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Women's Social Entrepreneurship in Rural Communities: A Case of "Karya Pratiwi" Women Agricultural Group in Ponorogo, Indonesia

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Abstract

Indonesia is one of country in the world that produce food raw materials like sugar cane, coconut, etc. Indonesia is the largest coconut fiber producing country in the world and has coconut plantation land with an area of close to 3,29 millions Ha and coconut production is around 2,85 million tons. The coconut products will be used to fulfill human needs, while the rest of the utilization will become waste. The process of destroying waste naturally usually takes place slowly, causing a pile of waste. If the waste do not manage properly, it can be a problem. Meanwhile, previous researches showed that coconut fiber ash contains silica oxide, alumina oxide also calcium oxide so it is potential to be used in construction material like concrete. Pozzolanic properties in coconut fiber ash can react with calcium hydroxide to create calcium silicate hydrate (C-S-H), This C-S-H is a compound that can bind the materials in concrete so that it can make a better quality of concrete. In this study, coconut fiber ash will be used as an additive material and will examine the influence of flowing concrete characteristics on the addition of coconut fiber ash. This research is planned to use flowing concrete test specimens with Sika-Viscocrete as superplasticizer. The variation in the percentage of coconut fiber ash are 0%, 2.5%, 5%, 7.5% and 10% by weight of cement. The characteristics of flowing concrete to be studied are bulk density or unit weight, compressive strength and absorption.
Keywords: Absorption, coconut fiber; compressive strength; density;flowing concrete

INTRODUCTION

Indonesia is one of country in the world that produce food raw materials like sugar cane, rice, coconut, etc. Indonesia is the largest coconut fiber producing country in the world and has coconut plantation land with an area of close to 3,29 millions Ha[1] coconut production is around 2,85 million tons[2].The coconut products will be used to fulfill human needs, while the rest of the utilization will become waste. The process of destroying waste naturally usually takes place slowly, causing a pile of waste. If the waste do not manage properly, it can be a problem. According to[3]. The huge amounts of coconut fiber waste are produced in the factories. The current waste disposal practice of incineration within the industry is normally done in an uncontrolled manner and contributes atmospheric significantly pollution. Therefore there is an effort to develop and present alternative materials that are environmentally friendly and can be used as a substitute for materials commonly used, especially in materials Concrete[4]. As the world's largest producer of coconut fiber, Indonesia has not been able to control the supply of coconut fiber efficiently. The production of concrete mixtures to date has rarely utilized solid waste, especially coconut fiber[5].

Concrete is a composite material comprised of aggregate sand and water that is joined together by cement and hardens after a certain amount of time. In the building business, concrete is the most extensively used traditional construction material, and it can be found everywhere[6].In addition to its advantages, concrete also has problems that can occur during the construction process. One of them is the occurrence of cavities during the compaction process, making the concrete compaction process more difficult because the reinforcing steel is too dense. To overcome this problem, flowing concrete is used . Flowing concrete is concrete that is able to flow on its own without causing segregation and bleeding with a slump value of more than 7.5 inches (190mm)[7]. Flowing Concrete is a concrete mixture with high[8]. fluidity that can be used with little or no vibration or excessive compaction[9]. Flowing concrete is able to flow on its own without the help of a concrete compactor and fills all spaces following the principle of gravity. This concrete utilizes the arrangement of coarse aggregate size, aggregate portion, and superplasticizer mixing is used to achieve a special viscosity so that it can flow on its own. [10].

Superplasticizer is an additional material that is mixed into concrete which functions as a thickener or increases the slump value to facilitate workability[11].

The use of new materials in this concrete mixture is very necessary as a material that is expected to replace commonly used materials and as an experiment that can produce new discoveries. The results of this research can be used in the production of concrete mixture materials in the future[12].

Coconut fiber is a fairly large part of the coconut fruit, which is 35% of the total weight of the fruit. Coconut fiber consists of fiber and cork that connects one fiber to another. Coconut fiber ash comes from the processing of burned coconut fiber waste which then becomes ash. Coconut fiber ash has pozzolanic properties that contain high silicate elements[13].

Coconut fiber ash contains alumina, silica and calcium which are pozzolanic so Accelerates cement setting time due to its properties This pozzolan can minimize deep pores cement paste, filling the voids between particles [14].coconut fiber ash carried out by the Center for Environmental Health Engineering, the composition of Silica compounds was obtained (SiO2) amounting to 67.55% (Bayuaji et al,2015). The use of silica powder ash in OPC hydration has been the focus of interesting discussions in recent years. The use of silica as a substitute material for cement provides better compressive strength, is economical and environmentally friendly. The silica surface will act as a nucleation site or initial reaction for the formation of CH and CSH, which will accelerate the hydration of cement clinker (especially C3S) thereby increasing the compressive strength at an early age. The effect of nucleation on concrete strength increases with the fineness and surface area of the silica material (Neville,2010).

