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Sustainable Agriculture: Today's and Tomorrow's Need

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SUMMARY

Food security is a high priority today due to the exponentially growing population, which makes agriculture a major consideration in the current world scenario. Our agricultural systems of today focus primarily on obtaining maximum yields to maximize prices for the produce marketed, which is useful to maintain our livelihoods, but not ideal for the long-term conditions of the soil. As well as nurturing our current resources, we must cultivate soil and plants in a way that benefits us and conserves nature in order to prolong and increase their productivity and production. As the title of the article implies, it mainly focuses on the topic of sustainable agriculture and the various techniques that are successful and realistic in achieving the goal of being sustainable in agriculture.

INTRODUCTION

It is estimated that approximately 58% of India's population derives their livelihood from agriculture, as well as providing the country with food security. There is no doubt that the farmers of our country have been continuously increasing the production by using the modern research and technology developed by the agricultural scientists, which is why we have succeeded in overcoming the food crisis. In addition to some of the negative effects of modern technology, other issues have also emerged, including overexploitation of our natural resources, especially soil and water, along with reducing its adverse effects, the issue of sustainable / sustainable / sustainable farming has also become one of concern.

Why Sustainable agriculture? Despite modern research and technology being able to increase production continuously, there are also a number of disadvantages that are resulting from it as well. There are a number of problems at hand, including the depleting ground water table which the Prime Minister himself has focused on recently, the threat of a depletion of organic matter from the soil, as well as widespread concerns about climate change, the uncertainty of monsoon rains during harvest, and the rising temperature. As a result, agriculture is experiencing instability.

Soil organic Carbon(SOC): It is very important for agriculture to be able to utilize the organic carbon that is present in soil. The organic carbon content of fertile soils of medium class should be between 0.4 and 0.75%. There are many farmers who use urea or di-ammonium phosphate (DAP) to fertilize their crops, and it is very important for these farmers to have a suitable organic carbon level in their soil for them to be able to utilize nitrogen and phosphorus from these chemical fertilizers for their crops. It should also be noted that organic matter is also a source of food for microorganisms that are beneficial to the improvement of soil porosity and aeration. The increase in carbon levels in the soil can also increase its capacity to hold moisture, which will lead to a reduction in water loss from the soil as well. There is a direct correlation between the organic carbon levels in the soil and the productivity of the soil, and therefore with the sustainability of agriculture. In order to raise organic carbon levels, agricultural residues can be added, as well as organic matter from the external environment (dung manure, vermicompost, etc.).

Sustainable agriculture and climate change: In the soil, atmospheric carbon dioxide (CO2) is stored in the form of organic carbon as a result of the process of uptake by plant residues and during the growing of crops. There is no doubt that carbon sequestration is one of the most powerful tools available for mitigating climate change today. According to the results of tests performed on samples that have been collected by the Centre's Soil Health Card program over the past four years, the picture is not all that rosy. The amount of organic carbon found in most parts of India has been found to be very low. In temperate climates, soils have a higher carbon

content, which makes them better for agriculture. There is a great contrast between this and the warm tropical atmospheric regions of the world such as India, where soils lose carbon through the decomposition (mineralization) of plant debris as the soil warms. As a result of climate change, the situation has become worse because of the rising temperatures as a result of global warming.

The road map to agricultural sustainability:

Appropriate crop selection: Through photosynthesis, plants are able to absorb carbon dioxide from the atmosphere and convert it into food. A good crop to grow is one that has a high biomass and is able to contribute to long-term productivity of the soil by increasing the organic matter levels in the soil. There is no doubt that farmers prefer to produce only those crops which are likely to provide them with a high and secure income, even if this income is short-term in nature. It is predicted that cropping patterns will remain the same until alternative crops become profitable in order to ensure a high level of organic carbon and long-term productivity. In order for such crops to be profitable and attractive for farmers to grow, appropriate policy interventions are required including incentivising the establishment of agro-processing units.

Fig. no.1 Green manuring Daincha crop

Appropriate crop residues management: A maximum quantity of straw and dry straw should be left in the field after harvesting, and they should be managed in a scientific manner after harvesting. There are many negative effects associated with burning straw, not just in terms of the environment and human health, but also in terms of soil fertility. Instead of adding organic carbon to the soil when crop residues are burned, they mix into the soil and convert to carbon dioxide instead of adding organic carbon to the soil after burning. Efforts are being made to address this issue by providing subsidies for equipment such as the Happy Seeder, the Super-Straw Management System attachments, mulchers, and chopper-shredders in order to address this problem. It must be noted, however, that most of these measures were implemented in the areas around the capital. In order for sustainable agriculture to be possible and soil health to be improved, all the states must work together actively.

