

Rice hulls absorbing capacity essay sample



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Rice hulls (or rice husks) are the hard protecting coverings of grains of rice.

In addition to protecting rice during the growing season, rice hulls can be put to use as building material, fertilizer, insulation material, or fuel.

Production

Rice hulls are the coating for the seeds, or grains, of the rice plant. To protect the seed during the growing season, the hull forms from hard materials, including opaline silica and lignin. The hull is mostly indigestible to humans. One practice, started in the seventeenth century, to separate the rice from hulls, it to put the whole rice into a pan and throw it into the air while the wind blows. The hulls are blown away while the rice fell back into the pan. This happens because the hull isn't nearly as dense as the rice.

These steps are known as winnowing. Later pestles and a simple machine called a rice pounder were developed to remove hulls. In 1885 the modern rice hulling machine was invented in Brazil. During the milling processes, the hulls are removed from the raw grain to reveal whole brown rice, which may then sometimes be milled further to remove the bran layer, resulting in white rice.

Use

A number of rice-producing countries, (e. g. Thailand), are currently conducting research on industrial uses of rice hulls. Some of the current and potential applications are listed below.

Brewing

Rice hulls can be used in brewing beer to increase the lautering ability of a mash.

Building material

Rice hulls are a class A insulating material because they are difficult to burn and less likely to allow moisture to propagate mold or fungi. It has been found out that when burned, rice hull produces significant amounts of silica. For these reasons it provides excellent thermal insulation.

Fertilizer

Rice hulls are organic material and can be composted. However, their high lignin content can make this a slow process. Sometimes earthworms are used to accelerate the process. Using vermicomposting techniques, the hulls can be converted to fertilizer in about four months.

Fireworks

Rice hulls are coated with fine-grained gunpowder and used as the main bursting charge in aerial fireworks shells.

Fuel

With proper techniques, rice hulls can be burned and used to power steam engines. Some rice mills originally disposed of hulls in this way.[citation needed] However the direct combustion of rice hulls tends to produce a lot of smoke. A far better alternative is to gasify rice hulls. Rice hulls are easily gasified in top-lit updraft gasifiers. The combustion of this rice hull gas produces a beautiful blue flame, and rice hull biochar makes a wonderful soil amendment.[3]

Juice extraction

Rice hulls are used as a “press aid” to improve extraction efficiency of apple pressing.[4]

Pet food fiber

Rice hulls are the outermost covering of the rice and come as organic rice hulls and natural rice hulls. Rice hulls are an inexpensive byproduct of human food processing, serving as a source of fiber that is considered a filler ingredient in cheap pet foods.[5]

Pillow stuffing

Rice hulls are used as pillow stuffing. The pillows are loosely stuffed and considered therapeutic as they retain the shape of the head.

Rice husk ash

The ash produced after the husks have been burned is high in silica. A number of possible uses are being investigated for this. These uses include * aggregates and fillers for concrete and board production. * economical substitute for microsilica / silica fumes

- * absorbents for oils and chemicals
- * soil ameliorants
- * as a source of silicon
- * as insulation powder in steel mills
- * as repellents in the form of “ vinegar-tar”
- * as a release agent in the ceramics industry
- * as an insulation material for homes and refrigerants
- * in Kerala, India- Rice husks (Umikari- in malayalam)was universally used for over centuries in cleaning teeth - before toothpaste replaced it.

References

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Carbonized Rice Hull Has Important Uses

Rice hull " ipa" used to be a big problem of ricemillers, especially in big rice producing areas such as Nueva Ecija and other Central Luzon provinces. It was usually considered a waste product that had to be thrown away. Thus, we used to see big piles of rice husk along the highway. There have been very limited uses for rice hull in the past. Today, rice husk is becoming increasingly useful as new uses are being popularized. One product that is becoming increasingly popular is the carbonized rice hull, CRH for short. To produce CRH, raw rice hull is burned without air so that it will not turn into ash. CRH is sterile and is free from disease organisms. And that is the reason why Dr. Rene Sumaoang, a microbiologist, has been promoting CRH as an ideal litter for brooding chicks. There are a number of benefits from using CRH for brooding chicks instead of the usual raw rice hull. Being sterile, CRH minimizes disease contamination. CRH readily absorbs the moisture in the manure so the litter does not get moist and not attractive to flies.

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When the litter is treated with an enzyme (Biosec) formulated by Dr. Sumaoang, the usual odor from the manure is eliminated. At the same time, the enzymes break down the nutrients found in the manure so that when brooding is over, the litter would have become an organic fertilizer that is ready to use on crops. Dr. Sumaoang explains that Biosec is a combination of live but immobilized beneficial microorganisms and digestive enzymes. Once applied the beneficial microorganisms multiply very rapidly, inhibiting the growth of disease-causing organisms like E. coli, salmonella and others. The enzymes, on the other hand, break down the food nutrients in the manure into simpler forms that could be readily absorbed by plants. Dr. Sumaoang observes that chicks grown on CRH litter grow faster and are more uniform in size. They are healthier because CRH does not allow the proliferation of harmful organisms that often cause respiratory diseases and diarrhea. At the Philippine Rice Research Institute (PhilRice) in Nueva Ecija, there's a showcase of a pigpen where carbonized rice hull, about one foot deep, serves as flooring instead of the usual cement floor.