According to earlier research, using coconust fiber ash by up to 10% gives the best results (Santosa,2009). This is due to earlier studies showing that adding more than 10% of coconust fiber ash can reduce its compressive strength. This study, the highest variation was 10%. coconust fiber ash would be added as a material in this research, not a substitute for cement, so that the waste can be utilized optimally and It examines how coconust fiber ash powder affects the properties of Material construction. This is due to the possibility of compressive strength reduction when using high amounts of coconust fiber ash as added material, so that excessive amounts of coconust fiber ash cannot be used. For this study examined flowing concrete as the specimens, which a flowing concerete with Sika-Viscocrete as superplasticizer is a compound made of cement, coarse aggregate, fine aggregate (sand) and water as the binder. The experimental plan was developed by adding coconust fiber ash 0%, 2.5%, 5%, 7.5% and 10% by weight of cement. The purpose of this research coconust fiber ash would be used as an added material in flowing concrete to know The characteristics of flowing concrete to be studied are bulk density or unit weight, compressive strength and absorption.

METHODOLOGY

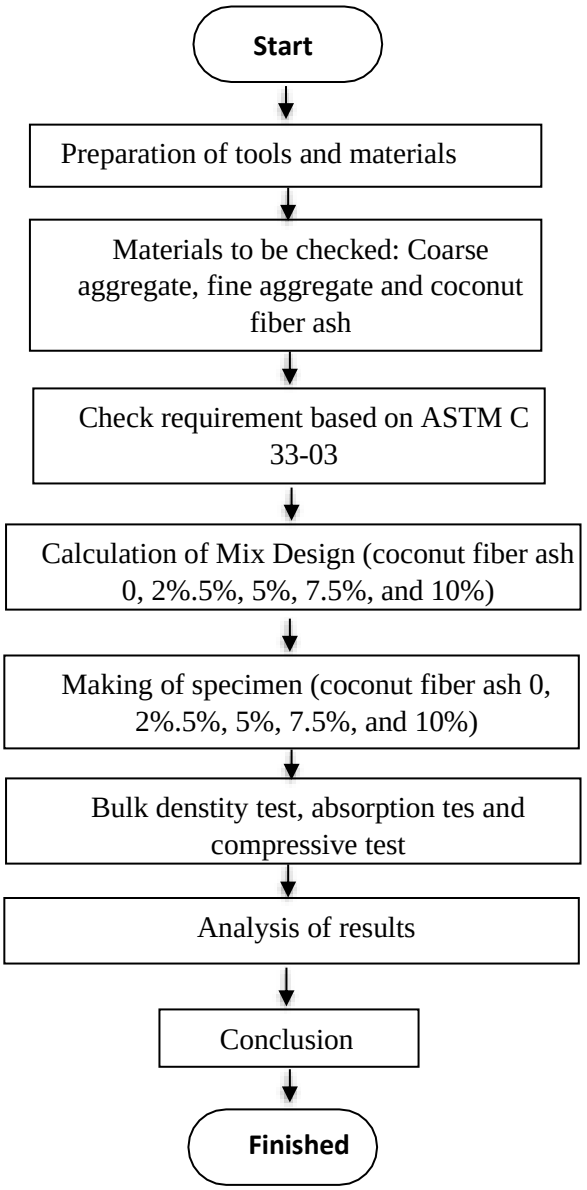
Materials :

Materials that are used in this study coarse aggregate, fine aggregate from Lumajang, water and Cement Portland Type I Gresik and superplastisizer Sika ®ViscoCrete®- 3115N dengan persentase 1,5% and coconut fiber ash.

Those Materials should be tested and it should be compared to standard before being used as ingredients in the flowing concrete's combination. For knowing that those materials are good standard, examining is done on those materials. The components of a flowing concrete are good quality if it meets the specifications, the flowing concrete is said to be good quality. The materials examined those are:

- Coconut fiber ash was tested using XRF Tes
- Fine aggregate and coarse aggregate was tested: Fine aggregate and coarse aggregate Specific Gravity, Fine aggregate and coarse aggregate Sieve Analysis, Fine aggregate and coarse aggregate Absorption, Fine aggregate and coarse aggregate Moisture, Fine aggregate and coarse aggregate Volume Weight, Fine aggregate and coarse aggregate Volume Development Test (Bulking), Fine aggregate and coarse aggregate Cleanliness Test of against Fine aggregate and coarse aggregate Mud Using Wet Method and Cleanliness Test of Fine aggregate and coarse aggregate Against Mud Using Dry Method.

