



OSUN STATE UNIVERSITY
OSOGBO, NIGERIA

**Horticulture for Wholesomeness:
We are What We Grow and Eat**

INAUGURAL LECTURE SERIES 011

by

Professor Fikayo Ezekiel Babatunde

B.Tech. Agric (ATBU), Msc (Ibadan), Ph. D (ATBU)
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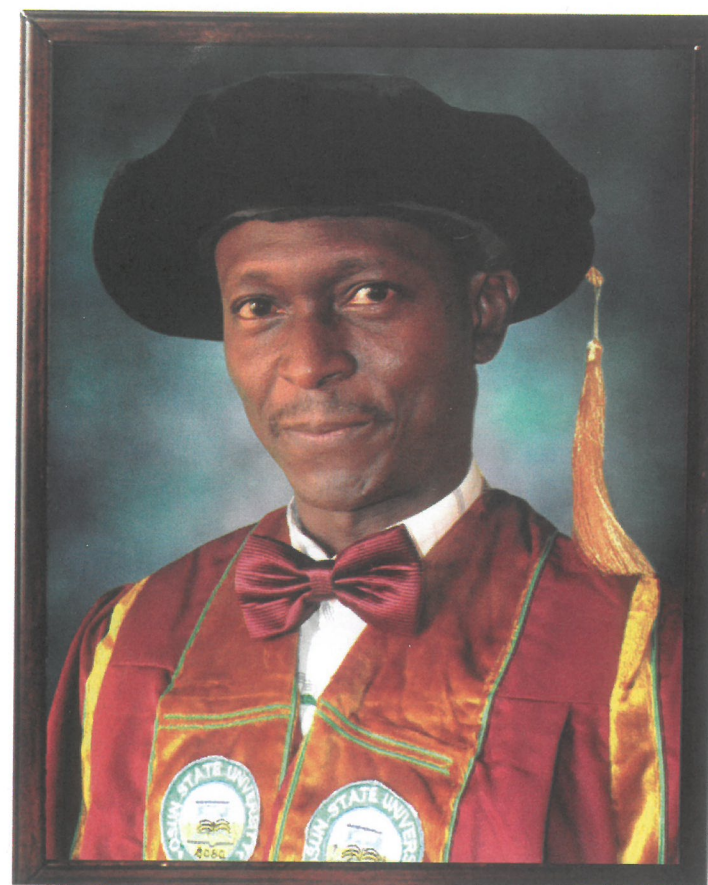
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PROFESSOR FIKAYO EZEKIEL BABATUNDE

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Osun State University



Vice Chancellor, Sir
Deputy Vice Chancellors
Principal Officers of the University
Members of Council and Senate
Royal Fathers and Chiefs
My Professors, Mentors and Scholars
Distinguished Farmers and Invited Guests
Gentlemen of the press
Ladies and gentlemen

Inaugural lecture is an enviable tradition of this great university. It is an honor and opportunity bestowed on me to descend from this niche in the ivory tower to interact with other academic, non-academic colleagues and the society at large. The lecture is an occasion in which the lecturer tells the distinguished heterogeneous and/or august audience, in non-technical and professional language, what he/she has been professing over the years.

Vice Chancellor Sir, I profess Agronomy/Horticulture, with specific area of specialization into Olericulture (vegetable crop production). In order to profess in this area of endeavor, it is not enough to be a scientist but to be a technologist also. Inaugural lecture in this endeavor is taken as a serious attempt to relate the subject area to general societal or national needs and goals. Although ample time is not available and the lecture could take a long time but as a trained teacher, the lecture would be delivered within the stipulated time.

