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Recycling Sawdust Waste for Construction Purposes – Solution for Disposal Problems

By

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Abstract

Sawdust is a by-product of wood which comes through the activities of wood based industries. As wood is converted and used for different purposes, it produces heaps of saw-dust at milling sites. This paper seeks for ways of utilizing sawdust in construction activities so as to minimize disposal problems, environmental pollution and also enhance economy. The study defines sawdust, looks at its availability, and affirms that it abounds everywhere. A look is also taken at some of the areas to which it has been put to use. The write up concludes that sawdust can be used meaningfully in the construction industry. This treatise therefore recommends that its usage in construction should be explored and encouraged. Its usage in construction industry will help preserve trees in our forest as well as reduce cost of some building materials.

Construction activities are being carried out on a daily basis especially house construction. These construction activities use a lot of timber in various ways. The materials used for house construction are however, very costly. This therefore makes it very difficult for people to own their own houses. Agarwal (1981) noted that the difficulty in the provision of housing is as a result of high cost of building materials which has contributed to make ownership of houses more and more difficult for the poor, especially in developing countries.

We can observe that a lot of wood is used during construction activities. This wood comes from trees in the forests. As the trees are continuously being used or converted into logs and subsequently timber, the forests are depleting. It is therefore important to find ways of recycling wood waste to produce other forms of using wood.

The wood converted for use in industries produce waste in form of chippings, slabs, off cuts, sawdust and shavings. Which are generally discarded as waste. A tour of saw milling sites in the country reveals that there are large heaps of sawdust at saw milling sites. These cause disposal problems to the saw millers. The sawdust is therefore usually burnt at milling sites and other wood industries as a means of disposal.

Sawdust is a by-product of wood, which is produced from sawing of wood. Badejo and Giwa (1985), Akande (2001), have observed that large quantities of sawdust can be found in Nigeria around sawmills and wood based industries. The sawdust is largely seen as waste and so is not utilized. According to Ogunawo (2001), the non-utilization of the sawdust creates disposal problems, which are burdensome. Owonubi and Badejo, (2000), have therefore, observed that in order to dispose of the large sawdust hills around the sawmills, that constitute visual blight to local environment, and also cause environmental pollution; many saw millers resort to burning. The burning thus produces smoke and offensive gases like carbon dioxide and carbon monoxide, which are hazardous to human health.

If ways of utilizing sawdust in an economical way to produce materials that could be used for construction or other endeavours could be found then disposal problems will be solved, wood conservation would be achieved. Some of the physical properties of the wood waste would be utilized to solve some of the building construction problems. Owonubi and Badejo (2000) have noted that activities of sawmills have continued to increase with the increase in the number of sawmill industries and other wood based industries. This means that quantities of sawdust generated will continue to increase

Availability of Sawdust

Sawdust comes from the saw milling activities and activities of wood based industries. Arends and Donkershoot-shooq (1985) have stated that enormous quantities of sawdust are produced annually all over the world. Similarly, Owonubi and Badejo (2000), have also stated that the volume of wood waste generated in Nigeria increases yearly, and that the volume of sawdust creates disposal problems which are of concern to all wood industries and government. Badejo and Giwa (1985) gave the estimated volume of sawdust in 1981 to be 1.72million m³. Owonubi and Badejo (2000) however, reported that wood wastes increased to 3.87million m³ in 1993. Out of these wood wastes, estimates, sawdust accounts for about 10-20%. The generation of wood wastes and hence sawdust continues to increase.

A study conducted by Raw Materials Research and Development Council (RMRDC) (1997), established that Nigeria had 1252 sawmill industries in existence by 1996. In a later study RMRDC (2003^b), further reestablished that by the year 2003.

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Nigeria had 1325 sawmills located in different parts of the country. RMRDC (2002) asserted that sawdust was in commercial quantity and can be used for production of building materials. The questions however are:

- i) How many building products so far, have been produced using sawdust?
- ii) Why do we still have so large and numerous sawdust hills around our sawmilling and wood based industries?

Investigations from other countries have also shown abundance of sawdust. Harkin (1969) attested that a planer mill in America produces about 600 pounds of dry residues per a thousand board feet, which gives the total amount of air dry wood fines originating from U.S.A. industries alone to exceed 15million tones a year. Zziwa, Kizito, Banana, Kamboggoza, Kambuga and Sseremba (2006), established that 18-20% of log volume in Uganda is sawdust. They also stated that sawdust is one of the major under-utilized by-product from sawmilling operations in Uganda. They therefore suggest that finding an appropriate use of sawdust would help to reduce production costs and increase the profitability of saw milling operations in Uganda's plantation forests. This suggestion will help Nigerian saw millers too, if economic use of sawdust is found.

