

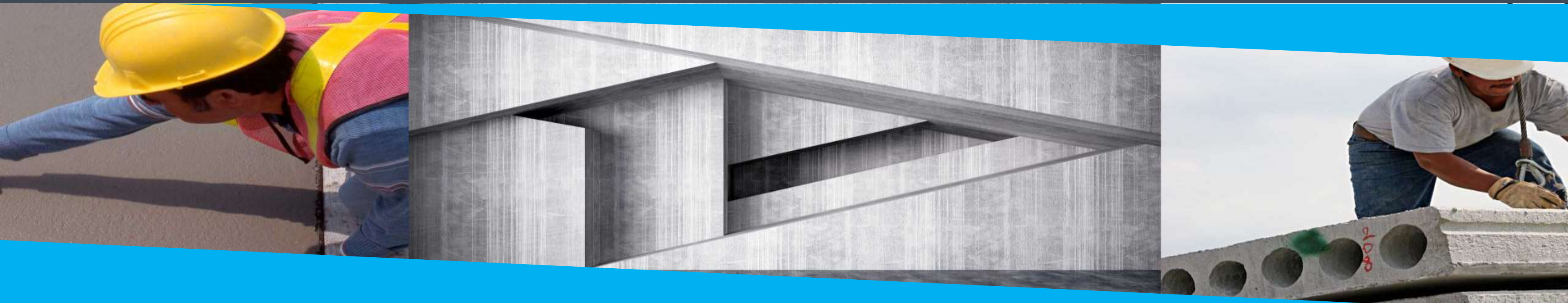


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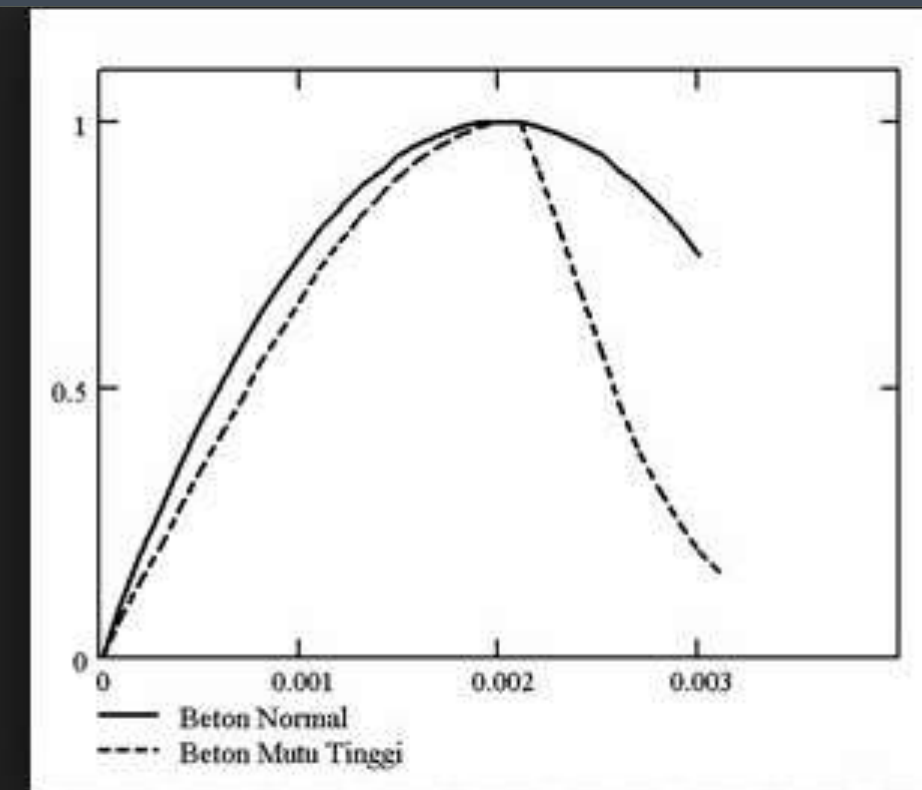
DEPARTEMENT OF CIVIL ENGINEERING  
UNIVERSITY OF JEMBER

2018

# “The effect of addition of banana tree bark for compressive strength and crack tensile strength of rice husk ash concrete”



# WEAKNESS OF CONCRETE MATERIALS



## BRITTLE

Concrete has a low level of Ductility which shows that concrete has a very large force of pressure, but the tensile strength of the concrete is very low.

