

# SOIL HEALTH FOR OUR FUTURE SUSTAINABILITY

**W**e all know that healthy soils are critical for plants, animals and human health. Hence, since COVID-19 pandemic, concept of 'One Health' has assumed great importance. Mother earth nurtures all the living beings through air to breathe, water to drink, food to eat and shelter to live. Unfortunately, the demographic pressure had doubled in 19th century due to the Industrial Revolution, which further tripled in 20th century resulting in a total of eight billion people. Although India has attained self-sufficiency in food grain production, there still remains SDG challenges of achieving zero hunger, and no poverty. Despite six and half fold increase in food grain production (330 million tons), about 15 per cent people are still below poverty and around 40 per cent of children below 5 years of age suffer from chronic and hidden hunger caused by nutritional deficiency. One of the key reasons of malnutrition is the soil nutrient deficiency that occurred over the years due to overexploitation of natural resources (soil, water, biodiversity, etc.). Infact, the inadequate and imbalanced nutrition in the soil is limiting crop productivity and affecting adversely the nutritional quality of our food. The 2021 food crisis in Sri Lanka as a result of ban on import of inorganic fertilizers is a glaring example as to how soil health can affect national economy.

## India Needs Regenerative Agricultural Practices

The gradual decline in soil organic matter (SOM) specially in the Green Revolution region is already affecting soil health as well as agricultural sustainability. Soils act as carbon (C) sinks, and play an important role towards mitigation of greenhouse gas (GHG) emissions. Also, we need to recognize that lack of attention and policy support to soil health would adversely affect our agri-food security. Meeting future food demand would be a great challenge in the face of rapidly depleting natural resources, especially the soil health. The very realization that farmers are to be associated with soil health initiatives such as: soil health cards (SHC) and public-private partnership like Bhoochetna, would enable us to regenerate soils in north-western region. The UN Food Systems Summit (2021) and G-20 held recently in India also recognized an urgent need for regenerative agricultural practices aiming at improved soil, plant, animal and human health (one health).

## One Health Demands Good Soil Health

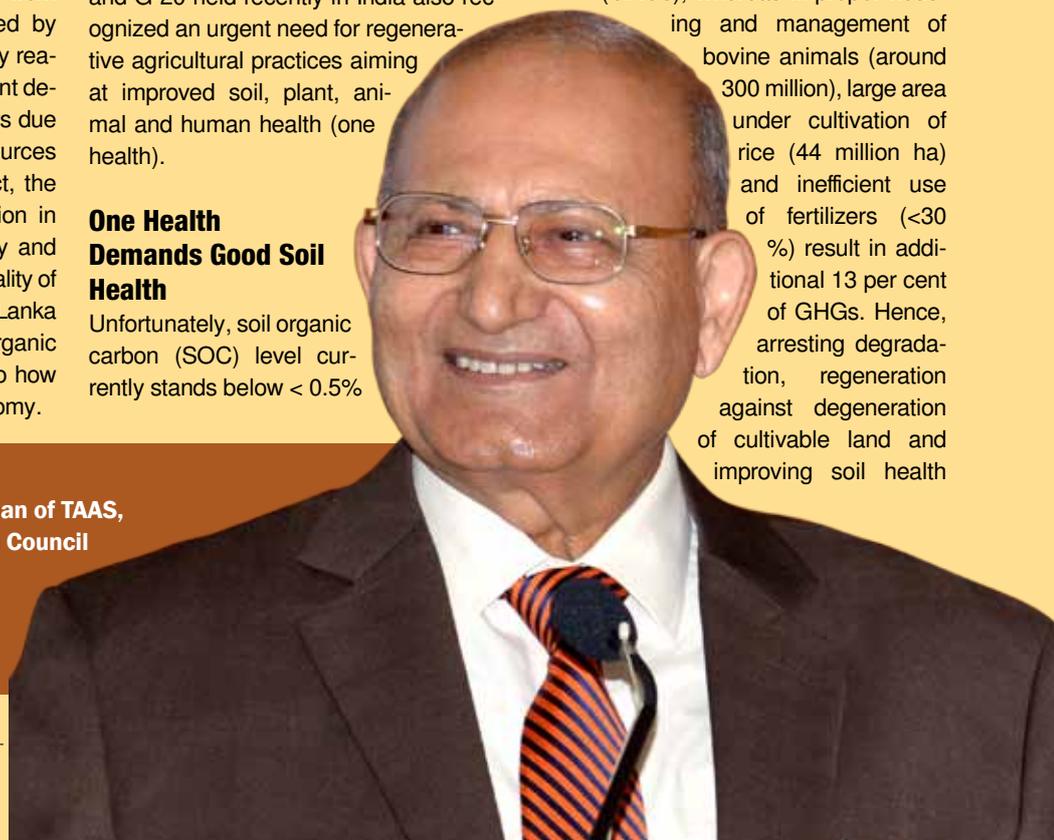
Unfortunately, soil organic carbon (SOC) level currently stands below < 0.5%

