

Soil health is the basis

Backed with more than 80 years of research on the role of fertilizers in maintaining productivity and soil health, researchers from Tamil Nadu Agricultural University (TNAU) are developing 'Integrated Nutrient Management'. Rani Perumal reports on their findings.

Rani Perumal

Research in India shows that continuous use of fertilizers deteriorates soil fertility and reduces crop yield. Besides, fertilizer prices have escalated, due to lowering subsidy with 40% since August 1992. Fertilizers were not available to farmers at critical phases of crop growth; nutrient imbalances were caused by rapid and one-sided increase in the use of nitrogen fertilizer. Farmers respond to these drastic changes by looking back to traditional practices. They increase the use of organic material again for fertilization and soil health, supported by researchers who develop Integrated Nutrient Management (INM). This is based on the judicious use of organic, mineral and microbial fertilizers to build soil fertility. Not only crop productivity and pollution hazards are minimized, but also farmers' fertilizer bill. Recommendations for various crops are developed, based on applying mineral fertilizers, micronutrients, organic manures and industrial wastes with appropriate microbial inoculants to promote N-fixation and P-mobilization. But soil health remains the basis.

Soil healthcare

Of all cropped areas of Tamil Nadu, 70% is rainfed and the rest is irrigated. The soils are low in organic matter (<2%) due to climatic and environmental influences. The only way to overcome the low fertility status, is to accelerate the soil's natural recuperation processes by using organic manures or by cultivating green manures. Organic material is a source of food for soil microorganisms which are responsible for the breakdown of plant and animal remains, ultimately forming humus. Applying only mineral fertilizers will result in the depletion of soil humus and consequently in the progressive decline in soil fertility. Continuous cropping and monocropping influences soil fertility as it causes drastic ecological changes in the soil-crop environment, because the buffering effect of the biological control decreases considerably. Clearly, sustained productivity can only be attained when organic material is the basis for soil health and productivity.

Effect of mineral and green manure of Nitrogen & bio-inoculant on rice grain yield & economics.

Treatments	Yield in kg/ha	% increase over control	Cost-benefit ratio of yield increase
1. Control	3867	-	-
2. 100 kg N/ha (Urea)	4563	18	2.9
3. 75 kg N/ha (Urea) 25 kg N/ha (from Cassia)	5170	34	6.5
4. 50 kg N/ha (Urea) 25 kg N/ha (from Cassia) 25 kg N/ha (from Azospirillum)	4883	26	7.7

Paddy: Rs.2.50/kg; Urea: Rs.6/kg; Cassia: Rs.2; Azospirillum Rs. 1.20.

Tamil Nadu is one of the States in India interested in nutrient recycling and more efficient use of biological sources in agriculture. Scientific research by TNAU on soil fertility dates back to 1909. Continuous application of mineral fertilizers alone resulted in lower yields, besides declining soil health, while the same mineral nutrients along with organic fertilizers improved or maintained soil health. TNAU researched numerous methods for integration of nutrients: farm yard manure (FYM), compost, coirpith, sewage sludge, sewage effluent, pressmud, green manure, crop residues, non-edible oil cakes and biofertilizers. It concludes that soil physical properties, moisture retentivity and micronutrients status improved and that microbes benefit from organic fertilization.

Organic manures also help in supplying micronutrient demands (Zn, Cu, Fe and Mn). These are important for productivity and soil health. A ragi-cowpea-maize sequence showed that adding only 10 tons FYM per ha increased the grain yield by 15-20% over that of inorganic fertilizer alone (Perumal 1991).

One third organic

Based on the availability of organic material in the farms of marginal and poor farmers, and on research findings, one third organic is recommended and farmers are adopting this practice. If the availability of organics on the farm increases or if it is possible to transport organic material from nearby, the use of mineral fertilizers is reduced even more. A reduction of 20 to 25% in N mineral fertilizer use is possible. The table shows how this also leads to increased benefits.

The information is passed on to farmers through extension personnel of TNAU and through the State Dept. of Agriculture. Many farmers adopt certain modes of INM. Nearly 35-40% of averagely poor farmers in Tamil Nadu and about 60-70% of the rich farmers adopted INM. In addition, particularly nitrogenous bio-inoculants as biofertilizers are being used by farmers to save 20 to 25 kg N per ha of mineral fertilizer. Organic, mineral and biofertilizers are not pollutants of soil, water, air, crop and foods if they are applied in an integrated manner. The vital importance of balanced fertilization is accepted by most scientists. Now it's time new policies focus on soil fertility based growth in agriculture.

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Reference

- Perumal, R. et al, 1991. **Integrated Nutrient Management in Tamil Nadu**. Dept. of Soil Science and Agricultural Chemistry, TNAU, Coimbatore 641 003, India.

MY VIEW

Organic farming is feasible and recommended only to the poor farmers of India, who cannot afford to invest in mineral fertilizers, particularly after the price escalation. These farmers have access to naturally available organic manures in villages (coirpith, cattle manure, pressmud, sewage, night soil, green manure, leaf manure). Transport costs can be saved by using hand and bullock drawn carts available with farmers. Regionwise, organic resources available may be recycled. For others INM, which includes 75-50% of the recommended dose of mineral fertilizers with organics or organics cum biofertilizers, is the best recommendation.