

Biotechnology: A mitigating measure against food crises in Nigeria

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ABSTRACT

It is a known fact that the right to adequate food and nutrition, to be free from hunger or the right to feed oneself is a fundamental human right firmly established in international law, it is also undoubted that there is food crisis in Nigeria, therefore in an attempt to overcome the challenges of satisfying the food needs of the citizenry, successive governments have introduced a number of programmes and policies such as green revolution, back to the land, agricultural development projects and so on, to alleviate food insecurity in the country. It is lamentable however, that as laudable as these programmes were, the nation had continued to depend on food importation to feed her ever teeming population. Biotechnology which in general terms refers to the application of a wide range of scientific techniques for the modification and improvement of plants and animals and micro-organisms is no doubt a mitigating measure against food crises in Nigeria. It is sustainable, cost effective and convenient because it can be used to reduce the need for herbicides, insecticides and fertilizers. The recent advent of genetic engineering and recombinant DNA techniques have really boosted the biotechnological advancements exploited primarily for industrial and public needs. However, the government is expected to come up with clear cut regulatory guidelines on biotechnology. This paper therefore, highlights the cause of food crises in Nigeria and the essence of biotechnology as a mitigating measure of food crises. It is envisaged that appropriate adoption of the various opportunities which biotechnology offers would ensure food security and improve standard of living of the citizenry.

Keywords: Biotechnology, Food crises and Nigeria.

INTRODUCTION

Background to the study and problem statement

Despite the abundance of human and natural resources in Nigeria, it is lamentable that Nigeria still remains a developing nation. Nigeria is richly blessed and naturally endowed with large expanse of land area and abundance of natural and human resources. Comparatively, the Nigeria environment is also blessed with good climate, which supports the growth of vegetations and rearing of animals (Borokini, 2003). It is however, surprising that the Nigerian agriculture is still characterized by low yield per hectare, low production technology, outdated production techniques, low level of innovation adoption, low capital formation among the small scale farmers and smallness of farm size (Olajide, 1990). Nigeria has witnessed progressive increase in importation of food into the country in order to meet shortfalls in domestic food supply. See table 1 below:

Year	Import (price in billion naira)
2003	13.0
2004	13.8
2005	51.7
2006	44.8
2007	52.8
2008	56.9

Source: Natural Planning Commission, 2008.

Several strategies and policies have been embarked upon by the government at various levels and at various times toward the self sufficiency of the nation as far as food sufficiency is concerned. These programmes include the Green Revolution, Structural Adjustment Programme, Nigerian Economic Recovery Drive, the Agricultural Development Project and the Nigerian Agricultural Insurance Corporation and so on. These schemes and projects involved farm mechanization, large scale production of grains and tuber crops, but unfortunately these laudable objectives and programmes have turned to be a mere mirage, as the cost of living with respect to feeding is ever increasing (Fasina, 2000).

Since the beginning of this year, the outbreak of food crises has been a major headline news item; food prices have increased by over 65 percent. Everywhere the price of food has increased, retail price of food are up by 18 percent in China, 17 percent in Sri Lanka, 10 percent or more throughout Latin America and Russia. In Nigeria rice epitomizes the magnitude of these crises as its price has doubled since last year (Thompson, 2008).

Overcoming hunger in the developing countries like Nigeria is one of the most fundamental challenges confronting the global community at the dawn of the new millennium. The existence of widespread hunger in developing countries in spite of their high food production potential is inconsistent with the principle of sustainable development.

The objectives of this paper are to:

- (i) Highlight the meaning and what comprises biotechnology
- (ii) Examine causes of food crises in Nigeria and how biotechnology can be a mitigating measure to it.

Significance of the study

This paper will reveal the dangers inherent in neglecting our national agriculture policies. It will also bring to limelight the benefits of biotechnology to our agricultural production as a vital tool to eliminating hunger and malnutrition among Nigerians.