1.0 ORIGIN AND HISTORY OF HORTICULTURE

In the beginning (referring to the original week of creation) God created the heaven and the earth (Genesis 1:1). The TRUTH about creation can be summarily explained as follows;

- The first born of creation was light from where we photosynthesize our crop plants (Genesis 1:3-5).
- Second born were waters which we use for moisture and / or irrigation (Genesis 1:6-8).
- Third born was crop plant i.e. HORTICULTURE HERSELF (Genesis 1:9-13).
- Fourth born were sun, moon and stars from where we derive photoperiods for our crops (Genesis 1:14-19).
- Fifth born were fishes and birds from where we study and become Animal Scientist (Genesis 1:20-23).
- Sixth born were cattle and man himself, from where we continue our study of animal science and eventually Agricultural Economics and Extension i.e the man who manages both crops and animals (Genesis 1: 24-31).
- And on the seventh day God ended his work which he had made; and he rested on the seventh day from all his work which he had made. And God blessed the seventh day, and sanctified it: because that in it he had rested from all his work which God created and made. (Genesis 2: 2-3)

The FACT is, life is dynamic and it gives us what we give it. Horticulture is not just a course of study or a profession but life, in which one cannot do well without it. It is the backbone of life going back to creation you will see how important horticulture is. God himself place man in a garden thus telling us we can't be successful on earth without gardens. The term Horticulture is derived from two Latin words, hortus (garden) and colere (to cultivate). This implies that Horticulture is concerned with the cultivation of garden plants viz: fruits, vegetables, flowers and ornamental plants. The origin of garden culture documented by man could be traced as far back as 3000 BC or beyond in Egypt. Historical evidence shows that by that time crops such as Grapes, Dates, Olive and Onions had been brought under cultivation by the Egyptians and the technology ensuring their cultivation such as land preparation, pruning, irrigation, fertilization had also been used. By this time, horticulture was an established discipline in Egypt. Further development in horticulture could be attributed to the Greeks and Romans. Evidence revealed that early development of ornamental horticulture took place to a considerably high level in Rome. After the fall of the Roman Empire, some horticultural art and technology survived in monastic gardens. The art of horticulture was in need of revival at this stage and this began with the Renaissance. By the fourteenth century, orchards and gardens were common features outside the monasteries in Italy. The revival of the art of horticulture spread from Italy to France and then England during this period.

At present the field of horticulture has grown considerably as a result of advances in science and technology during the twentieth century. Many researches have been conducted aimed at solving the problems of growing horticultural crops and a comparatively large volume of scientific information on the behavior of horticultural plants and products has become available. This information or literature constitutes the science of horticulture and the application of this scientific information constitutes the technology of horticulture. Thus, present day horticulture may be defined as the science and technology involved in the production, processing and merchandizing of fruits, vegetables, flowers and ornamentals. Horticulture is that branch of agriculture concerned with the production of intensively cultured crops directly used by people for food, for medicinal purposes, or aesthetic gratification.

1.1 BRANCHES OF HORTICULTURE

The field of horticulture could further be subdivided into four sub-disciplines:

- i. **Pomology:** is the sub-discipline of horticulture concerned with the management of all fruits such as mango, citrus, guava, banana, apple, grapes and many others.
- ii. **Olericulture:** Deals with management of vegetable crops such as tomato, pepper, onions, amaranth, potato, carrot and many others.

- iii. **Floriculture:** is concerned with the cultivation of herbaceous flowering plants. Flowering plants such as rose, acalypha, targets, marigold and many others are normally planted for aesthetic gratification.
- iv. **Ornamental/Landscape Horticulture:** concerned with the management of shrubs and trees for use in landscape design. It also covers the aspects of design and maintenance of gardens and parks.

1.2 WHAT CONSTITUTE A HORTICULTURAL CROP

What constitute a horticultural crop depends on three factors.

1. **Method of cultivation:** In considering cultivation method, an important question to ask is that 'is the crop intensively cultivated? Horticultural crops are intensively cultivated and are very difficult to mechanise from land preparation to harvesting unlike field crops.
2. **Custom of the area:** Classifying crops as horticultural also depends on the custom of the area. For example in Nigeria Irish potatoes are vegetables and hence horticultural crops. In Europe however, Irish potatoes are considered as field crops.
3. **Economic uses of the plant:** The economic use to which a plant is put determines whether it is horticultural or not. For example when we grow grass for forage it is an agronomic crop. But when the same grass is grown in front of a house as a lawn for decoration then it is a horticultural crop. In the case of kenaf (*Hibiscus cannabinus*) it could be horticultural when grown for the leaves but when cultivated for the fibre it is a field crop.

