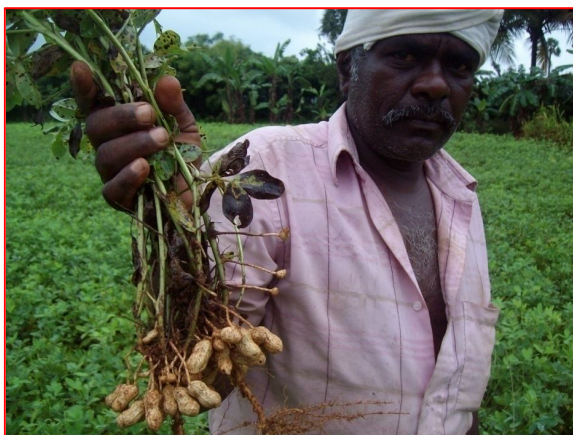


INTEGRATED NUTRIENT MANAGEMENT FOR GROUNDNUT BASED CROPPING SYSTEM IN SEMI-ARID REGION

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Indiscriminate use of chemical fertilizers for the supply of major nutrients and declining use of secondary nutrients and organic sources of inputs over time led to the deficiency of secondary and micronutrient, particularly boron and zinc are emerging as one of the major constraints for sustainable production in rainfed areas.

Groundnut is the major crop under oilseeds accounting for 8.36% of the total cropped area in Tamil Nadu. But the average yield of groundnut in most of the areas is still extremely low when compared to those prevailing in other parts of the country.

The reasons for low groundnut yield are the use of low yield potential varieties, poor soil fertility and nutrient management. Groundnut performs better in terms of yield and quality when good cultivars are sown under optimum nutrient management coupled with organic and inorganic nutrient management. Groundnut is capable of fixing atmospheric nitrogen with the help of the bacteria *Rhizobium*. Applications of fertilizer including gypsum in adequate quantities become more essential for obtaining higher yields. Even though use of improved variety is common in case of maize, zinc deficiency reduces the maize yield by 20 percent.

Caste study in Ayalur Watershed

Groundnut - fallow or maize - fallow is the predominant cropping system in rainfed area in Ayalur watershed, Erode district, Tamil Nadu. Nutrients such as boron and zinc are important to plant growth and yield of groundnut and maize, respectively, which are

deficient in the watershed. Traditional cultivation practices, coupled with poor quality seeds and varieties resulted in low crop yields. Average productivity of groundnut crop during good rainfall year is around 800-900 kg ha⁻¹ against the potential yield of 1916 kg ha⁻¹ in rainfed condition. This watershed area is characterized by low input use and even farm yard manure is applied only in little quantity.

Activities

Demonstrations were carried out successfully by the Central Soil and Water Conservation Research & Training Institute (CSWCRTI), Research Centre, Udhagamandalam, Tamil Nadu on integrated nutrient management (INM) and improved varieties in rainfed groundnut and maize, for increasing the crop productivity, in Ayalur Model Watershed, Erode District, Tamil Nadu developed under Macro-Management of Agriculture (MMA-NWDPR) programme of the Ministry of Agriculture, Govt. of India.

Based on the nutritional deficiency identified in the fields in the watershed, fourteen farmers evaluated the response to Integrated Nutrient Management (INM) for groundnut and maize in participatory mode. For groundnut, along with the recommended dose of chemical fertilizer (10:10:45 kg NPK ha⁻¹), bio fertilizers (*Rhizobium* and *Phosphobacteria*, each 2 kg ha⁻¹), gypsum (200 kg ha⁻¹) and boron (5 kg ha⁻¹) were applied in the demonstration fields. In case of maize, along with the recommended dose of chemical fertilizers (60:30:30 kg NPK

ha⁻¹, bio fertilizer (*Azospirillum* and *Phosphobacteria*, each 2 kg ha⁻¹) and ZnSO₄ @ 25 kg ha⁻¹ were applied. Farmers used improved CO 6 and COH (M) 4 variety, respectively for groundnut and maize cultivation. On each farmer's field, four plots measuring 0.1 ha were used for experimentation.

Benefits

The average yield and additional benefit obtained from different farmers for different interventions in groundnut is given in table 1.

Table 1. Response of groundnut to INM

Interventions	Yield (kg ha ⁻¹)	Additional yield (kg ha ⁻¹)
Farmer's practice	1078	-
Local variety with INM	1345	267
Imp. variety only	1265	187
Imp. variety with INM	1650	572

An average additional yield of 24% was obtained when the farmers practiced INM with their local variety. And an additional yield of 17% was realized when they used improved variety even without INM compared to their practice of using local variety without INM. The increase in groundnut was still higher (53%) when they practiced both improved variety and INM.

Additional return of Rs 5875 per ha and 5445 per ha was realized due to the practice of

INM in local variety and use of improved variety, respectively.

Table 2. Additional benefit in groundnut

Interventions	Additional cost (Rs. ha ⁻¹)	Additional income (Rs. ha ⁻¹)
Farmer's practice	-	-
Local variety with INM	3470	5875
Imp. variety only	1100	5445
Imp. variety with INM	4570	15450

When the farmers practiced both improved variety and INM, they got an additional return of Rs 15450 per ha.

In order to utilize both monsoon effectively, long duration (180 days) red gram variety CO6 was inter cropped with groundnut variety CO 6 (110 days) duration at 10:1 ratio. Higher groundnut equivalent yield (3408 kg ha⁻¹) and rain water use efficiency (3.98 kg ha⁻¹ mm) was achieved with groundnut + red gram intercropping.



Good groundnut crop under INM

In case of maize, 22 per cent increase in yield (5500 kg ha⁻¹) was achieved with improved practices. Rain Water Use Efficiency (RWUE) was also 22 per cent higher compared to the farmer's practice. An additional benefit of Rs 8000 ha⁻¹ was achieved over farmer's practice when hybrid seeds and INM were adopted.

Table 3. Response of maize to INM

Particulars	Farmer's practice	INM
Yield (kg ha ⁻¹)	4500	5500
Additional yield	-	1000
Additional cost (Rs)	-	2747
Additional benefits (Rs)	-	8000
RWUE (kg ha ⁻¹ mm)	10	12.2



Good maize growth under INM

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