Watech-2013
International Exhibition and Conference on
Water Technologies, Environmental Technologies & Renewable Energy
February 13-14, 2013 Bombay Exhibition Centre, Mumbai, India

Innovative application of scientific facts for development of universally applicable water technology for enhanced global food production and environment protection

R.C. Yadav

Bahir Dar University, Ethiopia

Abstract

Soil, water and environment constitute medium for plant growth and primary food production. Plants absorb macro nutrient such as N, P, K, and water in liquid form by absorption process operated by potential gradient. The nutrient preparation readied for uptakes follow set principles of decompositions, governed by sulphur cycle, nitrogen cycle and absorption of toxic gases and adsorption of salts etc, prominently, used in environmental engineering activities. While the principles of functioning of decomposition are fixed, their modus operandi and paths are modified by the surrounding factors convened by external and internal heritance of the plants and soils etc. Under anaerobic decomposition, methane, hydrogen sulphide and carbon dioxide are released , which become harmful to plants and the environment. Likewise, nitrate leaching and loss in flowing water leads to blue baby disease and fish kills in the ponds and even lakes,when accumulated and joins respective food chain. However, these facts have not come to the minds of water technologists so far and water conservation volumes have been sole basis of devising mode of application of irrigation or rainfall supplemented water. This study sets paths of principles of the scientific facts that are useful for creating favorable environment to produce high yields. The crux of the development is that all decomposition process occurring on the principle of sulphur cycle should go aerobic. Likewise, the nitrogen cycle should produce nitrates at crop growth stage when plants require high absorption of nitrogen in the form of nitrate. Incidentally, the nitrate is highly moveable and gets lost with flowing water. Therefore, water should be applied in quantity and form that it remains conducive for both the situations of sulphur and nitrogen cycle to function in desired manners. Formation of NADEP green manure composting or mere NADEP composting will have to go in practice to convene favourable substrate to promote N , P and K uptake by plants. These requirements demand a specific type of irrigation and plant bed configuration. The toxic gases and salts when emitted at high rate should be provided with suitable treatment to get absorbed. Using the set requirements, specifications for the manifestation of the innovative water technology is devised. Using the published data the utility of the innovative practice is substantiated. Finally, universally applicable most ideal water conservation technology with nutrient supplementation modules is developed. The examples of cases of practices for prominent crops viz. for rice- wheat cropping system, supplementing global staple food are prescribed. In this domain the water technology comprises raised bed to have large volume of water storage, well aerated but not submerged, and frequently irrigated by sprinkling. By sprinkling harmful gases such as, CO_2, H_2S and CH_4, present in water get removed and oxygen dissolved that promotes aerobic action in the soil. Such raised bed and sprinkling irrigation water have never been imagined to be the best practice of irrigation to conserve water and bring maximum yield. This will form new generation irrigation / rain water management technology. While mode of the form is clear from the application of scientific facts, it requires optimization of the form under generation II (2G) research on water technology.

The weighting factors are assigned to take account of customization with regard to local site, technological and socio-economical condition. How much close to the ideal situation the customization is, it will be possible to indicate efficiency of water, nutrient, sunlight, air, and land use efficacy. The new innovative practice has redundened earlier water technologies and made a new beginning in this domain. The innovative practices will conserve water, enhance productivity and protect environment. It requires carry out optimization of factors under varying site conditions and prescribes limits of input, output and retention of nutrient and water in global food production. The new knowledge intensive water technology will go long way in generation II (2G) agriculture.