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**LAMPIRAN**

# Lampiran 1. Foto Dokumentasi Proses Maserasi



Pengumpulan sampel kayu  
(Durian, Mahoni, Melinjo)



Pemotongan kayu secara arah  
longitudinal



Persiapan Alat dan Bahan



Membuat kayu menjadi balok kecil  
berukuran panjang 3 cm, lebar 0,2  
cm dan tinggi 0,3 cm. Ukuran  
panjang mengikuti arah longitudinal  
(arah sumbu pohon).



Proses pembuatan cairan maserator  
Asam asetat glasial dan Hidrogen  
peroksida



Memasukkan sampel kayu kedalam  
cairan maserator



pemasakan sampel serat kayu selama  
kurang lebih 4 jam



pemasakan air panas untuk mengisi  
ulang air yang hilang dari proses  
pemasakan sampel serat



Penambahan air panas ke gelas piala yang hilang akibat penguapan selama proses pemasakan sampel serat



Kayu sudah membengkak atau “swelling” dan lignin sudah larut



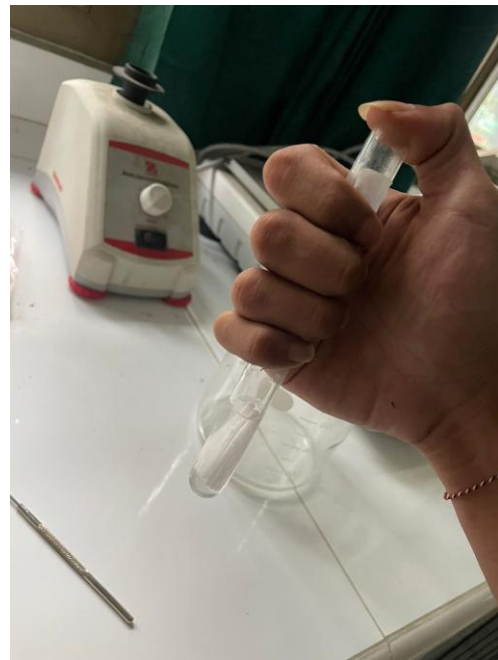
Mendinginkan sampel serat dengan suhu ruang



Pembuangan cairan maserator dan meninggalkan sampel serat yang ditahan dengan jarum preparat



Pembersihan sampel serat dari cairan maserator dengan cara mencuci sampel serat menggunakan aquadesah atau air suling



Menggojok sampel serat kayu yang sudah dibersihkan hingga serat terlepas satu sama lain



Memberikan aquadesah 1/3 tabugn reaksi setelah proses pencucian serat selesai



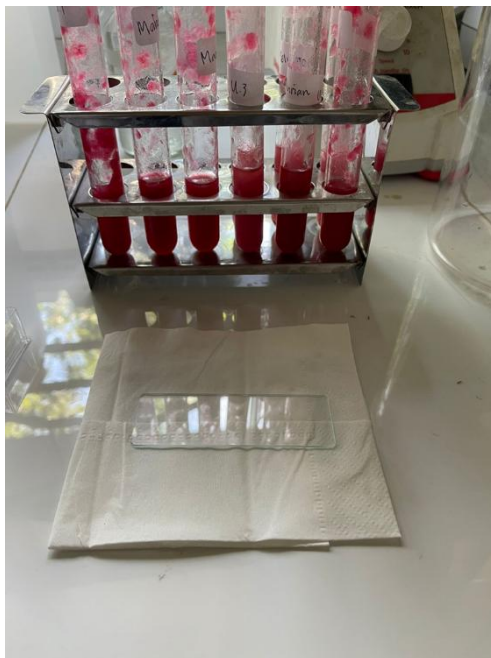
Sampel serat diberikan safranin 0,25% untuk mewarnai tubuh serat.



Mengojok kemabali sampel serat yang sudah diberikan safranin agar merata pada seluruh serat



Sampel serat didiamkan selama kurang lebih 24 agar mewarnai serat secara sempurna



Menyiapkan *object glass* dan *cover glass*

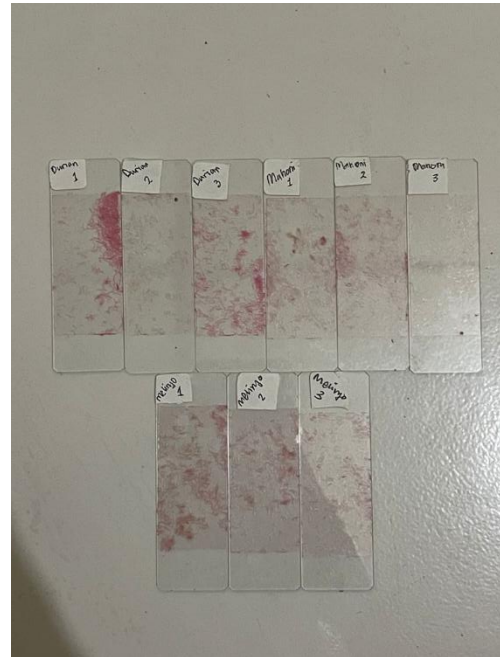


Mengambil sampel serat menggunakan pipet hisap yang selanjutnya diletakkan pada *objek glass*

## Lampiran 2. Dokumentasi Pembuatan Preparat Serat Dan Pemotretan Serat



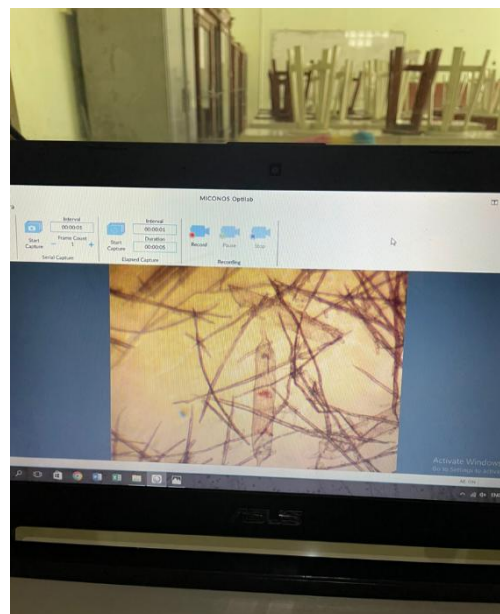
membuang air yang terdapat pada sampel serat dengan menggunakan kertas tisu



Keseluruhan sampel serat yang telah selesai dan siap dilaksanakan pemotretan



Persiapan pemotretan dengan mikroskop dan disambungkan dengan *optilab camera* dan mengambil sampel gambar yang selanjutnya akan diukur



Contoh gambar sampel serat setelah dilaksanakan pemotretan dengan *optilab camera*

Lampiran 3. Contoh Hasil Pemotretan Serat Dengan *Optilab* dan Pengukuran Dimensi Serat Dengan *Image Raster*

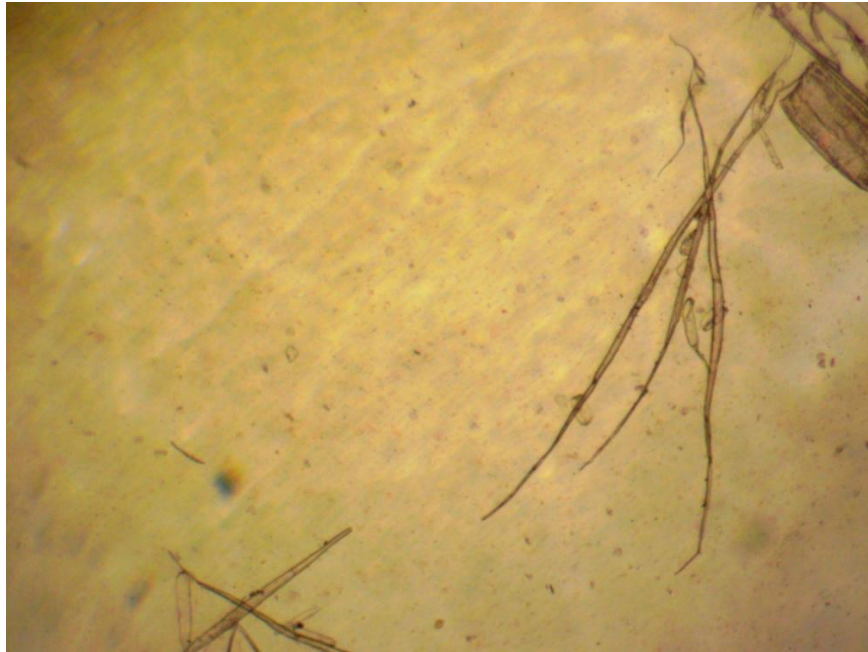


Foto contoh sampel serat kayu mahoni yang diambil dengan kamera optilab perbesaran 45x lensa 4,5x

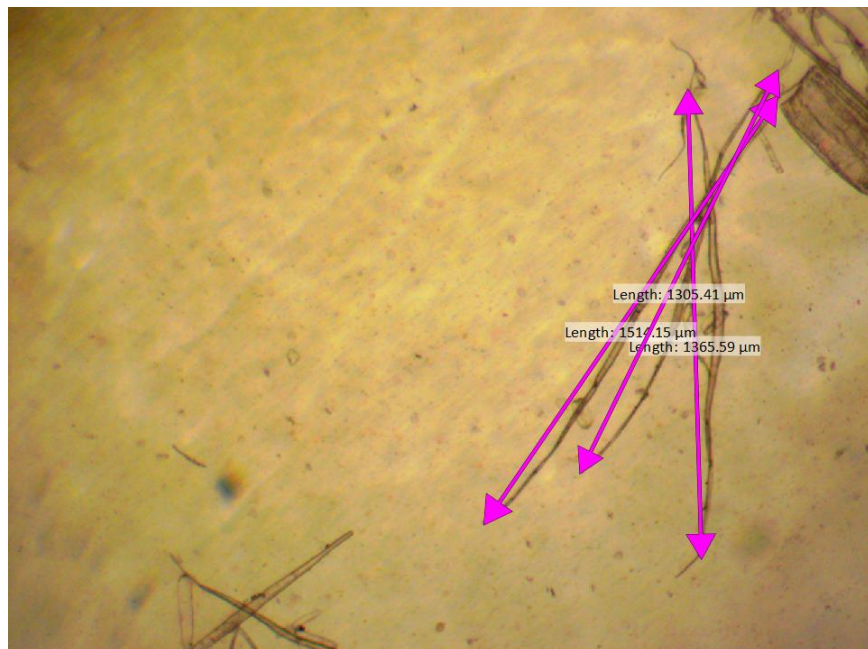


Foto contoh sampel serat kayu mahoni setelah pengukuran dengan *image raster*

Lampiran 3. Contoh hasil pemotretan serat dengan optilab dan pengukuran dimensi serat dengan *image raster* (lanjutan)

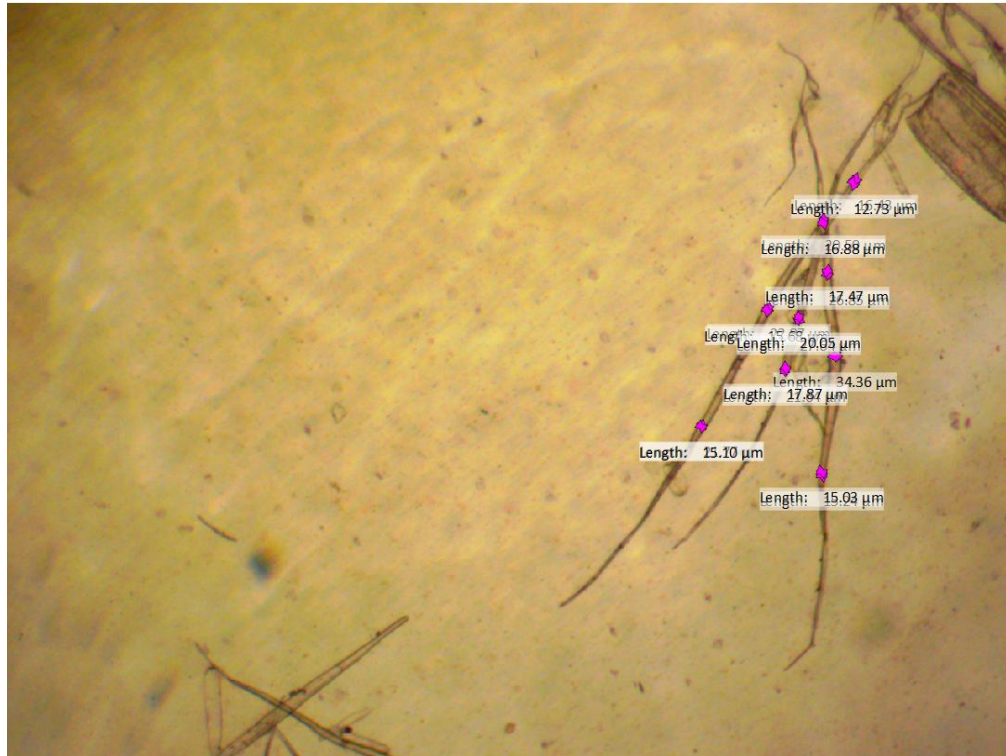


Foto sampel serat kayu mahoni setelah pengukuran diameter serat dan diameter lumen dengan *image raster*

