

Comparison Analysis of the Strength of Cement Bricks and Sago Bricks

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Abstract— Objective from study This For know how much big strong press on the brick sago that can become material addition as one _ alternative material building. Pith sago only end become waste on site processing sago in a manner tradition in Maluku Province. Study about utilization pith sago Already done However Not yet can utilized as product brick . Study This use print measuring 290 x 120 x 80mm. Composition Concrete brick sago sand 53%, cement 25%, pith sago 6%, water 16%, for cement brick test object on the market For tested the comparison . Heavy average cement brick 5297.90 gr and sago brick of 3602.54 gr with percentage weight 31.97% more light . Strong test results press Concrete brick cement obtained respectively 3.4 MPa, 2.4 MPa, 5.9 MPa. Concrete brick sago produce strong press respectively 20.5 MPa, 21.3 MPa, 24.1 MPa with strong average press of 22 MPa, so up to comparison strong very significant press . B atako sago produce strong press more _ tall from cement brick with percentage _ strong press to Concrete brick sago of 82.25%. Percentage elasticity Concrete brick sago to cement brick by 58.60%. Concrete brick sago own strength more compressive and elasticity _ big from cement bricks up to can used as one _ material building specifically for non- structural Because characteristic ductile.

I. INTRODUCTION

Waste is problem still difficult overcome, because one fundamental obstacle is Not yet exists awareness from society , and yet availability tool or facility For processing waste , mainly classified B3 waste . Waste this is very dangerous and can damage environment . One old waste to unravel also is waste sago so, no can for including inside it waste remainder processing starch sago good processing system in a manner traditional mapun in a manner manufacturing so that accumulated waste. Based on Production data Maluku National Sago 2017–2021 produces starch sago as much 10,269 tons or 10269000 kg in 2020. AY Dias (Sonny), GTE stated that in processing sago , every 6 kg of fiber sago produce 1 kg of flour sago and 5 kg of pulp fiber sago , means For pith only sago as waste as much as 51,345,000 kg or 51345 tons in

circumstances wet For Maluku Province . Waste pith sago can made as one material addition For brick making . Pith sago this is the material light and can used as material building . Pith sago can made material plus For making brick. With addition pith sago so expected can increase strong press on the sago brick .

Various study about addition fiber in the brick material among them is study about addition fiber fiber coconut (Enggawati,2011), where results his research show that results best obtained on the composition mixture fiber coconut by 10% at the age of 28 days . Besides that is , research about utilization waste fiber brick sago on concrete "paving block", has conducted by (Petrus Patandung et al , 2011), where results his research show that addition fiber sago can increase strong press concrete brick . Gunanto

2019 in research conducted with addition fiber palm fiber to Concrete brick get strong press of 5.40 MPa.

Material plus for sago brick making is objective from study this, is for make bricks with material addition pith sago. Addition pith sago expected can increase strong press from sago bricks , and can used as one material building that is For making wall especially. For get strong press Concrete brick got from

$$f_c = \frac{P}{A} \dots\dots\dots 1.1$$

Where :

f_c = Strong press (MPa)

P = Load (N)

A = Area (mm ²)

From the results testing strong press can counted Elasticity from concrete :

$$E_c = 4700 \sqrt{f'_c} \dots\dots\dots 1.2$$

II. MATERIALS AND RESEARCH METHODS

Method used is method experiment . For making sago bricks material the pith used is pith originating sago from location village Hit it Ambon Island , with function as an ingredient plus Concrete brick sago . The cement used is PC Conic cement , sand originate from Passo, the water used is borehole water . Equipment used _ in study This is tool the scales used For weigh the material, scoop as tool mixed materials, moulds with size 290mmx120mmx80mm customized size cement bricks that are taken from one place production bricks in Ambon city .

Process for making concrete brick done with method clean pith sago until no there is remnants adhesive . The pith that is already clean and dried, composition material making concrete brick sago consists sand 53% cement 25%, pith sago 6%, water 16%. Percentage composition on obtained each weight material For One test object as following : sand 2870,5gr cement 1354gr, pith sago 325gr, and water 867gr for one test object . Testing the test object is carried out at age brick 28 days . During maintenance concrete brick done without immersion .

III. RESULTS AND DISCUSSION

Result of testing strong press concrete done with use robust testing machine press . Amount object as many as 3 (three) specimens of cement bricks. Before tested strong press, cement bricks are weighed especially formerly. For know each weight test object . Heavy cement brick test objects seen in table 1

Table1. Cement Brick Test Object Weight

Name of Test Object	Weight (g)
BU1	5286,40
BU2	5187.90
BU3	5413.60
Average	5295.90

For heavy brick test object sago got results like seen in Table 2

Table 2. Weight of Batako Test Objects Sago

Name of Test Object	Weight (g)
BS1	3663.80
BS2	3416.80
BS3	3726.90
Average	3602.50

Difference average weight between cement brick and sago brick of 1693.50gr. Comparison weight 31.97% adobe sago more light from cement bricks . Testing process strong press cement bricks and bricks sago can seen in figure 1 and 2