The research flow can be seen in the chart below :



This research start from Preparation of tools and materials then Materials to be checked: Coarse aggregate, fine aggregate and coconut fiber ash, Check requirement based on ASTM C 33-03 for fine and coarse aggregate, Calculation of Mix Design (coconut fiber ash 0, 2%.5%, 5%, 7.5%, and 10%), Making of specimen (coconut fiber ash 0, 2%.5%, 5%, 7.5%, and 10%), Bulk denstity test, absorption tes and compressive test, Analysis of results, Conclusion and finished

Process of Preparation coconut fiber ash :

The process in making the coconut fiber are explained in this following steps :

1. In Figure 1a, Dry the coconut fiber ash using sunshine until there is no remaining water.

Figure 1a. Drying the coconut fiber

2. Figure 1b, Burn coconut fiber in burning barrel

Fig 1b. burning the coconut fiber

Fig 1c.coconut fiber ash before sieved

3. In Figure 1d, Then coconut fiber ash is sieved no 100 to get a finer material

Fig 1d. coconut fiber ash is sieved on no. 100 sieve

RESULT AND DISCUSSION

Density (Unit-Weight)

The specimens is used to calculate the density of flowing concrete. In Figure 2 shows how the density of flowing concrete is affected by the addition of coconut fiber density.

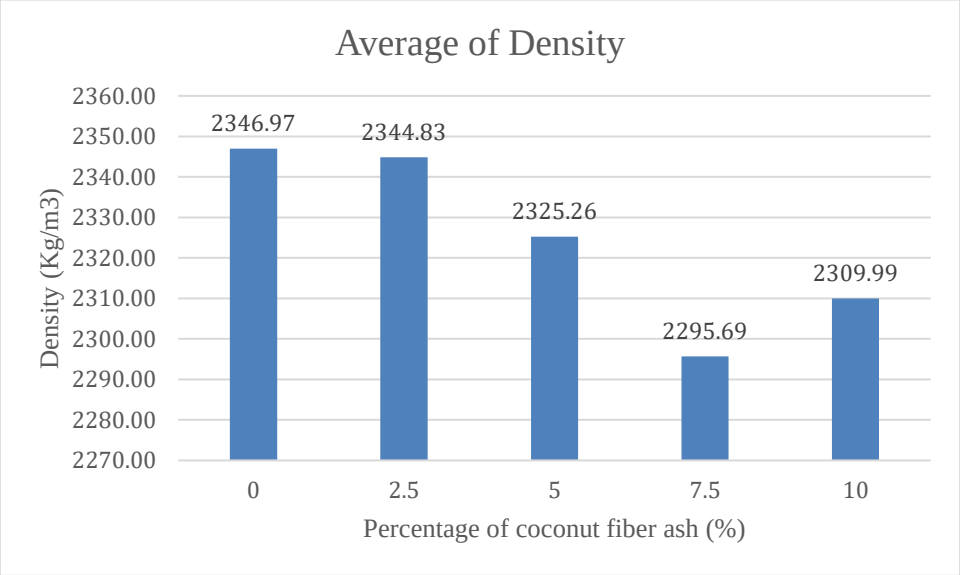


Fig 2. Influence of coconut fiber density of flowing concrete

The graph shows how the unit-weight of the flowing concrete tend to lower in the addition of coconut fiber ash. This result closed to the previous research by (Hwang lung, 2016) that show the densities of cementious mortars that were made with coconut fiber contents of 0%, 1%, 2,5% and 4% by mortar density were getting decrease.

Water Absorption

Flowing concrete specimens are tested for water absorption. Figure 3 illustrates how coconut fiber ash affects the flowing concrete's absorption value.