The pigpen does not have to be washed with water everyday. In fact, it does not get washed for the entire growing period of four months. The manure and urine of the pigs get buried in the carbonized rice hull. The usual foul smell is practically eliminated. And when the pigs attain market size and are sold, the litter is collected and used as organic fertilizer for vegetables, rice and other crops. CRH is also very useful in rice farming. Twenty bags of CRH combined with organic fertilizer or compost may be applied in one hectare. It could be plowed in during land preparation. This will make the land not only more porous for better plant growth, it will also enable the soil to retain the

moisture much longer. Thus, when there is a prolonged dry spell, the rice plants will be able to survive the rainless period longer. Rice grown in fields enriched with CRH also produce more profuse tillers. This will mean higher yield because there are more stems that will bear fruit. CRH is also useful in seedbeds for producing rice seedlings. Seedlings grown in beds of CRH are much easier to pull out come transplanting time. The roots don't get damaged, hence the seedlings get established in the field more readily. CRH can also be very useful in growing high-value vegetables, including those grown in containers.

Combined with compost or topsoil, the resulting growing medium is ideal for producing healthy crops. Radish grown in containers by Dr. Sumaoang's company produced sizeable roots. The ornamental horticulture industry could also benefit a lot from the use of CRH. Being sterile, the use of CRH will minimize fungal infection in various ornamental plants. CRH could be combined with compost for germinating expensive seeds. It will also make an ideal material for producing potted ornamentals. Farmers themselves can easily produce CRH for their own use or for sale. The equipment can be fabricated by them, consisting of a halved steel drum with holes on the side, and a four-foot steel pipe that will serve as chimney.

The half drum is turned upside down and the chimney is attached in the middle of the upper end. A few layers of hollow blocks could be installed several feet around the half drum that will contain the raw rice hull to be made into CRH. With a few pieces of dry wood, fire is started inside the drum. When the fire is stabilized and the pieces of wood are burning, raw rice hull is placed inside the drum and then a big pile is placed all around

and way above the drum. The fire inside the drum will gradually burn the raw rice hull. When burning has reached the top of the pile, water is sprinkled to stop the burning so that the burnt rice hull will not turn into ash. Ash is not good for incorporating in the planting medium because it will behave like cement. It will not make the soil porous.

Improving water-use efficiency of agricultural soils, particularly those in PE film houses where water is precious, is an important concern in Korea.

Hence, the use of rice hulls to improve water-use efficiency and the physical properties of greenhouse soils was investigated. However, the soil physical properties, particularly the water preservation capacity of greenhouse soils, barely improved with the use of rice hull basically because it is hydrophobic and disintegrates slowly in soils due to its surface wax layer. Thus, the rice hulls needed to be puffed to become hydrophilic. Puffed rice hulls was studied as a substitute for rice hulls and were found to have good effects on soil water conservation and physico-chemical properties (Fig. 1 and Table 1). Preparation of Puffed Rice Hull and Its Characteristics

Puffed rice hull is a hydrophilic material made from hydrophobic rice hulls. It can be produced under high temperature and pressure by the mechanical processing of crushing rice hulls through a narrow space between special compound metal housing and crushing balls. In the process, the surface wax layer of rice hull is destroyed and its texture becomes similar to that of sawdust. Puffed rice hull can absorb water over six times of its weight, and precipitate immediately in the water due to its broken wax layer and enlarged surface area. It can also work effectively as a soil improvement

agent with its high content of organic matter (about 46%) and C/N ratio (about 100). Advantages of Puffed Rice Hull Use

Precisely controlled drip irrigation system (Fig. 2), which started at -33kPa and was adjusted to -10kPa of soil water potential for lettuce cultivations, was adopted for the experiment carried out on a sandy loam soil in a PE film house to find out the application effect of 5 mg·ha⁻¹ of puffed rice hull. The effects of puffed rice hull on soil water preservation and soil physico-chemical properties were as follows: * Irrigation water was saved by 17% with puffed rice hull. The water requirement of the control plot was 1, 800 MT·ha⁻¹, while that of puffed rice hull plot was 1, 500 MT·ha⁻¹ for lettuce cultivation due to the high water absorbing and holding capacity of bulked rice hull. * The formation of soil aggregates with puffed rice hull increased from 8. 3% (control) to 14. 1%, and the soil pore phase from 55% (control) to 56%, giving more space for soil water preservation.

The results seem to be from the effect of enhanced microbial activity by puffed rice hull providing the energy and carbon for soil microorganisms. In addition to the above direct effect, the application of puffed rice hull showed other beneficial effects on soils: * The use of puffed rice hull softened the soil. Soil hardness was measured from 6. 4 kg·cm⁻² for the control to 3. 6 kg·cm⁻² with puffed rice hull, providing a better condition for root growth. * It also improved soil buffering capacity, especially in salt accumulated soil by excessive fertilization. The soil EC dropped to 2. 9 dS/m⁻¹ with puffed rice hull from 3. 8 dS/m⁻¹ for the control. Precautions

Farmers must be aware that the high water holding capacity of puffed rice hull is sometimes harmful for crops that require small amount of water. The application rate of puffed rice hull and water irrigation should be adjusted based on the plant requirements. Nitrogen deficiency can occur by the high C/N ratio of rice hulls.