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Editorial

Biotechnology and Microbes: Modern Tools for Sustainable Utilization

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The word "sustainable" has come for the word "sustain" that means to maintain or to support [1]. Through sustainable agriculture people try to identify and solve the problems in the existing agricultural system in order to offer food and fiber for people over the long term. However, till date, a fully sustainable agriculture has not been developed, and for the predictable future much improvement can be done [1,2]. There are three areas that must be addressed in order to be fully sustainable, these areas are as follows; agriculture, food, and natural resource systems [1-3]. Through sustainable agriculture, a fair and reasonably secure living for the farm families can be achieved. And it also reduces the possible harm caused to the natural environment. It should also maintain basic natural resources such as clean water, clean air, and healthy soil [1-3].

Biotechnology is considered as one of the major tool for the development of sustainability in our system for solving specific problems [4,5]. Sustainable development is no small undertaking for international companies looking to meet today's energy, food and environmental needs without compromising the Earth's resources or its future. In order to attain this goal, these corporate leaders are adapting biotechnology in various fields such as, disease therapy or diminish the use of pesticides, reduce greenhouse gas emissions, or to create an innovative technique for improving agricultural productivity. Biotechnology is providing the structure for a sustainable future [4,5]. Biotechnology have played an important role in the development of food products over many centuries. In recent years, the modern biotechnological tools such as molecular biology and gene technologies have gained a significant role in the agriculture, food and renewable energy sector [5].

Another potential area for the application of biotechnological tools in the sustainable development is the development of livestocks that are tropical disease resistant [4,5]. Modern methods, such as genomics, could be applied in this area without requiring transgenesis to develop various disease resistant crop varieties [4,5]. Investment in fast-growing plants could help facilitate ecological restoration in many denuded regions of the world. By 2030, the world's population is expected to grow to 8.1 billion at a rate of over 75 million people per year [5]. Almost all of the population increase will occur mostly in developing countries that can ill-afford additional population pressures. This will give rise to the food scarcity and thus increased application of sustainable agriculture and food system. The challenge, therefore, is not only to feed more people, but to do so with less available arable land, fewer non-renewable resources, less water, and fewer people engaged in primary agriculture. This led to sustainable utilization of available resources by biotechnological approaches [4,5].

Similarly, microbes also plays a significant role as the sustainable utilization in food agriculture and human health [6,7]. Microbes are used as biofertilizers, natural fermentators, biopesticides, bioherbicides etc. for their sustainable utilization in agriculture [6,7]. A lot of research has been undertaken for the favourable role of probiotics for developing novel food products and processes, for human health, rapid detection kits for GM foods, utilization of agricultural residues for obtaining value added products and low cost nutrient food supplements. Other areas of research where microbes contribute in producing healthy and nutritious foods are algal proteins such

as *Spirulina* and other beneficial algae as biofertilizers and fungal protein such as some highly nutritional mushrooms like Calocybeindica (Milk mushroom), Cordyceps sinensis (Insect mushroom, Kirajali), Lentinulaedodes (Shiitake) which are pharmaceutically important with many types of bioactive compounds of medicinal importance [6-8].

However, it is true that the modern biotechnology approaches and utilization of microbes in various fields have provided an estimated and strategic loom for the combined efforts in protecting the three major legs of sustainable agriculture and bio-resources. It could not just be a practice, it could be a combined strategic effort in solving issues emerging from social demands, environmental disturbance and climatic changes. At last it can be said that, the use of biotechnological tools and microbiological techniques has opened up new vistas in the field of sustainable development particularly in the areas of medicine, agriculture, silviculture, horticulture, environment and other important issues.

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