Yilkal Bezie et al., Madridge J Agric Environ Sci. 2020
DOI: dx.doi.org/10.18689/2643-5500.a1.002

madridge CONFERENCES

International
PLANT SCIENCE & MOLECULAR BIOLOGY CONFERENCE
October 27, 2020 | Virtual Conference

The Potential Applications of Site-Directed Mutagenesis for Crop Improvement: A Review

Yilkal Bezie[1,2], Tadesse Tilahun[1,3], Mulugeta Atnaf[4] and Mengistie Taye[5]
[1]Bahir Dar University, Ethiopia
[2]Debre Markos University, Ethiopia
[3]Debre Tabor University, Ethiopia
[4]Fogera National Rice Research and Training Centre, Ethiopian Institute of Agricultural Research, Ethiopia
[5]Biotechnology Research Institute, Bahir Dar University, Ethiopia

The search for technologies for crop improvement has been a continuous practice to address the food insecurity to the growing human population with an ever decreasing arable land and dynamic climate change around the world. Considering potential technologies for crop improvement could close the rooms of poverty in developing countries in particular and around the globe at large. In due regard, the purpose of this review is to assess the site-directed mutation creation methods and to show the potential tools for future crop improvement programs. Site-directed mutagenesis was found to be an efficient process to create targeted mutation on cereal crops, horticultural crops, oilseed crops and others. Agronomic traits such as yield, quality and stress tolerance have been improved using site-directed mutagenesis. Besides, selectable marker elimination was also reported from transgenic crops by targeted mutation. Most of the reports on site-directed mutagenesis is focusing on cereal crops (58.339%) followed by horticultural crops (22.92%). Any work targeting to cereals could ensure food security to the world human population. Four mutagenic tools have been reported to which the CRISPR/Ca9 technology was found to be frequently used (66.67%) followed by TALENs. This tool is potential since it is efficient in creating targeted mutagenesis and less likely off-target effect, so it is repeatedly used in different research works. TALENs were used usually to knockout genes with bad traits. Moreover, the mutation created by mutagenic tools found to be efficient and the mutated traits proved as it was heritable to generations. Hence, site-directed mutagenesis by the CRISPR/Cas9 system is advisable for agricultural development thereby ensuring food sustainability around the world.

Biography:

Yilkal Bezie Ayele Specialty-Plant Biotechnology and he currently a PhD student at Bahir Dar University in Agricultural Biotechnology. He is an Assistant professor in Plant Biotechnology. His home institution is Debre Markos University since 2007-present. He was teaching courses like Biochemistry, Molecular Biology, Genetics, Molecular Marker and their application, Omics, Medicinal plants and their antimicrobial evaluation, Plant Tissue Culture techniques, Plant breeding, Plant Biotechnology, Recombinant DNA Technology, Bioinformatics, Laboratory techniques in molecular biology, Medical Biotechnology, Immunology and Immunotechnology and Cellular Biology.