

Genetically Modified Crops for Sustainable Food Security in Nigeria

Audu, K. Isiaka

Department Of Biology,
F.C.E. Okene, Kogi State
Isiakaaudu27@yahoo.com

Abstract

The Role Of Genetically Modified (Gm) Crops For Food Security Is The Subject Of Public Controversy. Gm Crops Could Contribute To Food Production Increases And High Food Availability. There May Also Be Impacts On Food Quality And Nutrient Composition. It May Influence Famers' Income And Thus Their Economic Access To Food. This Paper Reviews The Role Of Genetically Modified (Gm) Crops On National Food Security. Advantages, Prospects And Challenges Of Gm Crops Are Discussed. Among The Recommendations Is The Need For Government To Support The Development Of Biotechnology And Gm Foods To Check Food Insecurity In Nigeria.

Introduction

Food Security Exists When All People Have Physical And Economic Access To Sufficient, Safe, And Nutritious Food. Unfortunately, Food Security Does Not Exist For A Significant Proportion Of The World Population. Around 900 Million People Are Undernourished, Meaning That They Are All Undersupplied With Calories (Fao, 2012). Many More Suffer From Specific Nutritional Deficiencies, Often Related To Insufficient Intake Of Micronutrients. Eradicating Hunger Is A Central Part Of The United Nations' Millennium Development Goals (United Nations, 2012). But How To Achieve This Goal Is Debated Controversially. Genetically Modified (Gm) Crops Are Sometimes Mentioned In This Connection. Some See The Development And Use Of Gm Crops As Key To Reduce Hunger While Other Consider This Technology As A Further Risk To Food Security (Shiva, Barker Lockhart, 2011).

There Are Three Possible Pathways How Gm Corps Could Impact Food Security. First Gm Crops Could Contribute To Food Production Increases And Thus Improved The Availability Of Food At Global And Local Levels. Second, Gm Crops Could Affect Food Safety And Food Quality. Third, Gm Crops Could Influence The Economic And Social Situation Of Farmers, Thus Improving Or Worsening Their Economic Access To Food. This Latter Aspect According To World Bank (2007) Is Of Particular Importance Given That An Estimated 5% Of All Undernourished People Worldwide Are Small Scale Farmers In Developing Countries.

In Regard To The First Pathway, Gm Technologies Could Make Food Crops Higher Yielding And More Robust To Biotic And Abiotic Stresses (Fedorff, Et Al 2010). This Could Stabilize And Increase Food Supplies, Which Is Important Against The Background Of Increasing Food Demand, Climate Change And Land Water Scarcity.

Concerning The Second Pathway, Crops With New Traits Can Be Associated With Food Safety Risks, Which Have To Be Assessed And Managed Case By Case. But Such Risks Are Not Specific To Gm Crops. According To European Commission (2010), Long Term Research Confirms That Gm Technology Is Not Per Se More Risky Than Conventional Plant Breeding Technologies.

The Third Pathway Relates To Gm Crop Use By Smallholder Farmers In Developing Countries. Half Of The Global Gm Crop Area Is Located In Developing Countries, But Much Of This Referrers To Large Farms In Counties Of South America. One Notable Exception Is *Bacillus Thuringiensis* (Bt) Cotton, Which Is Grown By Around 15 Million Smallholders In India, China, Pakistan, And A Few Other Developing Counties (James, 2012). Bt Cotton Provides Resistance To Important Insect Pests, Especially Cotton Bollworms.

Genetically Modified Foods

Genetically Modified Foods Also Known As Biotech Foods That Are Developed From Genetically Modified Organisms. Gm Crops Are The Crops Whose Dna Has Been Modified By Using Genetic Engineering Techniques, With The Aim To Introduce A New Trait To The Plant Which Does Not Occur Naturally In The Species. Specific Changes According To Sheetal (2014) Are Made In The Dna Of These Crops By Genetic Engineering Techniques That Encourage Extra Nutrients To Be Produced, Faster Growth And Ability To Resist Diseases And Other Purposes. Almost In Every Area In The Food Production Market Is Using Genetic Modification To Produce Foods That Taste Better, Grow Faster, And Resist The Amount Of Nutrients Found In The World.

Examples of Gm Foods Being Used In the World

Corn Has Got The Gene Is Insect Resistance And Due To This, The Farmers Do Not Have To Spray Pesticides That Are Harmful To The Soil As Well As The Crop.

