Khet Bachao Abhiyan Series: ICAR RCER, Patna

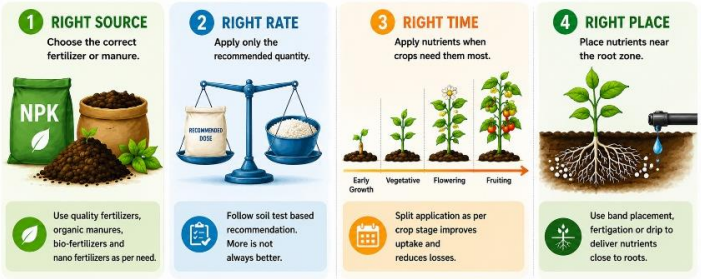
ICAR-Research Complex for Eastern Region, Patna

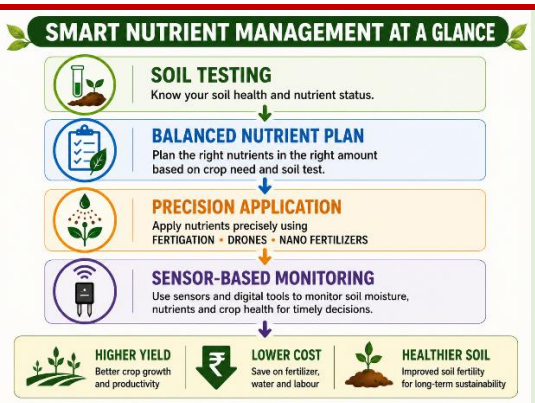
No-6: Smart Nutrient Management: Saving Fertilizer - Improving Yields

Rising fertilizer prices and declining soil health are major concerns for farmers today. Applying more fertilizer does not always result in higher yields; instead, it often increases costs and nutrient losses. Smart Nutrient Management (SNM) helps farmers apply the right nutrients, in the right amount, at the right time, resulting in better crop growth, improved soil health, and higher profits.

The first step towards smart nutrient management is understanding the nutrient status of the soil through soil testing. Based on soil test results, fertilizers can be applied according to crop requirements rather than following a fixed dose for every field. Organic sources such as farmyard manure, compost, vermicompost, crop residues, and biogas slurry can supplement chemical fertilizers and improve soil fertility.

Modern technologies are making nutrient management easier and more efficient. Nano fertilizers improve nutrient delivery with lower quantities. Drip fertigation supplies water and nutrients directly to the root zone, reducing losses. IoT-based soil moisture sensors and automatic irrigation systems help farmers apply water and nutrients only when needed. Drones can be used for uniform spraying of liquid fertilizers and micronutrients, reducing labour requirements and ensuring timely application. Mobile advisory services also provide location-specific recommendations on fertilizer use.





Why Adopt Smart Nutrient Management?

- ✓ Save 10–20% fertilizer
- ✓ Improve crop growth and quality
- ✓ Increase fertilizer-use efficiency
- ✓ Improve soil organic matter
- ✓ Reduce nutrient losses and pollution
- ✓ Increase farm profitability

Smart Technologies for Farmers

- ✓ Mobile-based nutrient advisories
- ✓ Drip fertigation systems
- ✓ Nano fertilizers
- ✓ IoT soil moisture sensors
- ✓ Drone-based fertilizer spraying
- ✓ Composting and vermicomposting units

From Traditional to Smart Nutrient Management

Traditional Practice	Smart Practice	Benefit to Farmers
Same fertilizer dose for all fields	Soil test-based fertilizer recommendation	Lower fertilizer cost and balanced nutrition
Entire fertilizer applied at sowing	Split application according to crop growth stage	Better nutrient uptake and reduced losses
Dependence mainly on urea and DAP	Balanced NPK, micronutrients and nano fertilizers	Improved crop growth and yield quality
Irrigation on fixed schedule	Sensor-based irrigation and fertigation	Savings in water and fertilizers
Nutrient deficiency noticed after visible damage	Mobile apps and sensor-based crop monitoring	Timely corrective action
Crop residues and animal wastes discarded	Composting, vermicomposting and nutrient recycling	Improved soil fertility and organic matter
Manual or uniform fertilizer spraying	Precision application (based on soil test values) through fertigation and agri-drones	Reduced labor and uniform nutrient distribution

Key Message

Smart Nutrient Management is not about using more fertilizer—it is about using fertilizers and organic resources more wisely. By combining soil testing, balanced fertilization, organic nutrient recycling, and timely nutrient application, farmers can improve crop productivity, maintain soil health, and increase farm income in a sustainable manner.

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