Journal of Agroecology and Natural Resource Management
p-ISSN: 2394-0786, e-ISSN: 2394-0794, Volume 6, Issue 3; April-June, 2019, pp. 108-109

http://www.krishisanskriti.org/Publication.html

Sustainable Agriculture Integrated with Plant Biotechnology and ancient Farming Methodologies is a Step towards Food Security in the Changing Scenario of Global Climatic Change

Kiran Sharma

Undergraduate, B.A.Prog. Shyama Prasad Mukherjee College,
University of Delhi,
E-mail: sharmakiru26@gmail.com

Abstract—*Plant biotechnology is a process in which genes are identified with desired characters, and transferred in the crop, with a series of experimentation and field trials to develop resilient agriculture to cope-up global climate change. Using this technology, saves time, money and land area as the yield and nutrient enrichment of the crop per unit area is enhanced several times. However, it is the technological solutionagainst global environmental problems like land degradation, melting ice-caps (global warming) and most concerning issue is climatic change. Plant-Biotechnology and traditional agricultural techniques if combined is an effective way to ensure sustainability. Ultimate goal is sustainable development which ensures food security for alland natural resource conservation hand-in-hand.*

Keywords*: Biotechnology, Sustainable Agriculture, Traditional Agriculture.*

Introduction

Biotechnology is one of the fastest growing areas in science that has provided immense contributions in various fields such as agriculture, medicine, pharmacy, industry and environment science. Along with the development of this technology, sustainable agriculture has been taken into account. It enhances the crop yield making it resistant and enriching with nutrients. Biotechnology improves production, saves time and money and causes reduction in chemical application. Understanding the importance of technology and integrating it with traditional agricultural practices, can help develop a model of resilient and sustainable agricultural framework. Some of the traditional agricultural practices are scare-crow, crop rotation, mixed cropping, agroforestry, terrace farming, mulching, compost formation, using harvested material as feed for livestock etc. Sustainable development is a holistic approach in which proper management of natural resources are ensured to supply human needs for food and other goods while conserving environmental quality and preventing natural resource degradation. In developing sustainable agriculture, reducing the pressure on land and ecosystems, avoiding the use of chemical in the form of fertilizers, pesticides, and herbicides and conserving natural resources and human health are the main objectives (Wittman et al, 2017).

Agricultural biotechnology plays a crucial role in economic competitiveness, especially in developing countries. In addition, biotechnology has a specific position in enhancing food security so that could be used as an advantage in sustainable agriculture for small farmers in developing countries (Anthony &Feeroni, 2012). Biotechnology by reducing the use of chemicals in agriculture has brought many benefits to our society, ensuring good ecosystem health along with economic growth and vice-versa.Ensuring a sustainable agricultural framework, structured political policies towards promoting the research, implementation, awareness programs are required to be implemented to produce products meeting ecological, socio-economic criteria.To achieve such changes it is necessary for authorities to build an integral connect between farmers, industry, consumer and universities (Hunter et. al., 2017).

Importanceof plant biotechnology in agriculture with respect to global climatic change.

Biotechnology applies scientific and engineering principles to living organisms in order to produce products and services of values to society. The discipline combines elements from many areas such as molecular genetics, microbiology, immunology, physics , chemistry engineering and to understand and manipulate the genetic make-up organisms for use in the production or processing of agricultural production and processing. ; to improve resistance to pests , diseases and temperatureand to enhance the nutritional content of foods . Biotechnology is being used to develop low-cost disease -free playing materials for crops such as banana and potato.There are various stages in the development of biotechnology to meet the various needs of humans. Biotechnology can be divided into three different stages , ancient biotechnology (pre

1800) , classical biotechnology (from 1800) and modern biotechnology (from 1953 onwards) .

Agricultural biotechnology is a collection of scientific techniques used to improve plants, animals and microorganisms. Based on an understanding of DNA , scientists have developed solutions to increase agricultural productivity. The ability to identify genes with desired traits, and the ability to work with such characteristics very precisely, biotechnology enables improvements in crops and livestock (Ismail, 1999). Biotechnologyenablesimprovementsthat are not possible with traditional crossing of related species alone, the transfer of gene is possible across thekingdom of species.

