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THE EFFECT OF GENETICALLY MODIFIED CROPS ON POULTRY PRODUCTION (A REVIEW)

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ABSTRACT
Genetically modified organisms -- plants and animals whose genes have been altered by scientists – aren't just thought over, they are fought over. Scientists create today's genetic changes, or modifications. They alter the DNA of seeds with radiation or chemicals, and then choose which resulting plants to breed. Or they can snip a gene (or several) from a plant, virus, or bacteria and plug it into another to transfer a desired feature. GMOs often make news related to the environment, world hunger, the economy, politics, and yes, even health. GM crops are promising to mitigate current and future problems in commercial agriculture with proven case in the development and approval of the Pod Borer Resistant Cowpea (popularly called Beans) in Nigeria. With the rise in production of broiler for human consumption it is essential to study the necessary attribute of feeding broilers with genetically modified crop. The main objective of this paper is to provide a comprehensive overview of genetically modified crop, its benefit and challenges.
Keywords: Genetically modified Organism, poultry, health.

1. INTRODUCTION

Several critical societal issues, including climate change, water use, biodiversity, food security, early childhood nutrition and food are all associated with Agriculture. The introduction of GMOs in Nigeria started in 2001 with the establishment of the National Biotechnology Development Agency (NBDA). Earlier; Nigeria had signed and ratified an international treaty known as the Cartagena Protocol on Biosafety in 2000 and 2003. The IITA and USAID-sponsored Nigeria Agriculture Biotechnology Project (NABP) launched in November 2003 to support the expansion of GM food in Africa (premium,2019). Improvements in animal productivity (growth rates, milk production, etc.) are critical to increasing the efficiency of animal production. Genetic modification (GM) is the area of biotechnology which concerns itself with the manipulation of the genetic material in living organisms, enabling them to perform specific functions. The pro- GMOs in Nigeria argued that its introduction will boost food production, promote sustainable agriculture and help avert the climatic problems associated with the global warming (Ajayi, 2017). The use of genetically modified organisms (GMOs) to boost agricultural productivity and reduce food insecurity in Nigeria has generated a lot of debate. The level of poverty and illiteracy of the majority of Nigerian farmers, it is not surprising that the emergence of genetic engineering and its application to farming techniques was viewed with suspicion in many places. However, given the concerns on the use of GMOs products, thorough research on safe application of GMOs is required.

2.0 LITERATURE REVIEW

2.1 Overview of Genetically Modified Organism

The developments leading to modern genetic modification took place in 1946 where scientists' first discovered that genetic material was transferable between different species. This was followed by DNA double helical structure discovery and conception of the central dogma – the transcription of DNA to RNA and subsequent translation into proteins – by Watson and Crick in 1954. In agriculture, the first GM plants – antibiotic resistant tobacco and petunia – were successfully created in 1983 by three independent research groups. In 1990, China became the first country to commercialize GM tobacco for virus resistance. In 1994, the Flavr Savr tomato (Calgene, USA) became the first ever Food and Drug Administration (FDA) approved GM plant for human consumption (Ruchir, 2017). This tomato was genetically modified by antisense technology to interfere with polygalacturonase enzyme production, consequently causing delayed ripening and resistance to rot. In Nigeria, the institute for agricultural Research, Ahmadu Bello University, Zaria released the first genetically modified

crop (Pod Borer resistant cowpea). The introduction of the GM cowpea will address the national cowpea demand deficit of about 500,000 tonnes and also improve the national productivity average of 350kg/hectare.

GM crops have been recorded to reduce environmental and ecological impacts, leading to increases in species diversity. It is therefore unsurprising that GM crops have been commended by agricultural scientists, growers and most environmentalists worldwide (Meyer *et al*.,2006). Nevertheless, advancements in GM crops have raised significant questions of their safety and efficacy. The GM seed industry has been plagued with problems related to human health and insect resistance which have seriously undermined their beneficial effects. Current agricultural practices alone cannot sustain the world population and eradicate malnutrition and hunger on a global scale in the future.

2.2 Imperfections in Genetically Modified Crop Technology

Despite the above controversies being proven unfounded, GM crops are an "imperfect technology" with potential major health risks of toxicity, allergenicity and genetic hazards associated to them. These could be caused by inserted gene products and their potential pleiotropic effects, the GMO's natural gene disruption or a combination of both factors. The most notable example of this is Star link maize (Carter *et al,* 2007).

2.3 Challenges of GM crops

GM crops are crops with altered DNA or rather mixing of genes (removal of gene from a desired plant and inserting into another). By mixing genes from totally unrelated species, genetic engineering generates a host of unpredictable side effects. Moreover, irrespective of the type of genes that are inserted, the very process of creating a GM plant can result in massive collateral damage that produces new toxins, allergens, carcinogens, and nutritional deficiencies (Zhang *et al*, 2016). The factors stated above has direct effect on the food safety and food security, cases have been reported where GM crops approved for animal feed and industrial use were detected at low levels in the products intended for human consumption (Bawa *et al*,2013). Anti-GM activists also argued that, due to monopoly of power, GM crops would result in input costs and decrease diversity of seed choice, thereby forcing out poorer farmers from farming and allowing a form of corporate-capitalist to dominate agriculture. These risks would be compounded by potential threats to biodiversity from the spread of GM genetic materials and consumers could be at risk from potentially unsafe foods (Ajayi, 2017).

