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RESEARCH PANORAMA ON THE SECOND GREEN REVOLUTION IN THE WORLD

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1. INTRODUCTION

The foundation of existence is soil, and on it a variety of activities have been formed that, in human conception, tend to enhance the quality of subsistence. Yet, it is unclear how successful various practises and scientific advancements will be at satisfying sustenance in its entirety. The current review1 creates a national and international panorama of one of those activities that may already be reflecting natural changes on the ecosystem's biodiversity and ecological connections. During the Second World War, a new idea known as the "Green Revolution" was developed in an effort to find alternatives to mitigate the consequences of the growing global population and to ensure food security for said people. The so-called technology packages, which comprised irrigation, mechanisation, chemical fertilisers, pesticides, herbicides, and concentrated foods, were the basis for this type of agricultural production, which was developed in industrialised nations and consisted of optimising races and seeds. The highest global productivity was attained with this maximisation of seed (basically Norman Bourlaug's concept for which he won the Nobel Peace Prize in 1970): surface cultivation per person worldwide decreased from 0.5 to 0.2 hectares between 1950 and 1995. In industrialised countries, production rose significantly between 1975 and 1995: 78% for grains, 113% for fishery, 127% for meat, 331% for eggs, and 280% for poultry (FAO, 1998) [1].

The Green Revolution and other strategies to boost food production and alleviate world hunger are subject to a variety of political, economic, and cultural constraints. One idea to raise the standard of living on the world was to explore yet another strategy inside what might be called a second Green Revolution. The World Food Summit participants believed that a second Green Revolution was necessary in order to provide food security for the 8.0 billion people who are expected to live on the planet by the year 2025. Throughout the past 30 years, the Green Revolution, which got underway in the 1960s, has contributed to keeping the food supply above demand. Production might be tripled and multiplied, giving emerging countries more time to begin addressing the population's explosive increase. One of the key proponents of the first revolution, Norman Borlaug, recognized that it was only a "temporary success". According to Borlaug, it is essential to control population growth in addition to increasing agricultural production on already-existing land.

In scientific literature, the term "transgenic" first "emerged" about 1983. The first of these (soy, corn, cotton, canola, and vegetables, particularly tomato) were made legal for human consumption in 1993. The second Green Revolution was an effort to increase seed production by horizontal transgenesis.

The goal of the "second Green Revolution" is to develop and grow "new plants." These clones are not produced using processes like crossover, hybridization, and cross-pollination. The new procedures actually focus on cell culture, protoplasts, and tissues in addition to genetic recombination techniques to produce significant biological diversity from molecular and cellular mechanisms [2]. Nowadays, advancements in in vitro cell and tissue culture techniques have made it possible to significantly advance the resolution of many issues in economically relevant crops, having attained a fresh development.

2. GREEN REVOLUTION

A state's ability to conserve, maintain, and exploit genetic resources of animal, plant, and microbial origin to ensure food production for the human population of its community is referred to when we talk about the need for food security [1]. In 1994, there were 5.6 billion people on the planet; by 2000, that number had increased to 6.2 billion. The population division of the United Nations estimates that 10540 children are born on each of the five continents every hour, or 252,960 individuals worldwide, every day. According to statistics gathered from the U.S. Census Bureau, this is how the world's population has already surpassed 7.0 billion people. The population growth does not, however, continue. Increasingly vigilant specialists in charge of investigating this phenomenon make predictions about what will occur over the upcoming years. In general, organisations like the UN project that by 2045 or 2050, there will be two billion more people on the planet than are currently counted.

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The idea of the "Green Revolution" and, more recently, transgenic crops—which are currently being used in conjunction with unchecked population growth—emerged as a result of this panorama, which allowed various international organisations to discuss a strategy with which to ensure food security for developing countries. The period in the second half of the 20th century (roughly between 1960 and 1990) when rich nations transferred the most technology to the agriculture sector in order to prevent food shortages in developing countries is commonly referred to as the "Green Revolution." Mostly centred on the use of agrochemicals, genetically improved seeds, irrigation, drainage, and agricultural machinery, the positivist paradigm intended to maximise crop productivity using technical packages created for the contexts of developing countries.