2.0 THE CHALLENGES FACING HORTICULTURE.

Horticulture globally is undergoing significant challenges that are considered with production of crops and priorities of research and development. Many are the challenges of horticulture but to mention a few:

1. **Long juvenile period:** Most fruit plant have a long juvenile period, thus bearing their first fruit after some years ,e.g, Pecan nut takes 10 to 12years hence leading to high cost of the Orchards.
2. **Perishable nature:** High content of water in horticultural crops makes it vulnerable to spoilage. The technology to increase shelf life and facilities to facilitate cold store are scarce, hence the farmers are forced to rush in selling the fruits thus flooding the market with fruits and experiencing a crash in price.
3. **Lack of processing unit:** The processing sector is equal to none in the country. With an abundance of growing fruit such as Mango, Banana, Citrus, Pineapple etc. which could be processed into different forms and products hence boosting the economy of the country and creating employment.
4. **Urbanisation:** Globally an increase in proportion of the world's population are in the urban environment where there is no interest in farming therefore food production is deficient.

In 1950 approximately 71% of the world's population lived in rural locations and declined in 2010 to 50% (or as low as 10,18, and 22% for the United Kingdom, USA and France respectively). And it is projected to be lower by 30% globally by year 2050 (United Nations 2007). Thus impacting significantly on availability of labour for farming activities in general.

5. **Genetically Modified Crops:** The use of GMOs (Genetically Modified Crops) is however not the case for horticultural crops where concerns and debates have been made about the safety and the wider justification of genetic modification prevail in many countries, the lack of awareness about the role of conventional plant breeding in the production of new cultivars with the confusion that prevails between conventional breeding and plants produced using gene transfer technologies, the changes outlined above are merely some of the factors that are impacting on the current developments and practices of horticultural crops. This provides a plethora of opportunities for horticultural sciences to solve many current problems facing producers and to offer solutions to those issues that are concerning consumers. The organized supply of a wide range of reasonably priced horticultural crops in most developed countries has led to a marked gratification about the need for ongoing R&D programmes in horticulture. Unfortunately, most research driving University have now disbanded horticulture/horticultural sciences departments and combined them into plant science departments with a strong focus on molecular sciences. On the contrary, the basic necessity for research on horticultural crops

has not decreased, rather the challenges have increased in complexity given the existing consumer demands for affordability, safety and continuity of supply; increase needs to achieve sustainable practices and requirement to deal with challenges originating from a more uneven climate, the loss of productive soil through urban intrusion and the loss of low-cost labour.

6. Availability of water: This is the most relevant issue that is facing horticultural production in Nigeria as most farmer are peasants and poor hence can't afford an alternative for water than the annual rainfall hence production is reduced Thus research is desirable to decide issues such as the development of drought tolerant crops, dealing with increased salinity, the management of crops under managed water deficits. Others includes: High initial investment, non-availability of quality planting materials, faulty marketing system, low purchasing power, current economic conditions globally and increase "protectionism"

3.0 ROLE OF HORTICULTURE IN ADDRESSING YOUTH UNEMPLOYMENT

Unemployment is one of the problems that face every developing economy and Nigeria is not exempted as unemployment remains one of the critical problems facing the country today. The importance of horticulture in reducing unemployment rate has not been well addressed and the country is lagging behind the developed nations where horticulture is practiced as a comprehensive and specialised

type of food and non-food production. With the country facing recession, the level of unemployment is expected to increase as more companies are laying off staff in order to cut cost and optimise profit. It is sacrosanct to become self-employed and be an employer of labour instead of waiting on government for employment in order to eradicate unemployment and poverty in Nigeria innovative method needs to be used. Some of such measures are:

1. Youth training on the management of horticultural fruit crops.
2. Techniques of fruits storage and transportation.
3. Youth training on skills acquisition and ways to manage flowers in nursery beds.
4. Youth seminar on how to manage vegetable crops for optimum yield.
5. Skills involve in landscaping and its uses in our environment.
- 6 Training of youth on importance of gardening for job creation.
- 7 Horticulture is wealth seminar for youth.