Literature review and conceptual framework

Biotechnology is the application of scientific and engineering principles to the processing of materials by biological agents to provide good services (Bull et al, 1982). It can also be defined as the application of biological organisms, systems or processes to manufacturing and service industry (H.M.S.O, 1980). It is application of wide range of scientific techniques to the modification and improvement of plants, animals and micro organisms (Uwaje, 2000). Biotechnology is a modern genetic technology that has cross-sectored impact on natural development. It has application in agriculture, food and beverages, health i.e. drugs and chemicals and so on. It is a tool that could be applied to bring solutions to human food security, health, diseases prevention and industrial development (Okunade, 2003). Many developing countries might reap benefits from genetically modified (G.M.) foods and crops that could significantly reduce malnutrition and help poor farmers working marginal lands. It is purported that without biotechnology, the yields and availability of food crops in developing countries, particularly at the sub-Saharan Africa would be heavily compromised, leading to inadequate supplies by the year 2025 (Dyson, 1999; Thompson, 2002).

The most spectacular discovery of biotechnology is deoxyribonucleic acid (D.N.A), the collection of encoded characteristics within the genetic material of a given organism. Different organisms can be similar in their basic structure and that it is relatively straightforward process to design and build new genes that never previously existed in nature. This process is called recombinant DNA technology, but to study the way in which the recombined genes will function, it is usually transferred to a living organism or to a cell growing in a dish. The organism to which the gene is transferred is called transgenic (Okunade, 2003).

MATERIALS AND METHODS

The review of the meanings of biotechnology by several authors was highlighted, as well as its benefits to crops and animals. Information relating to characteristics of Nigerian agriculture, the causes of food crises in Nigeria and the mitigating measures were obtained from journal publications, periodicals and bulletins from libraries.

Causes of food crises in Nigeria

The causes of food crises in Nigerians can be linked with inconsistency and inappropriate policies that have stifled the nation's great agricultural potentials. Poor implementations of policies and panicky measures, as well as fire brigade approach to issues are other factors. According to the Rice Farmers Association of Nigeria, Nigeria fell 800,000 tonnes short of its 5 million tones production target for year 2006, due to inconsistency in government policies. Of the projected 4.64 million tones annual national demand for rice, current local national production stands at a meager 525, 000 metric tones requiring worth US\$267 million (Thompson, 2008).

To make things worse import tariffs have put fertilizers out of reach of many farmers leading to low yields and hard manual labour. Ban on importation of various staple foods including wheat, rice, maize and vegetable oil is another problem because local production cannot meet up with local demands. Efforts in the past to get credit through to the farmers have achieved little as most of the funds were either mismanaged or ended up in wrong hands. Most of the poor farmers lack collateral securities to secure loans and infrastructural facilities for storage, processing and preservation are beyond their reach. It is ironical that as far back as 1986 the nation has got an excellent agricultural policy, which successive governments have woefully failed to implement. According to the book published by the Federal Ministry of Agriculture, Water Resources and Rural Development on Agricultural Policy of Nigeria in 1986 the Nigeria general agricultural policy objectives include:

- (i) Self-sufficiency in the supply of basic food commodities.
- (ii) Increases in the production of agricultural raw materials with a view to attaining self-sufficiency.
- (iii) Increases in the production and processing of exports crops.
- (iv) Improvement in the quality of rural life.
- (v) Modernization of agricultural production, processing, storage and distribution.
- (vi) Creation of increased rural employment opportunities, and
- (vii) Protection of agricultural land resources from ecological degradation, which may arise due to natural, or man made hazards.

An objective of food and nutrition policy is no increase nutrient intake in Nigeria from the present 1,964 kilo calories and 64 grammes crude protein per capita per day (F.M.A., 1986).

RESULTS AND DISCUSSION

The General Policy Instruments are:

- (i) Production of crops, especially those which do not require much of foreign capital inputs (e.g. maize, millet guinea corn, yam, cassava, fruits and vegetable) will be accelerated in the various ecological zones which are moist suitable for their production.
- (ii) Sources of animal protein which have short gestation cycle and high reproductive ratio such as poultry, pigs, sheep and goat, rabbits and fishes will receive greater priority while the productive efficiency of the natural cattle population will be enhanced.
- (iii) Stability of food supply will be ensured through the expansion of storage facilities at the farm level; as well as in urban centers, Government's food strategic reserve programme will also be pursued vigorously. Irrigation facilities will also be developed to minimize the adverse effect of drought on food supply.
- (iv) To conserve food and improve its nutrition quality, government will promote investment in food processing, packaging and preservation through appropriate incentives to the private sector.
- (v) Access to food will be facilitated through improved employment opportunities in both rural and urban centers. This will be accomplished through labour-intensive projects such as rural road construction, development of water resources, rural agro industries and urban service industries.
- (vi) Other measures to maintain reasonably good prices as the administration of price subsidies on production inputs and on the products will be explored.

