



ICRISAT

# Soil Health Management



## Background

- Soil health can be defined as the continued capacity of soil to function as a vital living system to sustain biological productivity, maintain environmental quality, and promote plant, animal, and human health.
- Most of the dryland population relies on agriculture for their livelihood. As such maintaining soil health is crucial.
- Globally, soil degradation is a major issue that includes soil erosion, nutrient and soil organic matter depletion, water scarcity, increased salinity built up mostly due to poor quality irrigation water.
- The removal of nutrients over time has left dryland soils with widespread multi-nutrient deficits, according to several studies undertaken by ICRISAT. Some secondary and micronutrients have been depleted below their critical limits, adversely affecting the nutrient and water use efficiency of soils.

- Soil health management promotes integrated nutrient management through the judicious use of chemical fertilizers including secondary and micronutrients in conjunction with organic manures and biofertilizers.



## Key Achievement

ICRISAT launched a Soil Health Management program 'Bhoochetana' (Revival of the soils) to mainstream micronutrient application policy across large states such as Karnataka and Odisha in India.

### Bhoochetana - Karnataka: The beginning

The project was initiated in Karnataka in 2009 across six districts with 200,000 farmers. The project positively impacted over **26,000 villages** and **4.2 million farmers**.



- Soil nutrient mapping for macro and micro-nutrients based on **100,000 soil samples** analyzed at ICRISAT
- Benefit-cost ratio: **3-14:1**
- **20 – 66%** increase in crop yields
- **US\$ 453 M** in net benefit accrued in 7 years
- **>5% rise** in agriculture growth since 2009

### Bhoochetana-Odisha: Scaling up

During 2018 – 2021 the Government of Odisha and ICRISAT successfully upscaled technologies to enhance crop productivity through the adoption of soil test-based nutrient application.

- Analysis of **40,265** georeferenced soil samples from across 30 districts while estimating their nutrient status was achieved.
- A web-based application was developed using a database of **40,265 soil** samples which used soil fertility indices and crop-wise fertilizer recommendations. Soil health cards were issued to farmers.
- A soil atlas "*Mapping the nutrient status of Odisha's soils*" to show the nutrient status of different types of soils across all regions of the State was released.



### ICRISAT's Capability

ICRISAT is a globally recognized leader in sustainable soil health management and offers:

- **Soil test-based fertilizer recommendations:** provides soil test-based nutrient recommendations and crop response incorporating risk and economic return



- **Build-Operate-Transfer (BOT):** ICRISAT can follow the BOT model for soil laboratories through public-private partnerships or through government agreements
- **Capacity Building:** Training of soil testing laboratory staff in the areas of geo-referenced stratified soil sampling and analysis using Standard Operating Procedures (SOPs) of soil analysis along with the interpretation of results and preparation of soil health cards
- **Advanced Geographic Information System (GIS) tools:** Guides in the handling of the analysis of data and its utilization for GIS map preparation
- **Integrated Soil Fertility Management (ISFM):** ICRISAT can facilitate an ISFM project, prepare the strategy for implementation and provide guidance and technical support for undertaking productivity enhancement activities.



### The Way forward

ICRISAT aims to further engage farmers, researchers, and extension specialists to scale up best soil management practices in the drylands for enhanced food security and environmental sustainability.