

Agricultural biotechnology, the solution to food crisis in Nigeria

Abstract

Nigeria's agricultural sector is faced with so many challenges from time past which had led to the current food crisis. Government Policies to encourage organic farming alone is not enough to meet the immediate diet and food demand of the highly increasing populace. Hence, the need to employ modern technology (Biotechnology) to boost food production in Nigeria.

Keywords: agricultural biotechnology, genetically modified foods, Nigeria, food Security

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Abbreviations: GMFs, genetically modified foods, OFN, operation feed the nation, GDP, gross domestic product

Introduction

The World population is expected to grow by over a third, or 2.3 billion people, between 2009 and 2050 (FAO, 2009) and nearly all of this growth is forecasted to take place in the developing countries among which sub-Saharan Africa's population (such as Nigeria) is expected to grow the fastest. As predicted, the Nigeria's population skyrocketed from year to year from 155,207,145 in 2009 to 186,987,563 in 2016.¹ As the population skyrocketed, Nigeria's food demand becomes increasing. However, at the current food production growth rates, Nigeria remains unable to feed its population. Histories have shown that no nation has actually become great without developing its agriculture.²

Nigeria has about 79million hectares of arable land, of which 32million hectares are cultivated. Over 90% of agricultural production is rain-fed and smallholders, in which subsistence producer's account for 80% of all farm holdings. Simple, low-input technology is employed, resulting in low-output labour productivity. A typical farm holds an average of 2.5 plots of 0.5 ha each.³ Apart from all these, Nigerian Agriculture had also been confronted with many challenges such as infrastructural facilities, man power/skill development, government regulatory policies, socio-cultural, economic and environmental factors. With these setbacks, it is certain that there is an underproduction of food products in the Country, hence, the need to step up production in order to measure up with the growing demand for food in the country. The Nigerian Government had in time past thrived to boost agriculture so as to divert the nation's economy from crude oil sales to agriculture, increase the nation's Gross Domestic Product as well as to ensure there is sufficiency of food in a fast growing populace. This vision had encouraged the pronouncement of different agricultural policies by different government in power since 1976 till date. The policy begins with the first civilian president who rolled out Operation Feed the Nation, (OFN) which was intended to be some kind of agricultural revolution in which everyone was asked to be involved to plant something, anything, anywhere. Several other agricultural policies were being initiated from subsequent government

but one can easily tell how effective those policies were considering the current food insecurity in the country. According to FAO,⁴ food insecurity exists when all people at all times do not have physical, social and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for a healthy life. Any system where food demand is not sufficiently marched by supply is no doubt one with looming food crisis.

Since 2014, the nation had been experiencing a recession in the economy, the aftermath of which resulted in a decline in the Gross Domestic Product (GDP) growth rate in the first and second quarter of 2016 at (-0.36%) and (-1.5%) and also an increase in the inflation rate from 9.3% to 17.6%.⁵ The Nigeria Government reacted to this development by launching another initiative of diversifying the country's economy from oil to agriculture. They gave agriculture a priority and allocated higher amount of money in the annual budget to boost the agricultural sector. Though there seems to be an improvement in food production but could not meet the immediate diet need and food security of the people, hence the need to broaden our horoscope of attaining the equilibrium between the populace demand for food and its production.

To achieve this, agricultural production needs to be enhanced with modern and effective technology such as Biotechnology. Biotechnology is defined as a set of tools that uses living organisms (or parts of organisms) to make or modify a product, improve plants, trees or animals, or develop microorganisms for specific uses [6]. However, as pertaining to food production, agricultural biotechnology is needed for crop and livestock improvement using biotechnology tools. The major aim of agricultural biotechnology is to improve crop characteristics such as yield, nutritional, disease/pest resistance or herbicide tolerance to a degree not often possible with traditional methods. In essence, the big picture of biotechnology is to provide food security to the people.

The conventional breeding techniques where farmers selected the best looking plants and seeds and saved them to plant for the next year needs to be overlooked and employ the modern biotechnology tools that are important for agricultural biotechnology. Among which are the tissue culture and micropropagation, Molecular breeding or marker assisted selection and Genetic engineered crops/foods.

- i. Tissue culture method is used to develop improved varieties in a short time. An Example is the anther culture which had been used to develop Rice varieties. Micropopagation is a tissue culture method developed for the production of disease-free, high quality planting material and for rapid production of many uniform plants. Through micropopagation, plants were found to establish more quickly, grow more vigorously and taller, have a shorter and more uniform production cycle, and produce higher yields than conventional propagules.⁶
- ii. Molecular breeding or marker assisted selection helps scientists to predict whether a plant will have the desired gene. This technique is being used in the efficient introgression of important genes into various crops including bacterial blight which is known to be resistance in rice; increased beta carotene content in crops such as cassava, rice and banana.⁶
- iii. Genetic engineering techniques can be used when all other techniques have been exhausted. Genetic Engineering is the introduction of a specific gene into the DNA of a plant to obtain a desired trait. Foods derived from genetic engineering are called Genetically Modified Foods (GMFs). GMFs had been found to have higher yields, herbicide tolerance, improved nutritional value, and insect and disease resistance, resulting in increased food production, food security, and improved livelihoods.^{6,7}

Conclusion

The incorporation of biotechnology in the Agricultural sector will not only solve the current food crisis in Nigeria but also help to boost the nations' economy.

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Conflict of interest

The authors have declared that no conflict of interest.

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