## STRESS-STRAIN GRAPHICS

this is seen in the stress-strain curve of concrete where there is a rapid decline in the area after the peak load, causing a sudden collapse. (Wilhelmus et al, 2015)



# FIBER CONCRETE



NATURAL FIBER CONCRETE



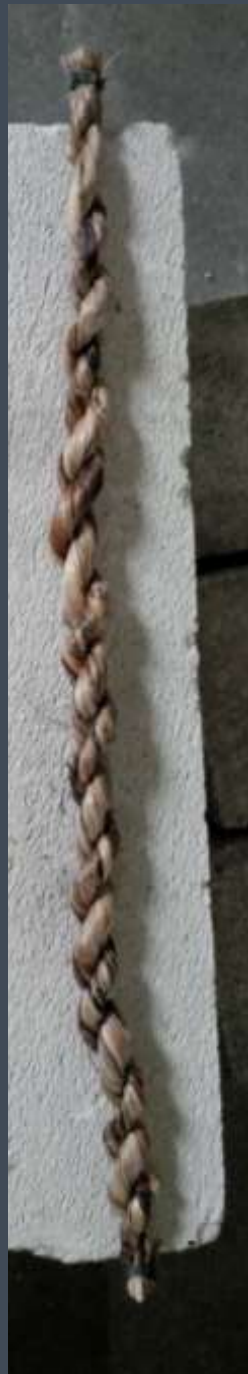
The use of Natural Fiber as an option because of its availability in nature that can be renewed and relatively cheap.

# RESEARCH DESIGN

Specimen code	Proportion		Testing	
	Rice Husk ASH	Bark Fiber	Compressive Strenght	Crack Tensile Strengt
NF	x%	0%	7	7
FC1,5	x%	1,5%	7	7
FC2	x%	2%	7	7
FC3	x%	3%	7	7
$\Sigma$ Number of Specimens			28	28
$\Sigma$ total			56 Specimen	

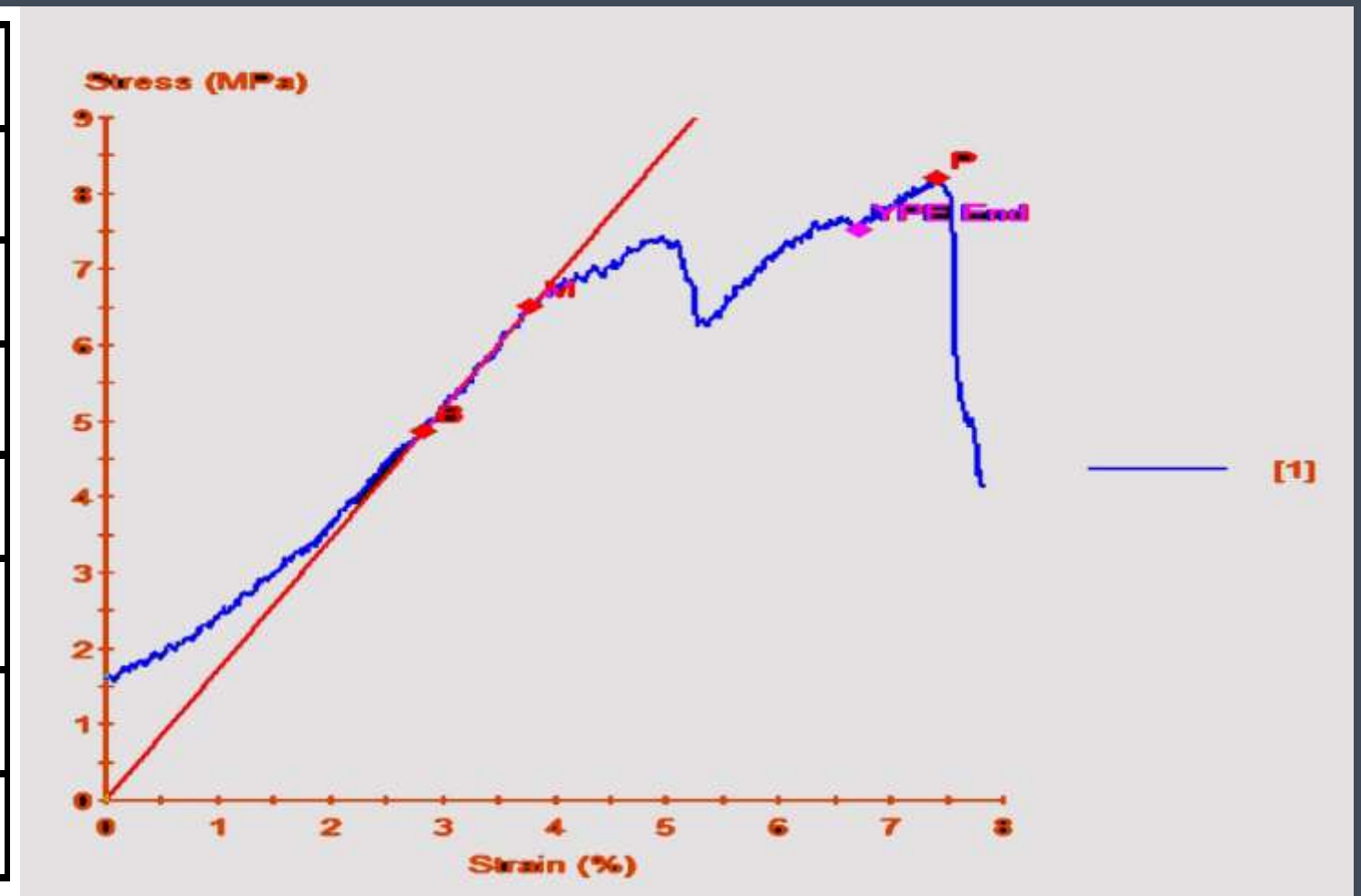
- Speciment test of cylindrical concrete measurement  $\emptyset$  10 cm x 20 cm
- X% variable was took from preliminary test
- The Rice husk ash has been through a combustion process at a temperature of 550 - 800 °C
- Preliminary tests were also conducted on the feasibility of banana tree bark fiber including testing of tensile strength and weight-volume testing.