Lampiran 4. Data Hasil Pengukuran Dimensi Serat dan Nilai Turunan Dimensi Serat Kayu Durian

1. Kayu Durian (*Durio zibethinus*) Ulangan ke-I

a. Data Panjang Serat

| No. | Panjang Serat | 26 | 1336.48 | 53 | 1495.06 | 80        | 1633.25       |
|-----|---------------|----|---------|----|---------|-----------|---------------|
| 1   | 1046.34       | 27 | 1339.18 | 54 | 1498.67 | 81        | 1633.26       |
| 2   | 1078.34       | 28 | 1340.04 | 55 | 1502.65 | 82        | 1666.61       |
| 3   | 1109.99       | 29 | 1345.59 | 56 | 1503.09 | 83        | 1670.69       |
| 4   | 1111.45       | 30 | 1354.73 | 57 | 1508.65 | 84        | 1675.58       |
| 5   | 1132.50       | 31 | 1359.30 | 58 | 1518.13 | 85        | 1679.38       |
| 6   | 1140.41       | 32 | 1361.15 | 59 | 1522.93 | 86        | 1688.58       |
| 7   | 1152.26       | 33 | 1361.86 | 60 | 1529.19 | 87        | 1698.78       |
| 8   | 1152.77       | 34 | 1368.99 | 61 | 1535.54 | 88        | 1705.47       |
| 9   | 1154.89       | 35 | 1388.16 | 62 | 1540.35 | 89        | 1707.36       |
| 10  | 1163.39       | 36 | 1388.88 | 63 | 1543.19 | 90        | 1741.58       |
| 11  | 1172.74       | 37 | 1391.40 | 64 | 1543.52 | 91        | 1746.01       |
| 12  | 1179.56       | 38 | 1403.90 | 65 | 1551.33 | 92        | 1753.22       |
| 13  | 1220.63       | 39 | 1404.97 | 66 | 1552.50 | 93        | 1787.63       |
| 14  | 1222.73       | 40 | 1410.65 | 67 | 1556.88 | 94        | 1789.52       |
| 15  | 1237.25       | 41 | 1412.12 | 68 | 1571.00 | 95        | 1789.68       |
| 16  | 1240.61       | 42 | 1412.33 | 69 | 1574.82 | 96        | 1797.49       |
| 17  | 1252.87       | 43 | 1414.42 | 70 | 1579.70 | 97        | 1805.02       |
| 18  | 1264.62       | 44 | 1440.29 | 71 | 1590.61 | 98        | 1870.59       |
| 19  | 1283.37       | 45 | 1442.57 | 72 | 1601.01 | 99        | 1903.52       |
| 20  | 1293.74       | 46 | 1454.45 | 73 | 1602.04 | 100       | 1934.37       |
| 21  | 1298.76       | 47 | 1478.82 | 74 | 1605.85 | Total     | 147045,9<br>9 |
| 22  | 1301.30       | 48 | 1482.81 | 75 | 1614.45 | Rata-rata | 1470.46       |
| 23  | 1323.41       | 49 | 1483.30 | 76 | 1615.73 |           |               |
| 24  | 1330.01       | 50 | 1486.78 | 77 | 1618.78 |           |               |
| 25  | 1333.96       | 51 | 1488.14 | 78 | 1619.49 |           |               |
|     |               | 52 | 1493.04 | 79 | 1630.99 |           |               |

## b. Perhitungan Sampel Serat

$$\text{Rata-rata Panjang serat} = \frac{147045,99}{100} = 1470,46$$

$$\text{Range} = 1934,37 - 1046,34 = 888,03$$

$$\text{Jumlah Kelas Interval} = 1 + 3,3 \log 100 = 8$$

$$\text{Lebar Kelas Interval} = 888,03 / 8 = 111,00$$

| Kelas  | Interval |         | Xi       | Fi  | Xi2         | Xi x Fi   | Xi2xFi       |
|--------|----------|---------|----------|-----|-------------|-----------|--------------|
|        | L1       | L2      |          |     |             |           |              |
| 1      | 1046,34  | 1157,34 | 1101,84  | 9   | 1214051,39  | 9916,56   | 10926462,47  |
| 2      | 1157,34  | 1268,34 | 1212,84  | 9   | 1470980,87  | 10915,56  | 13238827,79  |
| 3      | 1268,34  | 1379,34 | 1323,84  | 16  | 1752552,35  | 21181,44  | 28040837,53  |
| 4      | 1379,34  | 1490,34 | 1434,84  | 17  | 2058765,83  | 24392,28  | 34999019,04  |
| 5      | 1490,34  | 1601,34 | 1545,84  | 20  | 2389621,31  | 30916,80  | 47792426,11  |
| 6      | 1601,34  | 1712,34 | 1656,84  | 18  | 2745118,79  | 29823,12  | 49412138,14  |
| 7      | 1712,34  | 1823,34 | 1767,84  | 8   | 3125258,27  | 14142,72  | 25002066,12  |
| 8      | >1823,34 |         | 1878,84  | 3   | 3530039,75  | 5636,52   | 10590119,24  |
| Jumlah |          |         | 11922,72 | 100 | 18286388,52 | 146925,00 | 220001896,44 |

$$L = \frac{146925,00}{100} \times 0,05 = 73,46$$

$$S^2 = \frac{21586955625,00 - \frac{(146925,00)^2}{100}}{100 - 1} = 417440,81$$

$$N = \frac{4 \times 417440,80}{73,46^2} = 30,94 = 31$$

## c. Perhitungan diameter serat, diameter lumen, dan tebal dinding sel

| N         | Ujung 1 |       |      | Tengah |       |      | Ujung2 |       |      | Rata-rata    |              |             |
|-----------|---------|-------|------|--------|-------|------|--------|-------|------|--------------|--------------|-------------|
|           | d       | l     | w    | d      | l     | w    | d      | l     | w    | d            | l            | w           |
| 1         | 33,34   | 25,57 | 3,89 | 46,86  | 33,68 | 6,59 | 28,27  | 26,85 | 0,71 | 36,16        | 28,70        | 3,73        |
| 2         | 36,68   | 29,37 | 3,66 | 43,64  | 40,13 | 1,76 | 31,02  | 23,04 | 3,99 | 37,11        | 30,85        | 3,13        |
| 3         | 39,44   | 27,75 | 5,85 | 38,10  | 32,58 | 2,76 | 33,08  | 28,45 | 2,32 | 36,87        | 29,59        | 3,64        |
| 4         | 39,99   | 33,35 | 3,32 | 35,55  | 24,50 | 5,53 | 30,21  | 24,94 | 2,64 | 35,25        | 27,60        | 3,83        |
| 5         | 36,40   | 26,82 | 4,79 | 41,91  | 36,40 | 2,76 | 34,33  | 32,30 | 1,02 | 37,55        | 31,84        | 2,85        |
| 6         | 29,70   | 25,51 | 2,10 | 39,61  | 33,35 | 3,13 | 28,35  | 23,91 | 2,22 | 32,55        | 27,59        | 2,48        |
| 7         | 31,23   | 18,41 | 6,41 | 43,78  | 31,09 | 6,35 | 34,91  | 26,43 | 4,24 | 36,64        | 25,31        | 5,67        |
| 8         | 30,70   | 25,55 | 2,58 | 32,03  | 21,33 | 5,35 | 23,97  | 18,41 | 2,78 | 28,90        | 21,76        | 3,57        |
| 9         | 30,07   | 23,69 | 3,19 | 36,82  | 26,76 | 5,03 | 33,74  | 24,85 | 4,45 | 33,54        | 25,10        | 4,22        |
| 10        | 30,28   | 21,22 | 4,53 | 37,96  | 31,89 | 3,04 | 25,63  | 18,17 | 3,73 | 31,29        | 23,76        | 3,77        |
| 11        | 33,21   | 25,85 | 3,68 | 35,45  | 28,40 | 3,53 | 30,08  | 24,90 | 2,59 | 32,91        | 26,38        | 3,27        |
| 12        | 29,27   | 18,67 | 5,30 | 38,66  | 32,70 | 2,98 | 27,41  | 16,69 | 5,36 | 31,78        | 22,69        | 4,55        |
| 13        | 33,58   | 22,41 | 5,59 | 35,78  | 18,68 | 8,55 | 22,71  | 14,13 | 4,29 | 30,69        | 18,41        | 6,14        |
| 14        | 28,33   | 23,48 | 2,43 | 40,36  | 35,12 | 2,62 | 33,07  | 26,72 | 3,18 | 33,92        | 28,44        | 2,74        |
| 15        | 38,10   | 20,11 | 9,00 | 40,06  | 27,64 | 6,21 | 40,73  | 27,72 | 6,51 | 39,63        | 25,16        | 7,24        |
| 16        | 31,61   | 20,04 | 5,79 | 32,27  | 24,96 | 3,66 | 29,71  | 22,05 | 3,83 | 31,20        | 22,35        | 4,42        |
| 17        | 29,94   | 24,60 | 2,67 | 31,07  | 21,49 | 4,79 | 30,65  | 16,35 | 7,15 | 30,55        | 20,81        | 4,87        |
| 18        | 28,25   | 16,70 | 5,78 | 29,25  | 22,05 | 3,60 | 28,37  | 19,64 | 4,37 | 28,62        | 19,46        | 4,58        |
| 19        | 39,55   | 28,17 | 5,69 | 42,03  | 30,28 | 5,88 | 29,54  | 24,41 | 2,57 | 37,04        | 27,62        | 4,71        |
| 20        | 42,19   | 30,31 | 5,94 | 45,59  | 32,48 | 6,56 | 42,75  | 28,50 | 7,13 | 43,51        | 30,43        | 6,54        |
| 21        | 37,62   | 23,59 | 7,02 | 39,82  | 30,70 | 4,56 | 32,30  | 22,87 | 4,72 | 36,58        | 25,72        | 5,43        |
| 22        | 31,22   | 23,16 | 4,03 | 34,09  | 21,91 | 6,09 | 34,92  | 27,08 | 3,92 | 33,41        | 24,05        | 4,68        |
| 23        | 34,77   | 28,03 | 3,37 | 25,99  | 19,90 | 3,05 | 27,90  | 14,47 | 6,72 | 29,55        | 20,80        | 4,38        |
| 24        | 40,22   | 29,09 | 5,57 | 49,30  | 34,01 | 7,65 | 36,40  | 28,40 | 4,00 | 41,97        | 30,50        | 5,74        |
| 25        | 27,14   | 19,78 | 3,68 | 26,42  | 22,29 | 2,07 | 27,15  | 18,41 | 4,37 | 26,90        | 20,16        | 3,37        |
| 26        | 30,59   | 24,04 | 3,28 | 36,30  | 27,95 | 4,18 | 39,34  | 29,45 | 4,95 | 35,41        | 27,15        | 4,13        |
| 27        | 33,75   | 28,10 | 2,83 | 38,37  | 26,41 | 5,98 | 27,66  | 17,03 | 5,32 | 33,26        | 23,85        | 4,71        |
| 28        | 29,43   | 21,12 | 4,16 | 29,79  | 22,88 | 3,46 | 21,41  | 16,92 | 2,25 | 26,88        | 20,31        | 3,29        |
| 29        | 29,40   | 17,39 | 6,01 | 36,37  | 24,92 | 5,73 | 28,71  | 18,74 | 4,99 | 31,49        | 20,35        | 5,57        |
| 30        | 32,74   | 29,91 | 1,42 | 35,37  | 23,74 | 5,82 | 30,76  | 24,77 | 3,00 | 32,96        | 26,14        | 3,41        |
| 31        | 35,96   | 30,96 | 2,50 | 38,78  | 23,97 | 7,41 | 34,48  | 25,18 | 4,65 | 36,41        | 26,70        | 4,85        |
| Jumlah    |         |       |      |        |       |      |        |       |      | 1050,55      | 779,57       | 135,49      |
| Rata-rata |         |       |      |        |       |      |        |       |      | <b>33,89</b> | <b>25,15</b> | <b>4,37</b> |

## d. Perhitungan Nilai Turunan Dimensi Serat

$$\text{Bilangan runkel} = \frac{2 \times 4,37}{25,15} = \mathbf{0,35}$$

$$\text{Bilangan Muhsteph} = \frac{33,89^2 - 25,15^2}{25,15^2} \times 100\% = \mathbf{45\%}$$

$$\text{Daya tenun} = \frac{73,46}{33,89} = \mathbf{2,17}$$

$$\text{Koefisien Kekakuan} = \frac{4,37}{33,89} = \mathbf{0,13}$$

$$\text{Bilangan fleksibilitas} = \frac{25,15}{33,89} = \mathbf{0,74}$$

Lampiran 4. Data Hasil Pengukuran Dimensi Serat dan Nilai Turunan Dimensi Serat (Lanjutan)

