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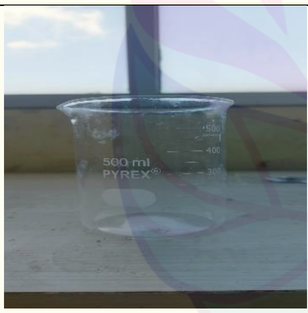
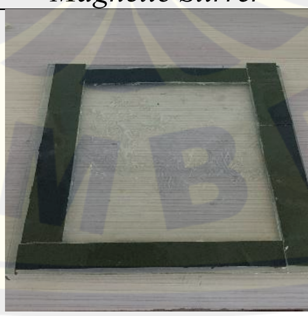
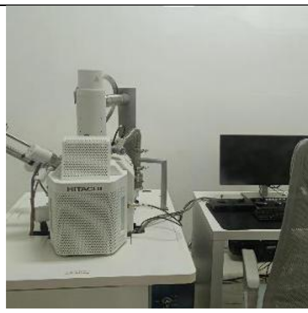
LAMPIRAN

LAMPIRAN 1. ALAT PENELITIAN

Alat		
 Sisir Besi	 Baskom	 *Thinwall*
 Oven	 Gunting	 Penggaris
 *Beaker Glass*	 *Magnetic Stirrer*	 *Hot Plate Stirrer*
 Timbangan Digital	 Cetakan Kaca	 pH Meter

Termometer Digital

Plastic Ziplock



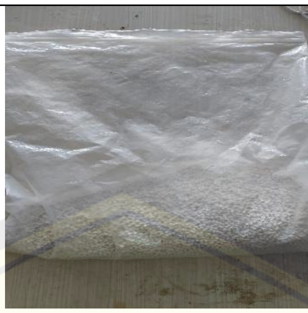
Scanning Electrone Microscope (SEM)

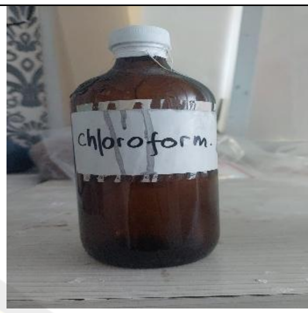
Universal Testing Machine (UTM)

LAMPIRAN 2. BAHAN PENELITIAN

Bahan


Sabut Kelapa


PLA (*Polylactic Acid*)



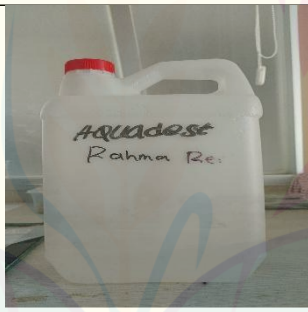
Kloroform


Pati Jagung

Sorbitol

NaOH

H_2O_2



Aquades


Aluminium Foil

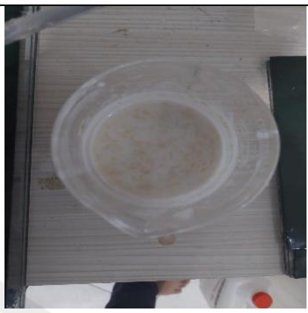
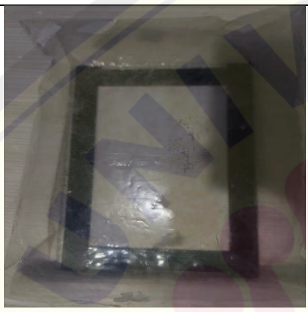

Tanah Kompos


Polybag

LAMPIRAN 3. PREPARASI SERAT SERABUT KELAPA

Preparasi serat serabut kelapa		
		
Proses pengeringan kelapa	Kelapa yang sudah kering	Perendaman kelapa
		
Proses pengambilan sabut kelapa	Sabut kelapa yang berhasil di ambil	Perendaman sabut kelapa
		
Pengambilan serat sabut kelapa	Pengeringan sabut kelapa dengan oven	Proses alkalisasi serat sabut kelapa
		
