Utilization of water hyacinth and bagasse to produce sound-reducing smart board walls



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Research questions

- Water hyacinth and bagasse as a significant environmental problem in Thailand.
- Water hyacinth grows rapidly and Large quantities of bagasse are difficult to manage
- How to deal with the water hyacinth and bagasse problems?
- How can water hyacinth and bagasse be used?

Research objectives

- 1.Study the appropriate ratio for producing smart board walls from water hyacinth mixed with bagasse.
- 2.Study the sound reduction efficiency of smart board walls made from water hyacinth mixed with bagasse

Scope of research

1. Scope of sampling:

Water hyacinth and bagasse samples were collected. Sankhaburi District Chainat Province and find the most suitable ratio of water hyacinth and bagasse, that produces smart board walls and tested the physical properties of the smart board wall made from a mixture of water hyacinth and bagasse.

2. Experimental scope

The sound test room is divided into two rooms for testing, size width 35 centimeters, length 250 centimeters, height 35 centimeters, in a horizontal position.

Instrument and material

1) Raw materials : water hyacinth, bagasse, clean water, latex and plaster.

2) Testing tools : sound measuring devices CEL - 600 series sound level meter

3) Various equipment :drying cabinets, digital scales Test chamber size 35 X 250 X 35 centimeters

bagasse

water hyacinth

clean water

latex

plaster

sound level meter

Test chamber size 35 X 250 X 35 centimeters

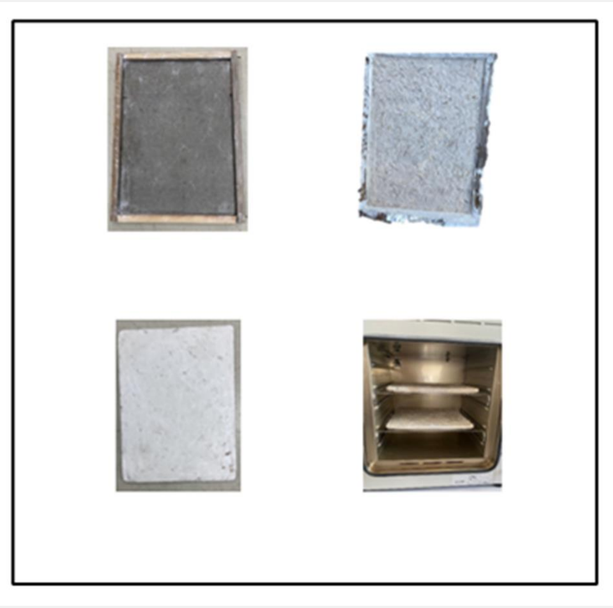
Steps for preparing materials

- 1) Take only the stem of water hyacinth and bagasse, because it have more fiber than other parts. Cut into pieces about 0.5 inches in size so that the fineness of the fibers adheres together. The porosity of the materials are moderate which suitable properties for forming sound-absorbing panels.

- 2) Water hyacinth and bagasse were mixed with sodium hydroxide (NaOH) solution and boiled for 2 hours. After that the structure of water hyacinths were transformed into fiber and wash the fibers with clean water 3-4 times.

Steps for making a smart board wall

- Mix together water hyacinth, bagasse, clean water, latex and plaster. Then pour it into a mold with a width 28 x length 37 centimeters and decorate the surface of the smart board wall smoothly. It should take no more than 5 minutes because the mixture will begin to harden. Then baked in a hot air dryer at a temperature of 65 °C for 24 hours, as shown in Figure 1.



