Application of nanotechnology in Environment and Agriculture

Nanotechnology is making significant improvements in technologies for protecting the environment.

Nanoscale devices are being used for enhanced sensing, treating and remediating environmental contaminants.

Nanoscale Developments in the Environment

1.Nanosensors can be used to detect and track pathogens (germs), contaminants, nutrients, environmental characteristics (light/dark, hot/cold, wet/dry), heavy metals, particulates, and allergens.

Nanotools can track agricultural products and improve their quality by detecting pesticides, fertilizers, and biological events.

2.Nanodevices can be used to extract unwanted agricultural byproducts from soil and water.

3.Nanocatalysts will bioprocess waste into food, feed, industrial chemicals, biofuels and energy.

(Catalysts are molecules that can quicken the speed of a chemical reactions by factors.

4.Nano-filters and nano-bioreactor can be used to study enzymes and microbes in compost systems.

5.Trends in nanotechnology can be utilized to clean up toxic waste sites.

Researchers have developed sponge-like nanoporous materials that will clean up pollutants in air and water, and break down toxic wastes therefore reducing greenhouse gases.

Cleaner Water with Nanotechnology

1-Nanotechnology can clean contaminated drinking water cheaply and simply enough to use in developing countries.

2-Researchers have developed nanocrystalline photocatalysts that purify water by accelerating a reaction that requires light.

3-Pipes might be coated with nanoparticles to weaken pollutants as they pass through.

Nanotechnology in Agriculture

Uses for nanotechnology in food

-Nanotechnologies are being developed all the time. Here are some examples that are being used:

-nanocarrier systems for delivery of nutrients and supplements;

-organic nano-sized additives for food, supplements and animal feed;

-food packaging applications e.g. plastic polymers containing or coated with nanomaterials for improved mechanical or functional properties;

-nanocoatings on food contact surfaces for barrier or antimicrobial properties;

-nano-sized agrochemicals (a chemical used in agriculture, such as a pesticide or a fertilizer.);

-nanosensors for food labelling.

Food examples

-Nanoparticles are being used to deliver vitamins or other nutrients in food and drinks without affecting the taste or appearance.

-These nanoparticles encapsulate the nutrients and carry them through the stomach into the bloodstream.

-Nanoparticle emulsions are being used in ice cream and various spreads to improve the texture and uniformity.

-It provides healthier foods (e.g. lower fat, lower salt) with desirable sensory properties;

Packaging examples

-Researches have produced smart packages that can tell consumers about the freshness of milk or meat.

When oxidation occurs in the package, nanoparticles indicates the colour change and the consumer can see if the product is fresh or not.

Incorporation of nanoparticles in packaging can increase the barrier to oxygen and slow down degradation of food during storage..

-Bottles made with nanocomposites minimise the leakage of carbon dioxide out of the bottle.

-Food storage bins have silver nanoparticles embedded in the plastic.

The silver nanoparticles kill bacteria from any food previously stored in the bins, minimising harmful bacteria.