2. Kayu Durian (*Durio zibethinus*) Ulangan ke-II

a. Data Panjang Serat

|    |               |    |         |    |         |           |           |
|----|---------------|----|---------|----|---------|-----------|-----------|
| No | Panjang Serat | 26 | 1302.53 | 53 | 1460.51 | 80        | 1655.12   |
| 1  | 1041.25       | 27 | 1303.46 | 54 | 1461.32 | 81        | 1664.62   |
| 2  | 1049.85       | 28 | 1306.02 | 55 | 1469.38 | 82        | 1671.52   |
| 3  | 1112.92       | 29 | 1311.97 | 56 | 1483.37 | 83        | 1684.16   |
| 4  | 1155.31       | 30 | 1318.98 | 57 | 1492.52 | 84        | 1703.06   |
| 5  | 1156.77       | 31 | 1319.19 | 58 | 1503.56 | 85        | 1707.84   |
| 6  | 1157.02       | 32 | 1326.46 | 59 | 1506.81 | 86        | 1711.50   |
| 7  | 1176.04       | 33 | 1338.91 | 60 | 1506.81 | 87        | 1717.79   |
| 8  | 1180.38       | 34 | 1343.52 | 61 | 1508.76 | 88        | 1747.80   |
| 9  | 1185.73       | 35 | 1363.97 | 62 | 1527.73 | 89        | 1753.69   |
| 10 | 1188.97       | 36 | 1378.29 | 63 | 1541.32 | 90        | 1758.38   |
| 11 | 1199.25       | 37 | 1378.85 | 64 | 1546.30 | 91        | 1769.59   |
| 12 | 1199.66       | 38 | 1380.54 | 65 | 1547.41 | 92        | 1783.60   |
| 13 | 1201.42       | 39 | 1399.36 | 66 | 1552.19 | 93        | 1802.33   |
| 14 | 1204.92       | 40 | 1400.50 | 67 | 1557.57 | 94        | 1868.33   |
| 15 | 1229.73       | 41 | 1407.85 | 68 | 1566.85 | 95        | 1876.95   |
| 16 | 1237.06       | 42 | 1419.92 | 69 | 1567.61 | 96        | 1896.78   |
| 17 | 1238.94       | 43 | 1421.48 | 70 | 1570.23 | 97        | 1897.41   |
| 18 | 1262.37       | 44 | 1423.10 | 71 | 1587.81 | 98        | 1927.28   |
| 19 | 1264.49       | 45 | 1427.29 | 72 | 1588.10 | 99        | 1955.70   |
| 20 | 1274.94       | 46 | 1429.36 | 73 | 1593.40 | 100       | 2026.77   |
| 21 | 1285.73       | 47 | 1436.06 | 74 | 1601.96 | Total     | 147055.19 |
| 22 | 1289.92       | 48 | 1438.69 | 75 | 1610.30 | Rata-rata | 1470.55   |
| 23 | 1298.74       | 49 | 1443.84 | 76 | 1620.45 |           |           |
| 24 | 1300.63       | 50 | 1445.04 | 77 | 1644.19 |           |           |
| 25 | 1301.52       | 51 | 1446.61 | 78 | 1646.38 |           |           |
|    |               | 52 | 1452.48 | 79 | 1654.30 |           |           |

## b. Perhitungan Sampel Serat

$$\text{Rata-rata Panjang serat} = 147055,19/100 = \mathbf{1470,55}$$

$$\text{Range} = 2026,77 - 1041,25 = \mathbf{985,52}$$

$$\text{Jumlah Kelas Interval} = 1 + 3,3 \log 100 = \mathbf{8}$$

$$\text{Lebar Kelas Interval} = 985,52/8 = \mathbf{123,19}$$

| Kelas  | Interval |         | Xi       | Fi  | Xi2         | Xi x Fi   | Xi2xFi       |
|--------|----------|---------|----------|-----|-------------|-----------|--------------|
|        | L1       | L2      |          |     |             |           |              |
| 1      | 1041,25  | 1164,44 | 1102,85  | 6   | 1216267,09  | 6617,07   | 7297602,564  |
| 2      | 1164,44  | 1287,63 | 1226,04  | 15  | 1503161,82  | 18390,53  | 22547427,32  |
| 3      | 1287,63  | 1410,82 | 1349,23  | 20  | 1820408,10  | 26984,50  | 36408162,01  |
| 4      | 1410,82  | 1534,01 | 1472,42  | 21  | 2168005,93  | 30920,72  | 45528124,58  |
| 5      | 1534,01  | 1657,20 | 1595,61  | 18  | 2545955,32  | 28720,89  | 45827195,69  |
| 6      | 1657,20  | 1780,39 | 1718,80  | 11  | 2954256,25  | 18906,75  | 32496818,77  |
| 7      | 1780,39  | 1903,58 | 1841,99  | 6   | 3392908,74  | 11051,91  | 20357452,44  |
| 8      | >1903,58 |         | 1965,18  | 3   | 3861932,43  | 5895,54   | 11585797,3   |
| Jumlah |          |         | 12272,09 | 100 | 19462895,69 | 147487,90 | 222048580,67 |

$$L = \frac{1474,87}{100} \times 0,05 = \mathbf{73,74}$$

$$S^2 = \frac{21752679171,53 - \frac{(147487,90)^2}{100}}{100 - 1} = \mathbf{45674,64}$$

$$N = \frac{4 \times 45674,64}{73,74^2} = \mathbf{33,60 = 34}$$

## c. Perhitungan diameter serat, diameter lumen, dan tebal dinding sel

| N  | Ujung 1 |       |      | Tengah |       |      | Ujung2 |       |      | Rata-rata |         |        |
|----|---------|-------|------|--------|-------|------|--------|-------|------|-----------|---------|--------|
|    | d       | l     | w    | d      | l     | w    | d      | l     | w    | d         | l       | w      |
| 1  | 38,91   | 26,72 | 6,10 | 46,81  | 40,82 | 3,00 | 34,76  | 23,38 | 5,69 | 40,16     | 30,31   | 4,93   |
| 2  | 32,31   | 23,60 | 4,36 | 43,43  | 37,54 | 2,95 | 45,37  | 38,81 | 3,28 | 40,37     | 33,32   | 3,53   |
| 3  | 29,04   | 22,90 | 3,07 | 38,00  | 31,85 | 3,08 | 33,46  | 28,24 | 2,61 | 33,50     | 27,66   | 2,92   |
| 4  | 29,24   | 21,84 | 3,70 | 36,97  | 27,54 | 4,72 | 30,57  | 23,21 | 3,68 | 32,26     | 24,20   | 4,03   |
| 5  | 31,94   | 22,08 | 4,93 | 40,87  | 25,77 | 7,55 | 28,58  | 22,31 | 3,14 | 33,80     | 23,39   | 5,21   |
| 6  | 33,92   | 27,83 | 3,05 | 44,25  | 32,63 | 5,81 | 36,07  | 25,77 | 5,15 | 38,08     | 28,74   | 4,67   |
| 7  | 41,15   | 29,25 | 5,95 | 40,95  | 31,20 | 4,88 | 32,58  | 23,04 | 4,77 | 38,23     | 27,83   | 5,20   |
| 8  | 34,76   | 27,15 | 3,81 | 41,20  | 26,21 | 7,50 | 28,99  | 21,41 | 3,79 | 34,98     | 24,92   | 5,03   |
| 9  | 30,21   | 25,07 | 2,57 | 26,92  | 21,22 | 2,85 | 31,79  | 24,51 | 3,64 | 29,64     | 23,60   | 3,02   |
| 10 | 34,64   | 26,78 | 3,93 | 32,09  | 24,92 | 3,59 | 36,98  | 25,33 | 5,83 | 34,57     | 25,68   | 4,45   |
| 11 | 25,06   | 17,76 | 3,65 | 28,23  | 20,24 | 4,00 | 24,34  | 17,54 | 3,40 | 25,88     | 18,51   | 3,68   |
| 12 | 32,15   | 25,45 | 3,35 | 35,62  | 32,42 | 1,60 | 34,64  | 28,60 | 3,02 | 34,14     | 28,82   | 2,66   |
| 13 | 31,18   | 21,58 | 4,80 | 36,52  | 26,99 | 4,77 | 32,19  | 27,01 | 2,59 | 33,30     | 25,19   | 4,05   |
| 14 | 33,53   | 26,82 | 3,36 | 33,87  | 29,23 | 2,32 | 27,46  | 25,34 | 1,06 | 31,62     | 27,13   | 2,25   |
| 15 | 28,90   | 24,99 | 1,96 | 26,56  | 20,93 | 2,82 | 29,79  | 22,41 | 3,69 | 28,42     | 22,78   | 2,82   |
| 16 | 35,38   | 29,50 | 2,94 | 37,12  | 32,99 | 2,07 | 37,70  | 32,80 | 2,45 | 36,73     | 31,76   | 2,49   |
| 17 | 28,30   | 20,92 | 3,69 | 29,51  | 25,99 | 1,76 | 29,01  | 22,17 | 3,42 | 28,94     | 23,03   | 2,96   |
| 18 | 27,20   | 24,34 | 1,43 | 28,39  | 22,30 | 3,05 | 28,14  | 22,53 | 2,81 | 27,91     | 23,06   | 2,43   |
| 19 | 39,93   | 33,48 | 3,23 | 42,81  | 34,94 | 3,94 | 36,52  | 28,63 | 3,95 | 39,75     | 32,35   | 3,70   |
| 20 | 28,81   | 23,43 | 2,69 | 31,13  | 25,05 | 3,04 | 31,84  | 21,60 | 5,12 | 30,59     | 23,36   | 3,62   |
| 21 | 35,60   | 24,40 | 5,60 | 27,96  | 22,32 | 2,82 | 36,09  | 28,24 | 3,93 | 33,22     | 24,99   | 4,12   |
| 22 | 33,65   | 25,32 | 4,17 | 32,61  | 24,61 | 4,00 | 33,94  | 26,81 | 3,57 | 33,40     | 25,58   | 3,91   |
| 23 | 28,75   | 24,40 | 2,18 | 28,89  | 23,36 | 2,77 | 25,77  | 19,44 | 3,17 | 27,80     | 22,40   | 2,70   |
| 24 | 25,58   | 18,58 | 3,50 | 32,45  | 26,03 | 3,21 | 28,10  | 21,15 | 3,48 | 28,71     | 21,92   | 3,40   |
| 25 | 32,35   | 22,80 | 4,78 | 29,50  | 27,77 | 0,87 | 26,12  | 22,52 | 1,80 | 29,32     | 24,36   | 2,48   |
| 26 | 26,38   | 24,00 | 1,19 | 30,27  | 23,08 | 3,60 | 26,14  | 22,70 | 1,72 | 27,60     | 23,26   | 2,17   |
| 27 | 29,93   | 24,25 | 2,84 | 29,81  | 24,83 | 2,49 | 26,63  | 19,16 | 3,74 | 28,79     | 22,75   | 3,02   |
| 28 | 28,32   | 21,44 | 3,44 | 36,06  | 28,90 | 3,58 | 33,47  | 28,86 | 2,31 | 32,62     | 26,40   | 3,11   |
| 29 | 34,25   | 25,92 | 4,17 | 32,23  | 24,85 | 3,69 | 31,36  | 24,83 | 3,27 | 32,61     | 25,20   | 3,71   |
| 30 | 37,59   | 30,06 | 3,77 | 37,15  | 32,52 | 2,32 | 30,94  | 25,58 | 2,68 | 35,23     | 29,39   | 2,92   |
| 31 | 40,45   | 29,34 | 5,56 | 38,79  | 33,14 | 2,83 | 31,61  | 23,87 | 3,87 | 36,95     | 28,78   | 4,08   |
| 32 | 36,72   | 27,06 | 4,83 | 39,67  | 31,41 | 4,13 | 32,67  | 27,90 | 2,39 | 36,35     | 28,79   | 3,78   |
| 33 | 37,97   | 31,38 | 3,30 | 36,99  | 30,28 | 3,36 | 38,96  | 30,26 | 4,35 | 37,97     | 30,64   | 3,67   |
| 34 | 32,14   | 28,50 | 1,82 | 41,73  | 31,06 | 5,34 | 33,16  | 28,07 | 2,55 | 35,68     | 29,21   | 3,23   |
|    |         |       |      |        |       |      |        |       |      | Jumlah    | 1129,11 | 889,30 |
|    |         |       |      |        |       |      |        |       |      | Rata-rata | 33,21   | 26,16  |
|    |         |       |      |        |       |      |        |       |      |           | 119,91  | 3,53   |

d. Perhitungan Nilai Turunan Dimensi Serat

$$\text{Bilangan runkel} = \frac{2 \times 3,53}{26,16} = \mathbf{0,27}$$

$$\text{Bilangan Muhsteph} = \frac{33,21^2 - 26,16^2}{26,16^2} \times 100\% = \mathbf{38\%}$$

$$\text{Daya tenun} = \frac{73,74}{33,21} = \mathbf{2,22}$$

$$\text{Koefisien Kekakuan} = \frac{3,53}{33,21} = \mathbf{0,11}$$

$$\text{Bilangan fleksibilitas} = \frac{26,16}{33,21} = \mathbf{0,79}$$

Lampiran 4. Data Hasil Pengukuran Dimensi Serat dan Nilai Turunan Dimensi Serat Kayu Durian (lanjutan)

