AGRICULTURE WASTE MANAGEMENT FOR SUSTAINABLE USE

Abstract

Agriculture is the most important source of livelihood. It contributes more than 15% of the GDP of the country and has provided a large avenue for employment to millions of people. It is an excellent example of small centralized entrepreneurship. In India, the agricultural sector has more than half of the total population in comparing with the developed nations. Agriculture, being the largest biological sector producing the highest biomass and also being an important input of bio-economy, it is necessary to generate a proper management and utilization of organic waste as a potential resource in farming and energy production. In regard to this, the present paper reveals on the sustainable development of agro wastes.

Keywords: agriculture, sustainable development, agricultural waste, economy.

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Agriculture is the pillar of Indian economy. It has been present in the country for thousands of years. It provides food and raw materials and also meets the increasing demand of the ever growing population. It is not only just a means of livelihood but also sustain the economy sector of the people. It contributes more than 15% of the GDP of the country and has provided employment to millions of people in the country. Over the year, agriculture has developed with the use of new technologies and equipment that replaced almost all the traditional methods of agriculture. With the advancement of these new technologies, it has started producing large quantities of food with the objective of achieving a great output from a given amount, land, labour and capital resource. Furthermore, the knowledge of new technologies can change the use of given bundles of resource which means the proportion of input remain while the output increases.

Agriculture provides the largest avenue for employment in the country and is an excellent example of small and centralized entrepreneurships. In agriculture, knowledge and decision making capacity sustain the advancement in the quality of life of the people. With the advancement and expansion of agriculture, their production has increased over the period of time and thereby significant increase in agricultural waste ranging from organic and inorganic materials discarded after agricultural processes.

India alone generates about 620 million tons of agricultural residues every year, out of which more than half remains unutilized. It is the world's largest producer of agricultural waste next to China. Moreover, the rice residue/waste are generally burnt down by the farmers without considering its negative impacts that disturb the soil physical, the chemical and biological properties altering the microbial activities as well as causes and imbalance in agro-ecosystem. Globally, it is estimated about 998 million tons of waste are produced per year which comprises of animal waste, crop waste and toxic agricultural waste.

Over the year, man has been continuously looking forward for a new improved way of producing good and service to implement the cost effective system to keep up with the food production. As the population increases from 3.7 billion in 1970 to 7.9 billion in 2021, it demanded food security and challenges of agricultural production. Ever since, it being the largest biological sector producing highest biomass and also being an important input of bio-economy, it is necessary to generate a proper management and proper utilization of organic waste that can harness the large potential of agricultural wastes as a resource in farming and in energy production.

Agricultural wastes are rich in various types of nutrients and their disposal without pre-treatment can cause leaching in fields which can cause environment pollution. For proper management, a high performance fermenter of layer by layer fermentation, vertical cylindrical bio-reactor is most preferred but most waste management approach with the method of concentration of waste such as sources separation, biological waste treatment, incineration, land disposal, recycling, and utilization of the waste in a positive manner that can only minimize the waste quantities and its ill effects. Above all, the aim and the principle of 3R is an efficient minimization of the waste effectively.

I. TYPES OF AGRICULTURAL WASTE AND ITS EFFECTS TO THE ENVIRONMENT

Agricultural waste can be classified as below

- **Crop Residue:** Stalk, leaves, husks and straw that remain after harvesting wheat, rice, corn, sugarcane and others.
- **Animal Manure:** Feces, urine, and bedding materials.
- Agrochemical containers of pesticides, herbicide and fertilizers.
- **Harvest and Processing Waste:** Fruit peel, vegetable trimming, damage, by products from food processing.
- **Left Over Feed :** Grains, forages and other feed materials
- **Packing Materials:** Plastic bags, cardboard boxes and containers.
- **Green Waste:** Trimming, pruning, plants debris, leaves, branches and grass clipping.

All these wastes give an impact to human life and ruined the present ecosystem. If it is not properly managed in course of time, it can lead to water pollution; reduce soil fertility, climate impact, and loss of valuable organic matter. And the burning of these wastes ultimately causing pollutants such as carbon monoxide, nitrous oxide, nitrogen dioxide and smoke carbon thereby resulting in the depletion of the ozone layer, respiratory disorder, health hazards, and deterioration of water quality, soil and year.

II. AGRICULTURAL WASTE MANAGEMENT METHOD

Different types of methods are employed for effective management of waste on the principle of 3R (reduction, Recycling and Reuse).

1. **Composting:** It is an effective solution for managing plant residue, trimming, manure and other agricultural products which decomposed into nutrient rich compost. The compost and the organic fertilizer made with agricultural waste improve soil fertility, increase crop production, and reduce the need for synthetic chemical fertilizer.

2. **Biogas:** Production of biogas not only help and manage agricultural waste effectively but also improve living condition by providing access to cleaner and more efficient energy production, reducing air and waste pollution and uplifting the overall quality of life.

3. **Mulching:** Agricultural solid waste use as mulch help conserve soil moisture, suppress weed growth and enhance nutrient retention. It is much effective for straw, hay, crop residue, leaves and also helps in soil moisture.

4. **Fermentation:** Fermented crops produce biofuel like ethanol or biodiesel.

5. **Gasification:** waste can be converted into a gas mixture, the syngas.

6. **Recycling:** Proper recycling involves collecting, sorting and processing plastic material to transform them into new products or raw material for manufacturing which can be contribute to the circular economy, reducing the demand for new raw materials and conserving natural resource.

III. REGULATION AND BENEFITS OF WASTE MANAGEMENT

Regulation of agricultural waste promotes sustainable management practice of the environment. Today, the international organization like FAO (Food and Agricultural Organization), WHO (World Health organization), EPA (Environmental Protection Agencies) play a significant role in regulating agricultural waste management by framing a specific law for unique farming practice and the local environment. The benefits of effective waste management focuses on the risk of contaminating resource and preserve ecosystem, protecting water quality and supporting sustainable food production at large scale, minimizing exposure to harmful chemical and pathogen. Lastly, more sustainable and resilient agriculture sector, long term economic growth and environmental protection.

IV. CONCLUSION

Proper management of agricultural waste is a crucial way of protecting the environment and the human health. It ultimately contributes food security and sustainable development in agricultural practice. More public awareness is necessary to highlight the ill impact of improper management of agricultural waste and laws should be enacted to impose penalties on those violating these laws.

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