Soyabean On The Other Hand Which Is Very Much Used In Every Altered Form Is Also Being Produced Genetically, So That The Farmers Do Not Have To Spray Insecticides Or Pesticides. They Have Been Genetically Modified To Offer Improved Oil Profiles For Processing Or For Healthier Edible Oils.

Tomatoes Have Been Modified In Order To Increase Their Shelf Life; It Was Genetically Modified To Prevent It From Rotting.

Canola Oil Has Been Genetically Altered For Resistance Against Pesticides.

Table 1:- List of Some of the Genetically Modified Food

Genetically Modified Foods	Description	
Rapeseed	Rapeseed Has Been Made To Be More Resistant To Pesticides	
Cotton	Because The Oil Can Be Consumed, Cotton Is Considered As Food. It Has Been Altered To Produce A Chemical That Kills Many Pests.	
Canola	Canola Oil Was Altered To Be Resistant To Pesticides And May Be In Oil Products, Baked Goods And Snacks	
Flax	Altered To Resist Herbicides, Flax Is In Many Products That Contain Flax Oil And Seed.	
Papaya	Papaya Have Been Modified To Be More Virus Resistant.	
Cotton Seed Oil	Cotton Seed Oil Can Be In Vegetable Oils, Fried Food, And Oil Products That Can Be Consumed.	W(Ücltxlr t
μ06tobacco	A Tobacco Has Been Altered That Contains Very Little Nicotine.	

Source:- Sheetal, (2014).

Advantages of Genetically Modified Food

- There Will Be No Need To Use Pesticides As The Crop Will Be Pest Resistant.
- More Environment Friendly As The Crops Will Be Insect Resistant, So There Is No Use Of Insecticides.
- High Crop Yield.
- More Nutrition Availability (Golden Rice).
- Rigorous Testing Of All Gm Foods and Products. Thus If There Is A Slight Chance Of Health Hazards, Then It Will Not Be Allowed To Enter The Market.
- Higher Resistance To Bacterial And Fungal Diseases
- Drought Tolerance
- Gm Foods Can Last For A Longer Period Of Time, And Thus Improves The Shelf Life Of The Crop.

Prospects and Challenges of Gmos

A Common Question We Face Frequently Is That, What Are The Reasons Behind Global Food Crisis? It May Be Due To Different Reasons Like Demand For Bio-Fuel, Population Growth, Global Climatic Changes, Speculation Of Food Products, Low Agricultural Productivity And Natural Calamities. Reality Shows That The Global Demand For Five Major Crops Like Rice Wheat, Soyabean, Cotton, And Corn Is Increasing Day By Day. From That Aspect Farmer Must Have To Be More Productive And More Resource Efficient To Meet The Global Food Demand And In That Case Emphasis On Breeding, Improvements On Agronomic Practices And Biotechnology Can Be The Strategies That Can Maximize The Yield Grains Or Production. The Potentiality Of Biotechnology As Well As Gm Crops May Be Diversed, For Instances, Gm Crops May Improve The Economic Of Production, Significantly Reduce The Pollutions By Destroying Accumulated Pollutants And May Protect Environment, And Can Maintain The Sustainable Production Of Existing And New Products (Gavilescu And Chisti, 2005).

A Quite Number Of Potentialities Of Commercialized Gm Crops Are Observed In The Last Few Years In Different Regions Around The World. Brookes And Barfoot (2009) Examine The Impact Of Four Gm Crops Such As Soyabean, Corn, Cotton, And Canola On The Production Base And Show That Gm Crops Have Made Significant Contribution In Increasing The Level Of Global Production In These Four Crops, For Example, 62 Million Tones And 68 Million Tones More Respectively To Global Production Of Corn And Soyabean. It Also Examines The Impact Of These Four Crops On Global Farm Income And Indirect Farm-Level Income And Shows That At The Farm Level There Are About Us \$10.1 Billion Net Economic Benefit In 2007 And Us\$44.1 Billion For The 12 – Year Period In Nominal Terms. It Also Shows The Positive Indirect Benefit In Farm Level Income In Relation To The Adoption Of Gm Crop Technology. Once More Commercialized Gm Crops Have Reduced The Impact Of Agriculture On Bio-Diversity With The Help Of Enhancing The Practice Of Conservation Tillage, Reducing The Use Of Insecticides And Using More Environment Friendly Herbicides, And Increasing Yields, By Reducing The Pressure On Land (Carpenter, 2011).