3. Kayu Durian (*Durio zibethinus*) Ulangan ke-III

a. Data Panjang Serat

|    |               |    |         |    |         |           |               |
|----|---------------|----|---------|----|---------|-----------|---------------|
| No | Panjang Serat | 26 | 1345.88 | 53 | 1489.89 | 80        | 1627.8        |
| 1  | 1087.32       | 27 | 1358.49 | 54 | 1490.07 | 81        | 1636.9        |
| 2  | 1135.17       | 28 | 1359.48 | 55 | 1494.23 | 82        | 1650.95       |
| 3  | 1137.03       | 29 | 1360.19 | 56 | 1494.76 | 83        | 1658.97       |
| 4  | 1150.63       | 30 | 1378.79 | 57 | 1494.95 | 84        | 1660.17       |
| 5  | 1191.23       | 31 | 1390.18 | 58 | 1500.17 | 85        | 1685.1        |
| 6  | 1191.87       | 32 | 1396.89 | 59 | 1502.92 | 86        | 1688.49       |
| 7  | 1193.17       | 33 | 1398.67 | 60 | 1504.58 | 87        | 1697.11       |
| 8  | 1198.06       | 34 | 1400.04 | 61 | 1506.27 | 88        | 1697.89       |
| 9  | 1201.66       | 35 | 1407.92 | 62 | 1507.05 | 89        | 1711.87       |
| 10 | 1233.91       | 36 | 1409.77 | 63 | 1516.6  | 90        | 1722.47       |
| 11 | 1237.52       | 37 | 1411.69 | 64 | 1518.29 | 91        | 1732.29       |
| 12 | 1238.82       | 38 | 1412.79 | 65 | 1520.23 | 92        | 1753.68       |
| 13 | 1252.15       | 39 | 1413.69 | 66 | 1525.51 | 93        | 1761.4        |
| 14 | 1261.59       | 40 | 1417.14 | 67 | 1533.01 | 94        | 1781.03       |
| 15 | 1264.37       | 41 | 1429.34 | 68 | 1536.15 | 95        | 1781.05       |
| 16 | 1274.64       | 42 | 1435.56 | 69 | 1543.39 | 96        | 1811.53       |
| 17 | 1281.06       | 43 | 1437.17 | 70 | 1553.06 | 97        | 1874.09       |
| 18 | 1292.08       | 44 | 1440.63 | 71 | 1553.53 | 98        | 1895.2        |
| 19 | 1299.01       | 45 | 1440.63 | 72 | 1562.04 | 99        | 1909.02       |
| 20 | 1300.47       | 46 | 1443.42 | 73 | 1564.59 | 100       | 1948.56       |
| 21 | 1320.21       | 47 | 1445.49 | 74 | 1574.98 | Total     | 147535.5<br>7 |
| 22 | 1328.00       | 48 | 1450.87 | 75 | 1599.54 | Rata-rata | 1475.36       |
| 23 | 1330.47       | 49 | 1452.16 | 76 | 1613.19 |           |               |
| 24 | 1338.83       | 50 | 1454.85 | 77 | 1620.04 |           |               |
| 25 | 1339.61       | 51 | 1456.18 | 78 | 1620.84 |           |               |
|    |               | 52 | 1458.68 | 79 | 1624.65 |           |               |

## b. Perhitungan Sampel Serat

$$\text{Rata-rata Panjang serat} = 147535,57/100 = \mathbf{1475,36}$$

$$\text{Range} = 1948,56 - 1087,32 = \mathbf{861,24}$$

$$\text{Jumlah Kelas Interval} = 1 + 3,3 \log 100 = \mathbf{8}$$

$$\text{Lebar Kelas Interval} = \text{Range} / \text{Kelas Interval} = \mathbf{107,655}$$

| Kelas  | Interval |         | Xi       | Fi  | Xi2         | Xi x Fi   | Xi2xFi       |
|--------|----------|---------|----------|-----|-------------|-----------|--------------|
|        | L1       | L2      |          |     |             |           |              |
| 1      | 1087,32  | 1194,98 | 1141,15  | 7   | 1302217,62  | 7988,03   | 9115523,317  |
| 2      | 1194,98  | 1302,64 | 1248,81  | 13  | 1559520,17  | 16234,50  | 20273762,24  |
| 3      | 1302,64  | 1410,30 | 1356,47  | 16  | 1840004,08  | 21703,48  | 29440065,26  |
| 4      | 1410,30  | 1517,96 | 1464,13  | 27  | 2143669,34  | 39531,44  | 57879072,08  |
| 5      | 1517,96  | 1625,62 | 1571,79  | 16  | 2470515,95  | 25148,60  | 39528255,12  |
| 6      | 1625,62  | 1733,28 | 1679,45  | 12  | 2820543,91  | 20153,37  | 33846526,86  |
| 7      | 1733,28  | 1840,94 | 1787,11  | 5   | 3193753,22  | 8935,54   | 15968766,08  |
| 8      | >1840,94 |         | 1965,18  | 4   | 3861932,43  | 7860,72   | 15447729,73  |
| Jumlah |          |         | 12214,07 | 100 | 19192156,70 | 147555,68 | 221499700,69 |

$$L = \frac{147555,68}{100} \times 0,05 = \mathbf{73,78}$$

$$S^2 = \frac{21772678700,26 - \frac{(147555,68)^2}{100}}{100-1} = \mathbf{38110,24}$$

$$N = \frac{4 \times 38110,24}{73,78^2} = \mathbf{28,01}$$

## c. Perhitungan diameter serat, diameter lumen, dan tebal dinding sel

| N         | Ujung 1 |       |      | Tengah |       |      | Ujung2 |       |      | Rata-rata    |              |             |
|-----------|---------|-------|------|--------|-------|------|--------|-------|------|--------------|--------------|-------------|
|           | d       | l     | w    | d      | l     | w    | d      | l     | w    | d            | l            | w           |
| 1         | 37,02   | 27,96 | 4,53 | 35,48  | 30,58 | 2,45 | 27,67  | 22,83 | 2,42 | 33,39        | 27,12        | 3,13        |
| 2         | 29,95   | 20,34 | 4,81 | 30,50  | 23,04 | 3,73 | 28,76  | 21,52 | 3,62 | 29,74        | 21,63        | 4,05        |
| 3         | 34,73   | 27,15 | 3,79 | 43,53  | 26,73 | 8,40 | 34,36  | 22,73 | 5,82 | 37,54        | 25,54        | 6,00        |
| 4         | 36,77   | 28,45 | 4,16 | 47,42  | 29,62 | 8,90 | 47,89  | 28,30 | 9,80 | 44,03        | 28,79        | 7,62        |
| 5         | 41,22   | 34,87 | 3,18 | 31,90  | 22,33 | 4,79 | 23,07  | 15,09 | 3,99 | 32,06        | 24,10        | 3,98        |
| 6         | 27,40   | 21,02 | 3,19 | 34,17  | 23,88 | 5,15 | 38,69  | 26,94 | 5,88 | 33,42        | 23,95        | 4,74        |
| 7         | 39,55   | 28,18 | 5,69 | 42,59  | 24,59 | 9,00 | 38,13  | 24,99 | 6,57 | 40,09        | 25,92        | 7,09        |
| 8         | 32,11   | 24,38 | 3,87 | 32,42  | 20,49 | 5,97 | 31,21  | 19,64 | 5,79 | 31,91        | 21,50        | 5,21        |
| 9         | 38,24   | 29,67 | 4,29 | 38,75  | 22,46 | 8,15 | 37,95  | 19,42 | 9,27 | 38,31        | 23,85        | 7,23        |
| 10        | 32,34   | 23,27 | 4,54 | 30,06  | 17,83 | 6,12 | 30,37  | 17,74 | 6,32 | 30,92        | 19,61        | 5,66        |
| 11        | 29,46   | 20,58 | 4,44 | 25,51  | 15,19 | 5,16 | 35,23  | 25,98 | 4,63 | 30,07        | 20,58        | 4,74        |
| 12        | 38,74   | 22,84 | 7,95 | 33,84  | 27,25 | 3,30 | 37,77  | 27,59 | 5,09 | 36,78        | 25,89        | 5,45        |
| 13        | 31,94   | 19,62 | 6,16 | 31,75  | 22,58 | 4,59 | 29,02  | 23,11 | 2,96 | 30,90        | 21,77        | 4,57        |
| 14        | 32,91   | 23,55 | 4,68 | 37,72  | 23,83 | 6,95 | 38,61  | 27,20 | 5,71 | 36,41        | 24,86        | 5,78        |
| 15        | 39,26   | 31,02 | 4,12 | 38,05  | 25,87 | 6,09 | 36,70  | 23,42 | 6,64 | 38,00        | 26,77        | 5,62        |
| 16        | 36,00   | 29,77 | 3,12 | 38,35  | 26,94 | 5,71 | 34,07  | 24,08 | 5,00 | 36,14        | 26,93        | 4,61        |
| 17        | 35,32   | 26,00 | 4,66 | 32,47  | 22,25 | 5,11 | 35,86  | 25,66 | 5,10 | 34,55        | 24,64        | 4,96        |
| 18        | 29,33   | 18,34 | 5,50 | 34,68  | 26,19 | 4,25 | 32,82  | 21,18 | 5,82 | 32,28        | 21,90        | 5,19        |
| 19        | 38,36   | 26,31 | 6,03 | 38,33  | 26,19 | 6,07 | 39,15  | 26,15 | 6,50 | 38,61        | 26,22        | 6,20        |
| 20        | 32,97   | 24,03 | 4,47 | 34,71  | 24,43 | 5,14 | 35,54  | 24,58 | 5,48 | 34,41        | 24,35        | 5,03        |
| 21        | 31,19   | 18,31 | 6,44 | 35,12  | 24,36 | 5,38 | 32,98  | 26,25 | 3,37 | 33,10        | 22,97        | 5,06        |
| 22        | 32,88   | 20,58 | 6,15 | 32,78  | 23,03 | 4,88 | 27,54  | 17,77 | 4,89 | 31,07        | 20,46        | 5,30        |
| 23        | 30,04   | 20,36 | 4,84 | 30,71  | 26,67 | 2,02 | 35,89  | 24,78 | 5,56 | 32,21        | 23,94        | 4,14        |
| 24        | 32,35   | 20,18 | 6,09 | 37,05  | 25,67 | 5,69 | 34,73  | 27,25 | 3,74 | 34,71        | 24,37        | 5,17        |
| 25        | 36,32   | 24,82 | 5,75 | 37,22  | 26,83 | 5,20 | 31,59  | 22,84 | 4,38 | 35,04        | 24,83        | 5,11        |
| 26        | 37,75   | 29,98 | 3,89 | 34,78  | 24,35 | 5,22 | 35,63  | 22,31 | 6,66 | 36,05        | 25,55        | 5,25        |
| 27        | 36,02   | 29,29 | 3,37 | 40,61  | 28,41 | 6,10 | 38,25  | 27,70 | 5,28 | 38,29        | 28,47        | 4,91        |
| 28        | 33,67   | 26,25 | 3,71 | 34,80  | 22,18 | 6,31 | 33,41  | 21,82 | 5,80 | 33,96        | 23,42        | 5,27        |
| 29        | 32,22   | 22,36 | 4,93 | 32,60  | 23,45 | 4,58 | 32,51  | 19,63 | 6,44 | 32,44        | 21,81        | 5,32        |
| Jumlah    |         |       |      |        |       |      |        |       |      | 1006,45      | 701,73       | 152,36      |
| Rata-rata |         |       |      |        |       |      |        |       |      | <b>34,71</b> | <b>24,20</b> | <b>5,25</b> |

## d. Perhitungan Nilai Turunan Dimensi Serat

$$\text{Bilangan runkel} = \frac{2 \times 5,25}{24,20} = \mathbf{0,43}$$

$$\text{Bilangan Muhsteph} = \frac{34,71^2 - 24,20^2}{24,20^2} \times 100\% = \mathbf{51\%}$$

$$\text{Daya tenun} = \frac{73,78}{34,71} = \mathbf{2,13}$$

$$\text{Koefisien Kekakuan} = \frac{5,25}{34,71} = \mathbf{0,15}$$

$$\text{Bilangan fleksibilitas} = \frac{24,20}{34,71} = \mathbf{0,70}$$

Lampiran 5. Data Hasil Pengukuran Dimensi Serat dan Nilai Turunan Dimensi Serat Kayu Mahoni