# TRIAL TENSILE TEST OF BANANA TREE BARK FIBER



- the banana tree bark was cut so that it has a length of 500 mm
- then twisted to have a diameter of 18.9 mm
- Both ends are given a wire to clamp and then the test will be done with Universal Testing Machine

Result	Value	Unit
Initial Diameter	18,9	mm
Initial Length	300	mm
Tensile Strength	8,211	MPa
Maximum Force	2,304	KN
Final Diameter	9,4	mm
Final Length	328	mm
Elongation Percentage	9,33	%



# RICE HUSK ASH CONCRETE PRELIMINARY TEST

This preliminary test is conducted to determine the maximum proportion of rice husk ash as a cement substitution material for maximum compressive strength, which is then used as the proportion of the mixture of fiber concrete. Then the percentage of rice husk ash is determined to be 5%, 7%, 10% and 12% of the weight of cement



# SPECIMENT TEST

Kode benda uji	Proporsi		Jumlah Benda Uji	
	Abu Sekam Padi	Serat Pelepah	Kuat Tekan	Kuat Tarik Belah
NF	7%	0%	7	7
FC1,5	7%	1,5%	7	7
FC2	7%	2%	7	7
FC3	7%	3%	7	7
$\Sigma$ per pengujian			28 buah	28 buah
$\Sigma$ total			56 buah	

- Rice Husk Ash passes 200 sieve
- The fibers are cut with a length of 50 mm



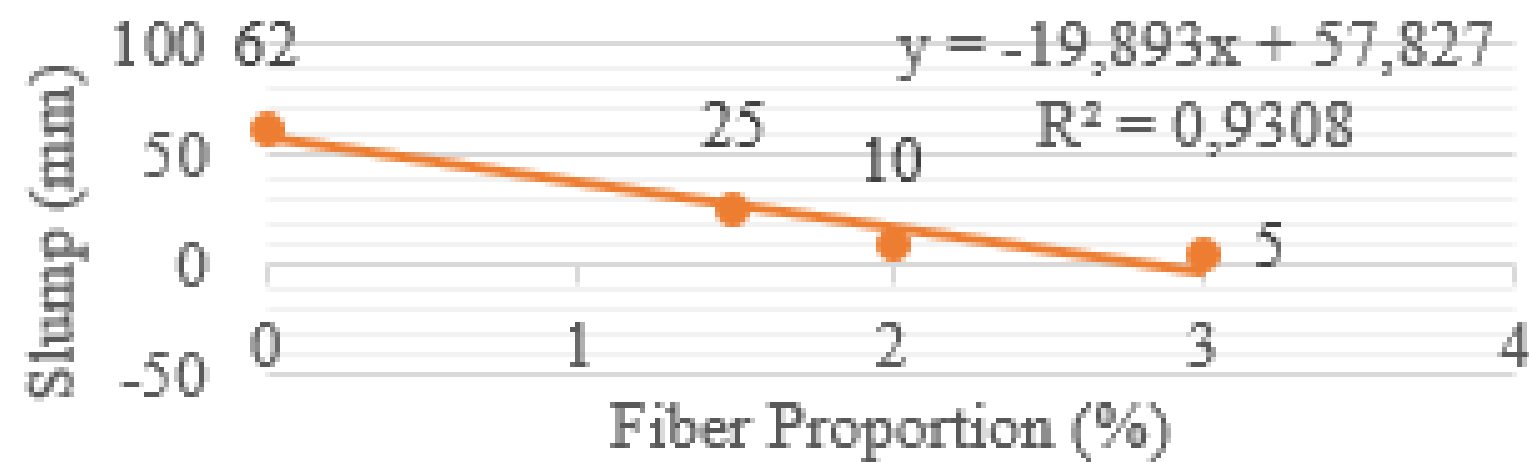
Proportion	Water needed from mix design	Slump (mm)
7% RHA, 0%Fiber	0,371	62
7% RHA, 1,5%Fiber	0,371	25
7% RHA, 2%Fiber	0,371	10
7% RHA, 3%Fiber	0,371	5