Fig. no.2 Crop residues management with composting

Addition of External organic matter: It is important to encourage the use of cow dung, compost, etc. as fertilizers. MGNREGA funds and other government programs should be used to subsidize the construction of vermicompost pits or compost tanks called "Nadep" that are used to compost vermicompost. In addition, compost made from municipal waste and sewage treatment plants can also be added to farm soil in order to improve its quality. There is a clear understanding that there is an increase in NPK ratios and organic carbon levels when nitrogen, phosphorus and potassium (NPK) supplements are added to conventional farm yard manure.

Fig. no.3 **Mixing organic matter (FYM) with soil**

Crop rotation: This method maintains the fertility of the soil by planting crops one after another. When growing rice-wheat systems or as a summer crop during Kharif/Rabi, pulses are essential. Pulses and leguminous crops contain rhizobium bacteria that absorb nitrogen from the atmosphere. This nitrogen helps fix carbon in the soil for a long time. By increasing pulse production, the Public Distribution System (PDS) will promote soil health and provide nutritional security to the masses.

Fig. no.4 Crop rotation: Rice - Wheat - Moong

Promoting zero tillage: As organic carbon is stored in large soil tracts, zero tillage needs to be promoted widely. In deep tillage, soil organic carbon is broken up into larger pieces, which evaporate with water or as carbon dioxide. Direct seeded rice machines, happy seeders and zero-till seed drills minimize soil disturbance and ensure low organic matter weathering.

Fig. no.3 Zero tillage cultivation

CONCLUSION:

The soil organic matter content should be increased in a sustained and time-bound manner by creating a massive awareness campaign with an emphasis on increasing soil organic matter content. By monitoring and evaluating outcomes, we will be able to pay more attention to this important aspect of our work. There is no doubt that agriculture should be profitable, but for long-term profit, it must also be sustainable, permanent, and sustainable.

REFERENCES:

Baker, B (2017). Can modern agriculture be sustainable? Perennial polyculture holds promise. BioScience, 67(4): 325-331.

Brahmaprakash, G.P. and Sahu, P.K (2012). Biofertilizers for sustainability. Journal of the Indian Institute of Science. 92(1): 37-62.

Bruce, T.J., Hooper, A.M., Ireland, L., Jones, O.T., Martin, J.L., Smart, L.E., Oakley, J. and Wadhams, L.J (2007). Development of a pheromone trap monitoring system for orange wheat blossom midge, Sitodiplosis mosellana, in the UK. Pest Management Science: formerly Pesticide Science. 63(1): 49-56.

Carroll, Z.L., Bird, S.B., Emmett, B.A., Reynolds, B. and Sinclair, F.L (2004). Can tree shelterbelts on agricultural land reduce flood risk?. Soil use and Management. 20(3): 357-359.

Kannan, R.L., Dhivya, M., Abinaya, D., Krishna, R.L. and Krishnakumar, S (2013). Effect of integrated nutrient management on soil fertility and productivity in maize. Bulletin of Environment, Pharmacology and Life Sciences. 2(8): 61-67.

Krebs, J. and Bach, S (2018). Permaculture—Scientific evidence of principles for the agroecological design of farming systems. Sustainability. 10(9): 3218.

Kumar, B.P., Babu, K.R., Rajasekhar, M. and Ramachandra, M (2019). Assessment of land degradation and desertification due to migration of sand and sand dunes in Beluguppa Mandal of Anantapur district (AP, India), using remote sensing and GIS techniques. Journal of the Indian Geophysical Union. 23(2): 173-180.

Mousavi, S.R. and Eskandari, H (2011). A general overview on intercropping and its advantages in sustainable agriculture. Journal of Applied Environmental and Biological Sciences. 1(11): 482-486.

Reddy, P.P., 2016. Sustainable crop protection under protected cultivation (No. BOOK). Singapore: Springer. Yang, M.M., Wang, J., Dong, L., Teng, Y., Liu, P., Fan, J.J. and Yu, X.H., 2017. Lack of association of C3 gene with uveitis: additional insights into the genetic profile of uveitis regarding complement pathway genes. Scientific reports. 7(1): 1-8