4. Kayu Mahoni (*Swietenia mahagoni*) Ulangan ke-I

a. Data panjang serat

| No | Panjang Serat | 26 | 1080.89 | 53 | 1221.75 | 80        | 1337.73   |
|----|---------------|----|---------|----|---------|-----------|-----------|
|    |               | 27 | 1085.40 | 54 | 1235.27 | 81        | 1338.20   |
| 1  | 830.38        | 28 | 1091.34 | 55 | 1235.73 | 82        | 1338.57   |
| 2  | 874.08        | 29 | 1091.67 | 56 | 1235.99 | 83        | 1353.16   |
| 3  | 922.45        | 30 | 1093.09 | 57 | 1248.70 | 84        | 1353.79   |
| 4  | 922.52        | 31 | 1113.78 | 58 | 1249.94 | 85        | 1357.79   |
| 5  | 940.17        | 32 | 1127.16 | 59 | 1250.16 | 86        | 1360.49   |
| 6  | 940.89        | 33 | 1140.04 | 60 | 1253.02 | 87        | 1365.59   |
| 7  | 943.37        | 34 | 1140.93 | 61 | 1255.10 | 88        | 1368.40   |
| 8  | 953.36        | 35 | 1146.69 | 62 | 1257.96 | 89        | 1375.74   |
| 9  | 964.33        | 36 | 1147.50 | 63 | 1261.77 | 90        | 1376.75   |
| 10 | 964.54        | 37 | 1155.26 | 64 | 1266.97 | 91        | 1381.28   |
| 11 | 968.05        | 38 | 1163.69 | 65 | 1268.63 | 92        | 1385.86   |
| 12 | 985.18        | 39 | 1164.93 | 66 | 1273.08 | 93        | 1388.82   |
| 13 | 986.91        | 40 | 1178.27 | 67 | 1278.16 | 94        | 1392.18   |
| 14 | 988.07        | 41 | 1179.59 | 68 | 1278.99 | 95        | 1406.77   |
| 15 | 991.90        | 42 | 1185.80 | 69 | 1286.62 | 96        | 1412.37   |
| 16 | 1019.09       | 43 | 1188.84 | 70 | 1288.05 | 97        | 1422.87   |
| 17 | 1039.79       | 44 | 1189.27 | 71 | 1288.50 | 98        | 1456.17   |
| 18 | 1040.87       | 45 | 1193.02 | 72 | 1289.68 | 99        | 1468.02   |
| 19 | 1042.03       | 46 | 1194.65 | 73 | 1292.26 | 100       | 1514.15   |
| 20 | 1044.96       | 47 | 1200.07 | 74 | 1297.45 | Total     | 119466.08 |
| 21 | 1046.36       | 48 | 1209.37 | 75 | 1300.90 | Rata-rata | 1194.66   |
| 22 | 1048.00       | 49 | 1209.67 | 76 | 1302.38 |           |           |
| 23 | 1051.22       | 50 | 1213.70 | 77 | 1303.28 |           |           |
| 24 | 1066.68       | 51 | 1214.01 | 78 | 1305.41 |           |           |
| 25 | 1074.91       | 52 | 1215.96 | 79 | 1320.93 |           |           |

## b. Perhitungan Sampel Serat

$$\text{Rata-rata Panjang serat} = 119466,08/100 = \mathbf{1194,66}$$

$$\text{Range} = 1514,15 - 830,38 = \mathbf{683,77}$$

$$\text{Jumlah Kelas Interval} = 1 + 3,3 \log 100 = \mathbf{8}$$

$$\text{Lebar Kelas Interval} = \text{Range} / \text{Kelas Interval} = \mathbf{85,47}$$

| Kelas  | Interval |         | Xi       | Fi  | Xi2         | Xi x Fi   | Xi2xFi       |
|--------|----------|---------|----------|-----|-------------|-----------|--------------|
|        | L1       | L2      |          |     |             |           |              |
| 1      | 830,38   | 915,85  | 873,12   | 2   | 762329,80   | 1746,23   | 1524659,606  |
| 2      | 915,85   | 1001,32 | 958,59   | 13  | 918885,20   | 12461,61  | 11945507,63  |
| 3      | 1001,32  | 1086,79 | 1044,06  | 12  | 1090050,84  | 12528,66  | 13080610,12  |
| 4      | 1086,79  | 1172,26 | 1129,53  | 12  | 1275826,73  | 13554,30  | 15309920,71  |
| 5      | 1172,26  | 1257,73 | 1215,00  | 22  | 1476212,85  | 26729,89  | 32476682,7   |
| 6      | 1257,73  | 1343,20 | 1300,47  | 21  | 1691209,22  | 27309,77  | 35515393,54  |
| 7      | 1343,20  | 1428,67 | 1385,94  | 15  | 1920815,82  | 20789,03  | 28812237,36  |
| 8      | >1428,67 |         | 1471,405 | 3   | 2165032,67  | 4414,22   | 6495098,022  |
| Jumlah |          |         | 9378,08  | 100 | 11300363,14 | 119533,69 | 145160109,69 |

$$L = \frac{119533,69}{100} \times 0,05 = \mathbf{59,77}$$

$$S^2 = \frac{14288303045,02 - \frac{(119533,69)^2}{100}}{100 - 1} = \mathbf{23000,80}$$

$$N = \frac{4 \times 23000,80}{59,77^2} = \mathbf{25,76 = 26}$$

## c. Perhitungan diameter serat, diameter lumen, dan tebal dinding sel

| N  | Ujung 1 |       |      | Tengah |       |      | Ujung2 |       |      | Rata-rata |        |        |
|----|---------|-------|------|--------|-------|------|--------|-------|------|-----------|--------|--------|
|    | d       | l     | w    | d      | l     | w    | d      | l     | w    | d         | l      | w      |
| 1  | 18,92   | 13,02 | 2,95 | 28,64  | 22,68 | 2,98 | 19,44  | 13,88 | 2,78 | 22,33     | 16,53  | 2,90   |
| 2  | 21,77   | 18,57 | 1,60 | 30,69  | 24,83 | 2,93 | 24,15  | 14,69 | 4,73 | 25,54     | 19,36  | 3,09   |
| 3  | 17,87   | 15,33 | 1,27 | 38,69  | 30,01 | 4,34 | 24,79  | 17,75 | 3,52 | 27,12     | 21,03  | 3,04   |
| 4  | 27,87   | 21,87 | 3,00 | 37,79  | 30,69 | 3,55 | 29,98  | 22,83 | 3,58 | 31,88     | 25,13  | 3,38   |
| 5  | 24,75   | 22,00 | 1,38 | 36,08  | 31,34 | 2,37 | 28,54  | 24,20 | 2,17 | 29,79     | 25,85  | 1,97   |
| 6  | 15,24   | 14,09 | 0,58 | 37,98  | 30,04 | 3,97 | 26,98  | 24,99 | 1,00 | 26,73     | 23,04  | 1,85   |
| 7  | 21,47   | 14,66 | 3,41 | 37,07  | 31,75 | 2,66 | 25,97  | 20,17 | 2,90 | 28,17     | 22,19  | 2,99   |
| 8  | 29,56   | 26,03 | 1,77 | 32,88  | 29,13 | 1,88 | 24,40  | 18,41 | 3,00 | 28,95     | 24,52  | 2,21   |
| 9  | 25,68   | 15,18 | 5,25 | 30,18  | 22,91 | 3,64 | 20,80  | 19,21 | 0,80 | 25,55     | 19,10  | 3,23   |
| 10 | 22,60   | 17,88 | 2,36 | 33,42  | 24,03 | 4,70 | 24,50  | 22,17 | 1,17 | 26,84     | 21,36  | 2,74   |
| 11 | 21,91   | 19,02 | 1,45 | 29,73  | 22,60 | 3,57 | 25,56  | 14,86 | 5,35 | 25,73     | 18,83  | 3,45   |
| 12 | 23,07   | 20,62 | 1,23 | 33,73  | 25,38 | 4,18 | 21,67  | 18,54 | 1,57 | 26,16     | 21,51  | 2,32   |
| 13 | 15,28   | 14,75 | 0,27 | 37,17  | 29,17 | 4,00 | 27,11  | 19,53 | 3,79 | 26,52     | 21,15  | 2,69   |
| 14 | 29,11   | 25,03 | 2,04 | 39,80  | 33,00 | 3,40 | 14,95  | 12,39 | 1,28 | 27,95     | 23,47  | 2,24   |
| 15 | 29,29   | 25,08 | 2,11 | 30,76  | 25,36 | 2,70 | 15,10  | 12,34 | 1,38 | 25,05     | 20,93  | 2,06   |
| 16 | 20,33   | 19,74 | 0,30 | 28,65  | 22,50 | 3,08 | 21,00  | 19,52 | 0,74 | 23,33     | 20,59  | 1,37   |
| 17 | 15,24   | 15,03 | 0,11 | 34,36  | 31,05 | 1,66 | 26,85  | 17,47 | 4,69 | 25,48     | 21,18  | 2,15   |
| 18 | 16,43   | 12,73 | 1,85 | 22,87  | 15,68 | 3,60 | 21,77  | 15,10 | 3,34 | 20,36     | 14,50  | 2,93   |
| 19 | 21,64   | 17,87 | 1,89 | 27,64  | 20,05 | 3,80 | 20,50  | 16,88 | 1,81 | 23,26     | 18,27  | 2,50   |
| 20 | 23,60   | 22,38 | 0,61 | 29,88  | 27,62 | 1,13 | 21,61  | 17,60 | 2,01 | 25,03     | 22,53  | 1,25   |
| 21 | 16,27   | 12,74 | 1,77 | 37,58  | 27,77 | 4,91 | 21,71  | 17,45 | 2,13 | 25,19     | 19,32  | 2,93   |
| 22 | 20,92   | 17,10 | 1,91 | 28,79  | 25,91 | 1,44 | 24,64  | 20,46 | 2,09 | 24,78     | 21,16  | 1,81   |
| 23 | 19,22   | 14,49 | 2,37 | 29,61  | 15,62 | 7,00 | 18,07  | 12,90 | 2,59 | 22,30     | 14,34  | 3,98   |
| 24 | 17,04   | 12,90 | 2,07 | 23,62  | 16,60 | 3,51 | 20,05  | 14,86 | 2,60 | 20,24     | 14,79  | 2,73   |
| 25 | 16,25   | 14,82 | 0,72 | 30,50  | 21,08 | 4,71 | 21,33  | 13,91 | 3,71 | 22,69     | 16,60  | 3,05   |
| 26 | 21,21   | 18,71 | 1,25 | 30,55  | 25,67 | 2,44 | 22,34  | 16,75 | 2,80 | 24,70     | 20,38  | 2,16   |
|    |         |       |      |        |       |      |        |       |      | Jumlah    | 661,67 | 527,66 |
|    |         |       |      |        |       |      |        |       |      | Rata-rata | 25,45  | 20,29  |

## d. Perhitungan Nilai Turunan Dimensi Serat

$$\text{Bilangan runkel} = \frac{2 \times 2,58}{20,29} = 0,25$$

$$\text{Bilangan Muhsteph} = \frac{25,42^2 - 20,29^2}{20,29^2} \times 100\% = 36\%$$

$$\text{Daya tenun} = \frac{59,77}{25,45} = 2,35$$

$$\text{Koefisien Kekakuan} = \frac{2,58}{25,45} = 0,10$$

$$\text{Bilangan fleksibilitas} = \frac{20,29}{25,45} = 0,80$$

Lampiran 5. Data Hasil Pengukuran Dimensi Serat dan Nilai Turunan Dimensi Serat Kayu Mahoni (lanjutan)