4.0 MY CONTRIBUTIONS

4.1 Agronomic practices on Roselle

- The effects of three agronomic practices (sowing dates, intra-row spacing and nitrogen fertilizer levels) were assessed on the productivity of Red variant Roselle

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(*Hibiscus sabdariffa*) during the rainy seasons of June-October in 1999 and 2000 by Babatunde et al (2002). It was observed that the effect of the earlier sowing date (June), wider intra-row spacing (80cm) and application of 60kg N/ha produced the highest mean calyx and seed yield indicating higher productivity of red variant Roselle. In subsequent study, the calyx yield was found to be strongly correlated with growth parameters. The regression analysis also showed that yield and yield components in Roselle cultivation were mainly determined by the agronomic practices such as sowing dates, intra-row spacing and nitrogen levels.

- Field experiments were conducted to investigate the influence of intercropping combinations on the productivity and profitability of Roselle in Nigeria by Babatunde (2003). The result showed that cash advantage due to intercropping (CAI) was highest for Roselle intercropped with groundnut and cowpea compared with reduction observed when intercropped with the cereals (millet and sorghum).
- Babatunde and Zachariah (2000) conducted experiments during the 1999 and 2000 rainy seasons on the influence of weeding regimes and spacing on the growth and yield of red variant Roselle.

The result showed that a wide spacing of about 60 x 80cm and higher weeding regime which produced higher plant biomass, fibre, pulp, pulp calyx and seed yield are recommended.

- Babatunde et al.(2002) conducted a field experiment that dovetailed into a polymer chemistry in a laboratory experiment on red variant Roselle. The result showed that Nitrogenous fertilizer increase calyx yield but detrimental to fibre quality.

Other agronomic practices

- Two varieties of Orange-Fleshed Sweet Potato (OFSP) and a White-Fleshed Sweet Potato (WFSP) and a constant three inter-row spacing (30, 45 and 60cm) respectively were evaluated in three seasons (2007, 2008 and 2009) for varietal and plant spacing influence on tuber size shape and fresh market yield of sweet potato in Bauchi by Dantata et al (2010).

Variety OFSP produced higher yield than WFSP in all the seasons. The wider the spacing, the higher the fresh marketable yield though, there was no interaction between varieties and spacing. The findings from this study therefore recommended that OFSP at wider plant spacing of 60cm should be encouraged by sweet potato growers in the Northern Guinea Savannah ecological zone of Nigeria and other related ecologies of the world.

- The Response of Waterleaf Vegetable (*Talinum triangulare* Jacq Wild) to Spacing and Fertilizer Application was investigated by Babatunde et al (2008).

The effect of intra-row spacing and rate of NPK fertilizer on growth and yield of waterleaf were evaluated in Bauchi North Guinea Savanna ecological of Nigeria. The study suggested that waterleaf vegetable growers, should use close intra-row spacing of 10cm and high NPK fertilizer rate of 600kg/ha in order to enhance greater productivity.