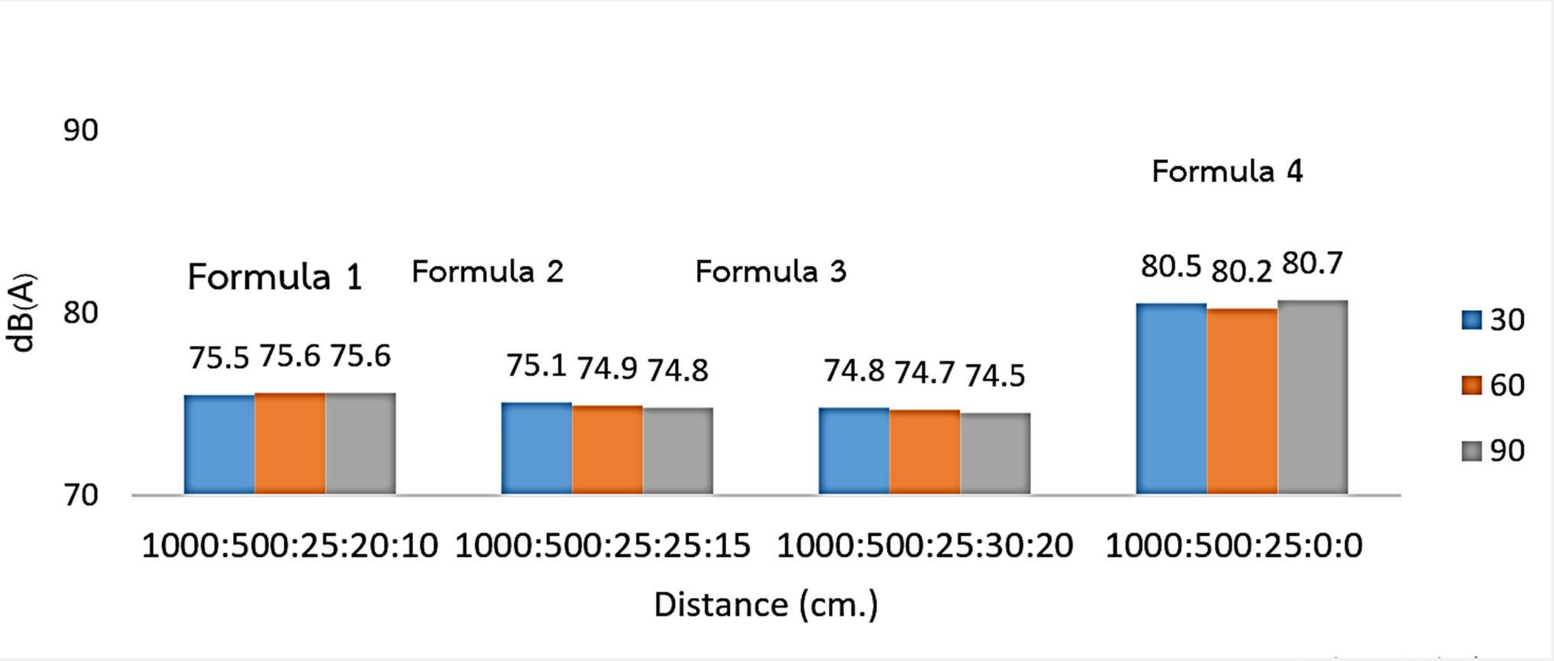
Steps for testing noise reduction

Build the 35 x 250 x 35 centimeter laboratory model from a smart wall board with the ratio of water hyacinth and bagasse is different (1000:500:25:20:10, 1000:500:25:25:15 1000:500:25:30:20 and 1000:500:25:0:0 grams). Turn on the sound generator with a loudness of 85 dB(A). Measure the sound pressure in the laboratory at distances of 30, 60 and 90 cm. and compare the sound reduction of the smart wall board with the ratio of broken water hyacinth and sugarcane bagasse. different, as shown in picture 2

Picture 2: Sound measurement laboratory and Sound Level Meter

Table 1 Compares the sound pressure through the smart board wall with different Formula

distance cm.	Formula 1 1000:500:25:20:10 dB(A)	Formula 2 1000:500:25:25:15 dB(A)	Formula 3 1000:500:25:30:20 dB(A)	Formula 4 1000:500:25:0:0 dB(A)
30	75.5	75.1	**74.8**	80.5
60	75.6	74.9	**74.7**	80.2
90	75.6	74.8	**74.5**	80.7



Research results

Results of the experiment measuring sound pressure at distances of 30, 60 and 90 cm. compared to Smart board walls mixed with water hyacinth and bagasse, Formula 3 plaster: clean water: latex: water hyacinth: bagasse The ratio of 1000:500:30:20 grams at a distance of 90 cm. can reduce the sound loudness by a maximum of 10.5 dB(A) as shown in Table 1

Summary

- The researcher conducted the experiment by bringing together various research studies It is a guideline for experimenting with the ratios for producing smart board walls mixed with water hyacinth and bagasse in the ratios 1000:500:25:20:10, 1000:500:25:25:15 1000:500:25:30: 20 and 1000:500:25:0:0 grams, which the process produces smart board walls can be formed using a molding method, By the size of smart board wall production which width of 120 cm, length of 250 cm. and thickness of 0.8 cm.
- Results from testing to determine the sound reduction value of smart board walls in each ratio found that gypsum board in the mixed ratio 1000:500:30:20 , It is more effective in reducing sound than smart board walls in other mixtures which is most effective in reducing sound within a distance of 90 cm. with a sound reduction test result of 74.5 dB(A)

Suggestions

- 1)The results of using water hyacinth mixed with bagasse should be studied together with other waste materials to reduce costs even more, material costs and value.

- 2) This research is a laboratory experiment only. It has not been implemented yet. If you want to use the results of this study to further develop, methods for testing other properties should be considered as well, such as density, water absorption rate.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