## SLUMP TEST OF FIBER CONCRETE AND CORRELATION



$$y = -19,893x + 57,827$$

(r) = 0,9648 which is close to the value 1 indicates that between the addition of fiber and the slump value has a very strong relationship

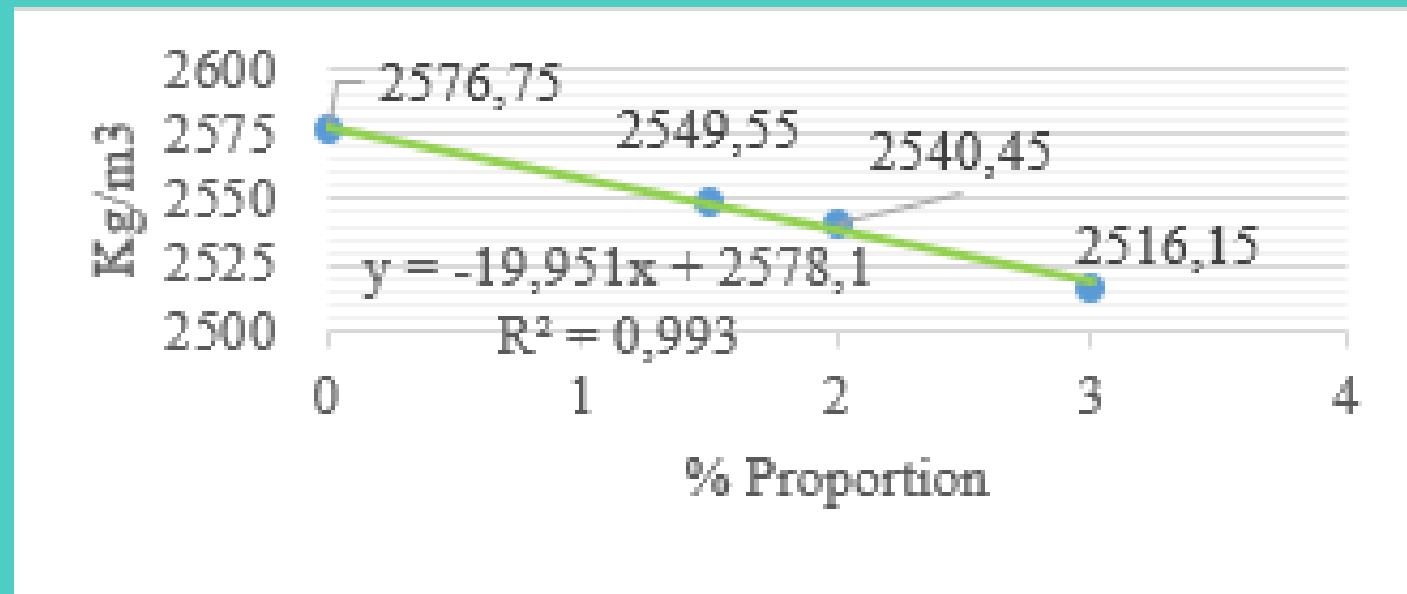


# WEIGHT OF CONCRETE FIBER

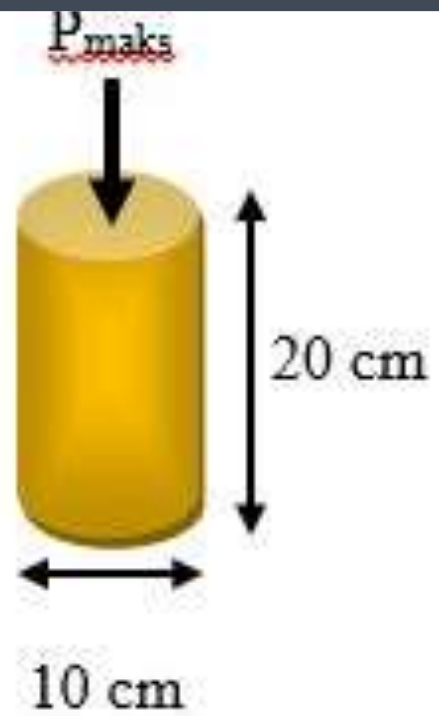
Proportion	Weight (Kg)	Weight (Kg/m <sup>3</sup> )
7% RHA, 0%Fiber	4,0492	2576,75
7% RHA, 1,5%Fiber	4,0042	2549,55
7% RHA, 2%Fiber	4,0064	2540,45
7% RHA, 3%Fiber	3,9540	2516,15

$y = -19,186x + 2578,8$  with the correlation value  $(r) = 0,996$ .

Decrease in the weight of concrete it is because the content of concrete is difficult to be compact. That is the effect of adding fiber and leading to the concrete has more cavities than normal concrete