Proses *bleaching* serat sabut kelapa	Pengeringan sabut kelapa dengan oven	Serat sabut kelapa setelah proses *bleaching*

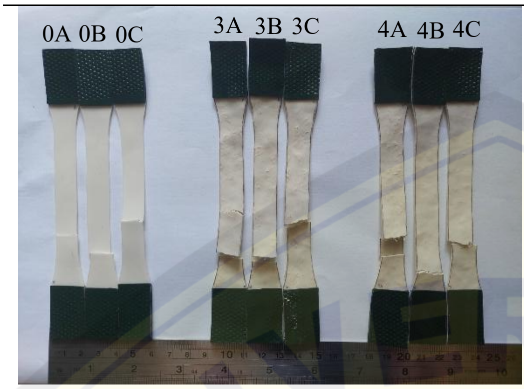
LAMPIRAN 4. PROSES PEMBUATAN BIOKOMPOSIT

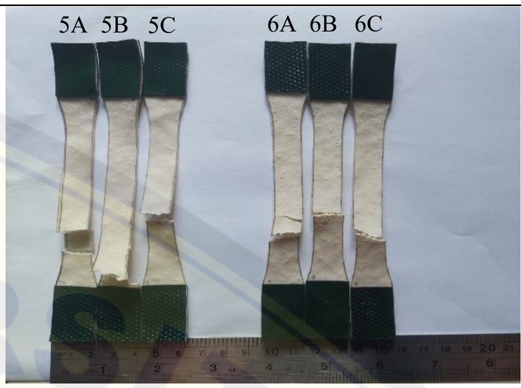
<table>
<tr><th colspan="3">Proses Pembuatan Biokomposit</th></tr>
<tr><td>
Pelarutan PLA dengan Kloroform</td><td>
Tambahkan pati jagung</td><td>
Tambahkan serat serabut kelapa</td></tr>
<tr><td>
Tuang ke dalam cetakan kaca dan masukkan ke plastik ziplock</td><td></td><td></td></tr>
</table>

LAMPIRAN 5. PROSES PENGUJIAN DAN HASIL PENGUJIAN

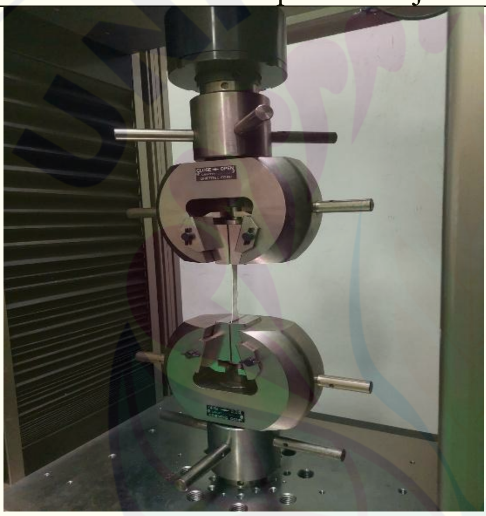
a. Proses Pengujian Tarik

Proses Pengujian Tarik





Spesimen Uji Tarik ASTM D638 Tipe-1



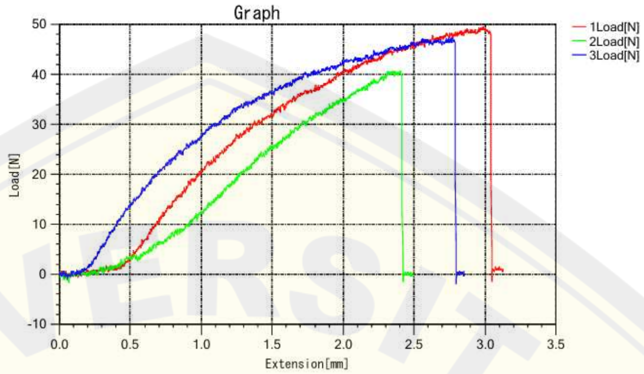
Proses pengujian tarik dengan mesin UTM (*Universal Testing Machine*)

b. Hasil Pengujian tarik

Data Hasil Uji Tarik

C:¥TACT¥LotData¥lot00000512
Laboratorium Pengujian Material
Fakultas Teknik
Universitas Jember