The first Green Revolution, which resulted in the comprehensive application of knowledge of classical genetics developed from the discoveries of Mendel3, prompted the application to vegetable improvement. Increasing cereal yields implied a significant transformation of the agricultural systems of many developing countries. [4] Historically, its start might be regarded as occurring after the end of the First World War; nevertheless, the Second World War, when major industry, especially in the United States, generated a significant accumulation of military technology innovation, was when it began to spread globally.

The second Green Revolution was born in the United States in the 1940s, developed in Mexico in the 1950s (the Rockefeller Foundation launched its Mexican Program of Agriculture, which focused primarily on improving maize and wheat), and from there it spread across the globe with the clear intention of modernising agriculture and eradicating hunger in developing countries. Its scientific foundation is molecular genetics, which emerged from Watson and Crick's 1952 discovery of the DNA structure. The fundamental goal of the Green Revolution was the development of transgenics, also known as GMOs. These are creatures that have been developed in the lab using specific methods that involve altering an organism's natural structure and changing its DNA in order to transfer a gene responsible for a specific feature from one organism to another.

The first green revolution, which occurred in the Neolithic era (8500 BC), consisted of the initial domestication of the main vegetable species we now cultivate; [5] the second green revolution, which began in the 1990s with advancements in xenotransplantation and genetic engineering of agricultural products; and the third green revolution, also known as the bio-revolution, which is currently underway with eco-sustainability.

The Green Revolution, which is based on food security, necessitates a number of alternatives to address population growth. Some of these include expanding the range of crops used for human nutrition because we only eat 20 of the 250,000 species that have been identified; manipulating the genetic and environmental components of current crops to increase yield; and expanding the agricultural frontier, which is challenging given that European and Asian countries are densely populated and that the agricultural frontier is a relatively new concept. Understanding a few concepts that are linked to the previously listed elements is important.

2.1. Biotechnology

According to the European Federation on Biotechnology (EFB), biotechnology is the application of natural sciences to the creation of products and services using organisms, cells, or fragments of them, as well as molecular analogues. It is divided into two categories: traditional biotechnology and new biotechnology. Traditional biotechnology refers to traditional methods that have been used for many years to produce foods like cheese, wine, beer, and many others. New biotechnology, on the other hand, includes all techniques for genetic modification using recombinant DNA and cell fusion techniques as well as contemporary improvements of traditional biotechnological processes [6]. Consequently, as seen in Figure 1, the integration of several disciplines.

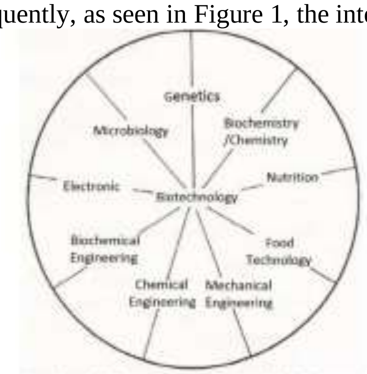

Figure 1. Disciplines integrated in biotechnology

Given that the Green Revolution (GR) was promoted by government with assistance from international organisations like the FAO, the International Monetary Fund, the Bank of Mexico, and the World Bank (Buttel et al., 1990 in Cota, H et al., [7]), one of the differences

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between the GR and Agricultural Biotechnology is that the GR developed within a context of government intervention, whereas biotechnology has not had the same kind of influence. Also, it is believed that biotechnology has a stronger impact on more societal contexts than GR, which only targets the agricultural sector, particularly in terms of productivity growth.

One of the main similarities between the GR and biotechnology is that both were designed to be exclusive technologies. This is because even though the GR was widely disseminated, only commercial producers could use the entire technological package because they had the funds to purchase all the inputs and equipment required to use it. Given that commercial manufacturers also have access to technology and marketplaces to sell their products, history is being repeated with biotechnology. Because of this, small farmers and/or producers are once again left out of the "modernization" of agriculture.