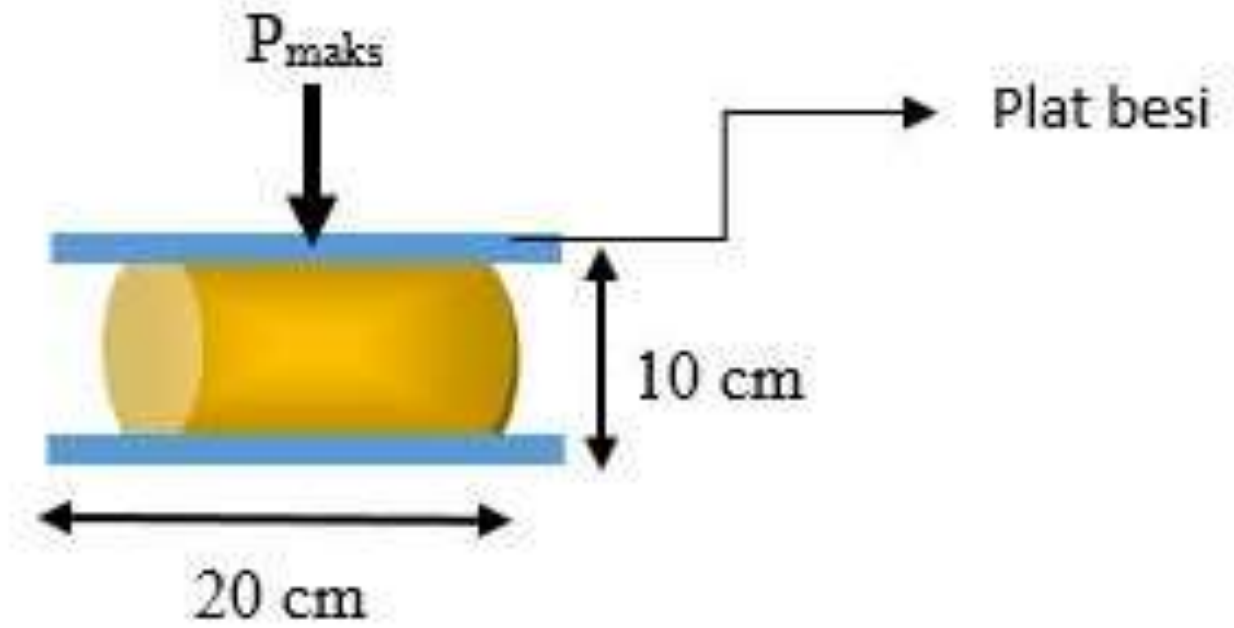


# ILLUSTRATION



**Gambar 2.4** Sketsa Benda Uji Silinder Ø 10 cm x 20 cm