It is quite unfortunate that the successive governments in Nigeria have abandoned and forgotten such a laudable national agricultural policy as well as the policy instruments.

Benefits of biotechnology to crops and animals

- (i) It provides built in protection against diseases, insects and weeds, creates opportunities for increasing crop yields and boosting the nutritional value of foods.
- (ii) Quality traits in crops can be improved to taste such as protein, sugar or amino acid content or even decrease levels of unwanted traits such as bitterness, weak stem, tallness etc.
- (iii) It is sustainable, cost effective and convenient because it can be used to reduce the need for herbicides, insecticides and fertilizers.
- (iv) Many different transgenic organisms have been produced over the past 15 years e.g. rabbits, sheep, goats, cattle and fishes. Embryo sexing and manipulation are also areas of significant implications of animal breeding.
- (v) Biotechnology has also produced some completely novel foods commonly called single cell proteins and has already had a market impact in the sweeteners industry. The availability of the enzymes glucose isomerase, invertase and amylase have made the production of high fructose corn sweeteners (H.F.C.S) very profitable (Threshan, 1991). With the global population expected to rise to nine billion within the next fifty years, feeding the world has never seemed such a daunting task. But the genetically modified technology is giving hope to developing countries like Nigeria. Scientists have found no evidence that G.M. foods affect human health, but the wave of negative publicity about the technology has reinforced the perception that G.M. foods could be harmful (Oke, 2005).

CONCLUSION

A country that cannot feed her teeming population cannot claim to be truly independent. Biotechnology is a vital tool that must be applied to bring solutions to the human food security, health, disease prevention and industrial development problems of our nation. There is clear potential for the application of biotechnology and genetic modification as tools to combat food crises and insecurity and improve the standard of living of our teeming population.

The new discipline of biotechnology will not just affect individuals; it will have a great positive impact on our society. The application of food biotechnology and genetic engineering will have a positive affect on the food production and processing industries and bring the necessary impetus for food security and economic development in Nigeria.

Recommendations

- (i) It is high time the government comes up with a regulatory guideline on biotechnology.
- (ii) Food production should be a continuous effort and not an ad hoc exercise. Rather than giving loans to farmers in times of emergencies, such loans should be made available at all times.
- (iii) Technology capacity building is a prerequisite for global competitiveness. Biotechnology research and development initiative capable of establishing a critical concern of our national food policy makers.

REFERENCES

- [1] Borokini, E.A. (2003): "Pathway to Economic Recovery and Development in Nigeria." Book of Reading, Rufus Giwa Polytechnic, Owo. **2003**, 84-92.
- [2] Bull, AT, Holt G. & Lilly M.D. (1982): "Biotechnology, International Trends and Perspectives" Organization for Economic Cooperation and Development, **1982**. 3: 89-96
- [3] Dyson, T. "World Food Trends and Prospects for 2025", Proc. Nall Acad. Sci. **1999**. 96:5929-5936.
- [4] Fasina, A. "Boosting Foreign Exchange through Agriculture", daily Champion, March 24, **2000**. 30.
- [5] F.M.A. "Agricultural Policy of Nigeria, Lagos NCA (2/86) **1986**. 2: 10 -12
- [6] H.M.S.O. "Biotechnology" Report of a joint Working Party Advisory Council for Applied Research and Development, Advisory Board. The Royal Society **1980**. 2: 18-22.
- [7] Oke, B. "G.M. foods as panacea for Hunger in Developing Nations" The Punch, April 14 **2005**: 43.
- [8] Okunade, S.O. "Characteristics, Problems and Significance of Farmers Nigeria Small Scale Farmers" CARD, Ibadan **2003** 11-12.
- [9] Olajide, S.O. "Characteristics problems and significance of farmers Nigeria small scale farmers" CARD, Ibadan **1990**, 11-12

[10] Thompson J. A. "Food Crises, Restrictive Trade Staved the Poor" The Nation June 2, **2008** . 15.

[11] Threshan, K. "From Biology to Biotechnology" Biotechnology, Pp 84 UN **2001**) United Human Development report, **2001**.

[12] Uwaje, C. "Impact of ICT on Agricultural production" The Guardian, April 18, **2000**. 41.