- Babatunde and Yongabi (2008) conducted an experiment on the Effect of Nitrogen on Productivity of Aloe barbadensis and its Inhibitory Effect on Trichophyton rubrum were evaluated on a pot experiment and a bioassay test conducted in Bauchi, Nigeria. The result of the study recommended that 80kgN/ha is adequate for optimum nitrogen application in Sandy loam soils with at least 1.07g/kg total nitrogen level. Aloe vera gel cultivated under 100kg N/ha gave the highest inhibitory effect on the mycelia of Trichophyton rubrum in the bioassay test.
- The effect of seed storage periods selected from 1986, 1991 and 2003 on the germination and seedling performance of ten Bambara groundnut (*Vigna subterranean*) accessions were assessed by Babatunde et al (2007). The result revealed that storage period had significant effect on germination, plant height number of leaves, leaf area and petiole length. Bambara groundnut seeds stored in 2003 performed better than those stored earlier (1986 and 1991) for optimum

germination and seedling establishment irrespective of the accessions.

- The findings from the field experiments conducted to evaluate the influence of sowing dates and weed interference on growth and yield of Egusi melon (*Colocynthis citrullus*) showed that Egusi melon possesses potentials to tolerate weed infestation, though this lowered the yield, while yield increase could be attained if the crop is sown earlier (Babatunde, 2003).
- Yield Evaluation and Analysis Hydraulic Performance of a Continuous flow Drip Irrigation System Tested on Tomato Field in Bauchi by Mofoke et al (2006)

The yield evaluation and analysis of hydraulic performance of a low-cost, low-tech continuous-flow drip irrigation system constructed tested on a tomato field in Bauchi, was investigated. The results showed that total flow energy of the system was the most sensitive to variation in pressure energy. The flow regulation using "Medi emitter" cushions discharge variation caused by hydraulic design where without flow reputation in the system discharge, which is influenced largely by plugging hydraulic design parameters. At high crop yields, the recommended range of continuous flow rate in drip irrigation system 150.03-0.05

Fertilizer application

- Babatunde et al (2009) conducted an experiment on the effect of nutrient (fertilizer) sources; (NPK fertilizer (15:15:15), wood ash, poultry manure, fermented cow dung slurry and control (zero) fertilization were investigated on elemental composition of irrigated garlic two peppers during the dry seasons. The result shows that NPK had significant increasing effect ($p < 0.01$) on bulb moisture content which measures the pungency of the crop compared with the control.

On the other hand, the organic fertilizers (wood ash, poultry manure and fermented slurry) yielded crops with wood ash giving the higher pungency strength. This slurry also demonstrated that organic fertilizers would give better quality garlic with higher pungency than the NPK fertilizer and absence of fertilizer application. Therefore, application of 16.5t ha⁻¹ of wood ash is adequate for optimum yield of garlic in the study area (Babatunde et al., 2003; 2004 and 2008).

- The investigation on productivity of vegetable sesame (*Sesamum radiatum* schum) as influenced by nitrogen, phosphorus and seasons was carried out during the 1996 dry and 1997 rainy cropping seasons in two locations in Bauchi by Auwalu et al (2007). The findings suggested that farmers should grow vegetable sesame during the rainy season, and established that optimum 30 kg Nha-1 as urea and 15kgPha-1 as super phosphates

(SSP) should be applied in single dose at two weeks after sowing. The N*P interaction was also observed to be significant on leaf fresh weight, shoot dry weight, and total marketable yield in 1997 but not in 1996.

- Babatunde et al in 2003 and 2004 investigated the influence of nutrient sources on the productivity and pungency of onion (*Allium cepa*). The findings from this study showed that the highest pungency in onion bulb with optimum productivity was obtained with nutrient sourced from wood ash, and therefore should be encouraged amongst onion growers. Also, the effects of nutritional sources, mode of storage and post harvest losses on yield and economic returns in onions (*Allium cepa* L). The result from the experiment showed that wood ash and guano fertilizer sources could be substituted for inorganic fertilizer (N.P.K). Again, the storage media containers should be selected because onion bulbs possessed longer shelf life in open and airy medium, compared with other storage treatment conditions (Open air with no container, black polythene bag and yellow polythene bag).

