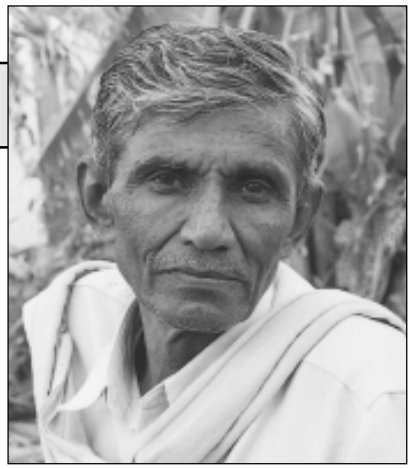
The Narayana Reddy Column



Natural regeneration processes at work

Modern agriculture technology has imposed many external inputs like machinery for cultivation, hybrid seeds, chemical fertilizers, pesticides and herbicides to improve crop production. These technologies, though have resulted in better yields for a short duration have necessitated use of more and more high cost inputs including the scare resource, water. Among all the inputs to improve crop yields, the requirement of fertilizer or plant nutrition is the most important myth. The plant nutrition requirement might have been recommended, thinking that plants get nutrition only from the manure provided from external resources. It is said that 8 tonnes of nitrogen is available in 1 square meter space. Indian soils contain enough phosphorous, adequate for 20 more years. If the crop residues are recycled back into the soil, 80% of potash requirement is met.

It is also said that 1 square millimeter of soil area would contain 4 cubic meters of root and each gram of root would accommodate 1 billion micro-organisms. It is an inter-woven or inter-dependent obligation with each other. The root excretion and dead roots are food for the organisms and biological activity around the root will convert minerals into plant nutrients. For example, earth worms can multiply 6 times in a day, feeding on crop residues, improving nitrogen by 5 times, phosphorous by 7 times, potash by 11 times, magnesium by 2-1/2 times, calcium by 2 times besides producing many enzymes that help soil micro-organisms. Hence, a natural self-regenerating system has been existing ever since the evolution of the universe. If all the crop residues were recycled back into agricultural land, there will not be any necessity for manuring.

The System of Rice Intensification (SRI) is a very good practice that results in getting maximum benefit for the crop yield. The main reasons for higher yields with SRI method of paddy cultivation are (1) transplanting 10-12 day old seedling or direct sowing of paddy (2) spacing from row to row and also plant to plant at 25 X 25 cms or 30 X 30 cms (3) water management. Here, water management plays the most important role. Importantly, 50% to 60% water can be saved. This is because, for about 80 days from seeding or transplanting, we maintain only 60% moisture in the soil instead of submerging the field with 2-4 cms deep water. Then, between the last 80th and 110th days, we increase the soil moisture to 80%. Since the rice field is not submerged in water during all the 110 days, plenty of oxygen is available both for the soil organisms including earth worms and also for roots of paddy plants. Soil aeration is therefore more important than water and plant nutrition. Most importantly, it is the congenial atmosphere provided for the organisms in the soil, which convert biomass into humus or plant nutrition. This happens in the soils where organic farming practices are adapted. With water submergence, not only will the soil organisms be eradicated, but also the physical, chemical and biological activities would not take place. Thus, the benefit of applying organic manures is also lost. Also, due to crust formation and hardening of the soil, the plants suffer from inadequate supply of oxygen.

Therefore, any person involved in agriculture and has interest in saving the mother earth in its natural and sustainable form should provide harmonious and congenial situation in the soil by protecting the humus or soil carbon content, to a minimum levels of 2%. In tropical weather, the rate of soil carbon mineralisation is high. It is said to be between 8 to 10 tonnes per year per acre. This mineralisation is being doubled each year with the use of nitrogenous chemical fertilizers. That is the reason our soil carbon or humus content has come down from 3% to less than 0.5% in most cases, during the past 50 years of using chemical fertilizers. Therefore, it is very important to put an end to the use of chemicals and resort to practices like mulching for protecting the soil moisture to a maximum extent possible. It is more important to recycle all the agriculture waste and incorporate green manure to increase the humus content in the soil, which provides shelter and food for the organisms in the soil. It also increases the capacity of oxygen availability and water retaining capacity of the soils.

Let us not be under the illusion that we should grow crops by providing mineral fertilizers and irrigation only. It is important to maintain the natural regenerating process with relationship between the roots and soil organisms. This is being done from ages and that is the same biological process that would meet the basic needs of the universe in future also.

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