Control Of Need Has Been A Challenge Throughout The History Of Agriculture. This Is Because Weeds Represent A Significant Threat To Agricultural Productivity And Cause A Serious Loss In Production Even With Control Efforts. Technological Developments Have Increased The Available Tools For Weed Control. Biotechnology Has Produced Herbicides Tolerant Crops Which Have Enabled The Farmers Not To Use Wide Ranges Of Herbicides In The Crop Field For A Greater Control Of Weeds (Mozumdar, Islam, And Saha, 2012). Many Producers Have Adopted These Crops Mainly Due To Several Key Benefits To Their Weed Control System.

The Production Of Insect Resistant Bt Cotton Has Remarkably Reduced The Insecticide Use (Qaim And De Janvry, 2005). In Addition, Yield May Increase 3% In Case Of Bt Cotton And 17% For Herbicide Tolerant Varieties. Mozumdar, Islam And Saha (2012) Opined That This Is One Of The Most Important Contributions Of Gm Crop Technology Due To Increased Yields With Less Amount Of Cultivated Land Along With Improved Conservation Of Soil And Bio-Diversity.S(•

Inspite Of The Above Mentioned Potentials, The Uses Of Gm Crop Technology Have Faced Some Challenges. There May Be A Few Ecological And Health Related Problems Associates With Gm Crop Technology As Researchers Like Altieri (2001) And Friends Of The Earth (2008) Argue That Environmental Problem, Health Risks And The Adverse Social Implications Are The Fear Of Gm Crop Technology.

Nigeria and Biotechnology

The Growing Spate Of Insecurity In Nigeria Poses A Threat To Food Security. A Professor And Member Of National Academy Of Sciences (Nas) Attributed The Violence In Some Parts Of The Nation Partly To Poor Nutrition Citing Scientific Report That Says Poor Nutrition May Lead To Low Intelligent Quotient (Iq) And Later Anti-Social Behaviour. The Nigeria Government Should Embrace The Technology To Boost Food Production In Spite Of The Safety Concern Being Raised.

Nigeria According To Ojo And Adebayo (2012), Is One Of The Food-Deficit Counties In Sub-Saharan Africa Although It Is Arguably Better In Terms Of Production Than The Others. It Has Also Not Suffered Any Major Catastrophe That Could Precipitate Scourges Of Famine, Mass Hunger And Therefore Food Crisis. Nevertheless, Nigeria Government Has Embraced The Idea Of Using Biotechnology To Boost Food Production As A Pre-Condition For Food Security. It Established The National Biocology Development Agency At Abuja Setting Aside A Huge Sum Of Money 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 (Vanguard, February 16, 2005). The Good Thing Is That Nigeria 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 Crop. The Incontrovertible Fact Is That Without The Help Of Biotechnology, Success In Food Security Will Continue To Elude Nigeria (Davies, 2009).

Conclusion

After Seeing The Advantages Of Using Gm Foods, It Is Assured That Securing Food Security In The Nation Requires Encouragement Of Gm Foods And Biotechnology. Gm Foods Play A Major Role In Enhancing The Productivity Of The Crop By Providing Resistance To Crop And Reducing Chemical Inputs. Gm Crops Can Contribute To Increased Rural Farm Income In Some Developing Countries. Gm Crops With Higher Micronutrient Contents Can Help In Reducing The Nutrient Deficiencies Among The Hard-Core Poor. In Spite Of These Potentials, Public Attitudes Regarding The Use Of Gm Crops Are Controversial And New Risks And Related To Bio-Safety, Food Safety, And Labeling Regulations. More Scientific Investigations Are Necessary To Achieve The Significant Trust From The General People And Thus Can Ensure The True Facts On This Technology.

Recommendation

Government Support Is Necessary For The Development Of Biocenology As Well As Gm Crop Technology In Nigeria. The High Cost Of Food Items Currently Being Experienced In This Country Is Unacceptable. Having More Gm Foods in the Market Will Bring Down the Cost of Food Items. Finally More Efforts Should Be Geared Towards Educating The Populace That Gm Foods Are As Safe As The Conventional Ones In Order To Encourage Massive Production.

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