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Editorial

# Recent Scenario in Agricultural Sciences: A Pathway to Sustainability

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Agricultural sciences are continually developing, with breakthroughs and challenges defining the future of food security and sustainability. Following are some current trends, problems, and advancements in the agriculture field

## Recent trends in agricultural sciences

- Precision Agriculture utilizes AI, IoT, and drones to optimize inputs such as water, fertilizer, and pesticides.
- Vertical and Urban Farming: CEA uses hydroponics and aeroponics to grow crops in urban areas.
- CRISPR-Cas9 gene editing enables the creation of disease-resistant, high-yield, and climate-resilient crops.
- Regenerative agriculture uses practices as cover cropping, decreased tillage, and agroforestry to improve soil health and carbon sequestration.
- Enhancing supply chain transparency, traceability, and fair trade practices.

## Challenges in agriculture

- Climate change impacts crop production and food security through rising temperatures, variable rainfall, and extreme weather events.
- Excessive use of synthetic fertilizers and pesticides causes soil degradation, reducing fertility and biodiversity.
- Increasing pest and disease resistance in *Helicoverpa armigera* and *Spodoptera frugiperda* to conventional insecticides and Bt crops.
- Excessive use of groundwater and diminishing freshwater resources for agriculture. Declining Pollinators: Bee population reduction impacts agriculture output.

## Advancements in agricultural sciences

- Developing drought- and salt-tolerant agricultural types using biotechnology.
- Biopesticides and biological control methods include *Bacillus thuringiensis*, *Trichoderma* sp., parasitoids like *Bracon hebetor*, and predators such as ladybird beetles.
- RNA interference (RNAi) technology is a novel pest control method that targets particular genes in insect pests.
- AI-driven drip and sensor-based irrigation improves water efficiency.
- Innovations in lab-grown meat and plant-based protein sources aim to minimize dependency on traditional animal production.