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IMPORTANCE OF NANOTECHNOLOGY IN AGRICULTURE

Divya Gaur[1] Shruti Gaur[2] and Aishwarya Maheta[3]

[1,3] Ph.D. Scholar, Department of Soil Science and agricultural Chemistry, B.A. College of Agriculture, Anand Agriculture university, Anand
[2] Department of Soil Science and agricultural Chemistry, college of Agriculture, Junagadh Agriculture university, Junagadh

Corresponding author: divyagaur777@gmail.com

Introduction:

The development of agriculture is compulsory phenomena for the purge of poverty and hunger which must be getting rid of from the present situation. Therefore, we should have to take one bold step for agricultural development. Agriculture is always most important and stable sector because it produces and provides raw materials for food and feed industries. The limit of natural resources (land, water and soil etc.) and the growth of population in the world claim the agricultural development to be economically viable, environmentally and efficiently. Nowadays, the most vital obsession is to create flanked by, agriculture poverty and nutritional process getting food. The agriculture on the road to recovery, thus the environmental performance is required and at the same time participation of food chain ecosystems are required in relation to agricultural food production (Thornhill et al. 2016).

Therefore, new technology should have to be adopted that focuses on getting better agricultural production Recently, food and nutritional security are fully embedded in the novel knowledge. The agriculture development also depends on the social inclusion, health, climate change, energy, ecosystem processes, natural resources; good supremacy, etc. must also be documented in specific target oriented goals. Therefore, sustainable agricultural strengthening the practical opportunity to get rid of poverty and hunger of the people. No doubt that the sustainable growth of agriculture totally depends on the new and innovative techniques like nanotechnology. Nanotechnology monitors a leading agricultural controlling process, especially by its miniature dimension. Additionally, many potential benefits such as enhancement of food quality and safety, reduction of agricultural inputs, enrichment of absorbing nanoscale nutrients from the soil, etc. allow the application of nanotechnology to be resonant encumbrance. Agriculture, food and natural resources are a part of those challenges like sustainability, susceptibility, human health and healthy life. The ambition of nanomaterials in agriculture is to reduce the amount of spread chemicals, minimize nutrient losses in fertilization and increase yield through pest and nutrient management.

Nanotechnology has the prospective to improve the agriculture and food industry with novel nanotools for the controlling of rapid disease diagnostic, enhancing the capacity of plants to absorb nutrients among others.

Nanotechnology and agricultural sustainable development:

Nanotechnology takes an important part in the productivity through control of nutrients as well as it can also participate in the monitoring of water quality and pesticides for sustainable development of agriculture. This technology was proved to be as good in resources management of agricultural field, drug delivery mechanisms in plants and helps to maintain the soils fertility. Recently, nanosensors are widely applied in the agriculture due to their strengths and fast for environmental monitoring of contamination in the soils and in the water (Ion et al., 2010). Several sensors based on nano- detection technology such as viz. biosensors, electrochemical sensors, optical sensors, and devices will be the main instruments for detecting the heavy metals in trace range Nanomaterials not only directly catalyze degradation of waste and toxic materials but it also aids improve the efficiency of microorganisms in degradation of waste and toxic materials.

In the present century, there is a big demand for fast, reliable, and low-cost systems for the detection, monitoring and diagnosis for biological host molecules in agricultural sectors (Vidotti et al., 2011; Sagadevan and Periasamy, 2014). The application of chemically synthesize nanomaterials now a days considered as toxic in the nature, in attract of this, nanomaterials may synthesis from plant system and it considered as green nanotechnology (Prasad, 2014). Green nanotechnology is a safe process, energy efficient, reduces waste and lessens greenhouse gas emissions. Use of renewable materials in production of such products is beneficial, thus these processes have low influence on the environment. Nanomaterials are eco-environmentally sustainable and significant advances have been made in the field of green nanotechnology. In the present decade, it is more shift toward the green nano in a faster rate for implementation its functions. Still it is not clear how the environmental sustainability of green nanotechnology will be achieved in future? These risks must be mitigated in advancing green nanotechnology solutions (Prema, 2015).

The development of the high-tech agricultural system with use of engineered smart nanotools could be excellent strategy to make a revolution in agricultural practices, and thus reduce and/or eliminate the influence of modern agriculture on the environment as well as to enhance both the quality and quantity of yields (Sekhon, 2014; Liu and Lal, 2015). In modern agriculture, sustainable production and efficiencyare unimaginable without the use of agrochemicals such as pesticides and fertilizers. However, every agrochemical has some potential issues including contamination of water or residues on food products that threat the human being and environmental health, thus the precise management and control of inputs could allow to reduce these risks (Kah, 2015). The development of biosensors is also a good field for exploitation of many strengths of nanotechnology, thus nanotechnology is there and plays an essential role.

Future perspectives:

Sustainable agriculture must be taken as an ecosystem method, where abiotic–biotic living beings live in accord with a coordinated stability of food chains and their related energy balance. New technologies, modernization, increased in use of nano-chemicals, specialization and government policies are adapted to maximize the production in agriculture. To overcome the situation, it is mandatory to establish the recent technology in the food industry. Therefore, the new and future technology is nanotechnology that possesses very unique property in food supply chain (from the field to table: crop production, use of agro-chemicals such as nanofertilizers, nanopesticides, nanoherbicides, etc., precision farming techniques, intelligent feed, enhancement of food texture and quality, and bioavailability/nutrient values, packaging and labeling, etc.) round the world agricultural sector. Some focused areas may need more attention in near future researches in the field of agricultural nanotechnology or nanofoods.

References:

Kah, M. (2015). Nanopesticides and nanofertilizers: emerging contaminants or opportunities for risk mitigation? Front. Chem. 3:64. DOI: 0.3389/fchem.2015. 00064

Liu, R., and Lal, R. (2015). Potentials of engineered nanoparticles as fertilizers for increasing agronomic productions. Sci. Total Environ. 514, 131–139. DOI: 10.1016/j.scitotenv.2015.01.104

Prema, R. S. (2015). Methods of synthesis of nano particles and its applications. J. Chem. Pharm. Res. 7, 278–285.

Sagadevan, S., and Periasamy, M. (2014). Recent trends in nanobiosensors and their applications - a review. Rev. Adv. Mater. Sci. 36, 62–69.

Sekhon, B. S. (2014). Nanotechnology in agri-food production: an overview. Nanotechnol. Sci. Appl. 7, 31–53. DOI: 10.2147/NSA.S39406

Thornhill, S., Vargyas, E., Fitzgerald, T., and Chisholm, N. (2016). Household food security and biofuel feedstock production in rural ozambique and Tanzania. Food Sec. 8, 953–971. DOI: 10.1007/s12571-016-0603-9

Vidotti, M., Carvalhal, R. F., Mendes, R. K., Ferreira, D. C. M., and Kubota, L. T. (2011). Biosensors based on gold nanostructures. J. Braz. Chem. Soc. 22, 3–20. DOI: 10.1590/S0103-50532011000100002.

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