Figure 1



Figure 2

Test results strong press cement brick can seen in table 3

Table 3. Strong Press Cement Bricks

Name of Test Object	Strong press (MPa)
BU1	3,40
BU2	2.40
BU3	5.90
Average	3.90

Test results and relationships chart between load (P) and f'_c (strong press brick) can seen respectively in Graph 1, Graph 2, Graph 3



Graph 1. Relationship between Load and Strength Press BU1



Graph 4. Relationship between Load and Strength Press BS1



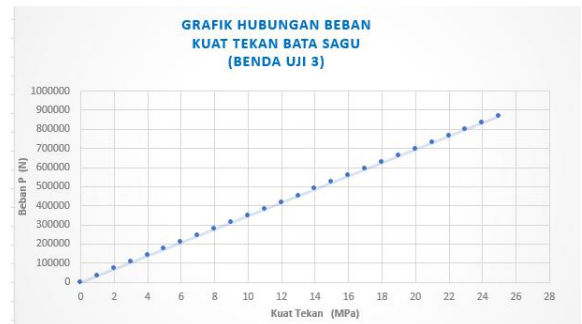
Graph 2. Relationship of Load and Strength Press BU2



Graph 5. Relationship between Load and Strength Press BS2



Graph 3. Relationship between Load and Strength Press BU3



Graph 6. Relationship between Load and Strength Press BS3

Table 4. Strong Press the Sago Brick

Name of Test Object	Weight (g)
BS1	20.50
BS2	21.30
BS3	24,10
Average	21.97

Test results strong press in Table 4 shows sago bricks own strong press more big from strong press cement brick. Percentage strong press the sago brick of 82.25% against strong press cement brick , as seen on strong average pressure on Graph 7 .

Connection between Load (P) and Strong Press the Sago Brick can seen in Graph 4, Graph 5, Graph 6

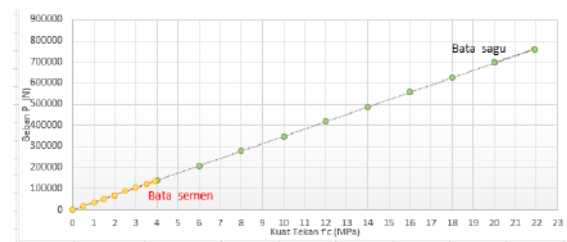
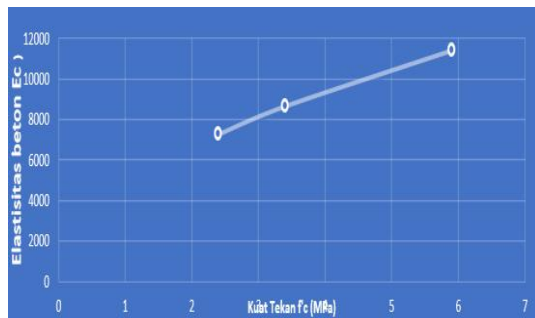
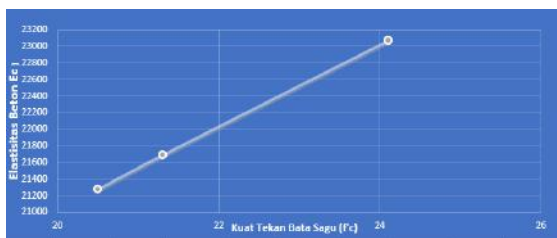


Figure 7. Average Graph Connection Load - Strong Press

For get magnitude elasticity from Cement bricks can be seen in graph 8 and bricks sago can seen in graph 9.



Graph 8. Relationship Strong Press and Elasticity Cement Bricks



Graph 9. Relationship Strong Press and Elasticity Concrete brick Sago

Analysis Data

During the strong test press Concrete brick seen pattern cracks between cement bricks and bricks sago different , where the current cement brick tested press , thing test direct destroyed when reach burden maximum . For Concrete brick sago , pattern very ductile destruction Because influence fiber in the bricks . From weight the resulting brick , it turns out results Comparison weight 31.97% adobe sago more light from cement bricks . Testing strong press cement bricks and bricks sago produce strong press more _ tall from cement bricks . Percentage strong press Concrete brick sago of 82.25%.

Elasticity from Concrete brick sago more large 58.60 % of cement bricks .

IV. CONCLUSION

Obtained :

1. Average weight _ cement brick 5295.90gr, and the average weight Concrete brick sago of 3602.50gr, percentage the weight by 31.97%
2. Strong flat press flat 3.90MPa cement brick , and strong average press concrete brick sago 21.97 MPa with percentage strong press of 82.25%.

3. For elasticity brick cement mortar 9121.28MPa, for Concrete brick sago of 22014.9MPa which produces percentage between elasticity of cement bricks and sago bricks 58.60%.
4. Cement bricks can used as material building for non- structural .
5. Waste pith can utilized as material addition in making Concrete brick sago .
6. Concrete brick sago is very ductile so that the crack not brittle.

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