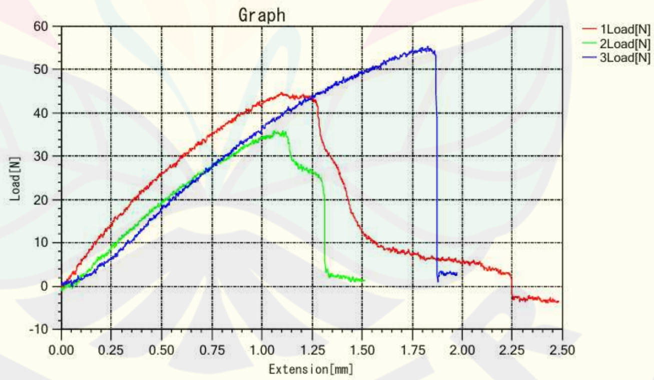
Uji Tarik Komposit Biodegredable PLA



	Width mm	Thickness mm	Section area mm2	Max point Load N	Max point Stress MPa	Elastic modulus MPa	Break point Elongation %GL
1	11. 350	0. 7200	8. 1720	49. 085	6. 0065	457. 17	3. 020
2	11. 620	0. 7600	8. 8312	40. 860	4. 6267	280. 36	2. 399
3	11. 240	0. 7400	8. 3176	47. 029	5. 6541	387. 74	2. 699

C:¥TACT¥LotData¥lot00000508
Laboratorium Pengujian Material
Fakultas Teknik
Universitas Jember

Uji Tarik Komposit Biodegredable PLA + serabut kelapa 3%

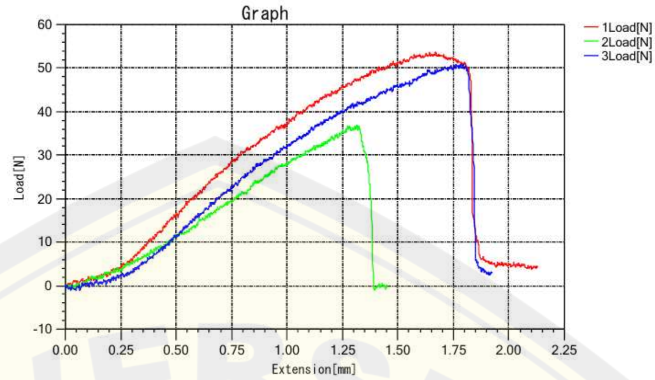


	Width mm	Thickness mm	Section area mm2	Max point Load N	Max point Stress MPa	Elastic modulus MPa	Break point Elongation %GL
1	12. 740	1. 3500	17. 199	44. 794	2. 6044	5. 6710	2. 38
2	12. 810	1. 4800	18. 959	35. 495	1. 8722	23. 580	1. 40
3	13. 000	1. 8000	23. 400	54. 718	2. 3384	200. 83	1. 86

C:¥TACT¥LotData¥lot00000509

Laboratorium Pengujian Material
Fakultas Teknik
Universitas Jember

Uji Tarik Komposit Biodegredable PLA + serabut kelapa 4%

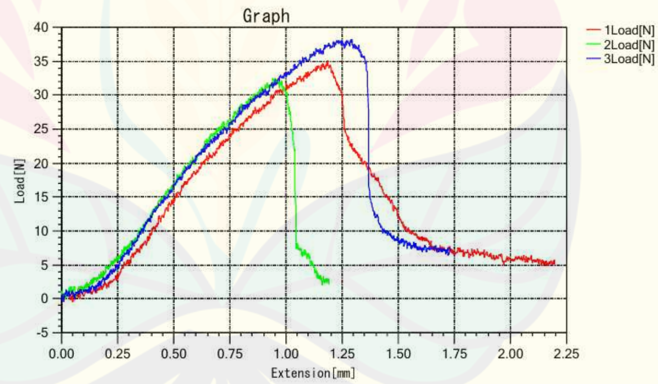


	Width mm	Thickness mm	Section area mm2	Max point Load N	Max point Stress MPa	Elastic modulus MPa	Break point Elongation %GL
1	12.620	1.4400	18.173	53.198	2.9273	219.33	2.06
2	12.850	1.3300	17.091	36.479	2.1344	182.89	1.31
3	12.720	1.7800	22.642	50.426	2.2272	193.62	1.84