2.2. Genetic Engineering

By inserting nucleic acid molecules made by any external medium into viruses, bacterial plasmids, or other vector systems that allow their incorporation into host organisms in which said process does not occur naturally and which are capable of continuous propagation, genetic engineering is defined as the creation of novel combinations of inheritable material. In its simplest form, genetic engineering entails changing an organism's genetic makeup using recombinant DNA technology.

2.3. Transgenic Crops

Recombinant DNA technology has been used in agriculture to create transgenic, biotechnological, or genetically modified (GM) crops. These kinds of organisms are made up of the introduction of foreign genes (transgenes) into the cultivated plant species' genomes from any biological source (animals, plants, microorganisms, or viruses). Since 1996, GM crops have been grown all over the world, and as of December 2010, 1 billion ha has been planted.

Soy, cotton, corn, and colza are the main GM crops used in the world today. These crops carry transgenes obtained from bacteria that give them resistance to lepidopteran insects (RLI) or tolerance to some herbicides like glyphosate and gluphosinate ammonium. The creation of ingestible vaccinations against lethal diseases is a significant contribution of transgenic technology. Insect resistance and herbicide tolerance have been established as the two key attributes of GM crops that are currently for sale. Using genes taken from the actual virus, a few crops, including the pumpkin, potato, and papaya, have been developed with the trait of virus resistance. The soil bacterium Bacillus thuringiensis is the source of pesticide toxins produced by commercial transgenic plants (Bt).

2.4. Third Green Revolution

A third Green Revolution based on ecological, organic, or biological agriculture, according to certain authors, is currently underway. This succeeds in framing all agricultural systems that support the production of fibres and foods that are healthy, safe, and sustainable from an environmental, social, and economic standpoint. These systems aim to improve the quality of agriculture and the environment in all of its facets by using the natural fertility of the soil as the foundation for optimal output without altering the needs and inherent abilities of plants, animals, and the landscape. Consumers must be assured of every step used to produce an organic product through a certification process. carried out a study on transgenesis and culture: The article outlines the following points: Transgenic foods are currently a hot topic of controversy, but it is concluded that they are not necessary to address global food inequalities. Are our GM crops necessary? It has long been understood that distribution issues, rather than issues with food supply, are what cause famine throughout the world. Never before had so many people been registered as going hungry despite the fact that humanity generated so many tonnes of food (enough for 4.3 pounds of food per person each day). Politics and the economy are the sources of hunger.

With regard to Colombia particularly, we can see that our nation has adequate arable land in the plateaus, inter-Andean valleys, Caribbean lowlands, and even on the mountains to feed its existing and future populations. The primary restrictions concern land ownership. One of the nations with the largest tracts of fertile land is our own. Over 4 million ha of land have been transferred to a small group of people who use it for significant cow ranching over the course of the last ten years by the simple purchase of property by drug traffickers, which is possibly the largest process of modern agrarian reform in the world. Does Colombia need to import transgenic crop seeds to increase agricultural output? No, is the response.

Because there are many species connected to one another and to the cultivated and sprouting plants in an environment where food is in abundant supply, the various fields are themselves techniques for controlling pests and diseases. This helps the agrosystem maintain self-control. In a nation with so many different climates, lands, and soils, modified plants are not necessary in the face of such extreme difficulty.

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3. STATE-OF-THE-ART OF THE GREEN REVOLUTION

The consideration of the benefits and drawbacks this approach may have for society, the environment, and science is at the heart of the Green Revolution's current state of development. Figure 2 depicts some of the research done in these three areas, which are the Green Revolution, transgenics, and biotechnology in general.

First, with regard to the theories surrounding the first and second Green Revolutions, [5] provides a historical account of the two movements, highlighting the results and accomplishments of the first as well as the potential effects of the second on our society and the environment in the near future. The theory of "primitive accumulation," which economists first proposed in the middle of the 19th century and which has come to be known as the modern social inequality, is discussed by the author. According to this theory, those who own the means of production accumulate more wealth than those who are employed. Some social movements contend that an analogous process is currently in full development throughout the world, despite the fact that the ten largest biotechnology companies in the world (dedicated to subproducts for the pharmaceutical industry and agriculture) make up only 3% of the totality of these types of companies while controlling 73% of sales, after 500 years of the start of the primitive accumulation and nearly 60 years of the Green Revolution. Amgen, Monsanto, and Genentech are the three biggest ones.

