

Climate Change and Food Insecurity: Genetically Modified Food as a Panacea to the Hunger and Nutritional Issues in Nigeria

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Abstract—Food security exists when all people have physical and economic access to sufficient, safe and nutritious food. In recent times, Nigeria has experienced some climate change that has led to unprecedented event of flood, which affected all dimension of food security; food availability, food utilization and food system stability resulting to malnourishment to man and animals. Advancement in technology has proposed gradual introduction of Genetically modified foods (GMF), these are foods that have had foreign genes inserted into their genetic codes. GMF can contribute to food production increase and higher food availability, also impact on food quality and nutrient composition. Genetically modified crops can grow in any climatic conditions and do not use tons of pesticides. This study looks at how GMF can step in to avert food insecurity as a result of climate change.

Keywords— GMF, Impact, Malnourishment, Technology.

I. INTRODUCTION

The frequency of natural disasters has been increasing over the years, resulting in loss of life, damage to property and destruction of the environment. The number of people at risk has been growing each year and the majority is in developing countries with high poverty levels making them more vulnerable to disasters [5]. The unprecedented rate of flooding in recent years implicates increasing rainstorms due to the on-going global warming and climate change. The most common causes of floods are climate related, most notably rainfall. Prolonged rainfall events are the most common cause of flooding worldwide. These events are usually associated with several days, weeks or months of continuous rainfall. The extent of a flood has a direct relationship for the recovery times of crops, pastures and the social and economic dislocation impact to populations. Floods are the most costly and wide reaching of all natural hazards. Agriculture is one area of human endeavor that Africa has comparative advantage over other continents. For instance, about 65 percent of the world's arable land is found in Africa. The availability of this natural asset implies that it can be leveraged upon to ensure food security as well as save millions of people on the continent from hunger and poverty. Around 900 million people are undernourished, meaning that they are undersupplied with

calories; many more suffer from specific nutritional deficiencies, often related to insufficient intake of micronutrients. [4].

Nigeria faces huge food security challenges, about 70 percent of the population live on less than N 100 (US\$ 0.70) per day, suffering hunger and poverty, with between 60 and 70% of the population productively engaged in farming. Nigeria has about 79 million hectares of arable land, of which 32 million hectares are cultivated. Both crop and livestock production remains below potentials. Inadequate access to and low uptake of high quality seeds, low fertilizer use and inefficient production systems lead to this shortfall. In many cities in Nigeria there is lack/inadequate infrastructural provisions to curb flooding. Urban areas in the Nigeria are particularly vulnerable to flooding due to inadequate capacity of drainage structures; changes to ecosystem through the replacement of natural and absorptive soil cover with concrete; and deforestation of hillsides, which has the effect of increasing the quantity and rate of runoff, and through soil erosion and the silting up of drainage channels. For instance, Nigeria at some point was a leading producer of cocoa, banana, cassava, and second largest producer of tomatoes amongst other crops but has declined to importing virtually all crops. However, the use of Genetically Modified crops can fast-track the nation's quest to regain its lost glory in the area of production out-put, besides, enable small holder farmers to transit from subsistence to commercial agriculture. The technology came about as a means of combating the problem of food shortage and hunger in the world.

II. WHAT ARE GENETICALLY MODIFIED CROPS?

Genetically modified crops have had foreign genes (genes from other plants or animals) inserted into their genetic codes. The term genetically modified foods is most commonly used to crop plants created for human or animal consumption using the latest molecular biology techniques. These plants are modified in the laboratory to enhance desired traits such as increased resistance to herbicides or improved nutritional content. The enhancement of desired traits can be undertaken through traditional breeding but conventional plant breeding methods are time consuming and are not effective always. Genetic engineering can be done with plants, animals, or microorganisms; it is used to create plants to the desired traits very rapidly and with accuracy. For example, plant geneticists

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can isolate a gene responsible for draught tolerance and insert that gene in to a different plant. Thus the new genetically modified plant gains draught tolerance. Not only genes can be transferred from one plant to another, but genes from non-plant organism also can be used. Though this kind of genetic modification is used both in plants and animals, it is found more commonly in the former than in the later.

