An Overview Of Press-Mud And Its Unique Characteristics

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Abstract

In India, Sugarcane waste accumulates dramatically and is largely squandered; although the waste material has a lot of potential when coupled with agricultural soils to be used as Sustainable agronomic practises and improved soil health are only two of the many benefits of using organic fertiliser. This waste material changed as it broke down to produce exceptionally nutrient-rich organic manure. Composting is a highly promising waste disposal technology that allows for the recycling and solid treatment of organic waste. Organic solid waste can be biodegraded and made suitable through this process, and the final compost products can be used as a soil conditioner or fertiliser in agricultural fields. Additionally, they increase the microbial population, prepare beneficial microbial communities, improve microbiological standards, and produce substances that can be managed.It is also used to promote sustainable agricultural output in areas damaged by continuous and excessive use of chemical pesticides and fertilisers, protect plants against various soil-borne diseases, and maintain soil fertility.

Key Word: Press-mud, Compost, Soil Properties, Micronutrient, Carbon Sequestration, Soil Health.

Introduction: India is the world's largest consumer and second largest producer of Sugarcane after the Brazil. The sugar industry in India is the second largest agro-processing sector, after the textile industry, with a total production of about 439.42 MT (DAC&FW IInd 2021-22), produced by 538 sugar mills in (2015–2016). Molasses and press-mud are significant byproducts of the sugar industry, producing 8.7 and 8.5 million tonnes of each year, respectively (National Federation of Co-operative Sugar Factories Ltd 2016; Dotaniya et al. 2016). A waste product following the extraction or filtration of sugar from sugarcane juice, press mud has enormous agricultural potential. Press mud is rich in organic matter and vital nutrients. It can be converted into organic manure, providing an environmentally responsible and long-lasting method of enhancing soil. The qualities and advantages of employing press mud as organic manure in farming operations are explored in this article. One such source of organic matter and minerals that can be economically used for crop production is press-mud cake (PMC), which is high in potassium and phosphorus or various macro and micronutrients. When use as other organic manures, PMC has beneficial impacts on the physical, chemical, and biological characteristics of soil in addition to having a large ability to give nutrients. Press mud has long been valued as an organic manure for use in agriculture because, in addition to being a highly effective soil ameliorant, it includes important plant nutrients in an organic form.Main components of press mud are moisture (50-65%), fiber (15-30%), crude wax (5-14%), sugar (5-15%), crude protein (5- 15%) and nitrogen (2-2.5%)(Singh et al. 2015).

Press-mud compost: It's an organic by product of sugar mills, is applied to the soil as manure to improve sustainable output by providing a high quality, nutrient rich organic matter, another unique feature that is dark brown, amorphous, squish and porous material more absorb the sunlight and contains all of the carbon containing ingredients that are present in the finished product, as well as nitrogen, cellulose, lignin, protein, sugar fibre, and coagulated colloids, such as cane wax, albuminoids, inorganic salts, and soil particles. It can be used to produce fertiliser and biofuel. By applying 20 t/ha of press mud, 25% less fertiliser was used than was advised, and the ensuing crops benefited greatly from the residual benefits. 25–30% of it is organic matter includes minor elements like Fe, Zn, Mn, Cu, B, and Mo as well as major nutrients like N, P, K, Ca, Mg, and S for plants (Mogheet at 1999) saves between 15% and 20% on the price of inorganic fertilisers enhances the soil's texture, structure, and quality increases the soil's ability to retain water since the compost includes fibrous materials like degraded coir waste and other agricultural biomass. It reduces the crop's need for water

to a certain degree, packed with helpful microorganisms that help the soil become more nutrient-mineralized and accessible to plant roots, these bacteria create a variety of organic acids, including amino acids, auxins, and other growth regulators, as well as enzymes that aid in the growth of the tap root/ fibrous root system's lateral roots and root hairs.

Effect of press-mud on soil properties:

Biological properties: The organic carbon found in soil is a diverse and intricate blend of components. The physical dimensions, chemical makeup, level of interaction with soil minerals, and rate of degradation of these materials vary. With the goal of making use of the waste and increasing the amount of organic carbon in the soil, industrial wastes like Press-mud are used as fertiliser. Applying press-mud significantly enhanced the soil's bacterial and fungus population. The breakdown of organic materials releases nutrients for plant growth and development, and the use of press-mud in agricultural soils enhances the populations of fungal, bacterial, and actinomycetes (Kumar et al., 2017). Additionally, the press-mud-treated soils' increased C biomass and N contents demonstrated modifications to the amount of organic matter in the soil.