nearly 55 per cent of the Green Revolution belt (Punjab, Haryana and Western U.P.) due to existing exploitative agricultural practices that are unsustainable. Already, the factor productivity has declined, and the imbalanced use of nutrients with increasing deficiency of micronutrients is affecting the productivity of plants, animals and humans. Earlier, farmers could harvest 32 kg foodgrain from one kg of nitrogen applied, but now they get around 12 kg only. Existing fertilizer subsidy provisions also favour more use of nitrogenous fertilizers, resulting in imbalanced use of macro-, and micro-nutrients. The low nitrogen use efficiency (NUE), around 30 per cent only, is further affecting both production and income of farmers. India accounts for 10 percent of global 1.0 billion ha degraded land. Land degradation alone causes 11 per cent of greenhouse gases

(GHGs), whereas improper housing and management of bovine animals (around 300 million), large area under cultivation of rice (44 million ha) and inefficient use of fertilizers (<30 %) result in additional 13 per cent of GHGs. Hence, arresting degradation, regeneration against degeneration of cultivable land and improving soil health

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become critical for human survival. Hence, one health demands first good soil health. Sooner we act better it would be for our future survival. Also, increase in soil acidity in eastern India due to increased fertilizer use is an additional concern. Groundwater depletion is another challenge in Punjab, Haryana and Rajasthan. The challenges are further compounded due to increased greenhouse gases (GHGs), rapidly declining soil health and drying aquifers. Hence, long-term sustainability of varying ecosystems is drawing attention worldwide with greater focus on 'one health' concept.

### Soil Health Restoration Plan

For restoring soil health, urgent efforts and enabling policy environment are needed to scale innovations around Regenerative Agriculture (RA), which includes practices like conservation agriculture (CA), also known as "no till" agriculture, organic farming; use of fertilizers only as per soil test; diversification of cropping systems; reclaiming saline, alkaline and acidic soils; need based use of micronutrients (Zn, Fe, Mn, etc.), biofertilizers, etc. The

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4Rs (right source, right rate, right time, and right place) approach for application of balanced fertilizers also needs to be promoted for sustainable agriculture. Also, there is an urgent need to link the 4Rs approach with soil health cards (SHC) and "PM-PRANAM" schemes. Mechanization for deep placement of fertilizers is another option for fertilizer use efficiency. The integrated nutrient management (using organic manures like cattle dung, vermicompost, and poultry manure in combination with mineral fertilizers) could considerably improve soil health as well as crop yields. Use of happy turbo seeder in rice-wheat system also ensures in situ conservation of straw resulting in increased soil organic

carbon. The age old practice of broadcasting fertilizers also needs to be discouraged by promoting use of ferti-cum-seed drill. Also, division support systems such as leaf colour chart, green seeker and now use of artificial intelligence (AI) would enable fertilizer use efficiency so critical in national as well as farmers' interest.

Hence, to conclude, there is an urgent need for an enabling policy environment that is pro-nature, pro-agriculture and pro-farmer. Towards this, needed incentives for eco-system services, including mission mode approach of doubling NUE (from current 30 to 60 %) by 2030 would save use of inorganic fertilizers as well as huge subsidy. Currently, fertilizer subsidy is about 2.2 lakh crores. We can convert this subsidy into incentives to an extent of Rs 10,000 per ha using fertilizers on the basis of soil analysis and by adoption of good agronomic practices (GAP) by the majority of smallholder farmers (around 80 %). Such a policy decision will make all the difference in soil health as well as national food and agricultural sustainability.