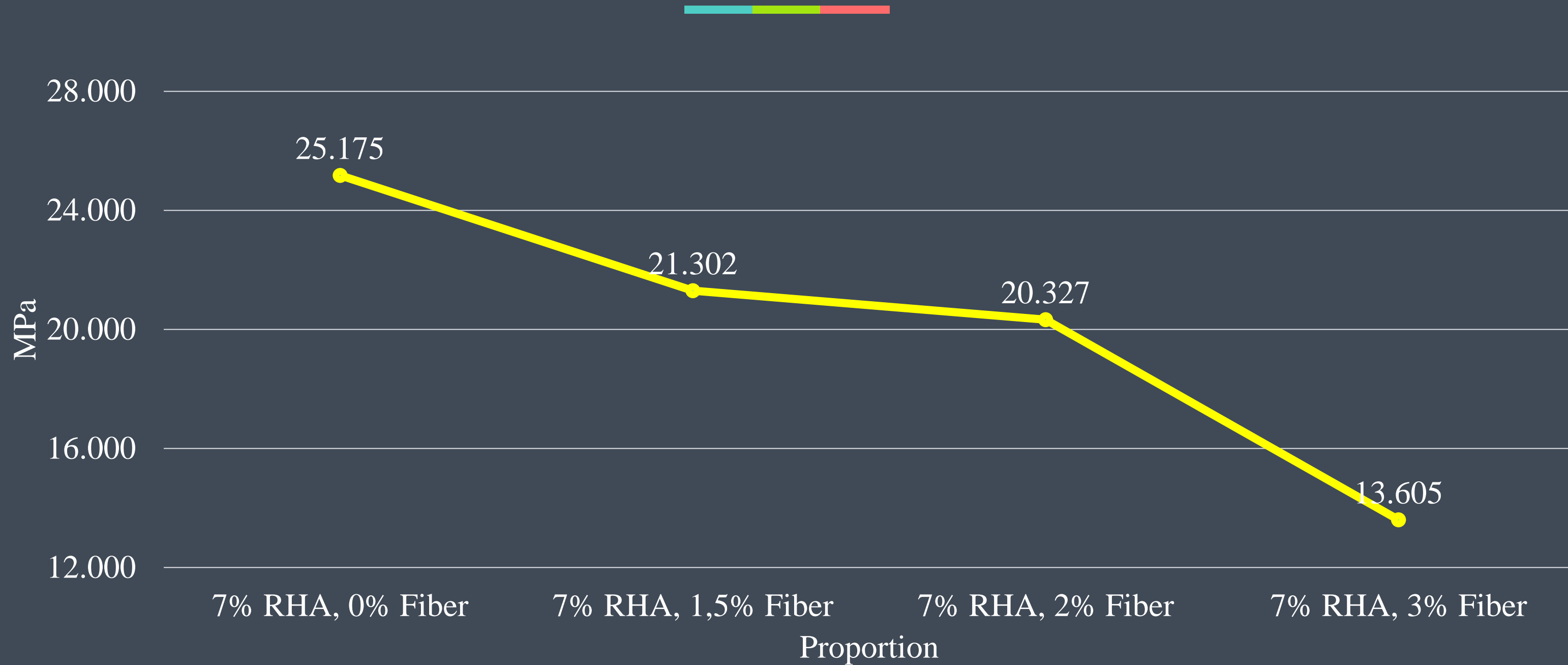
COMPRESSIVE STRENGTH



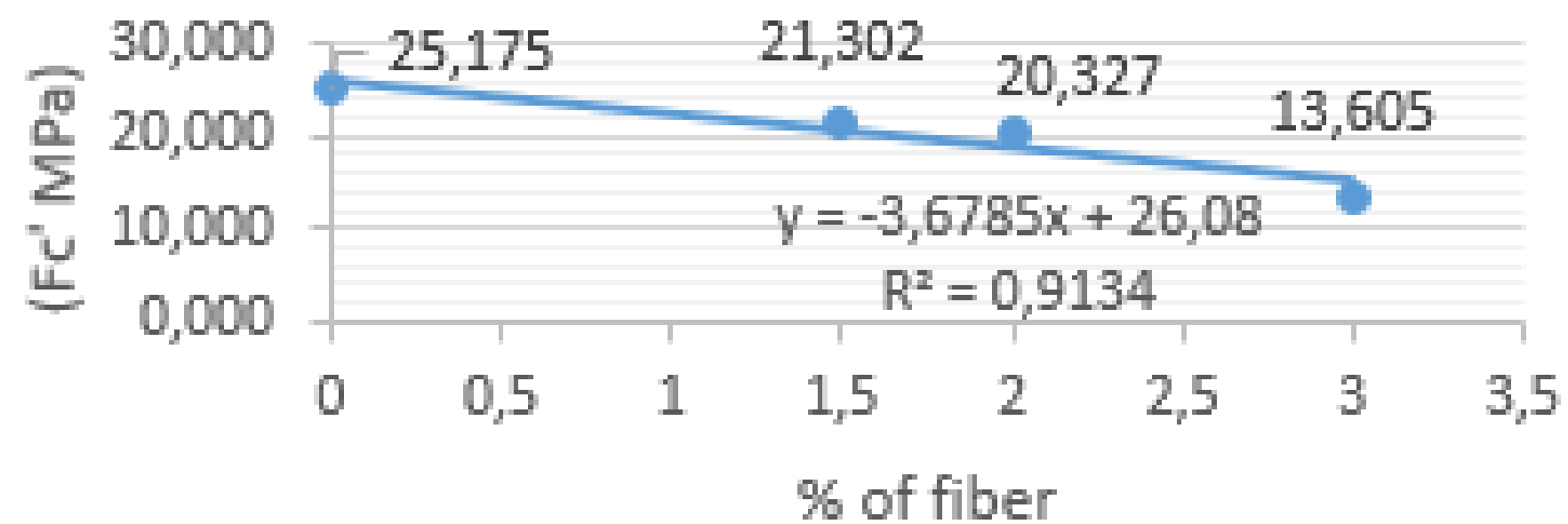
**Gambar 2.5** Sketsa Pengujian Kuat Tarik Beton