Climate change mitigation through plant biotechnology

A. Reduction of Green House Gases (GHGs)

The main cause of green house gases (CO_2 ,CH_4, and N_2O) emissions is able to deforestation, use of inorganic fertilizers etc. The green revolution through Plant Biotechnology is one of the most reliable answers to mitigate climate changes through use of biofuels, carbon sequestration and reduced chemical pesticide usage.

B. Biotechnology for abiotic and biotic stresses

Agricultural Biotechnology could contribute to the crop production through the development of stains that are resistant to biotic stresses such as insects, fungi, bacteria and viruses . Bacillus thurigiensis (BT) gene is introduced into corn, cotton and soybeans which imparts resistance to harsh environmental conditions. Salinity, drought, extreme temperatures oxidative stress etc. includes in abiotic stress tolerance in crops that can allow harsh conditions on marginal lands (Apse &Blumnal, 2013).Molecular breeding approaches for abiotic stress tolerance are regulations of stress – related genes . Genetically modified crops resistant to drought, salt and heat tolerant viz., Arabidopsis, tobacco, maize , wheat , cotton , soybean, pearl millet , tomato , rice , brassica have been developed workers. Genome sequence of various microbes and plants has opened and advanced era where we can manipulate genes for stress tolerance and can change the climate within short time. In earlier times the wheat crops are longer but due to the plant Biotechnology the gene of small or dwarf plant is combined to the whole kingdom of species of wheat crops became dwarf. Therefore, the gene transfers in the kingdom. By this technological experiment much of the wheat grains are saved that we're earlier destroyed due to wind or rainfall (Barrows et al, 2014).Somehow on the other side it is environmental risks associated although testing methodologies are concerned and working for the side effects of biotech-crops. Also, large areas are kept far away from grazing animals and societal interferences, where transgenic plants are grown.

Conclusion

Plant Biotechnology can be best security option for the food security with the space for sustainable development. Sustainable development Goals (SDGs) are a universal call to action to end poverty, protect the planet and ensure that all people enjoy peace & prosperity. Food security through plant Biotechnology will lead to sustainableagriculture and it is the main goal of SDGs. In the process of Biotechnology the gene is transferred across the kingdom of the species, enables prospering towards resilient agriculture . Traditional and modern agricultural techniques for the stability of crops safely that, were used by the small farmers.

Acknowledgements

I am indebted to the esteemed college, Principal Madam, organising secretary, the convenor, co-conveners & the members of organising committee of international conference which gave a forum to express our thoughts, actions towards research. I am grateful to my guide Dr. Divya Agarwal for providing extensive guidance, support and encouragement, without which I was not able to prepare and present this paper. I am also thankful to all the EVS faculties for providing conducive learning environment.

References

[1] Anthony, V.M. and Feeroni , M., "Agricultural Biotechnology and small holder farmers in developing countries", *Current opinion in biotechnology*, 23, 2, 2012, pp.278-285.

[2] Apse , M.P. and Blumnal , E. Engineering salt tolerance in plants .curr. biotechnol; 13, 2013, pp.146-150.

[3]Barrows , G. ; Sexton, S: and Zilberman , D. "Agricultural Biotechnology: The promise and prospects of genetically modified crops".*J. Economic Perspectives*, 28, 1, 2014, pp.99-120

[4] Hunter, M. C., Smith, R. G., Schipanski, M. E., Atwood, L. W., and Mortensen, D. A., "Agriculture in 2050: recalibrating targets for sustainable intensification", *BioScience*, 67, 2017, pp. 386–391.

[5]Ismail, S.,"Biotechnology and food security in the 21st century", *Science*,July 1999, 285, 5426, pp.387-389.

[6] Wittman, H., Chappell, M. J., Abson, D. J., Kerr, R. B., Blesh, J., Hanspach, J. "A social–ecological perspective on harmonizing food security and biodiversity conservation". *Reg. Environ. Change*, 17, 2017, pp. 1291–1301.