



Integrated Agricultural Waste Management: A solution of many problems

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ABSTRACT

India produces more than 620 million tonnes agricultural waste annually of which only 25-30% part is utilizing as livestock fodder and energy production. Most of the Indian farmers are practicing residue burning practices to clear the field in Rice-Wheat cropping system for timely sowing of the next crop. Crop residue burning release harmful gases like CO₂, CH₄, N₂O, H₂S, O₃ and smog which causes air pollution by. It largely affects public life and disturbs soil physical, biological and chemical properties by destroying beneficial soil microorganism. Implementation of effective agricultural waste management can not only solve the air pollution problem but also provide better inputs to crop.

Integrated agricultural waste management system follows the principle of resource management to minimize input cost of production. Here two or more enterprises are combined judiciously as waste of one enterprise is utilized by another as input. As for example, weeds and residue of crop production as livestock feed, dung from livestock is input for biogas production, biogas slurry is input of vermicompost which lastly goes to crop production (Management & Handbook, 2011).

India produces more than 620 million tonnes agricultural waste annually of which only 25-30% part is utilizing as livestock fodder and energy production. Most of the Indian farmers are practicing residue burning practices to clear the field in Rice-Wheat cropping system for timely sowing of the next crop. The reason is low nutritive value and more cost of labor to clear the field. Crop residue burning causes air pollution by releasing harmful gases like CO₂, CH₄, N₂O, H₂S, O₃ and smog. Which largely affect public life and disturb soil physical, biological and chemical properties by destroying beneficial soil microorganism. Implementation of effective agricultural waste management can not only solve the air pollution problem but also provide better inputs to crop.

In India, production of 284.83 million tonnes food grains utilizes 25.94 million tonnes chemical fertilizers (NPK) annually. Agricultural waste contains 0.5% nitrogen, 0.2% phosphorus and 1.5% potassium as a source of plant nutrient. This can replace 6.5 million tonnes chemical fertilizer equivalent to 25% of total NPK requirement (Choudhary, 2018). The Indian economy is predominantly rural and agriculture-

oriented. In India, arable land area is 159.7 million hectares that is the second largest in the world, after the United States of America (Plateau et al., 2018). The farmers concentrate mainly on crop production, other enterprises like dairy, fishery, poultry, agro-forestry, goat and sheep rearing are supportive in gross income from which huge amount of secondary product remain as agricultural waste produces like crop residues, cow dung etc. Adoption of Integrated agricultural waste management is need of the hours.

Objectives of Integrated Agricultural Waste Management (IAWM):

Smart use of science and technology to improve traditional practices for maximum benefit at minimum damage of natural resources;

- Maximum employment and income generation round the year
- Minimum two or more enterprises combine as complementary to each other
- Minimum waste production
- On farm or off farm utilization of waste
- Minimum waste production (reduce), reuse and recycling
- Waste to new product like methane
- Sustainable solution

Points to be considered while choosing the enterprises for Integrated Agricultural Waste Management:

- Soil and climatic feature of an area/locality as for example, dry areas sheep and goat, in wet ecosystem fishery and duckry etc.



- Availability of resources, land and capital with the farmers
- Present level of utilization of resources
- Economics of proposed system
- Social customs pre-calling in the locality

Integration of enterprises for Agricultural Waste Management:

- In agriculture, crop husbandry is main activity which contributes maximum waste production
- Dairy is best complementary enterprise with crop production
- Setup of biogas plant with dairy supply good quality manure for crop production and fuel for cooking and lightening purpose
- Biogas slurry is good for vermicomposting.
- Waste grains are better utilized by poultry as feed
- Rain water harvesting, drainage water collection on farm pond to irrigate the crops
- Crop residue utilize as mulching to reduce water requirement and weed infestation
- Agroforestry protect the crop from high speed winds and supply timber wood
- Scientific integration of enterprises generates year round income with sustainable productivity

Advantages of Integrated Agricultural Waste Management:

- Improve soil health and fertility
- Increase economic yield per unit area per unit time
- Improved profitability achieved due to recycling of waste of enterprises as energy inputs for other system.
- Reduces piling of waste
- Grater sustainability in production
- Solving energy crisis
- Better utilization of family labor
- Minimize the use of harmful chemicals

- Recycling of resources
- Pollution free environment

Constraints of Integrated Agricultural Waste Management:

- I. Unavailability of crop residue and labor throughout the year
- II. High start-up cost may restrain farmers from switching to multi-enterprise system and enjoy the benefits of resource integration.
- III. Nutritional values of crop residues are generally low.
- IV. Intensive recycling can cause nutrient losses.
- V. Farmers prefer use of chemical fertilizer instead of manure because it acts faster and easy to apply.
- VI. Vermi-compost and FYM is not sufficient to fulfil the nutritional demand of crops (Choudhary, 2018).

To achieve doubling farmer income target along with with Clean India Mission, points, which have been discussed regarding Integrated Agricultural Waste Management, should be kept in mind while practicing agriculture. The integrated agricultural waste management system covers all aspects of waste management; from waste generation through collection, transfer, transportation, sorting, treatment and their utilization by farmers in the other form. Adoption of IAWM practices can enhance profitability of farms and maintain the cleanliness of homes and farms.

References

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