Training on Soil Health – World Soil day occasion – KVK, Lohardaga, NAHEP – CAAST on 01/12/2020

Introduction:

Training was organised by **KVK, Lohardaga,** NAHEP-CAAST, Birsa Agricultural University, Ranchi at Krishi Vigyan Kendra, Lohardaga on the occasion of world soil day. **World Soil Day** (WSD) is celebrated annually on 5th December recommended by the **International** Union of **Soil** Sciences (IUSS) in 2002 to focus attention on the importance of **healthy soil** and to advocate for the sustainable management of **soil** resources. The date of 5th December was chosen in remember of birthday of the Late H.M. King Bhumibol Adulyadej, King of Thailand, who was one of the main proponents of this initiative. The importance of the soil in maintaining the healthy ecosystems and human well-beings by addressing the growing challenges in soil management, fighting soil biodiversity, etc. It also aims at encouraging the governments, organizations, communities and individuals around the world to commit for proactively improving the soil health. World Soil Day also highlights the growing problem due to population expansion. Therefore, it is necessary to take a step to reduce the erosion of soil, to maintain fertility so that food safety can be ensured.

Objectives:

- Sustaining plant and animal productivity (agronomic focus).
- Enhancing biodiversity (Soil Biodiversity).
- Maintaining or enhancing water and air quality (environmental/climate focus).
- Supporting human health and habitation.
- Sequestering Carbon.

World Soil Day: Theme

The theme for World Soil Day 2020 is “Keep soil alive, protect soil biodiversity” urges us to focus our attention on the workers below ground - from tiny bacteria to agile millipedes and slimy earthworms - all of which contribute to processes that are indispensable to life on Earth.
Soil is home to more than 1/4 of our planet's biodiversity but yet, we only know 1% of this universe. There are more living creatures in a single teaspoon of healthy soil than there are people on Earth. Bu these days biodiversity loss is a worry.

Fun facts about soil:

- In just 3 inches of soil, there is 13 quadrillion living organisms, weighing 100 million tones.
- One hectare of soil contains the weight equivalent of two cows of bacteria.
- There are more organisms in one gram of healthy soils than there are people on Earth.
- An earthworm can digest its own weight in the soil every 24 hours. 50% of the planet's soil passes through the gut of earthworms each year.

Soil health assessment

Soil health assessment is a growing field of research in which the functions and complexities of soil, a vital natural resource on Earth, are quantified so that the overall health of the soil can be managed for longevity and sustainability, both for agricultural and environmental needs such as carbon sequestration. While momentum is building behind the concept of soil health as a major driver of improved global food security and climate change mitigation, it is still unclear how we can accurately measure the health of soil for the sake of economic, political, and agriculturally applicable reasons. Researchers debate the methods of assessing soil health due to complexities involving many different measurements and indicators of what qualifies a soil to be "healthy" and lack of location-specific adjustments to accommodate soil diversity and land use goals. Soil health assessments introduce great opportunity to advance the communication between soil studies, agriculture, and ecosystem management, while bringing awareness to gaps of knowledge and the need for improvement.

Improved soil health

Soil health is an intricate interaction between the chemical, biological, and physical components of the soil. Soil management and agronomic practices greatly influence soil quality components. Intercropping is known as a sustainable practice that can conserve and improve soil health, quality and fertility. Positive impacts of intercropping on soil quality characteristics include increasing and maintaining soil organic matter, biological nitrogen fixation when a legume crop is present in the system, increasing phosphorus availability, and reducing soil erosion.

Despite the importance of intercropping effects on the soil quality, only a few studies have been conducted that integrate all three elements of soil health. Levels of carbon and nitrogen play a critical role in health and quality of agricultural soils.

Soil health indicators

Indicators of soil health provide information about how the soil is functioning with respect to a particular management goal or ecological role. Since a specific soil function may involve several processes, and each process may be associated with a combination of soil chemical, physical, and biological properties, the exact number of properties measured to assess soil health may, therefore, vary considerably. Similarly, because many soil properties that contribute to soil health are interrelated, no single soil attribute can be used as a measure of soil health.

Significant efforts are currently being placed on identifying soil properties for the determination of soil health. Researchers have developed a wide range of soil health assessment methodologies. These often include a combination of physical, chemical, and biological properties such as soil organic matter, texture, water holding capacity, and extractable essential nutrient concentrations. Ideal soil health indicators should: (1) be easy to measure; (2) measure changes in soil functions; (3) encompass chemical, biological, and physical properties; (4) be accessible to many users and applicable to field conditions; and (5) be sensitive to variations in climate and management.

Soil nutrient management with chemical fertilizer is a short-term correction and long-term soil health management through a combination of chemical and biological approaches requires attention. Among the agronomic practices, lesser land leveling, minimum tillage, and zero tillage is a good option for the improvement of the soil carbon stock. Conservation tillage is one of the most important traditions in climate smart soil management. Less soil exposure to sunlight can conserve soil biodiversity and preserve soil moisture which is also another way to prevent drought stress.

Nutrient management following site specific nutrient management (SSNM), integrated nutrient management (INM), and the use of mobile apps for fertilizer management practices reduces the losses of applied chemical fertilizer and is an essential part of climate smart soil management. Efficient fertilizer management practices improve nutrient use efficiency and reduce

environmental pollution. In the SSNM practice an assessment is made for the possible plant nutrient and OM sources that are available within the farming system and they are then applied to chemical fertilizers as per plant requirement. In the INM practices, the correct doses of different types of fertilizers (organic and inorganic) are applied at the correct time and place to optimize fertilizer use efficiency. Both nutrient management practices improve the soil nutrient status and soil biology as compared to chemical fertilizer management practices. Before planning crop fertilization, it is important to look at the entire cropping pattern rather than a single crop, and the whole farming system rather than the individual field. Before establishing the need for mineral fertilizers, available organic sources on the farm, the plant nutrient value of farm yard manure (FYM), crop residues, compost, and other organic materials should be estimated. A balanced fertilizer plan needs to consider proper crop rotation in the cropping system. Climate smart agricultural management encourages crop diversification, and the use of green manure like dhaincha and pulse crop. The application of biofertilizer improves soil biology and soil enzymes and this will improve nutrient use efficiency and crop productivity. Furthermore, biofertilizer reduces the demand for chemical fertilizer and environmental pollution. Biochar amendment is another approach of soil carbon sequestration. It is rich in carbon and can be stable in the soil for long periods as well as used to reclaim acid soil. The alternate wetting and drying method reduces the number of irrigations for rice production without yield reduction. In this method CH_4 production was reduced from the rice field. This practice may improve sulfur availability in rice soil.

Soil Health Card

A Soil Health Card is used to assess the current status of soil health and, when used over time, to determine changes in soil health that are affected by land management. A Soil Health Card displays soil health indicators.

Prime Minister Narendra Modi had launched the Soil Health Card (SHC) Scheme on 19th February 2015 at Suratgarh in Rajasthan. The scheme aims at issuing soil health cards to farmers every two years so as to provide a basis to address nutritional deficiencies in soil.

Conclusion:

In conclusion, soil is the media of food production, so it should be properly managed with OM, biofertilizer, biochar, mulching, and crop rotation with legume crop. Reduced tillage, chemical fertilizer, and pesticide use will eliminate carbon emissions and prevent loss of soil biodiversity. Residents of the earth cannot ignore the inevitable circumstances of climate change and it is time to take the necessary steps to correct our soil for the future of our food production.