5. Kayu Mahoni (*Swietenia mahagoni*) Ulangan ke-II

a. Data Panjang Serat

|    |               |    |         |    |         |           |           |
|----|---------------|----|---------|----|---------|-----------|-----------|
| No | Panjang Serat | 26 | 1149.54 | 53 | 1287.51 | 80        | 1372.62   |
| 1  | 955.71        | 27 | 1158.56 | 54 | 1289.02 | 81        | 1373.18   |
| 2  | 976.46        | 28 | 1158.62 | 55 | 1290.89 | 82        | 1374.94   |
| 3  | 1011.98       | 29 | 1160.31 | 56 | 1293.47 | 83        | 1383.91   |
| 4  | 1014.50       | 30 | 1165.64 | 57 | 1301.20 | 84        | 1392.61   |
| 5  | 1021.02       | 31 | 1178.56 | 58 | 1301.83 | 85        | 1407.44   |
| 6  | 1024.15       | 32 | 1183.27 | 59 | 1303.55 | 86        | 1430.06   |
| 7  | 1082.83       | 33 | 1184.64 | 60 | 1307.39 | 87        | 1432.05   |
| 8  | 1091.32       | 34 | 1186.97 | 61 | 1312.28 | 88        | 1443.00   |
| 9  | 1091.70       | 35 | 1197.91 | 62 | 1314.81 | 89        | 1445.03   |
| 10 | 1097.25       | 36 | 1199.93 | 63 | 1315.04 | 90        | 1456.87   |
| 11 | 1097.28       | 37 | 1203.11 | 64 | 1316.85 | 91        | 1459.03   |
| 12 | 1101.14       | 38 | 1209.90 | 65 | 1318.69 | 92        | 1463.75   |
| 13 | 1102.11       | 39 | 1215.02 | 66 | 1321.42 | 93        | 1482.53   |
| 14 | 1106.48       | 40 | 1218.51 | 67 | 1324.88 | 94        | 1498.12   |
| 15 | 1107.18       | 41 | 1223.46 | 68 | 1325.34 | 95        | 1506.64   |
| 16 | 1107.57       | 42 | 1226.61 | 69 | 1331.74 | 96        | 1509.55   |
| 17 | 1115.87       | 43 | 1232.07 | 70 | 1334.67 | 97        | 1517.03   |
| 18 | 1123.16       | 44 | 1232.61 | 71 | 1349.61 | 98        | 1558.93   |
| 19 | 1124.03       | 45 | 1238.88 | 72 | 1350.11 | 99        | 1591.81   |
| 20 | 1128.49       | 46 | 1238.94 | 73 | 1354.90 | 100       | 1593.03   |
| 21 | 1131.44       | 47 | 1247.20 | 74 | 1355.98 | Total     | 126487.74 |
| 22 | 1134.85       | 48 | 1260.09 | 75 | 1361.08 | Rata-rata | 1264.88   |
| 23 | 1136.56       | 49 | 1274.11 | 76 | 1367.09 |           |           |
| 24 | 1141.64       | 50 | 1278.66 | 77 | 1368.31 |           |           |
| 25 | 1143.34       | 51 | 1281.12 | 78 | 1372.02 |           |           |
|    |               | 52 | 1281.57 | 79 | 1372.06 |           |           |

## b. Perhitungan Sample Serat

$$\text{Rata-rata Panjang serat} = 126487,74/100 = \mathbf{1264,88}$$

$$\text{Range} = 1593,03 - 955,71 = \mathbf{637,32}$$

$$\text{Jumlah Kelas Interval} = 1 + 3,3 \log 100 = \mathbf{8}$$

$$\text{Lebar Kelas Interval} = 637,32/8 = \mathbf{79,67}$$

| Kelas  | Interval |         | Xi       | Fi  | Xi2         | Xi x Fi   | Xi2xFi       |
|--------|----------|---------|----------|-----|-------------|-----------|--------------|
|        | L1       | L2      |          |     |             |           |              |
| 1      | 955,71   | 1035,38 | 995,55   | 6   | 991109,85   | 5973,27   | 5946659,082  |
| 2      | 1035,38  | 1115,05 | 1075,22  | 10  | 1156087,30  | 10752,15  | 11560872,96  |
| 3      | 1115,05  | 1194,72 | 1154,89  | 18  | 1333759,36  | 20787,93  | 24007668,54  |
| 4      | 1194,49  | 1274,16 | 1234,33  | 15  | 1523558,21  | 18514,88  | 22853373,08  |
| 5      | 1274,16  | 1353,83 | 1314,00  | 23  | 1726582,86  | 30221,89  | 39711405,78  |
| 6      | 1353,83  | 1433,50 | 1393,67  | 15  | 1942302,13  | 20904,98  | 29134531,98  |
| 7      | 1433,5   | 1513,17 | 1473,34  | 9   | 2170716,02  | 13260,02  | 19536444,2   |
| 8      | >1513,17 |         | 1553,01  | 4   | 2411840,06  | 6212,04   | 9647360,24   |
| Jumlah |          |         | 10193,98 | 100 | 13255955,79 | 126627,14 | 162398315,87 |

$$L = \frac{126627,14}{100} \times 0,05 = \mathbf{63,31}$$

$$S^2 = \frac{16034432584,58 - \frac{(126627,14)^2}{100}}{100 - 1} = \mathbf{20747,37}$$

$$N = \frac{4 \times 20747,37}{63,31^2} = \mathbf{20,70}$$

## c. Perhitungan diameter serat, diameter lumen, dan tebal dinding sel

| N         | Ujung 1 |       |      | Tengah |       |      | Ujung2 |       |      | Rata-rata    |              |             |
|-----------|---------|-------|------|--------|-------|------|--------|-------|------|--------------|--------------|-------------|
|           | d       | l     | w    | d      | l     | w    | d      | l     | w    | d            | l            | w           |
| 1         | 24,34   | 18,97 | 2,69 | 34,73  | 28,56 | 3,09 | 14,13  | 10,43 | 1,85 | 24,40        | 19,32        | 2,54        |
| 2         | 21,74   | 14,41 | 3,67 | 36,25  | 33,72 | 1,27 | 14,41  | 10,52 | 1,95 | 24,13        | 19,55        | 2,29        |
| 3         | 14,78   | 11,64 | 1,57 | 28,34  | 25,65 | 1,35 | 22,62  | 17,29 | 2,67 | 21,91        | 18,19        | 1,86        |
| 4         | 20,81   | 16,30 | 2,26 | 28,66  | 25,21 | 1,73 | 21,08  | 16,99 | 2,05 | 23,52        | 19,50        | 2,01        |
| 5         | 16,22   | 14,33 | 0,94 | 27,65  | 20,50 | 3,58 | 25,52  | 19,03 | 3,25 | 23,13        | 17,95        | 2,59        |
| 6         | 20,75   | 14,32 | 3,22 | 26,38  | 24,28 | 1,05 | 17,96  | 15,28 | 1,34 | 21,70        | 17,96        | 1,87        |
| 7         | 15,18   | 13,53 | 0,83 | 27,25  | 22,55 | 2,35 | 16,87  | 16,01 | 0,43 | 19,77        | 17,36        | 1,20        |
| 8         | 18,67   | 14,49 | 2,09 | 25,26  | 17,10 | 4,08 | 23,71  | 14,22 | 4,75 | 22,55        | 15,27        | 3,64        |
| 9         | 20,72   | 14,81 | 2,96 | 31,30  | 24,10 | 3,60 | 25,69  | 17,68 | 4,01 | 25,90        | 18,86        | 3,52        |
| 10        | 23,88   | 18,12 | 2,88 | 29,86  | 22,79 | 3,54 | 23,00  | 21,64 | 0,68 | 25,58        | 20,85        | 2,37        |
| 11        | 21,46   | 18,14 | 1,66 | 31,82  | 28,76 | 1,53 | 23,62  | 22,61 | 0,51 | 25,63        | 23,17        | 1,23        |
| 12        | 23,37   | 19,00 | 2,19 | 27,69  | 24,92 | 1,39 | 16,95  | 16,33 | 0,31 | 22,67        | 20,08        | 1,29        |
| 13        | 19,10   | 13,94 | 2,58 | 26,82  | 25,51 | 0,65 | 24,79  | 18,54 | 3,13 | 23,57        | 19,33        | 2,12        |
| 14        | 20,03   | 17,16 | 1,44 | 32,62  | 24,82 | 3,90 | 23,96  | 19,13 | 2,42 | 25,54        | 20,37        | 2,58        |
| 15        | 27,05   | 23,92 | 1,57 | 38,51  | 29,99 | 4,26 | 24,65  | 22,57 | 1,04 | 30,07        | 25,49        | 2,29        |
| 16        | 21,90   | 19,16 | 1,37 | 25,71  | 18,76 | 3,48 | 18,40  | 13,80 | 2,30 | 22,00        | 17,24        | 2,38        |
| 17        | 19,40   | 14,38 | 2,51 | 26,56  | 20,35 | 3,11 | 22,17  | 20,86 | 0,66 | 22,71        | 18,53        | 2,09        |
| 18        | 19,35   | 14,18 | 2,59 | 26,16  | 19,94 | 3,11 | 16,88  | 14,61 | 1,14 | 20,80        | 16,24        | 2,28        |
| 19        | 26,97   | 21,70 | 2,64 | 28,13  | 22,28 | 2,93 | 16,59  | 13,51 | 1,54 | 23,90        | 19,16        | 2,37        |
| 20        | 19,14   | 14,43 | 2,36 | 20,32  | 13,74 | 3,29 | 19,36  | 14,25 | 2,56 | 19,61        | 14,14        | 2,73        |
| 21        | 15,60   | 13,50 | 1,05 | 21,36  | 18,20 | 1,58 | 15,84  | 12,50 | 1,67 | 17,60        | 14,73        | 1,43        |
| Jumlah    |         |       |      |        |       |      |        |       |      | 486,68       | 393,32       | 46,68       |
| Rata-rata |         |       |      |        |       |      |        |       |      | <b>23,18</b> | <b>18,73</b> | <b>2,22</b> |

## d. Perhitungan Nilai Turunan Dimensi Serat

$$\text{Bilangan runkel} = \frac{2 \times 2,2}{18,73} = 0,24$$

$$\text{Bilangan Muhsteph} = \frac{23,18^2 - 18,73^2}{18,73^2} \times 100\% = 35\%$$

$$\text{Daya tenun} = \frac{63,31}{23,18} = 2,65$$

$$\text{Koefisien Kekakuan} = \frac{2,22}{23,18} = 0,10$$

$$\text{Bilangan fleksibilitas} = \frac{18,73}{23,18} = 0,81$$

Lampiran 5. Data Hasil Pengukuran Dimensi Serat dan Nilai Turunan Dimensi Serat Kayu Mahoni (lanjutan)

6. Kayu Mahoni (*Swietenia mahagoni*) Ulangan ke-III

a. Data Panjang Serat

|    |               |    |         |    |         |           |           |
|----|---------------|----|---------|----|---------|-----------|-----------|
| No | Panjang Serat | 26 | 1222.53 | 53 | 1341.25 | 80        | 1436.61   |
| 1  | 977.92        | 27 | 1227.54 | 54 | 1346.70 | 81        | 1440.53   |
| 2  | 1041.46       | 28 | 1227.59 | 55 | 1350.92 | 82        | 1454.79   |
| 3  | 1077.92       | 29 | 1233.02 | 56 | 1354.65 | 83        | 1456.76   |
| 4  | 1090.37       | 30 | 1234.35 | 57 | 1355.65 | 84        | 1458.55   |
| 5  | 1102.59       | 31 | 1242.27 | 58 | 1357.28 | 85        | 1460.07   |
| 6  | 1123.46       | 32 | 1246.02 | 59 | 1358.09 | 86        | 1464.87   |
| 7  | 1134.77       | 33 | 1257.03 | 60 | 1358.67 | 87        | 1470.20   |
| 8  | 1136.35       | 34 | 1259.22 | 61 | 1359.04 | 88        | 1470.56   |
| 9  | 1137.69       | 35 | 1263.28 | 62 | 1360.45 | 89        | 1474.10   |
| 10 | 1149.31       | 36 | 1265.71 | 63 | 1362.30 | 90        | 1475.61   |
| 11 | 1151.51       | 37 | 1268.48 | 64 | 1364.10 | 91        | 1476.21   |
| 12 | 1163.66       | 38 | 1272.53 | 65 | 1366.85 | 92        | 1489.17   |
| 13 | 1165.22       | 39 | 1274.55 | 66 | 1371.53 | 93        | 1495.71   |
| 14 | 1167.88       | 40 | 1280.27 | 67 | 1373.88 | 94        | 1503.30   |
| 15 | 1185.98       | 41 | 1281.02 | 68 | 1375.98 | 95        | 1519.28   |
| 16 | 1186.54       | 42 | 1281.87 | 69 | 1377.38 | 96        | 1525.89   |
| 17 | 1192.42       | 43 | 1287.87 | 70 | 1381.29 | 97        | 1548.71   |
| 18 | 1193.92       | 44 | 1289.89 | 71 | 1391.66 | 98        | 1576.17   |
| 19 | 1204.81       | 45 | 1296.28 | 72 | 1412.65 | 99        | 1586.08   |
| 20 | 1206.68       | 46 | 1303.29 | 73 | 1416.06 | 100       | 1592.11   |
| 21 | 1210.23       | 47 | 1303.75 | 74 | 1416.72 | Total     | 131943.81 |
| 22 | 1211.96       | 48 | 1308.17 | 75 | 1421.81 | Rata-rata | 1319.44   |
| 23 | 1213.31       | 49 | 1308.45 | 76 | 1424.77 |           |           |
| 24 | 1217.96       | 50 | 1318.10 | 77 | 1427.49 |           |           |
| 25 | 1222.25       | 51 | 1327.93 | 78 | 1430.19 |           |           |
|    |               | 52 | 1330.66 | 79 | 1433.33 |           |           |