CRACK TENSILE STRENGTH

# COMPRESSIVE STRENGTH TEST RESULT



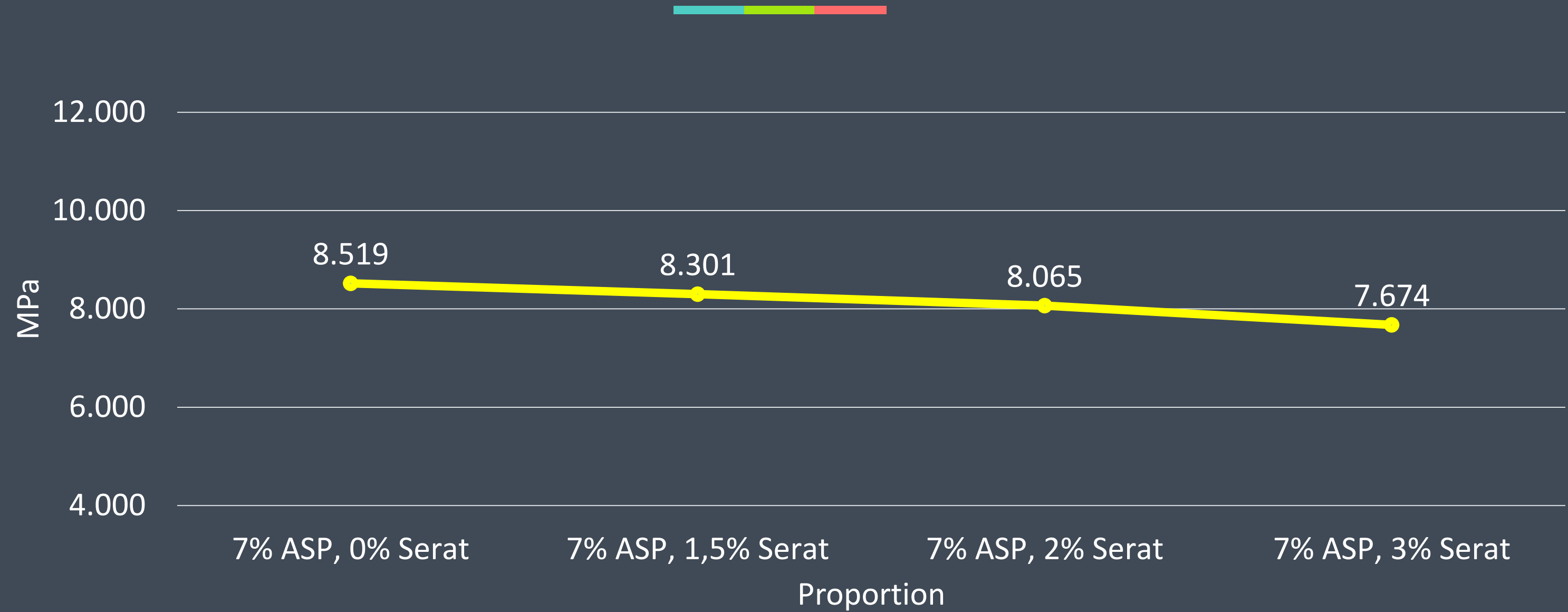




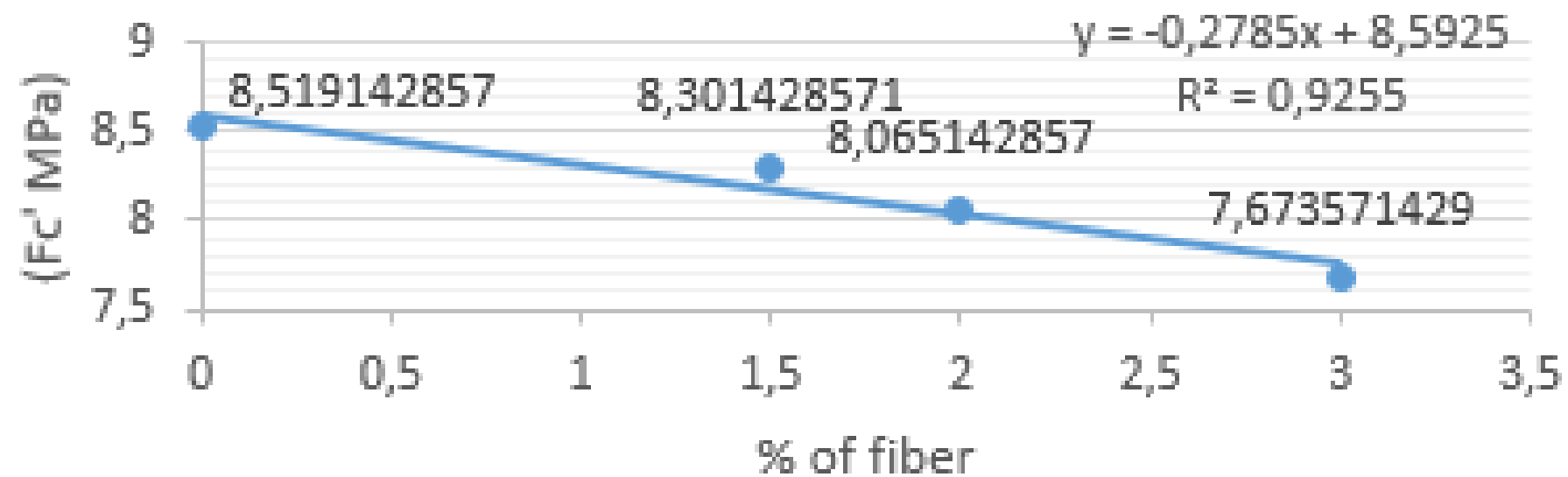
## Correlation of fiber addition and compressive strength

- affects the addition of fiber by giving the same proportion of water, then the slump value will also be smaller. If the slump value is small, and hard concrete becomes compaction.
- This is also evidenced by the decreasing of the weight of concrete content caused by the addition of fiber which also makes the compressive strength of concrete decreased

# Prosentase penurunan kuat tarik



# Correlation of fiber addition and crack tensile strength



- value  $r = 0.96203$ . The value of  $r$  is based on the interval table can be concluded that between the addition of fiber to the drop of tensile strength has a strong relationship.
- This decrease in tensile strength is also directly proportional to the decrease of compressive strength in fiber concrete, it is because of the influence of the level of slump value so that the concrete is difficult to become solid and produce the weight of the concrete content is also decreasing.

# Conclusion

- The result of slump for fiber proportions of 0%, 1.5%, 2% and 3% are 62 mm, 25 mm, 10 mm and 5 mm respectively.
- Concrete compressive strength test results have decreased in each proportion with the results of 25.2 MPa, 21.3 MPa, 20.3 MPa, 13.6 MPa respectively.
