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Use of Nano-technology in Agriculture

LECTURE NO :16



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16.1 Use of Nano-technology in Agriculture

- Agriculture has always been the backbone of the developing countries
- Nanotechnology is now emerging and fast growing field of science which is being exploited over a wide range of scientific disciplines including Agriculture
- A smarter way for sustainable agriculture appears to be nanotechnology



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16.2 Potential applications

- **Potential applications of Nanotechnology in Agriculture:**
- Increase the productivity using nanopesticides and nanofertilizers
- Improve the soil quality using nanozeolites and hydrogels
- Stimulate crop growth using nanomaterials
- Provide smart monitoring using nanosensors by wireless communication devices



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16.3 Nanotechnology in tillage

- Mechanical tillage practices improve soil structure and increase porosity leading to better distribution of soil aggregates and eventually modify the physical properties of soil.
- Nanomaterials usage increase soil pH and soil structure
- It also reduces mobility, availability and toxicity of heavy metals besides reducing soil erosion.



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16.4 Nanotechnology in Seed Science

- Seed is nature's nano-gift to man. It is self-perpetuating biological entity that is able to survive in harsh environment on its own.
- Nanotechnology can be used to harness the full potential of seed.
- Seed production is a tedious process especially in wind-pollinated crops.



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16.5 Nanotechnology in Water Use

- Water purification using nanotechnology exploits nanoscopic materials such as carbon nanotubes and alumina filters for nanofiltration
- It utilizes the existence of nanoscopic pores in zeolite filtration membranes, nanocatalysts and magnetic nanoparticles.



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16.6 Nanotechnology in Fertilizers

- Fertilizers have played a pivotal role in enhancing the food grain production in India
- Despite the resounding success in grain yield, it has been observed that yields of many crops have begun to stagnate as a consequence of imbalanced fertilization and decline in organic matter content of soils.
- Excessive use of nitrogenous fertilizer affects the groundwater and also causes eutrophication in aquatic ecosystems.



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16.7 Nanotechnology in Plant protection

- Nanoencapsulation comprises nano-sized particles of the active ingredients being sealed by a thin-walled sac or shell (protective coating).
- Nanoencapsulation of insecticides, fungicides or nematicides will help in producing a formulation which offers effective control of pests while preventing accumulation of residues in soil.



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16.8 Nanotechnology in Weed Management

- Multi-species approach with single herbicide in the cropped environment resulted in poor control and herbicide resistance
- Continuous exposure of plant community having mild susceptibility to herbicide in one season and different herbicide in other season develops resistance in due course and become uncontrollable through chemicals



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THANK YOU