C:¥TACT¥LotData¥lot00000511

Laboratorium Pengujian Material
Fakultas Teknik
Universitas Jember

Uji Tarik Komposit Biodegredable PLA + serabut kelapa 6%



	Width mm	Thickness mm	Section area mm2	Max point Load N	Max point Stress MPa	Elastic modulus MPa	Break point Elongation %GL
1	12.700	1.5400	19.558	34.243	1.7509	205.72	2.06
2	13.010	1.5000	19.515	32.276	1.6539	228.45	1.08
3	12.620	1.7500	22.085	37.999	1.7206	171.08	1.68

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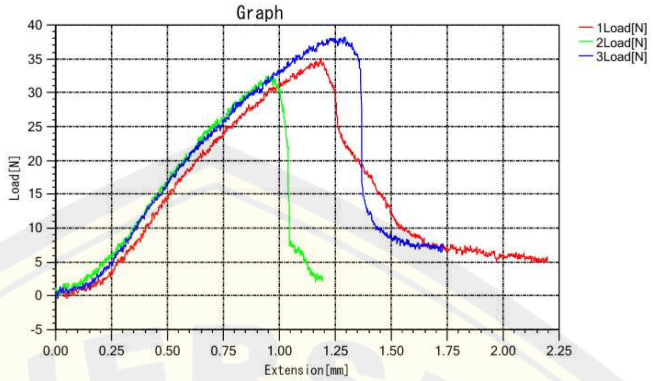
Laboratorium Pengujian Material
Fakultas Teknik
Universitas Jember

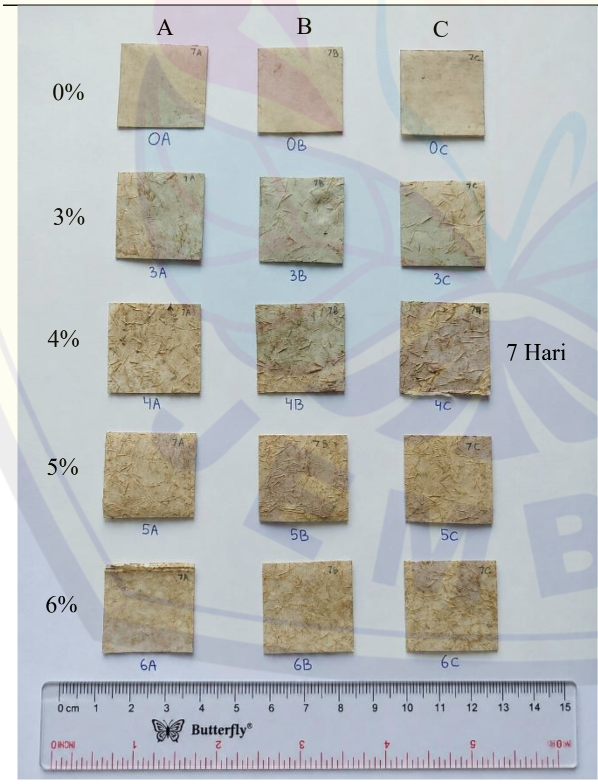
Uji Tarik Komposit Biodegredable PLA + serabut kelapa 6%



