

# Nanotech Agriculture

- Case Study 1 – Using any form of nanotechnology, propose a way to make a positive impact on UN SDG2 (Zero Hunger) OR UN SDG6 (Clean Water and Sanitation)
- Team Name - VARP
- University - Birla Institute Of Technology And Science Pilani , Dubai Campus
- Mentor – Rishi Upadhyay
- Team Members :- Vikrant Mohan
  - Akshat Singh
  - Rishi Upadhyay
  - Parth Deshmukh



# Introduction to Nanotechnology in Agriculture : The Future of Farming



- Nanotechnology is a rapidly growing field that involves manipulating matter at the molecular and atomic level. It has the potential to revolutionize agriculture by improving crop yields, reducing the use of pesticides and fertilizers, and enhancing the nutritional content of food.



- 
- Nanotechnology can be used to develop sensors and other devices that can provide real-time data on soil moisture, nutrient levels, and other key factors in crop growth. This information can be used to optimize crop yields and reduce waste.
  - Nanoparticles can be used to detect and remove contaminants from soil and water. Nanosensors can also be used to monitor air and water quality, providing early warning of potential environmental hazards.

## Our Module

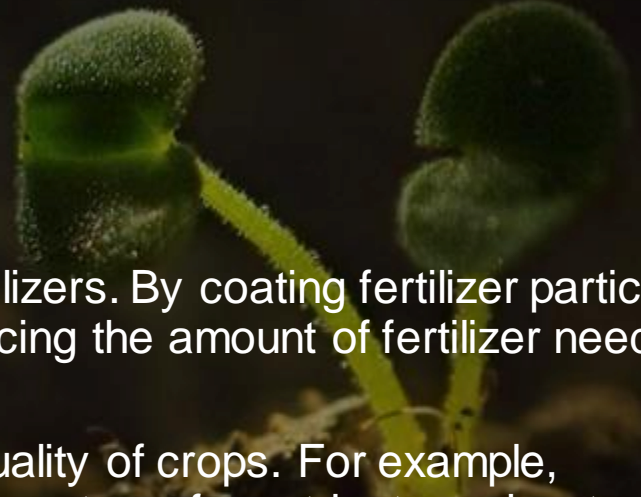
# Transport

- Food industries are leading in forming the food with good nutritive value. For example, high impermeable packaging nanomaterials are used for protection of food from UV radiations and providing more strength to maintain the food protected from environment, increasing their shelf lives. Nanosensors are used for the detection of chemicals, gases and pathogens in food. In modern terminology, a word is given to such type of packaging as smart packaging. Some studies suggested that people are not accepting the direct involvement of nanoparticles in food due to some risk factors. Therefore, it is needed to provide some safety measurements to reduce the risk and human safety.



# The Need Of Nanotech In The Agricultural Industry

- Nanoparticles can be used to improve the efficiency of fertilizers. By coating fertilizer particles with nanoparticles, they can be better absorbed by plants, reducing the amount of fertilizer needed and minimizing environmental impacts.
- Nanoparticles can also be used to improve the yield and quality of crops. For example, nanoparticles can be used to create more efficient delivery systems for nutrients and water, helping plants to grow faster and stronger. Nanoparticles can also be used to enhance the flavor, color, and texture of fruits and vegetables.
- Nanotechnology can be used to develop biosensors that detect diseases in livestock at an early stage, allowing for prompt treatment and prevention of outbreaks. Additionally, nanoparticles can be used to develop vaccines that are more effective and have fewer side effects.



# Revenue

- The revenue model for nanotechnology in livestock production includes the sale of nanoparticle-enhanced feed and diagnostic tools, as well as consulting services for farmers on the implementation of nanotechnology in their operations. Additionally, the use of nanotechnology can lead to increased efficiency and reduced costs in livestock production, resulting in higher profits for farmers.

# Impacts



- Nanoparticles used in agriculture can accumulate in soil and affect the soil microbial community, which can have long-term effects on soil health and fertility.
- Nanoparticles can also leach into groundwater and surface water, potentially contaminating water sources and affecting aquatic ecosystems.
- The use of nanotechnology in agriculture may also have unintended consequences on non-target organisms, such as pollinators and beneficial insects, which can disrupt ecosystem balance and biodiversity.





# Future and Scalability

- As nanotechnology continues to advance, its potential applications in agriculture are becoming increasingly apparent. In the future, we can expect to see even more widespread use of nanotechnology in crop and livestock production, as well as in environmental monitoring and remediation.
- Precision Agriculture
- One of the most promising areas of nanotechnology in agriculture is precision agriculture. By using nanosensors and other nanotechnology-based tools, farmers can gather more precise data about their crops and make more informed decisions about how to manage them. This can lead to increased yields, reduced waste, and more sustainable farming practices overall.
- Improved Nutrient Delivery
- Nanotechnology also has the potential to improve the delivery of nutrients to crops and livestock. Nanoparticles can be used to encapsulate and protect nutrients, allowing them to be delivered more effectively and efficiently. This can help to reduce the amount of fertilizer and other inputs needed for farming, which can in turn reduce costs and environmental impacts.
- Environmental Monitoring and Remediation
- Nanotechnology can also be used to monitor and remediate environmental issues related to agriculture. For example, nanosensors can be used to detect pollutants in soil and water, while nanomaterials can be used to remove contaminants from these same resources. By using nanotechnology in this way, we can help to mitigate the negative environmental impacts of agriculture and promote more sustainable practices.





Conclusion