## b. Perhitungan Sampel Serat

$$\text{Rata-rata Panjang serat} = 131943,981/100 = \mathbf{1319,44}$$

$$\text{Range} = 1592,11 - 977,92 = \mathbf{614,2}$$

$$\text{Jumlah Kelas Interval} = 1 + 3,3 \log 100 = \mathbf{8}$$

$$\text{Lebar Kelas Interval} = 614,2/8 = \mathbf{76,77}$$

| Kelas  | Interval |         | Xi       | Fi  | Xi2         | Xi x Fi   | Xi2xFi       |
|--------|----------|---------|----------|-----|-------------|-----------|--------------|
|        | L1       | L2      |          |     |             |           |              |
| 1      | 977,92   | 1054,69 | 1016,31  | 2   | 1032875,85  | 2032,61   | 2065751,706  |
| 2      | 1054,69  | 1131,46 | 1093,08  | 4   | 1194812,96  | 4372,30   | 4779251,823  |
| 3      | 1131,46  | 1208,23 | 1169,85  | 14  | 1368537,32  | 16377,83  | 19159522,54  |
| 4      | 1208,23  | 1285,00 | 1246,62  | 22  | 1554048,96  | 27425,53  | 34189077,08  |
| 5      | 1285,00  | 1361,77 | 1323,39  | 20  | 1751347,86  | 26467,70  | 35026957,16  |
| 6      | 1361,77  | 1438,54 | 1400,16  | 18  | 1960434,02  | 25202,79  | 35287812,43  |
| 7      | 1438,54  | 1515,31 | 1476,93  | 14  | 2181307,46  | 20676,95  | 30538304,38  |
| 8      | >1515,31 |         | 1553,70  | 6   | 2413983,69  | 9322,20   | 14483902,14  |
| Jumlah |          |         | 10280,01 | 100 | 13457348,12 | 131877,91 | 175530579,26 |

$$L = \frac{131877,91}{100} \times 0,05 = \mathbf{65,94}$$

$$S^2 = \frac{17391783145,97 - \frac{(131877,91)^2}{100}}{100 - 1} = \mathbf{16290,38}$$

$$N = \frac{4 \times 16290,38}{65,94^2} = \mathbf{14,99 = 15}$$

## c. Perhitungan diameter serat, diameter lumen, dan tebal dinding sel

| N         | Ujung 1 |       |      | Tengah |       |      | Ujung2 |       |      | Rata-rata    |              |             |
|-----------|---------|-------|------|--------|-------|------|--------|-------|------|--------------|--------------|-------------|
|           | d       | l     | w    | d      | l     | w    | d      | l     | w    | d            | l            | w           |
| 1         | 23,34   | 19,20 | 2,07 | 46,22  | 37,90 | 4,16 | 22,98  | 21,47 | 0,76 | 30,85        | 26,19        | 2,33        |
| 2         | 26,78   | 20,57 | 3,11 | 36,36  | 31,90 | 2,23 | 21,55  | 17,20 | 2,18 | 28,23        | 23,22        | 2,50        |
| 3         | 24,07   | 19,03 | 2,52 | 35,21  | 28,40 | 3,41 | 23,68  | 21,20 | 1,24 | 27,65        | 22,88        | 2,39        |
| 4         | 19,91   | 18,60 | 0,65 | 33,14  | 31,16 | 0,99 | 22,24  | 18,38 | 1,93 | 25,10        | 22,71        | 1,19        |
| 5         | 27,08   | 21,76 | 2,66 | 36,93  | 30,58 | 3,18 | 27,61  | 23,25 | 2,18 | 30,54        | 25,20        | 2,67        |
| 6         | 23,59   | 22,88 | 0,36 | 31,92  | 30,51 | 0,71 | 21,93  | 18,84 | 1,55 | 25,81        | 24,08        | 0,87        |
| 7         | 20,95   | 19,34 | 0,81 | 37,51  | 32,55 | 2,48 | 26,65  | 22,57 | 2,04 | 28,37        | 24,82        | 1,78        |
| 8         | 22,63   | 18,82 | 1,91 | 38,39  | 32,64 | 2,88 | 25,40  | 21,90 | 1,75 | 28,81        | 24,45        | 2,18        |
| 9         | 21,75   | 21,17 | 0,29 | 29,95  | 26,76 | 1,60 | 23,33  | 22,68 | 0,32 | 25,01        | 23,54        | 0,74        |
| 10        | 19,41   | 13,41 | 3,00 | 38,11  | 33,88 | 2,12 | 27,93  | 25,25 | 1,34 | 28,48        | 24,18        | 2,15        |
| 11        | 23,51   | 21,25 | 1,13 | 34,14  | 30,07 | 2,04 | 24,54  | 22,22 | 1,16 | 27,40        | 24,51        | 1,44        |
| 12        | 26,31   | 22,51 | 1,90 | 29,34  | 25,33 | 2,01 | 14,77  | 12,96 | 0,90 | 23,47        | 20,27        | 1,60        |
| 13        | 20,95   | 14,33 | 3,31 | 34,73  | 31,83 | 1,45 | 30,59  | 24,40 | 3,10 | 28,76        | 23,52        | 2,62        |
| 14        | 26,96   | 24,35 | 1,31 | 31,34  | 29,36 | 0,99 | 21,65  | 15,76 | 2,95 | 26,65        | 23,16        | 1,75        |
| 15        | 26,50   | 25,97 | 0,27 | 40,34  | 34,55 | 2,90 | 25,34  | 19,48 | 2,93 | 30,73        | 26,67        | 2,03        |
| Jumlah    |         |       |      |        |       |      |        |       |      | 415,85       | 359,39       | 28,23       |
| Rata-rata |         |       |      |        |       |      |        |       |      | <b>27,72</b> | <b>23,96</b> | <b>1,88</b> |

## d. Perhitungan Nilai Turunan Dimensi Serat

$$\text{Bilangan runkel} = \frac{2 \times 1,88}{23,96} = 0,16$$

$$\text{Bilangan Muhsteph} = \frac{27,72^2 - 23,96^2}{23,96^2} \times 100\% = 25\%$$

$$\text{Daya tenun} = \frac{65,94}{27,72} = 2,38$$

$$\text{Koefisien Kekakuan} = \frac{1,88}{27,72} = 0,07$$

$$\text{Bilangan fleksibilitas} = \frac{23,96}{27,72} = 0,86$$

Lampiran 6. Data Hasil Pengukuran Dimensi Serat dan Nilai Turunan Dimensi Serat Kayu Melinjo

7. Kayu Melinjo (*Gnetum gnemon*) Ulangan ke-I

a. Data Panjang Serat

| No | Panjang Serat | 26 | 1469.16 | 53 | 1580.84 | 80        | 1708.37  |
|----|---------------|----|---------|----|---------|-----------|----------|
|    |               | 27 | 1479.77 | 54 | 1583.82 | 81        | 1709.74  |
| 1  | 1216.53       | 28 | 1481.28 | 55 | 1590.99 | 82        | 1720.84  |
| 2  | 1264.12       | 29 | 1491.41 | 56 | 1592.25 | 83        | 1721.15  |
| 3  | 1277.64       | 30 | 1492    | 57 | 1592.63 | 84        | 1732.64  |
| 4  | 1284.89       | 31 | 1492.87 | 58 | 1598.54 | 85        | 1732.7   |
| 5  | 1312.23       | 32 | 1494.67 | 59 | 1599.74 | 86        | 1734.13  |
| 6  | 1313.46       | 33 | 1495.06 | 60 | 1609.99 | 87        | 1740.29  |
| 7  | 1330.63       | 34 | 1497.71 | 61 | 1610.7  | 88        | 1746.02  |
| 8  | 1332.65       | 35 | 1504.12 | 62 | 1621.75 | 89        | 1774.96  |
| 9  | 1345.63       | 36 | 1505.37 | 63 | 1625.56 | 90        | 1795.96  |
| 10 | 1359.93       | 37 | 1507.94 | 64 | 1628.37 | 91        | 1802.1   |
| 11 | 1368.87       | 38 | 1510.27 | 65 | 1628.82 | 92        | 1805.77  |
| 12 | 1382.22       | 39 | 1510.86 | 66 | 1634.42 | 93        | 1864.66  |
| 13 | 1385.3        | 40 | 1512.06 | 67 | 1647.29 | 94        | 1902.72  |
| 14 | 1387.71       | 41 | 1517.38 | 68 | 1650.3  | 95        | 1904.01  |
| 15 | 1392.53       | 42 | 1531.19 | 69 | 1653.37 | 96        | 1922.6   |
| 16 | 1402.72       | 43 | 1534.72 | 70 | 1662.25 | 97        | 1935.38  |
| 17 | 1408.54       | 44 | 1538.31 | 71 | 1665.27 | 98        | 1941.58  |
| 18 | 1411.94       | 45 | 1540.26 | 72 | 1674.79 | 99        | 1957.67  |
| 19 | 1418.1        | 46 | 1549.75 | 73 | 1675.82 | 100       | 2042.93  |
| 20 | 1423.87       | 47 | 1555.37 | 74 | 1677.76 | Total     | 157855.4 |
| 21 | 1436.75       | 48 | 1561.05 | 75 | 1690.98 | Rata-rata | 1578.554 |
| 22 | 1447.36       | 49 | 1570.04 | 76 | 1699.55 |           |          |
| 23 | 1450.94       | 50 | 1575.82 | 77 | 1702.44 |           |          |
| 24 | 1457.52       | 51 | 1577.76 | 78 | 1707.06 |           |          |
| 25 | 1457.67       | 52 | 1580.25 | 79 | 1707.64 |           |          |

## b. Perhitungan Sampel Serat

$$\text{Rata-rata Panjang serat} = 157855,00/100 = \mathbf{1578,55}$$

$$\text{Range} = 2042,93 - 1216,53 = \mathbf{829,40}$$

$$\text{Jumlah Kelas Interval} = 1 + 3,3 \log 100 = \mathbf{8}$$

$$\text{Lebar Kelas Interval} = 829,40/8 = \mathbf{103,68}$$

| Kelas  | Interval |          | Xi       | Fi  | Xi2         | Xi x Fi   | Xi2xFi       |
|--------|----------|----------|----------|-----|-------------|-----------|--------------|
|        | L1       | L2       |          |     |             |           |              |
| 1      | 1216,53  | 1320,205 | 1268,37  | 6   | 1608756,12  | 7610,205  | 9652536,69   |
| 2      | 1320,21  | 1423,885 | 1372,05  | 14  | 1882514,34  | 19208,67  | 26355200,79  |
| 3      | 1423,89  | 1527,565 | 1475,73  | 21  | 2177771,65  | 30990,28  | 45733204,74  |
| 4      | 1527,57  | 1631,245 | 1579,41  | 24  | 2494528,05  | 37905,78  | 59868673,23  |
| 5      | 1631,25  | 1734,93  | 1683,09  | 21  | 2832783,53  | 35344,84  | 59488454,19  |
| 6      | 1734,93  | 1838,605 | 1786,77  | 6   | 3192538,10  | 10720,61  | 19155228,59  |
| 7      | 1838,61  | 1942,285 | 1890,45  | 6   | 3573791,75  | 11342,69  | 21442750,5   |
| 8      | >1942,29 |          | 1965,18  | 2   | 3861932,43  | 3930,36   | 7723864,865  |
| Jumlah |          |          | 13021,03 | 100 | 21624615,98 | 157053,42 | 249419913,59 |

$$L = \frac{157053,42}{100} \times 0,05 = \mathbf{78,53}$$

$$S^2 = \frac{24665775163,16 - \frac{(157053,42)^2}{100}}{100 - 1} = \mathbf{27900,63}$$

