

The Role of Green Chemistry in Agriculture

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Description

Nowadays, green chemistry plays a new paradigm in the field of agriculture. In the last few years, for sustainable production in agriculture use of renewable biomass resources increases to generate bio-based food products with low inputs, zero waste, substantial social values, and minimizing environmental impact.

The problem of poverty in developing countries increases the demand for more productive and industrialized economies, which causes global and local environmental pollution, and the non-sustainable use of natural resources. Environmental pollution threats, ranging from atmospheric pollution in cities, acid rain, municipal solid waste, deforestation and desertification, the reduction of the ozone layer, and signs of climate change were overlooked. The idea of sustainable eco-development was presented for the first time in 1987 in the report of the World Commission on Environment and Development of the United Nations.

In the last few years, the production of synthetic pesticides was increasing and modern agriculture methods produced major greenhouse gases. The adverse impact of contamination in agrochemical fields through indirect or direct exposure of improper use of pesticides affects the animals and human health. Pesticides include all chemicals which are used to control or kill pests, but these pesticides in the food chain coupled with bio magnifications and bioaccumulation have adverse effects on entire animals and human life. To minimize these harmful effects, the employment of organic farming should be increased in place of synthetic pesticides. These pesticides also cause the contamination of groundwater and led to eutrophication of rivers and lake waters, and the movement of toxic chemicals from surroundings into an organism.

The sustainability of agriculture is the core area that requires green chemistry strategies in the agrochemical field for implanting the judicious use of pesticides and fertilizers. The principles of green chemistry are especially relevant to the manufacturing of agrochemicals due to their direct impact on human and environmental health. However, current agricultural practices are still based on intensive production methods using unsustainable technologies developed during the 'green revolution.

As consumer focus shifts towards establishing a sustainable and secure food supply, the agrichemical industry will require a

second 'green revolution' utilizing green chemistry principles to continue providing products relevant to agricultural practices. Renewable energy resources such as solar, wind, hydroelectric, biomass, biorefineries, geothermal, and ocean energy are important resources for future sustainable development, so they will replace carbon-containing sources and reduce the emission of global warming. In the last years, third-generation biofuels (high-yielding-low input feedstock) were derived from renewable feedstock. As we see some of the chemicals still used conventionally in agriculture are associated with adverse impacts to the environment and human health. There is growing concern about how we farm for sustainable agriculture, what inputs would supply to it, what technologies to employ. Green chemistry will shift agriculture towards sustainable development.

Green chemistry seeks the goal towards farm profitability, community prosperity, and improving soil quality by reducing the dependence use of non-renewable resources like synthetic fertilizers and pesticides, minimizing the adverse effects on water quality, wildlife, and safety. There are various alternatives to chemical farming such as biological agriculture, organic farming, natural farming, bio-dynamic agriculture, ecological agriculture. Bio-pesticides are organic in nature, so these can be employed in farming for controlling pests, insects, and weeds and also for plant physiology and productivity. These bio-pesticides are bio-degradable to the environment. Therefore, for sustainable developments, shift agricultural farming into green chemistry manufacturing processes, use of crop protection and production, and develop green agrochemicals.

Conclusion

Thus, sustainable agriculture and green chemistry are both revolutionary fields and intertwined. For this green chemists needs that the farmers used green technology for sustainable agriculture and farmers need safe and green agricultural inputs. Biocatalysts have been used increasingly in agrochemicals, pharmaceuticals, and food industries, these can help in reducing waste and improving the yield of products. At last, green chemistry generates the new green inputs for sustainable agriculture productions and protections.