Arbuscular Mycorrhiza Fungi

- The productivity of cucumber (*Cucumis sativus*) as influenced by Arbuscular mycorrhiza (*Glomus deserticola*) was assessed by Olawuyi et al (2011). The effect of *Glomus deserticola* on growth and yield of cucumber plants was optimum reduced phosphorus

toxicity in the soil, and produced higher cumulative weight of harvested fruit per plant. Also, Influence of AMF and NPK fertilizer on the productivity of cucumber were compared. Plants tested with 500 kg/ha AMF fungi produced higher fruit weight per plant than other treatments.

- The accession, treatment interaction, morpho-agronomic variability and correlation studies of four pepper (*Capsicum* spp) were investigated under the influence of treatment combinations of AMF (*Glomus clarum*) and cow dung by Olawuyi et al (2014).

The findings from this study show that there were interactive effect of the treatments for most of the morphological and yield related traits.

Glomus clauum treated plants responded positively, and had higher potential in influencing pepper production. This could be an alternative to persistent application of inorganic fertilizer which may be toxic to Nigerian soil.

4.2 Seasonal variation

- The seasonal variation on Rice production in northern Nigeria was investigated by Garba et al (2009).

The result of 10 adapted and newly improved rice varieties evaluated during the dry and rainy seasons of Northern Guinea Savannah agro-ecological zone of

Bauchi, Nigeria revealed that the long duration and lowland types FARO 44 and WITA 4 produced significantly ($p < 0.001$) higher grain field during the dry season under irrigation. On the other hand, the (short duration and upland types; Ex-China and FARO 54 produced more grain field than the lowland types during the rainy season. The combined analysis of variance carried out for the seasons showed that FARO 44 and WITA 4 were superior in yield and therefore, may suit the agro-ecologies of Bauchi. Comparing the two seasons, it was observed that rice production during the dry season produced more yield than during the rainy season.

4.3 Computer Simulation

- Agada and Babatunde (2007) produced an unpatented software that can simulate path analysis of direct, combined and indirect contributions of growth parameters to crop yield. The result of the study affirmed that this simulation is beneficial in that the program of computer has speed and accuracy that can handle several parameters at a glance.

5.0 CONCLUSION AND RECOMMENDATION

Vice-Chancellor Sir, this inaugural lecture is not only for me, but for my fellow agriculturist as well as those who value farming and take it for a serious business, it is for all of us. Let's join hands and make this country a home of sufficiency in food

production. Let's join hands and remove that cankerworm that has eaten our soil and makes it toxic to our crop plant as well as humans. Let's go back to organic farming towards a better production and healthy living. I know it will be difficult but we can do it, we can make our farm land fertile instead of making it a graveyard with inorganic form of farming. Just as the devil given one a million naira after enjoying you suffer the consequences for years. This is the case with heavy chemicalization of soil and environment because these chemicals are mostly residual in the seeds, pods, tubers down to the point of sale to the final consumer which is you and I. We enjoy them but the end result is disastrous.

As an agronomist, I put it to my other colleagues that we are responsible for everything that goes wrong with the farmers, soil and its produce. It is actually disheartening that most of us so called professionals are not involved in active farming leaving the peasants farmers with his old way of farming. Agriculture is practical and if the farmer doesn't see us actively involved in farming using new techniques that will improve yield he or she will continue with his or her old method. Consequently if we must make progress in agriculture, we must shift from our mentality of title holding to research and development. You may feel indignant but even if you are it should be a positive indignation that will spur you into action. An action that will bring liberation to farming, put a smile on the faces of the consumer's health wise, change the economy of our state and nation, and make you proud for being a blessing to your generation and a legend in the next

generation. Let our profession speak positively of us because we have a lot to offer to our state, nation and the world at large. As an Agronomist, you are key in the world, humans depend on you likewise animals and environment. Rise up and save the World, make our environment friendly again just as it was in the times past. You may not want to establish an Agri-preneur centre like JOJELYBABS but you can make it a point of duty to organize a garden in your environment and office habitually. Thank you for listening and God bless you all.

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To everybody present here today, I say thank you and God bless you all.

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