2.4 Ethical concern about GM foods

A key ethical concern about GM foods is their potential to trigger allergies or disease in humans. Given that a gene could be extracted from an allergenic organism and placed into another one that typically does not cause allergies, a person may unknowingly be exposed to an allegen.in turn, this could lead to an allergic reaction. There is also the fear that new allergies could occur from the mixing of genes from two organisms. Disease is a major health worry with regards to GM foods. Given that some of the crops modified are done with DNA from bacteria and virus, there is concern that a new disease may occur in humans who consume the GM foods.

With some GM crops having antibiotic-resistant marker genes, there is also the worry that these genes could be passed onto microbes that cause disease and health problems in human. Damage to the environment is another ethical fear with regards to GM crops. Unfortunately, the technology is still new enough that there is much we do not know about the effect of GM crop production on the environment. Long-term studies take decade to complete and most studies of GM crop production involve short-term effects of the technology.
An animal could also consume the GM crop itself, which means that if the crop has been engineered to produce a pesticide, the animal will be in health danger.

3.0 FINDINGS

3.1 Increasing Population Growth

The Food and Agricultural Organization projects the global population to grow to approximately 9.7 billion by 2050 – a near 50% increase from 2013 – and further to an estimated 11bn by 2100 (FAO,2017). Current agricultural practices alone cannot sustain the world population and eradicate malnutrition and hunger on a global scale in the future. Indeed, the FAO also estimates that despite a significant reduction in global hunger, 653million people will still be undernourished in 2030. Further studies shows that the four major crops cultivated globally (soybean, maize, wheat and rice) are increasing at 1.0%, 0.9%, 1.6% and 1.3% per annum respectively– approximately 42%, 38%, 67% and 55% lower than the required growth rate (2.4%/annum) to sustain the global population in 2050(Ray *et.,al* 2013).

3.2 Relevance of GM crops to developing countries

Most commonly, the improvement of plants aims to increase the yield or quality of crops. Yield is influenced by many factors including pests, diseases, soil conditions, or abiotic stresses (Ruchir, 2017) which stem from unfavorable climatic conditions. Significant improvements can often be achieved by means of irrigation, the application of insecticides or pesticides and the addition of fertilizer. However, most of these interventions are expensive, particularly for small-scale farmers in developing countries. The use of genetic modification provides plant breeders with new opportunities to produce crops that are protected from environmental stresses and attacks from pathogens and insects.

3.3 Solution Provided by GM Crops

Genetically modified (GM) crops have been largely successful in proffering solutions to the major challenges facing agriculture and at the same time providing numerous benefits to growers worldwide. GM crops have been widely adopted by growers because they benefit from the introduced traits that help protect plants from insect damage, to maximize yield on minimal acreage (Ray et al, 2013). The global yearly net income increased by 34.3% in 2010– 2012(Brookes *et.al* 2014). Furthermore, while increasing global yield by 22%, GM crops reduce the use of pesticides and fertilizers because of pest-resistance quality in their trans- genetic make-up (Klumper *et.al* 2014). GM allows crops to be bred by selectively inserting one or more genes into a plant. So, plants that are resistant to pests and diseases can be reproduced, hence the reduction of the amount of pesticide used on crops. Therefore, farmers do not need to spray pesticides that are harmful to the crops as well as humans and animals. Thus, this reduction in the use of insecticides and pesticides will help in saving fossil fuels and lowering greenhouse gases emission, thereby fighting against unhealthy climate change(Adenle,2011) The introduction of GM foods to Nigerian farming system can therefore be a good start to solving malnutrition and also tackling the issue of global earth warming.

4.0 CONCLUSION/RECOMMENDATION

4.1 Conclusion

In spite of the fact that every major global regulatory group has approved the safety of the crops they have reviewed, there continues to be some concerns. Consumers often deal with confusing information that does not explain the benefits of biotechnology; therefore, GM seed providers and agricultural scientists need to be able to provide accurate information to make science-based decisions and to understand their benefits to reducing the impact of agriculture on use of land and other resources. In spite of the concerns and health risks associated with the adoption of GM foods in Nigeria, GMOs have a vital role to play in addressing the problem of acute food shortage in the country. Although the GMOs can be a basis for increasing food production without expansion of land to cultivate, it is important to acknowledge that the implementation of GM crops may be a useful element for the fight against hunger.

4.2 Recommendation

Further research should be carried out on the health implications of genetically modified (GM) crops on animals and humans in an unbiased environment free from personal interest and political motives.

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