# Nanotechnology: A Promising Technology for Agriculture Oriented Research

**Dr. Mohd Tariq[1] Dr. Shipra Choudhary[2] and Dr. Harjeet Singh[3]**

[1-2]Department of Biotechnology and Microbiology, Meerut Institute of Engineering and Technology, Meerut, 250005, Uttar Pradesh, India

[3]Cattle Genetics and Breeding Laboratory, Central Institute for Research on Cattle, Meerut, 250001, Uttar Pradesh, India

**Corresponding author : tariq.du14@gmail.com**

## INTRODUCTION

For the last few decades, major population pressure had led to food scarcity and consequence decline in global agriculture and forestry due to urbanization. Plants, the indispensable component of our planet are always bare to different environmental variations and numerous stress factors throughout their life. Unlike animals, plants are deprived of mobility to a better place on arrival of any kind of stress (biotic/abiotic). To overcome such stresses, nature has provided them certain mechanisms that helps these sessile organisms to endure these stresses. Though, plants develop various mechanisms (avoid, escape and tolerate) to counter against adverse conditions but their responses could vary considerably even in the same plant species. As a result, identification of tolerant plant species is always the major concern towards sustainable agriculture and crop production. Foremost abiotic stresses which affect plants include heat, salinity, cold drought, flooding/submergence (anoxia), chemical toxicities, and excess light. So, there is a major concern among scientific communities to raise world food crop production by 70% (FAO, 2009). In such varying environmental scenarios, it is needful to recognize a new area of research to conquer the technological challenges in addressing the yield barrier, resource use efficiency, and development of environmentally accepted technology (Jalil and Ansari, 2019).

Nanotechnology, a recently multi-disciplinary area and emerging field of science which offers immense and wide use in various discipline and its allied field e.g., medicine, agriculture, industrial, environment, electronics with application in numerous preparations e.g., Medicine and Drugs, Nano devices, Optical Engineering, Bio-engineering, tissue engineering etc. The trends of development in the field of nanotechnology and its based industries are increasing tremendously. In the current scenario and recent estimation report of Consumer Products Inventory (CPI) of upto August 2015, the nanotechnology-based consumer products inventory has grown to 1,814 products, representing thirty-fold increase in comparison to 54 products as listed in 2005 (CPI, 2015).

Nanotechnology has emerged out broadly into the 'agri-food sector' which includes the nano sensors, tracking devices, targeted delivery of required components, food safety, new product developments, precision processing, smart packaging and others.

Nanotechnology offers wide research area and provides opportunities for a large scope of diverse applications and advantages in fields of biotechnology and agriculture-based research such as disease prevention, nutrient management by nano-fertilizers, nano-pesticides or nano-herbicides, mitigating abiotic stress. Recently, nanotechnology has emerged out to be a probable promising technology for solving the problem associated with abiotic stress to obtain sustainability in the field of agriculture. Increasing crop production is the need of hour to deal with the increasing population. It has been estimated that various factors like climate change, habitat loss, global warming have decreased the yield of major crops like wheat, maize, barley by ~40 million metric tons per year (1981-2002; http://environmentalresearchweb.org/cws/article/news/27343).

## Conclusion

Nanotechnology, a multi-disciplinary approach, has emerged out as a powerful discipline in the last few years and is revolutionizing various field like medicine, agriculture, industrial, environment, electronics etc. Nanotechnology is emerging as a tool for agriculture by empowering it with tools to conquer nutritional poverty and food scarcity. The applicability of nanotechnology needs to be commercialized from laboratory to agricultural fields.

**Reference**

FAO (2009). High Level Expert Forum-How to Feed the World in 2050. Economic and Social Development, Food and Agricultural Organization of the United Nations, Rome, Italy.

Jalil, S.U. and M.I. Ansari (2019). Nanoparticles and abiotic stress tolerance in plants: synthesis, action, and signaling mechanisms. In: *Plant Signaling Molecules.* Elsevier Publishing, pp.549-561.

CPI, 2015. The Project on Emerging Nanotechnologies. Consumer Products Inventory. http://www.nanotechproject.org/cpi (accessed March 25, 2019).

❖❖