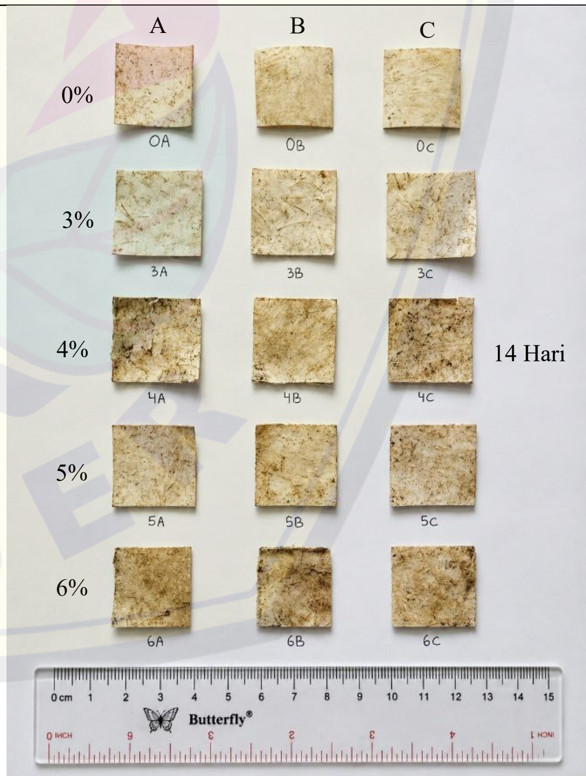
	Width mm	Thickness mm	Section area mm2	Max point Load N	Max point Stress MPa	Elastic modulus MPa	Break point Elongation %GL
1	12.700	1.5400	19.558	34.243	1.7509	205.72	2.06
2	13.010	1.5000	19.515	32.276	1.6539	228.45	1.08
3	12.620	1.7500	22.085	37.999	1.7206	171.08	1.68

c. Proses pengujian biodegradasi

Proses Pengujian Biodegradasi



Spesimen Uji Biodegradasi setelah 7 Hari



Spesimen Uji Biodegradasi setelah 14 Hari

Spesimen Uji Biodegradasi setelah 21 Hari


Proses uji biodegradasi

d. Proses pengujian biodegradasi

Hasil data uji biodegradasi

SERAT SERABUT KELAPA SEBELUM DITANAM

Sampel	Replika Sampel	7 Hari	14 Hari	21 Hari
0%	0A	0.53	0.63	0.80
	0B	0.49	0.51	0.85
	0C	0.45	0.53	0.81
	Rata-rata	0.49	0.56	0.82
3%	3A	0.68	0.81	0.64
	3B	0.77	0.78	0.65
	3C	0.72	0.88	0.63
	Rata-rata	0.72	0.82	0.64
4%	4A	0.51	0.59	0.64
	4B	0.56	0.64	0.61
	4C	0.55	0.72	0.64
	Rata-rata	0.54	0.65	0.63
5%	5A	0.97	1.31	1.04
	5B	1.11	1.30	1.01
	5C	1.07	1.33	0.99
	Rata-rata	1.05	1.31	1.01
6%	6A	0.85	0.73	0.74
	6B	0.77	0.71	0.72
	6C	0.84	0.80	0.68
	Rata-rata	0.82	0.75	0.71

SERAT SERABUT KELAPA SETELAH DITANAM

Sampel	Replika Sampel	7 Hari	14 Hari	21 Hari
0%	0A	0.49	0.60	0.73
	0B	0.48	0.48	0.81
	0C	0.44	0.50	0.75
	Rata-rata	0.47	0.53	0.76
3%	3A	0.62	0.75	0.55
	3B	0.70	0.70	0.56
	3C	0.68	0.80	0.56
	Rata-rata	0.67	0.75	0.56
4%	4A	0.47	0.52	0.49
	4B	0.50	0.54	0.54
	4C	0.49	0.63	0.54
	Rata-rata	0.49	0.56	0.52
5%	5A	0.90	1.09	0.85
	5B	1.01	1.15	0.80
	5C	0.94	1.10	0.81
	Rata-rata	0.95	1.11	0.82
6%	6A	0.75	0.59	0.50
	6B	0.72	0.56	0.50
	6C	0.74	0.67	0.50
	Rata-rata	0.74	0.61	0.50