Uses of Sawdust

Sawdust is generally considered a waste product in Nigeria. However, some efforts have been made in the utilization of this waste product in other countries. Arends and Donkershoot-Shouq (1985) have stated the uses of sawdust to include fuel use, agricultural uses, uses in building materials, uses in chemical industries and miscellaneous uses. Sawdust used with resin can be molded into chair backs, toilet seats, furniture parts and containers among many other things. Arends and Donkershoot-Shouq (1985) explained that sawdust is also briquetted so as to decrease its bulk and increase the heating value when used as fuel while it is used as litter, bedding, fertilizer, soil conditioner and feeds in agriculture. Sawdust is used to provide both thermal and noise prevention in buildings. It is used for wood concrete and wood granite to produce board plates and fiber boards. It is also used as climate control on fresh concrete surfaces. Sawdust is mixed with clay to produce bricks, which decreases their weight and increases their insulating capacity. It is also used for the production of linoleum and wall paper as well as bottle stoppers and as fire retardants.

RMRDC (2002), Badejo (2002) also stated the uses of sawdust to include fuel for cooking, particle board production, ceiling boards, wall tiles and partitioning panels. Chemically, sawdust is used to produce ethyl-alcohol, yeast and oxalic acid rinse. Anonymous (2003) observed that sawdust contributes greatly to heat generation in an insulating brick during firing, as it burns out when mixed with clay, cutting fuel cost and it is environmentally friendly.

BMP Association Ltd (2008) used a mixture of organic components and concrete to produce light-weight concrete called sawdust concrete. The organic elements used were waste wood like sawdust, chips and other cuttings. The sawdust concrete was found to have several unique characteristics which made it competitive among other building materials. These characteristics include that it is made of green, ecologically pure stuff; it controls interior humidity level; it is fire proof, it is not subject to mold and fungi attack; and it is light. It is also compatible with cement, stucco, different finishes, strains, lacquers and vanishes.

The mention of the uses of sawdust shows that efforts have been made to use it. However, disposal of sawdust is still a problem. The major methods of disposal therefore are burning process which produces offensive gases like carbon dioxide and carbon monoxide.

Conclusion

Sawdust is seen as a menace in our environment. Its accumulation at milling sites creates disposal problems. The burning, which is presently the predominant method of its disposal rather causes change to the soil nutrients in the area. The smoke generated pollutes the environment with gases that are hazardous to health.

This paper has however, shown that sawdust could be put to useful agricultural, building and chemical uses. Since it can be used for production of paper, more factories or industries should be built to utilize the sawdust. Wall panels are also possible with sawdust, when mixed with either resin or cement.

In order to curb environmental pollution, soil degradation and diversify wood usage, sawdust should no longer be considered as a waste. It should be considered as a material with a lot of promise. The recycling of this product in construction and other spheres will greatly improve our economy. Sawdust is therefore no longer a waste material but an industrial material of use

Recommendations

Sawdust is assumed to be a waste product of wood operations, especially in Nigeria. Some efforts at its utilization have been made in some quarters. However, large hills of sawdust are found in the country at sawmilling sites. This paper therefore wishes to recommend thus:-

1. That industries be built in each geographical region of the country to convert this waste to useful materials.

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2. Since sawdust is said to have good sound and insulating properties, and since it binds well with cement, sawdust bricks could be produced so that they could be used for sound-proof rooms or even cold rooms.
3. The falling and conversion of wood for different purposes is gradually leading to depletion of the forests. Since a lot of the wood is still being used for firewood, this paper recommends that factories that would convert sawdust into briquettes so that it can be used as fuel for fire as it is being done in other countries should be built.
4. Local clay bricks manufacturers use wood to fire their bricks in the kilns. The possibility of using sawdust to fire these bricks should also be explored to save our trees in the forest from extinction.
5. Bricks manufacturers should also learn to incorporate sawdust in the brick manufacture so that during burning, the sawdust is burnt out thereby making the bricks very light. This incorporation also reduces the time of firing in the kiln and hence, less fuel or wood is used.
6. Wall panels could be produced using sawdust which could be used as non-load bearing partition walls. This will help to provide a more thermal conducive interior environment in buildings.

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