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Utilisation of agricultural by-products and feed refusal, dung and urinal wastage as a biofertilizers

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Abstract: The demand for food worldwide is rising every year as a result of the ongoing expansion in human population. A growing problem is the lack of resources and the vast amount of trash produced by the agriculture industry. For instance, not all of the fruit and vegetable pieces are consumed by customers, and this phenomenon can cause enormous volumes of food to be wasted worldwide. Additionally, unutilized agricultural by-products such seed coat, hull, husk, peels, seeds, and pomace can have an adverse effect on the environment.

High amounts of waste and by-products are produced during the manufacturing and processing of food in developing nations, which has an adverse effect on the environment and incurs large costs. However, there is a lot of promise for these biomaterials to generate food additives, which will reduce poverty and malnutrition in the poor nations where they are produced. Many of these biomaterials are sources of beneficial substances such dietary fibre, proteins, lipids, carbohydrates, and micronutrients.

Additionally, antinutritional elements that are present in some by-products can be reduced using biotechnological techniques for use as a food additive or in the creation of balanced meals. The utilisation of these biomaterials in this environment is difficult but presents a huge opportunity to increase food security. In order to decrease malnutrition and hunger in developing nations, this review aims to project the potential of food waste and by-products as a sustainable alternative.

Keywords: Food Security, Food Waste, Micronutrients, Eco-Friendly Agricultural

Introduction:

An efficient and sustainable way to improve soil fertility and crop production is to use agricultural waste and by-products as biofertilizers. The potential advantages and difficulties of employing agricultural by-products as biofertilizers, such as rejected feed, manure, and urinal waste, will be discussed in this paper.

The use of agricultural waste and by-products as biofertilizers has drawn a lot of interest in the quest for sustainable and environmentally friendly agricultural practises. The conversion of agricultural by-products such crop residues, feed rejection, manure, and urine waste into biofertilizers is efficient and has several advantages. The possibility and benefits of using these organic waste products as biofertilizers in agricultural systems are examined in this article.

Due to population growth and globalisation, the food industry is expanding quickly to enormous sizes and offering a broader variety of food goods to meet customer demand. Dairy, fruits and vegetables, meat and poultry, seafood, and cereals are among the world's largest food sectors. However, these sectors produce a significant quantity of wastes and by-products, much of which include organic matter, which creates issues with disposal, environmental contamination, and sustainability (Russ and Pittroff, 2004).

Additionally, essential nutrients and biomass that may be utilised to create goods with additional value are lost.

Feed refusal refers to the uneaten or wasted feed generated during livestock feeding. This agricultural by-product can be rich in organic matter, nutrients, and beneficial microorganisms. Instead of being discarded or left to decompose, it can be composted or converted into biofertilizers through various processes, such as vermicomposting or anaerobic digestion.

Overall, the utilization of agricultural by-products and waste materials, such as feed refusal, dung, and urinal wastage, as biofertilizers can contribute to sustainable agriculture by recycling nutrients, improving soil fertility, and reducing waste. However, proper management practices, including composting, treatment, and nutrient balancing, are essential to maximize the benefits and mitigate potential challenges associated with these biofertilizers.

Agricultural By-Products as Biofertilizers:

A. Crop Residues: After harvesting the main crop, the residue left behind, such as stalks, stems, and leaves, can be transformed into valuable biofertilizers. Crop residues are rich in organic matter, essential nutrients, and beneficial microorganisms. When properly processed and applied to soil, they improve soil structure, enhance nutrient availability, and promote microbial activity, leading to improved soil fertility and plant growth.
B. Feed Refusal: Feed refusal, which includes leftover feed or fodder, can be repurposed as biofertilizers. These materials contain valuable nutrients that can be recycled back into the soil. By composting or vermicomposting feed refusal, organic matter decomposition is accelerated, releasing nutrients and enriching the soil with humus. The resulting biofertilizer contributes to soil fertility, nutrient cycling, and overall plant health.

The leftovers from the production and processing of raw agricultural goods such fruits, vegetables, meat, poultry, dairy, and crops are known as agricultural by-products or wastes. Animal wastes, such as manure and animal carcasses, food processing waste, crop trash, and hazardous and toxic agricultural waste, including pesticides, insecticides, and herbicides, are also included in the list of wastes. These agricultural wastes may be solid, liquid, or slurry-based.