3.1. Research on Transgenesis and Biotechnology

Following the historical backdrop, the majority of research on the Green Revolution points to transgenesis. Some studies in this field include:

In a study on the use of genetically modified crops around the world, Chaparro [8] identified the most popular varieties and discussed their benefits. The author also considers the biological risks, coming to the conclusion that some of these include the following: harm caused by transgenic proteins to humans and unintended species; gene flow from GM crops to non-GM crops; development of biotopes in landscapes resistant to transgenic proteins; and impact on biodiversity. Among the benefits are reduced environmental effect from eliminating active components and economic gain from lowering production costs and raising output. The study on transgenesis shown in Table 2 demonstrates how current research in this area is directed to assist humans by producing vaccines or other chemical substances that can enhance health. In terms of biotechnology, the following research areas are currently being studied: creation of novel therapies and medications for a variety of human and animal diseases; development of diagnostic tests to improve disease prevention and pollution control; enhancement of numerous aspects of plant and animal agriculture; cleaning and improvement of the environment; and creation of processes for cleaner industrial manufacturing.

Also, significant study in the subject of biotechnology has been conducted by BellverCapela, V (2012) [13], which provides a panorama of biotechnologies applied to human life while highlighting its remarkable impact on society and its dramatic evolution since the late 1990s. The author asserts that the relationship between biotechnology and society underwent a significant change in the early 21st century, leading to a second stage in the development of biotechnology, which the author proposes to refer to as "biotechnology 2.0," in light of some particularly noteworthy biotechnological achievements between 2010 and 2011.

The essay centres on biotechnology's use in human reproduction with the goal of creating predictive medicine based on our genes. Cloning embryos will enable the stem cells obtained to have the same genetic characteristics as its receptors and will, therefore, avoid rejection issues. Human embryonic stem cells will be an endless source of repair materials to regenerate our organism and cure serious diseases that are currently incurable. It is challenging to resist while looking at these hopeful possibilities. When biotechnology 2.0 is introduced, it ceases to be a tool for enhancing human life and instead serves as a means of obtaining post-human existence, which is better than human life.

Following the first "Green Revolution" in the 1960s, when fertiliser use and plant culture helped to enhance yields, there was a need for a "second Green Revolution," which included biotechnology to improve yields and agricultural availability.

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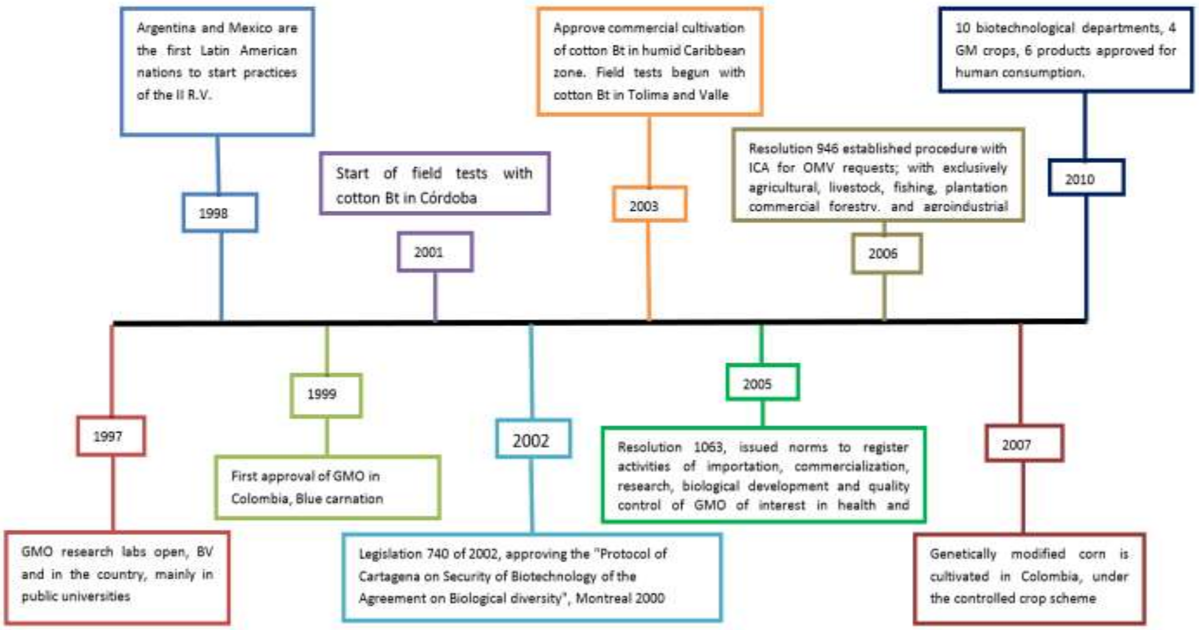