III. ADVANTAGES OF GENETICALLY MODIFIED FOODS

Genetically modified foods have more nutrients and contain more vitamins and minerals than the traditionally cultivated food. It is also believed that the genetically modified food has a better taste. People like genetically modified foods because they do not get rotten quickly than the traditional foods. Genetically modified foods grow faster than the foods that are grown in traditional manner for which the productivity is more. As usual normal crops grow only in the season and climatic condition favorable for it but genetically modified foods can be cultivated in unfavorable climatic condition. The most advantage of this genetically modified food is they help in controlling many diseases. There are some foods that cause allergy when consumed. By modifying DNA system of these foods, the properties that cause allergy are eliminated successfully. Modern day's farmers prefer to cultivate genetically modified food because they get more crops, can grow the crops in any climatic conditions and do not use tons of pesticides annually as consumers do not wish to eat food that has been treated with pesticides due to health hazards. These crops do not rot quickly for which the farmers get more profit. Foods can be improved by making the process of producing them easier for the farmers or growers.

Genetic modified crops are more resistant to pests and diseases, reducing losses and lessening the dependence on pesticides. For example, a gene that gives resistance to a fungal infection in a wild plant can be inserted into a food plant that lacks this protection. The crop is then less susceptible to fungal infection. There are many viruses and bacteria which plants can get diseases from. Scientists or the plant biologists are working to create plants which can resist these diseases. Unexpected cold can destroy sensitive seedlings. An anti freeze gene induced into plants can help the plant to tolerate unexpected cold. By this the production of the crop will not be destroyed. [6]. Generally, GMFs are cheaper to produce than their natural counterparts. This is because the process of genetic modification has minimized some of the cost especially on pest control on the field and during storage. Since GMFs are produced by farmers at cheaper rates, the relief will be passed on to the consumers who will purchase the produce at cheaper rates. Another benefit of genetically modified plants is the reduction in the price of certain medicines that are produced from them.

No doubt, one of the major objectives Nigerian must pursue in this democratic era is food security. A country that cannot formulate and effectively implement agricultural and food policies may find it difficult to use the citizens as catalyst for sustainable democracy. More so, the very survival of the state is linked to the ability of its economy to meet the material

demands of both people and government and this is why the Nigerian government has embraced the idea of using biotechnology to boost food production as a pre-condition for food security. It established the National Biotechnology Development Agency at Abuja (Federal Capital Territory) setting aside the sum of 26 million naira (about \$185,000) to be Invested in the project, and specifically mandating the Institute of Agriculture Research, Ahmadu Bello University, Zaria, to apply biotechnology for the Improvement of farming systems for various crops such as Sorghum, maize, Cowpea, cotton and sunflower [2]. [7]. However, the use of Genetically Modified crops can fast-track the nation's quest to regain its lost glory in the area of production out-put, besides, enable small holder farmers to transit from subsistence to commercial agriculture. Furthermore, Nigerian agricultural scientists have been very enthusiastic in advancing the frontier of knowledge in biotechnology. They have been making efforts to assure the people that genetically modified foods do not pose any higher risk to consumers than conventionally cultivated crops, and have been calling on the government to allocate more research funds to enhance the application of biotechnology in agriculture to optimize yield potential. [8]. [1].

IV. RECOMMENDATIONS

- Public policy makers must as a matter of urgency see food as component of welfarism and as such develop sufficient political will to achieve (i) increased Food production; (ii) evolve food policy and (iii) eventually attain food security for all.
- Nigeria needs a programme devoted to a new generation of farmers that trains young educated people interested in agricultural entrepreneurship and provides financial and technological support. They should be enabled to use improved technologies and modern management approaches that help ensure farm profitability and sustainable resource use.
- Bio-safety regulations should be introduced into farming as the planting of herbicides-resistant crops might encourage farmers to use weed killers more frequently. As a result the excess use could be carried away by rain fall to pollute ponds, rivers and other water ways. These chemicals may poison fish, wild animals, plants and even drinking water also.

Finally, there are still unwarranted public fears to contend with in the safety of genetically modified foods, stemming from scare-stories, reinforced by superstition and ignorance, of the danger in the consumption of genetically modified foods, the mass media most especially, electronic media (radio in particular) have a role to play in educating rural farmers in their local language and dialects on the associated problems vis-à-vis abuse of agrochemicals. The incontrovertible fact is that without the help of agricultural biotechnology, success in food security will continue to elude Nigeria [3]. Moreover, a hungry and unenlightened nation is a weak one while any region subject to famine or starvation is an insecure one no matter how vast and populated it is. GMF has been presented as the ultimate weapon against hunger in Africa, and other developing countries.

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