Physical properties: The key to keeping agricultural soils productive, fertile, and healthy is to regularly add organic materials like crop residues, animal manures, press-mud compost, and municipal biosolids. Due to its beneficial effects on soil texture, structure, water holding capacity, infiltration, soil porosity, hydraulic properties, bulk density of soil, and can be linked to most fundamental soil properties, press-mud, also known as filter cake, is an important organic byproduct of the sugar industry. These are accompanied by improvements in soil aggregate stability, and these physical environments of the soil ecosystem are critical for a healthy soil and sustainable agriculture (Stockdale et al., 2001).

Chemical Properties: While press-mud made from the carbonation process contains lime, which is beneficial in acidic soils, pressmud made from the sulphuration method is acidic by nature and can therefore be applied to alkaline soils. Every year, thousands of tonnes of press mud are produced, which presents significant disposal challenges for the environmental sector and the sugar industry. Nevertheless, in an effort to reduce pollution and improve soil health, press mud has lately been employed as fertiliser in agricultural and crop production. Because press mud contains a lot of organic matter and essential micronutrients like zinc, copper, iron, and magnesium in large quantities, it is likely to promote the distribution of these nutrients and stimulate positive microbial activity in the soil system.The decomposition of soil organic matter produces cations including Ca2+, Mg2+, and K+, which promote granulation, raise cation exchange capacity (CEC), and improve the adsorbing power of the soils up to 90%. Composted press-mud has been used to partially or completely replace inorganic fertilisers in order to increase soil N, available P, exchangeable potassium (K), calcium (Ca), and magnesium (Mg). It contains essential plant nutrients such as nitrogen (N), phosphorus (P), and a number of micronutrients in higher concentrations than in agricultural soils (Okalebo et al., 2012).

Effect of press-mud on crop production: Low levels of organic matter in our soils and the quick decomposition of organic materials are caused by a number of factors, including decreased usage of organic manures, rising temperatures brought on by climate change, drier circumstances as a result of resource base degradation, and diminishing agricultural sustainability. The sugar industry and environmentalists face major disposal issues due to the annual generation of thousands of tonnes of press-mud. It is used as an organic fertiliser source in agriculture and crop production. Sugar byproducts can be recycled to keep them out of the environment and preserve the balance between environmental preservation and economic growth. They are also an excellent source of macro and micronutrients because they are naturally organic.By raising the soil's C and N contents, the use of press mud in agricultural fields greatly increased the fertility status. Higher N mineralization by microbial activity was suggested by lower C/N ratios in the treated soils. It has been reported that applying press-mud compost to agricultural areas may enhance soil health by introducing organic matter, macro- and micronutrients, and soil particles that will ultimately increase crop production. found that as compared to

single super phosphate, the press-mud compost application enhanced the phosphorus usage efficiency by wheat (20–48%) and greengram (12–90%). Additionally, it was stated that the compost improved the quality of the grains by raising their protein and calcium contents.

Pressmud as Carbon Sequester: To comprehend the dynamics of global warming and help mitigate climate change, local mitigation and adaptation programmes must be implemented in conjunction with international initiatives. Agricultural production encompasses a wide range of products and is a highly varied business. Due to no predicted value, the majority of this burning is caused by field burning, household burning of materials as a fuel source, and the emission of greenhouse gases (GHGs) and black carbon (C) into the atmosphere. Many useful items that may otherwise be employed for good purposes are lost when these materials are burned. Moreover, there is the amount of GHGs present in the atmosphere, such as methane (CH4), nitrous oxide (N2O), and carbon dioxide (CO2), has significantly increased since the industrial revolution (Verma et al., 2015).It is imperative to guarantee that the SOC incorporated into the soil stays there and does not undergo rapid breakdown. Numerous plant, animal, and microbial wastes can make up the SOC that is being supplied to the soil. Enhancing agricultural practises with beneficial additions can improve soil carbon sequestration.

Unique Characteristics of Press- mud:

- Press mud has a richness of micronutrients and macronutrients
- It works well as an organic fertiliser because of its nutrient-rich makeup, which encourages strong plant growth and development.
- The organic content in press mud enhances soil structure, leading to better water retention, drainage, and aeration.
- Press mud releases nutrients gradually over time, providing crops with a consistent supply of nourishment. This slow-release feature maximises nitrogen intake in line with the growth requirements of the plant and minimises fertiliser runoff.
- The ability of press mud to retain moisture aids in soil water conservation. especially helpful in dry or water-scarce areas, helping crops endure dryness.
- Press mud has potential use in anaerobic digestion and bioenergy production outside agriculture. A further option for sustainable energy practises is the production of biogas.

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