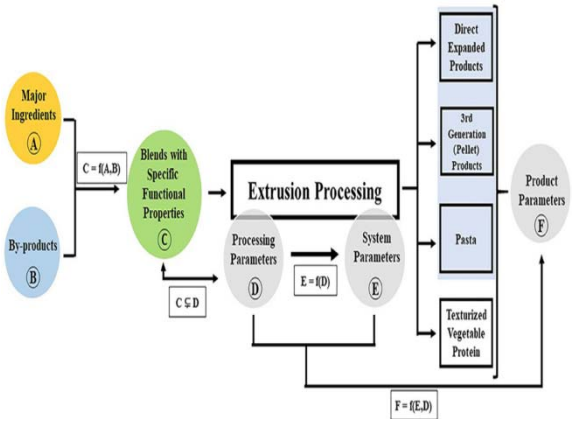

Fig. 1 Dependent Variables in The Processing of Extrusion

The properties of the final extrudate product are determined by the overall interactions between system parameters and extrusion processing parameters. For creating extruded goods with consistent quality, a detailed understanding of the input factors, their correlations, and their influence on extrudate qualities is crucial. To efficiently incorporate by-products into the extruded goods, it also becomes crucial to comprehend the physicochemical properties of the by-products and their components, as well as the numerous changes that the individual components undergo during extrusion. Additionally, it is essential to comprehend how the constituent parts interact with one another during extrusion circumstances.

Dung and Urinal Wastage as Biofertilizers:

A. Animal Dung: Livestock waste, such as cow dung, poultry manure, and pig manure, is a valuable source of organic matter and nutrients. Properly managed composting or anaerobic digestion processes can convert animal dung into nutrient-rich biofertilizers. These biofertilizers enhance soil fertility, increase nutrient availability, improve water-holding capacity, and promote beneficial soil microorganisms. Additionally, using animal dung as a biofertilizer reduces the environmental impacts associated with waste disposal.
B. Urinal Wastage: Human urine is a potential biofertilizer rich in nitrogen, phosphorus, and potassium, along with trace elements and micronutrients. Diluted urine can be applied directly to crops or processed through simple treatment methods to prevent odors and enhance nutrient availability. When used as a biofertilizer, urinal wastage improves plant growth, stimulates soil microbial activity, and reduces the need for synthetic fertilizers.

Wastes and By-Products from Food Processing for Industrial Uses:

Food processing businesses generate wastes and by-products that haven't yet been recycled or used for other purposes in the creation of the various food items. A sizable number of materials are produced in the form of wastes during the processing of raw materials including cereals, fruits, vegetables, and animals (Ezejiofor et al., 2014). These wastes from the food processing industries vary from one another depending on the type of product being produced and the manufacturing technique used. Even the concentrations and quantities of rubbish change and are inconsistent. For instance, wastes from the processing of fruits and vegetables include considerable quantities of protein and fat, whereas wastes from the preparation of meat have high concentrations of polyphenols and dietary fibres.

Advantages of Using Agricultural By-Products and Waste as Biofertilizers:

A. Sustainable Nutrient Management: The utilization of agricultural by-products and waste materials as biofertilizers promotes sustainable nutrient management. It reduces the dependence on chemical fertilizers, minimizes nutrient loss through leaching or runoff, and improves soil health and fertility in the long run.
B. Waste Management and Environmental Benefits: Repurposing agricultural by-products and waste materials as biofertilizers reduces waste disposal issues and environmental pollution. It offers a sustainable alternative to traditional waste management practices while minimizing greenhouse gas emissions and nutrient runoff into water bodies.
C. Cost-Effectiveness: Producing and utilizing biofertilizers from agricultural by-products and waste materials can be cost-effective compared to purchasing commercial fertilizers. It reduces input costs, particularly for small-scale farmers, and promotes self-sufficiency in nutrient management.
D. Enhanced Soil Health and Plant Growth: Biofertilizers derived from agricultural by-products and waste materials improve soil structure, increase nutrient availability, enhance microbial activity, and stimulate plant growth. These organic inputs contribute to sustainable and resilient agricultural systems.

Conclusion:

There are several advantages for sustainable agriculture in using dung, urine waste, feed refusal, and agricultural by-products as biofertilizers. Farmers may increase soil fertility, improve nutrient management, resolve waste disposal difficulties, and promote environmentally responsible agricultural practises by turning these organic waste products into useful resources. Using biofertilizers made

from agricultural waste helps crop output while also preserving the environment and enhancing the long-term viability of agricultural systems.

By-products from the production, post-harvest, processing, distribution, or consumption of fruits and vegetables are known as by-products. While a significant quantity of the byproducts is being thrown, some of them have been employed as building materials, animal feed, or fire fuel. Agriculture by-products from the food sector come in a wide variety and have shown to be highly nutritious. The cost of production can be reduced by using these by-products as useful food and ingredients.

Despite the extensive research that has been done so far, there are still gaps in our understanding of how by-products function to enhance the texture and sensory qualities of extruded products, particularly pasta, products of the third generation (or pellet type), and products made with texturized proteins.

The final qualities of extruded goods are significantly influenced by the functioning of by-products. A functional classification of by-products might be a useful tool for food processors to create nutrient-rich products with improved texture and flavour.

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