LAMPIRAN 6. PERHITUNGAN PROSES ALKALISASI, *BLEACHING*

a. **Data perhitungan proses alkalisasi**

Serat sabut kelapa 25 gram

Rasio perbandingan serat sabut kelapa dengan larutan NaOH adalah 1 : 20 ml

Kadar NaOH 5%

Total larutan Alkalisasi = 25 x 20 = 500 ml

NaOH yang dibutuhkan = 500 ml x 5% = 25 Gram

Total aquades yang dibutuhkan = 500 – 25 = 475 ml

b. **Data perhitungan proses *bleaching***

Serat Sabut kelapa 25 gram

Rasio perbandingan serat sabut kelapa dengan larutan *bleaching* adalah 1:20 ml

Kadar H_2O_2 40%

Total larutan H_2O_2 = 25 x 20 = 500 ml

LAMPIRAN 7. Perhitungan Variasi Fraksi Volume Serat Serabut Kelapa

Total volume cetakan biokomposit = 120 ml

Rasio perbandingan PLA,SSK, pati jagung dengan kloroform adalah 1 : 2. Jika larutan total volume cetakan 120 ml, maka volume larutan PLA,SSK, pati jagung adalah 40 ml dan volume larutan kloroform adalah 80 ml

Massa Jenis serat serabut kelapa = 1,4 g/cm^3

Massa Jenis pati jagung = 0,92 g/cm^3

Massa Jenis PLA = 1,25 g/cm^3

Perhitungan Fraksi Volume SSK

a. Variasi SSK 3%, Pati Jagung 5%, PLA 92%

$$\text{SSK} = \frac{3}{100}\ x\ 40\ ml = 1{,}2\ ml\ x\ \frac{1{,}4\ g}{cm^3} = 1{,}68\ gram$$

$$\text{Pati Jagung} = \frac{5}{100}\ x\ 40\ ml = 2\ ml\ x\ \frac{0{,}92\ g}{cm^3} = 1{,}84\ gram$$

$$\text{PLA} = \frac{92}{100}\ x\ 40\ ml = 36{,}8\ ml\ x\ \frac{1{,}25\ g}{cm^3} = 46\ gram$$

b. Variasi SSK 4%, Pati Jagung 5%, PLA 91%

$$\text{SSK} = \frac{4}{100}\ x\ 40\ ml = 1{,}6\ ml\ x\ \frac{1{,}4\ g}{cm^3} = 2{,}24\ gram$$

$$\text{Pati Jagung} = \frac{5}{100}\ x\ 40\ ml = 2\ ml\ x\ \frac{0{,}92\ g}{cm^3} = 1{,}84\ gram$$

$$\text{PLA} = \frac{91}{100}\ x\ 40\ ml = 36{,}4\ ml\ x\ \frac{1{,}25\ g}{cm^3} = 45{,}5\ gram$$

c. Variasi SSK 5%, Pati Jagung 5%, PLA 90%

$$\text{SSK} = \frac{5}{100}\ x\ 40\ ml = 2\ ml\ x\ \frac{1{,}4\ g}{cm^3} = 2{,}8\ gram$$

$$\text{Pati Jagung} = \frac{5}{100}\ x\ 40\ ml = 2\ ml\ x\ \frac{0{,}92\ g}{cm^3} = 1{,}84\ gram$$

$$\text{PLA} = \frac{90}{100}\ x\ 40\ ml = 36\ ml\ x\ \frac{1{,}25\ g}{cm^3} = 45\ gram$$

d. Variasi SSK 6%, Pati Jagung 5%, PLA 89%

$$\text{SSK} = \frac{6}{100}\ x\ 40\ ml = 2{,}4\ ml\ x\ \frac{1{,}4\ g}{cm^3} = 3{,}36\ gram$$

$$\text{Pati Jagung} = \frac{5}{100}\ x\ 40\ ml = 2\ ml\ x\ \frac{0{,}92\ g}{cm^3} = 1{,}84\ gram$$

$$\text{PLA} = \frac{89}{100}\ x\ 40\ ml = 35{,}6\ ml\ x\ \frac{1{,}25\ g}{cm^3} = 44{,}5\ gram$$