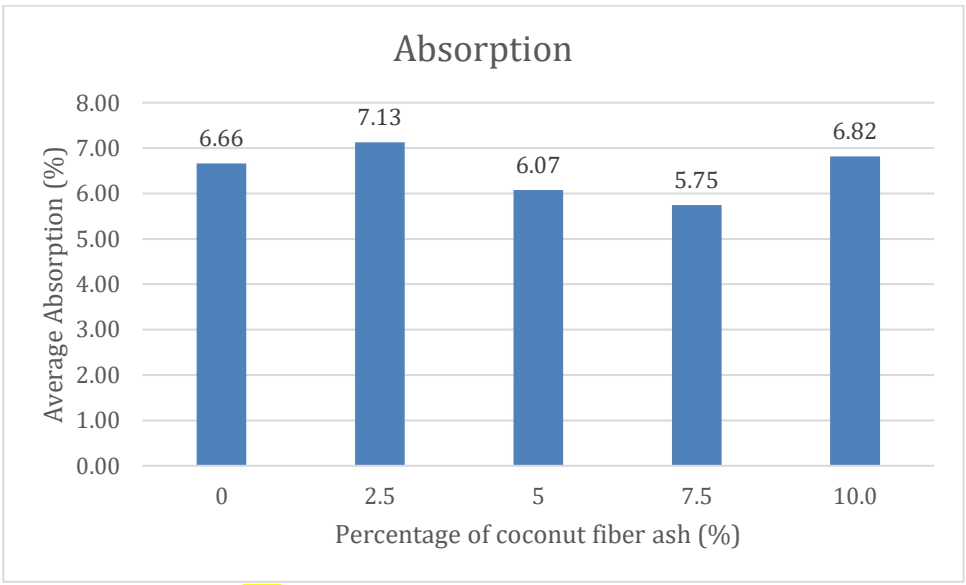


Fig 3. Influence of coconut fiber ash on absorption

Figure 3 indicates how adding coconut fiber ash to the flowing concrte mixture tends to increase and decrease. The addition of coconut fiber ash causes these particles to cover the pores in the concrete, so that the concrete absorbs less water (Maryoto,2019).

The mixture with 0% coconut fiber ash produces water absorption value (6,66%), In the flowing concrete, the 2,5% coconut fiber ash has the highest absorption value (7,13%) and the 7,5% coconut fiber ash has the lowest absorption value (5,75%)

Compressive strength

Average of compressive strength in adding (CFA) coconut fiber ash after 28 days was used for finding compression strength of flowing concrete in this research. Figure 4 shows how CFA impacts the compressive strength.

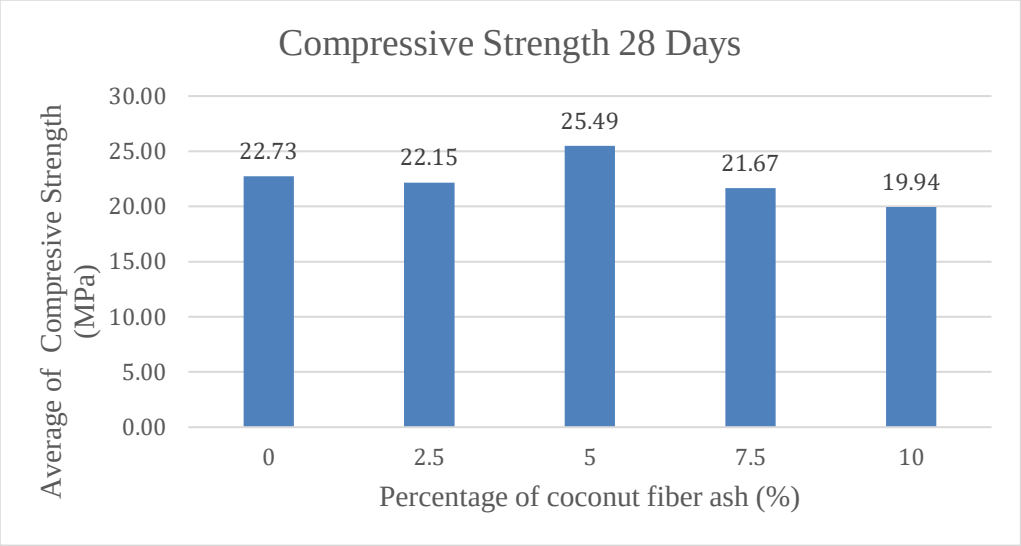


Fig 4. Influence of eggshell powder on compressive strength

Figure 4 shows how adding CFA to the flowing concrete affected the results of the compressive strength . The mixture containing 5% CFA (25,49 MPa) has the highest compressive strength. The findings close to earlier studies that were done by [15]that The result shows that the highest compressive strength in the percentage 4% of replacement cement with CFA. From this compressive strength results show coconut fiber ash has a good potential as added material in flowing concrete but this added material shoul not more than 5%

CONCLUSION

Volume-weight of the flowing concrete was reduced during the density test by the addition of coconut fiber ash in the mixture. Coconut fiber ash has the minimum density in the value of 2.295,7 kg/m^3.

For water absorption tests, The mixture with 7,5% Coconut fiber ash produces the mixture with the lowest water absorption value (5,75%). And The mixture with 2,5% Coconut fiber ash produces the mixture with the highest water absorption value (7,13%)

The result of compressive strength test, percentage 5% of Coconut fiber ash as added material produced optimal value of 25,49 MPa. The increasing value of compressive strength test due The presence of SiO2 assists in improving compressive strength due to The silica surface will act as a nucleation site or initial reaction for the formation of CH and CSH, which will accelerate the hydration of cement clinker (especially C3S) thereby increasing the compressive strength.

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