

# Integrated Nutrient Management Options



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- Food security
- Fodder security
- Energy security
- Power security



- ❖ PRA and RRA
- ❖ FGDs to prioritize constraints
- ❖ Verification using suitable diagnostic tools



## Diagnosis of soil fertility problems for enhancing crop production

Locations	No. of farmers fields	Extractable Zn ( $\mu\text{g g}^{-1}$ )		Extractable B ( $\mu\text{g g}^{-1}$ )		Extractable S ( $\mu\text{g g}^{-1}$ )		
		Min	Max	Min	Max	Min	Max	
<b>Andhra Pradesh</b>								
Nalgonda	176	0.08	2.20	0.02	0.8	1.4	50.5	
(% deficient fields)		94		99		89		
Mahabubnagar	262	0.12	1.38	0.02	0.74	1.1	30.8	
(% deficient fields)		83		98		89		
Kurnool	223	0.10	1.18	0.04	1.48	1.3	24.7	
(% deficient fields)		81		92		88		
<b>Madhya Pradesh</b>								
Vidisha	12	0.16	0.96	0.65	1.2	3.2	5.35	
(% deficient fields)		92		0		100		
Dewas	24	0.12	0.56	0.2	0.8	3.9	9.5	
(% deficient fields)		100		96		100		
Guna	18	0.24	1.74	0.6	2.2	2.6	14.2	
(% deficient fields)		78		0		89		



## INM Strategy

- ❖ Strategies to manage soil organic matter
  - ❖ Vermicompost
  - ❖ Composting
  - ❖ In-situ generation of green matter
- ❖ Organic inputs for nutrient management
  - ❖ Agricultural residues
  - ❖ Sericultural residues
  - ❖ Animal manures
  - ❖ Dairy and poultry wastes
  - ❖ Food industry wastes
  - ❖ Municipal solid wastes
  - ❖ Biogas-sludges from sugarcane factories



# Vermicompost Preparation



# Vermicompost Preparation



# Precautions

- ❖ Use only plant materials such as vegetable peelings, leaves, or grass.
- ❖ Remove glass, metal, and plastic materials from the organic material.
- ❖ Protect against birds by covering mesh on the rings.
- ❖ Sprinkle the water intermittently and maintain adequate moisture.
- ❖ Prepare compost under shade to protect from sun and rain.



# In-Situ generation of Organic Matter



*Gliricidia plants grown on border of chickpea field under rainfed situation in India*



# Biological Inputs for Nutrient Management: BNF

- Beneficial microorganisms
- Nitrogen fixing microorganisms
- $\text{PO}_4$  – solubilizing microorganisms
- *Mycorrhizae*
- Plant growth promoting *rhizobacteria* (PGPR)



Management Practices to improve plant growth and BNF in soil

- Use high nitrogen-fixing crops/varieties
- Practice mixed and intercropping (row and strip) with legumes
- Use appropriate tillage practices, landform treatments and nutrient amendments
- Inoculation with efficient inoculants



# Mineral Fertilizers

- Use appropriate mineral fertilizers based on soil analysis as INM component
- Form or type – as recommended for the crop
- Method – furrow placement and covering with soil instead of broadcasting
- Time – split N doses instead of one application
- Quantity – just sufficient to meet plant demand without adversely affecting biological nitrogen fixation



# Recommendations for Practitioners

- ❖ Undertake detailed soil analysis to identify soil fertility constraints limiting crop production
- ❖ Develop suitable nutrient management recommendations from soil analysis results and share knowledge with the farmers and stress the need for adopting INM strategy to maintain fertility and productivity
- ❖ Use participatory research and development (PR&D) approach
- ❖ Optimize and harness full potential of available biological and organic sources and use chemical fertilizers only to supplement the gap in the nutrient requirements of the production system
- ❖ Adopt holistic rather than compartmental approach for sustainable development



# Policy and Financial Incentives

- Enabling policies and incentive mechanisms for greater adoption of INM practices.
- Timely availability of quality products and knowledge on quality products and sustainable INM practices to the farmers, by establishing appropriate institutions.
- Enabling policies and mechanisms to produce, distribute and use various sources of different plant nutrients.





**Thank You**