bani, 1988).

2.1 Horticultural Crops Production: Global Trend

Food and Agricultural Organization of the United Nations (FAO) predicted that the world population would top eight (8) billion by the year 2030 (Simson and Straus, 2010). Therefore, the demand for food would increase dramatically. As stated in the FAO report "Agriculture: Toward 2015/30" remarkable progress has been made over the last three decades towards feeding the world. While global production has increased over 70 percent, per capita food consumption has been almost 20% higher. According to the report, crop output is projected to be 70 percent higher in 2030 than the current output. Fruits and vegetables will play an important role in providing essential vitamins, minerals and dietary fibre to the world, feeding populations in both developed and developing countries.

The United States (US) continues to dominate the international trade of fruits and vegetables and is ranked number one as both importer and exporter accounting for approximately 18 percent of the $40 billion (USD) in fresh produce world trade. As a group, the European Union (EU) constitutes the largest player, with 15 additional export and import commodities contributing about 20 percent of total fresh fruit and vegetable trade. Within Europe,

Germany is the principal exporter, Spain is the principal supplier and Netherland plays an important role in the physical distribution process. In the Southern Hemisphere, Chile, South Africa and New Zealand have become major suppliers in the international trade of fresh fruit commodities, although they remain insignificant in the vegetable trade (Simson and Straus 2010). The estimated world production of fruits and vegetables reached a global production of 508 million tons for vegetables and 469 million tons for fruits in 1996. This trend in production was expected to increase at a rate of 3.2 percent per year for vegetables and 1.6 percent per year for fruits (which means by this year 2017 the estimated world fruit production is expected to hit about 626 million tons per year, while that of vegetable is about 849 million tons per year). However, this trend is not uniform worldwide, especially in developing countries where the lack of adequate infrastructure and technology constitutes the major drawback to competing with industrialized countries. Nevertheless, developing countries will continue to be the leaders in providing exotic fruits and vegetables to developed countries. Most developing countries have experienced a high increase in fruit and vegetable production as in case of Asia and South America.

Asia is the leading producer of vegetables with a 61 percent total volume output and a yearly growth of 51 percent. However, the US continues to lead in the export of fresh fruits and vegetables worldwide particularly in orange, grapes and tomatoes. Brazil dominates the international trade of frozen orange juice concentrate, while Chile has become the major fresh fruit exporter with a production volume of 45 percent. The top six fruit producers in declining order of importance are China, India, Brazil, USA, Italy and Mexico. China, India and Brazil account for almost 50 percent of the world's fruit supply, but since most of this production is destined for domestic consumption; its impact