DISCUSSION

The analysis is summarised on a SWOT matrix of the Green Revolution in each of the environmental components, the result of interdisciplinary study and research that was focused on the changes in the human landscape and environment, which served as the inspiration for authoring this document.

Conclusions

The term "Green Revolution" refers to a method of agricultural production developed in industrialised civilizations that maximises genetic diversity and seed potential.

The majority of agricultural genetic improvement, which led to an increase in yields, came via conventional improvement. These tools will continue to be crucial in photo-improving systems, while being slow and occasionally tiresome. In addition, GM technology can, among other desirable qualities, change a plant's genotype in a relatively short amount of time and contribute to the design of more nutrient-dense plants. Unfortunately, the old methods for improving plants are only supplemented by this new technology. To speed plant progress and help ensure global food security, conventional and new technologies should work together.

Ten departments in Colombia are currently using OMG crops, which include cotton, corn, rice, and flowers like carnations and roses. Moreover, maize is grown using the controlled crop system. Resolution 1063 regulates importation, commercialization, research, biological development, and quality control.

The Green Revolution has been used to control pests and diseases, develop crops that are resistant to herbicides, adapt to adverse weather, extend the postharvest period for agricultural products, and biofortify them.

Because of the conversion of fragile and conservation lands to crop lands with a higher percentage of transgenic crops, man introduces a conflict of use on the soil resource; these can be harmful for the soil due to loss of the physical, chemical, and biological properties, exceeding the load capacity, and decreasing self-purification.

Given the various natural phenomena being produced by the Quaternary climate changes, the ecological equilibrium of systems supported by the soil is naturally altered. However, certain human activities, such as overusing the soil, can compromise the ecological equilibrium and cause natural phenomena to move on a human scale rather than an ecological scale, endangering biodiversity. Transgenesis may seem like an obvious way to lessen the strain on the soil, but it can seriously harm genetic diversity and the human genome.

Transgenics and biotechnology are still being discussed; while the effects on human health and the environment are becoming more and more depressing, it should not be forgotten that genetics has saved lives and raised standards of living in several spheres of society.

REFERENCES

1. Albrecht Mathhew A., Cameron W. Evans and Colin L. Raston (2006), "Green Chemistry and the health Implications of Nanoparticles" http:// www.filterair.info/library files/l-2009aa.pdf down loaded on 11-5-2011.
2. Balaji Fakir (2008), "India needs special agricultural zones: swaminathan" //http://twocircles.net/node/35320 down loaded on 18-3-2009
3. Bayer Crop Science (2009), "Research for the Second Green Revolution" http: www.research.bayer. com/ edition-20/safe harvests worldwide aspx down loaded on 11-07-2009.
4. 4.Berger Michael (2009), "Investigating Potential Nanotechnology risks at the bottom of the Food Chain" (http://www.nanowerk. com/spot light/ spotid=8774.php) down loaded on 28-2-2009.
5. ByravanSujatha (2010), "The Inter-Academy Report on Genetically Engineered Crops: Is It Making a Farce od Science?" Economic and Political Weekly, XLV no. 43, pp 14-16.
6. Chand, R. (2006), "India's Agricultural Challenge and their Implications for Growth and Equity," paper presented at Silver Jubilee Seminar on Perspective on Equitable Development: International Experiences and Can India Learn? Centre for Economic and Social Studies, Hyderabad as mentioned in Reddy and Mishra (2009).