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Impact of nanotechnology on environment and their application in agronomy and food stuffs production: An Overview

Yashwant Sompura [1,*], Deepika Sangwan [2] and Tansukh Barupal [1]

[1] *Department of Botany, University College of Science, MLS University, Udaipur, Rajasthan. (313001) India.*
[2] *Department of Botany, Hindu College, Delhi University, Delhi, (110007) India.*
* Corresponding author e-mail: *yashwantmlsu2018@gmail.com*

Abstract: In few decades, nanotechnology plays an important role in agriculture and food stuffs production. It has contribution in many areas of life science such as production of fertilizers, pesticides, insecticides, food products, disease resistance and lots of applications in industrial products. The world population get increased gradually so all people have need to more food stuffs and agricultural products so we should use of biotechnology and nanotechnology. Its important applications in medicines it increases efficiency of medicines. Using nanoparticles such as silver and iron nanoparticles we can be detect disease in plants as well as animals. In other hand it's very important significance in food processing, storage etc. This review paper explains the role of nanotechnology in agriculture and food stuffs production their applications and their future aspects.

Keywords: *Nano fertilizer*

In few decades, world's population increases gradually. All the people have need of food for their survival. Agriculture provides these foods. Zero hunger is a goal of sustainable development goal of UN. Food requirement increases with population. According to some organization world population is reach 10 billion by 2050. In The distribution of food agriculture play a great role. There are many types of chemical fertilizers used in an agriculture to improve crop yield. These chemical fertilizers cause harmful effects in the quality of soils as well as agroecosystem. The most important and essential needs of humans is food. This food is obtained from agriculture which is produced by farmer. But this food has no good quality and quantity **[1].** So, the evolution of biotechnology and nanotechnology play a great role in improving quality and quantity of food crops. But the use of this type of technology is safe? Many people and experts say that technically improved food has risk. The food security is big challenge from few decades. The nanotechnology has capacity to change this challenge. The use of nanotechnology in agriculture and food production will have beneficial in future.

Nanotechnology in agriculture

Usually, agronomy or precision agriculture is a new way in farm. By the use of nanotechnology as a Nano sensor will be determined smallest part of farm which require chemical pesticides or fertilizers. Nano sensors and other Nano systems increase the utility of resources such as mineral nutrients, water etc in agriculture. By the use of Nano sensor or Nano pesticides and GPS and RS we can detect crop pests or evidence like drought. **[2]** This is also helpful in detection the presence of plant pathogens (viruses) and the presence of micro or macronutrients in the soil. Nanoparticles has capacity to absorbed in the plants quickly and complete. Nano particles has potential to decease the rate of fertilizers and save fertilizer consumption. It also decreases the environmental

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pollution. Moreover, in genetic improvement and pest or disease management also play an important role. **[3].**

Nano fertilizers

An improvement in crops yield specially in food crops such as cereals during last few decades. It completed the nutritional requirement of the world's population and decrease the rate of Malnutrition. This is possible due to use of nanotechnology. Use of chemical fertilizers in more quantity decrease the yield of crops and also reduce their nutritional quality and the chemical fertilizers are contaminates environment. So, we should improve the quality of crops and increase the accessibility of nutrients. Nano fertilizer is a good way. These are micro or macro nutrient and act as a carrier for mobilize nutrient. They play an important role in improve crops yield improve the quality of crops, low cost of production, improve the metabolic reaction of crops, increase the uptake of nutrients, reduce the loss of nutrients, make environment eco-friendly. These are easily available and has very low cost. They may contain nanoparticles such as zinc, silica, iron etc. **[5-8].**

(b). Nano herbicides

In fields or farms many unwanted plants grown along with the plant crops these unwanted plants are called as weeds. To control and kill these weeds herbicides play a significant role but use of conventional herbicides can affect a growth and development of a desirable crops and may be infected it. They also affect soil environment and soil properties. **[12-13].**

Nanotechnology in food stuffs production

In present nanotechnology have wide role in food industry as food packaging. Food packaging is a problematic factor in food industry because gases such as oxygen can enter in package and cause food spoilage and discoloration. By using nanoparticles, a new packaging material have been developed which prevent the entry of oxygen. in other words, it acts as a barrier. There are many Nano- coating products have been developed for covering of fruit and restrict shrinkage of fruit. **[9].**

Effect of nanotechnology

Effect on environment

Effect on plant growth and biomass:

The Phytotoxicity of nanoparticles reduced a growth and biomass. It has been reported that Ag and Cu nanoparticles decline a growth of Cucurbita pepo. It has been also reported that nanoparticles have negative effect on growth of phytoplankton's.

Zn and ZnO - Inhibition a seed germination and root growth.
ZnO - effect on rice roots at early seeding stage.
Nano-Zno- Stunt root length and reduce number of roots.
Nano- TiO_2- to promote the growth of spinach. **[5-7].**

Effect on soil organic Matter:

It has been reported that nanoparticles can change physical, chemical and biological properties of SOM. It depends on the nature of SOM which may either humic or non humic. CuO have significant effect on SOM biochemistry. TiO_2 can reduce SOM decomposition. **[10].**

Effects of nanoparticles on organism:

Nanoparticles pass through different call membranes of mammalians and be absorbed in them, and their absorption rate depend on these sizes. Then size of nanoparticles and their distribution, aggregation and sedimentation in cells are the most important parameters in determining these absorption rates. The toxicity of nanoparticles is selected to their small size, large surface area and their ability to produce reactive oxygen species. several respiratory and cardiovascular diseases are caused by carbon black particles in humans. Most carcinogenic materials, such as polycyclic hydrocarbons and very tiny roots, can find these ways deep into the lungs and cause toxic effects. Diseases associated with air pollution due to nanoparticles can cause premature deaths of workers in the gas, coal and asphalt industries as well as in workers in plants that produce carbon elements. Latex nanoparticles are absorbed in the body and eggs of originalities a small Japanese fish and accumulate in gills, intestines, brains, genital organs, lives and blood. Carbon nanotubes are a limited factor of growth in protists and they have effects on the respiratory systems of rainbow trouts. The cells walls of bacteria have adapted physiologically to the presence of fullerenes. **[5-8].**

Effect of nanotechnology on water:

One of the main environmental applications of nanotechnology is in water sector. As freshwater sources become increasingly scarce due to overconsumption and contamination, scientists have begun to consider sea water as another source of drinking water. Carbon nanotubes membranes have the potential to reduce desalination costs. Similarly, nanofillers could be used to remediate or clean up ground water or surface water contaminated with chemicals and hazardous substances. But nanomaterials can also have a negative impact. Currently there is very little information describing the relative environmental risk of manufactured nanoparticles. Recently, a worker, conducted by the National Science Foundation and the US Environmental protection agency, was undertaken to identify the critical risk issues concerning nanomaterials. Specifically, the workshop aimed at determining the exposure and toxicity of manufactured nanoparticles ability to extrapolate manufactured nanoparticles toxicity using existing particles and fibre toxicity database, and recyclability and overall sustainability of the manufactured nanomaterials. A remedial solution is use of green technology or green manufacturing. Their technology aims at producing environmentally friendly technology with lesser raw materials, minimum energy consumption and minimum waste production. Scientific authorities and monitoring various nanoparticles produced and used, as well as their subsequent impact. This is in order to balance the technology's benefits and possible unintended consequences. **[2-3].**

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