- Tensile strength also decreases in each addition of fiber proportion with the results of 8.5 MPa, 8.3 MPa, 8.1 MPa, 7.7 MPa, respectively, meanwhile the result of this tensile strength still meets the minimum requirement that is 8% of the compressive strength of the plan that is equal to 2 MPa.
- It can be concluded that the addition of banana tree bark fiber can decrease the workability, density, compressive strength and tensile strength of concrete because it is caused by the fibers that make hard concrete becomes solid.





# Recommendation



- All fiber proportions must meet the requirement slump value in order to obtain solid concrete and little cavities.
- when pouring into the mold needs to be done more shots and tapping to produce compact concrete.
- Need to select a smaller coarse aggregate diameter to obtain better slump value

# Reference



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THANKYOU









# TREATMENT RICE HUSK ASH

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## PENUMBUKAN

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- RHA yang diperoleh ditumbuk terlebih dahulu agar mudah dalam pengayakan



## Pengayakan

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- Dipilih RHA yang lolos saringan nomor 200



# TREATMENT SERAT PELEPAH POHON PISANG



## Pelepasan Pelepah

- Dilakukan pelepasan pelepah hingga berbentuk lembaran



## Pemisahan serat dari daging

- Bertujuan untuk memperoleh serat tanpa ada unsur lain



## Penjemuran

- Dalam penelitian ini dilakukan pengovenan untuk menghilangkan kadar air dalam serat



## Pemotongan serat

- Serat kemudian dipotong dengan panjang 50 mm