$$N = \frac{4 \times 27900,63}{78,53^2} = \mathbf{18,10}$$

## c. Perhitungan diameter serat, diameter lumen, dan tebal dinding sel

| N         | Ujung 1 |       |      | Tengah |       |      | Ujung2 |       |      | Rata-rata    |              |             |
|-----------|---------|-------|------|--------|-------|------|--------|-------|------|--------------|--------------|-------------|
|           | d       | l     | w    | d      | l     | w    | d      | l     | w    | d            | l            | w           |
| 1         | 34,79   | 26,77 | 4,01 | 38,74  | 27,65 | 5,55 | 28,95  | 22,06 | 3,45 | 34,16        | 25,49        | 4,33        |
| 2         | 30,90   | 21,04 | 4,93 | 36,51  | 21,50 | 7,51 | 30,03  | 19,10 | 5,47 | 32,48        | 20,55        | 5,97        |
| 3         | 37,14   | 24,95 | 6,10 | 38,86  | 29,51 | 4,68 | 37,47  | 26,12 | 5,68 | 37,82        | 26,86        | 5,48        |
| 4         | 31,12   | 21,35 | 4,89 | 28,01  | 19,59 | 4,21 | 23,32  | 18,82 | 2,25 | 27,48        | 19,92        | 3,78        |
| 5         | 34,51   | 22,16 | 6,18 | 26,35  | 13,90 | 6,23 | 32,11  | 19,34 | 6,39 | 30,99        | 18,47        | 6,26        |
| 6         | 24,56   | 18,71 | 2,93 | 27,75  | 21,50 | 3,13 | 37,02  | 25,86 | 5,58 | 29,78        | 22,02        | 3,88        |
| 7         | 35,82   | 30,55 | 2,64 | 39,22  | 28,59 | 5,32 | 36,39  | 18,92 | 8,74 | 37,14        | 26,02        | 5,56        |
| 8         | 38,98   | 24,27 | 7,36 | 42,68  | 33,48 | 4,60 | 37,79  | 28,89 | 4,45 | 39,82        | 28,88        | 5,47        |
| 9         | 38,86   | 28,23 | 5,32 | 36,37  | 30,74 | 2,82 | 32,62  | 22,46 | 5,08 | 35,95        | 27,14        | 4,40        |
| 10        | 33,87   | 20,21 | 6,83 | 37,40  | 30,28 | 3,56 | 33,35  | 28,67 | 2,34 | 34,87        | 26,39        | 4,24        |
| 11        | 30,80   | 23,69 | 3,56 | 31,37  | 23,59 | 3,89 | 33,23  | 23,49 | 4,87 | 31,80        | 23,59        | 4,11        |
| 12        | 29,20   | 21,51 | 3,85 | 35,42  | 26,10 | 4,66 | 34,47  | 30,40 | 2,04 | 33,03        | 26,00        | 3,51        |
| 13        | 32,39   | 23,49 | 4,45 | 34,40  | 27,36 | 3,52 | 40,90  | 30,51 | 5,20 | 35,90        | 27,12        | 4,39        |
| 14        | 37,08   | 28,61 | 4,24 | 41,06  | 29,73 | 5,67 | 39,86  | 32,33 | 3,77 | 39,33        | 30,22        | 4,56        |
| 15        | 36,01   | 26,43 | 4,79 | 35,52  | 27,52 | 4,00 | 32,59  | 26,51 | 3,04 | 34,71        | 26,82        | 3,94        |
| 16        | 31,41   | 24,00 | 3,71 | 37,12  | 23,51 | 6,81 | 29,61  | 23,23 | 3,19 | 32,71        | 23,58        | 4,57        |
| 17        | 31,48   | 21,37 | 5,06 | 37,93  | 26,49 | 5,72 | 37,46  | 26,48 | 5,49 | 35,62        | 24,78        | 5,42        |
| 18        | 41,44   | 30,26 | 5,59 | 42,99  | 33,95 | 4,52 | 33,56  | 30,07 | 1,75 | 39,33        | 31,43        | 3,95        |
| 19        | 39,20   | 32,23 | 3,49 | 38,99  | 34,97 | 2,01 | 38,99  | 28,55 | 5,22 | 39,06        | 31,92        | 3,57        |
| Jumlah    |         |       |      |        |       |      |        |       |      | 661,99       | 487,20       | 87,40       |
| Rata-rata |         |       |      |        |       |      |        |       |      | <b>34,84</b> | <b>25,64</b> | <b>4,60</b> |

## d. Perhitungan Nilai Turunan Dimensi Serat

$$\text{Bilangan runkel} = \frac{2 \times 4,60}{25,64} = \mathbf{0,36}$$

$$\text{Bilangan Muhsteph} = \frac{34,84^2 - 25,64^2}{4,60^2} \times 100\% = \mathbf{46\%}$$

$$\text{Daya tenun} = \frac{78,53}{34,84} = \mathbf{2,25}$$

$$\text{Koefisien Kekakuan} = \frac{4,60}{34,84} = \mathbf{0,13}$$

$$\text{Bilangan fleksibilitas} = \frac{25,64}{34,84} = \mathbf{0,74}$$

Lampiran 6. Data Hasil Pengukuran Dimensi Serat dan Nilai Turunan Dimensi Serat Kayu Melinjo (lanjutan)

8. Kayu Melinjo (*Gnetum gnemon*) Ulangan ke-II

a. Data Panjang Serat

|    |               |    |         |    |         |           |           |
|----|---------------|----|---------|----|---------|-----------|-----------|
| No | Panjang Serat | 26 | 1435.31 | 53 | 1583.19 | 80        | 1720.43   |
| 1  | 1214.98       | 27 | 1450.1  | 54 | 1597.27 | 81        | 1724.22   |
| 2  | 1242.94       | 28 | 1452.59 | 55 | 1610.01 | 82        | 1732.13   |
| 3  | 1253.87       | 29 | 1457.3  | 56 | 1621.93 | 83        | 1744.72   |
| 4  | 1288.35       | 30 | 1463.88 | 57 | 1625.19 | 84        | 1747.13   |
| 5  | 1321.35       | 31 | 1471.44 | 58 | 1626.1  | 85        | 1752.99   |
| 6  | 1321.45       | 32 | 1472.01 | 59 | 1643.75 | 86        | 1753.95   |
| 7  | 1329.11       | 33 | 1479.2  | 60 | 1644.4  | 87        | 1757.94   |
| 8  | 1330.68       | 34 | 1488.13 | 61 | 1645.56 | 88        | 1765.77   |
| 9  | 1335.43       | 35 | 1488.16 | 62 | 1647.34 | 89        | 1766.36   |
| 10 | 1338.13       | 36 | 1488.95 | 63 | 1652.08 | 90        | 1784.82   |
| 11 | 1359.12       | 37 | 1514.05 | 64 | 1657.39 | 91        | 1834.97   |
| 12 | 1368.43       | 38 | 1516.61 | 65 | 1658.59 | 92        | 1846.42   |
| 13 | 1392.37       | 39 | 1518.88 | 66 | 1660.85 | 93        | 1869.25   |
| 14 | 1395.25       | 40 | 1529.63 | 67 | 1661.54 | 94        | 1870.71   |
| 15 | 1398.09       | 41 | 1532.68 | 68 | 1663.11 | 95        | 1892.87   |
| 16 | 1401.96       | 42 | 1534.54 | 69 | 1670.1  | 96        | 1917.31   |
| 17 | 1402.42       | 43 | 1541.86 | 70 | 1670.15 | 97        | 1935.32   |
| 18 | 1404.12       | 44 | 1542.21 | 71 | 1676.37 | 98        | 1937.86   |
| 19 | 1405.81       | 45 | 1544.43 | 72 | 1678.02 | 99        | 1950.94   |
| 20 | 1406.11       | 46 | 1550.52 | 73 | 1679.39 | 100       | 2003.24   |
| 21 | 1410.32       | 47 | 1566.29 | 74 | 1680.53 | Total     | 142592.03 |
| 22 | 1411.25       | 48 | 1570.03 | 75 | 1685.78 | Rata-rata | 1425.92   |
| 23 | 1417.77       | 49 | 1575.16 | 76 | 1686.87 |           |           |
| 24 | 1429.11       | 50 | 1577.71 | 77 | 1692.66 |           |           |
| 25 | 1430.8        | 51 | 1581.11 | 78 | 1699.67 |           |           |
|    |               | 52 | 1582.4  | 79 | 1707.94 |           |           |

## b. Perhitungan Sampel Serat

$$\text{Rata-rata Panjang serat} = 142592,03/100 = \mathbf{1425,92}$$

$$\text{Range} = 2003,24 - 1214,98 = \mathbf{788,26}$$

$$\text{Jumlah Kelas Interval} = 1 + 3,3 \log 100 = \mathbf{8}$$

$$\text{Lebar Kelas Interval} = 788,26/98,53 = \mathbf{98,53}$$

| Kelas  | Interval |         | Xi       | Fi  | Xi2         | Xi x Fi   | Xi2xFi       |
|--------|----------|---------|----------|-----|-------------|-----------|--------------|
|        | L1       | L2      |          |     |             |           |              |
| 1      | 1214,98  | 1313,51 | 1264,25  | 4   | 1598315,42  | 5056,98   | 6393261,68   |
| 2      | 1313,51  | 1412,04 | 1362,78  | 18  | 1857155,70  | 24529,95  | 33428802,61  |
| 3      | 1412,04  | 1510,57 | 1461,31  | 14  | 2135412,30  | 20458,27  | 29895772,24  |
| 4      | 1510,57  | 1609,10 | 1559,84  | 18  | 2433085,23  | 28077,03  | 43795534,09  |
| 5      | 1609,10  | 1707,63 | 1658,37  | 24  | 2750174,47  | 39800,76  | 66004187,36  |
| 6      | 1707,63  | 1806,16 | 1756,90  | 12  | 3086680,04  | 21082,74  | 37040160,49  |
| 7      | 1806,16  | 1904,69 | 1855,43  | 5   | 3442601,93  | 9277,13   | 17213009,65  |
| 8      | >1904,69 |         | 1965,18  | 5   | 3861932,43  | 9825,90   | 19309662,16  |
| Jumlah |          |         | 12884,03 | 100 | 21165357,53 | 158108,76 | 253080390,29 |

$$L = \frac{158108,76}{100} \times 0,05 = \mathbf{79,05}$$

$$S^2 = \frac{24998378407,65 - \frac{(158108,76)^2}{100}}{100 - 1} = \mathbf{31278,85}$$

$$N = \frac{4 \times 31278,85}{79,05^2} = \mathbf{20,02 = 21}$$

## c. Perhitungan diameter serat, diameter lumen, dan tebal dinding sel

| N         | Ujung 1 |       |      | Tengah |       |      | Ujung2 |       |      | Rata-rata    |              |             |
|-----------|---------|-------|------|--------|-------|------|--------|-------|------|--------------|--------------|-------------|
|           | d       | l     | w    | d      | l     | w    | d      | l     | w    | d            | l            | w           |
| 1         | 30,51   | 22,67 | 3,92 | 31,88  | 18,44 | 6,72 | 31,08  | 26,01 | 2,54 | 31,16        | 22,37        | 4,39        |
| 2         | 36,15   | 28,16 | 4,00 | 36,48  | 28,76 | 3,86 | 35,89  | 28,36 | 3,77 | 36,17        | 28,43        | 3,87        |
| 3         | 40,10   | 33,32 | 3,39 | 42,68  | 35,22 | 3,73 | 43,06  | 35,71 | 3,68 | 41,95        | 34,75        | 3,60        |
| 4         | 33,54   | 29,76 | 1,89 | 32,70  | 27,15 | 2,78 | 35,59  | 28,04 | 3,78 | 33,94        | 28,32        | 2,81        |
| 5         | 30,29   | 22,81 | 3,74 | 30,84  | 22,64 | 4,10 | 32,18  | 25,66 | 3,26 | 31,10        | 23,70        | 3,70        |
| 6         | 38,34   | 32,68 | 2,83 | 40,54  | 30,12 | 5,21 | 39,09  | 33,29 | 2,90 | 39,32        | 32,03        | 3,65        |
| 7         | 33,72   | 22,90 | 5,41 | 35,00  | 28,57 | 3,22 | 34,21  | 27,48 | 3,37 | 34,31        | 26,32        | 4,00        |
| 8         | 35,04   | 26,05 | 4,50 | 31,89  | 23,90 | 4,00 | 31,86  | 21,03 | 5,42 | 32,93        | 23,66        | 4,64        |
| 9         | 34,18   | 24,01 | 5,09 | 37,44  | 22,24 | 7,60 | 31,69  | 22,01 | 4,84 | 34,44        | 22,75        | 5,84        |
| 10        | 30,61   | 23,23 | 3,69 | 36,63  | 31,83 | 2,40 | 28,37  | 21,14 | 3,62 | 31,87        | 25,40        | 3,24        |
| 11        | 35,75   | 26,52 | 4,62 | 35,32  | 25,79 | 4,77 | 30,06  | 16,97 | 6,55 | 33,71        | 23,09        | 5,31        |
| 12        | 32,04   | 22,54 | 4,75 | 29,59  | 22,00 | 3,80 | 29,68  | 24,36 | 2,66 | 30,44        | 22,97        | 3,74        |
| 13        | 29,35   | 24,89 | 2,23 | 35,59  | 24,13 | 5,73 | 29,04  | 21,58 | 3,73 | 31,33        | 23,53        | 3,90        |
| 14        | 27,31   | 16,64 | 5,34 | 36,39  | 28,69 | 3,85 | 31,90  | 23,40 | 4,25 | 31,87        | 22,91        | 4,48        |
| 15        | 31,95   | 21,27 | 5,34 | 38,53  | 27,27 | 5,63 | 38,53  | 25,38 | 6,58 | 36,34        | 24,64        | 5,85        |
| 16        | 29,93   | 20,87 | 4,53 | 32,57  | 20,19 | 6,19 | 26,65  | 21,45 | 2,60 | 29,72        | 20,84        | 4,44        |
| 17        | 35,08   | 27,96 | 3,56 | 46,52  | 38,91 | 3,81 | 38,22  | 30,69 | 3,77 | 39,94        | 32,52        | 3,71        |
| 18        | 31,37   | 23,70 | 3,84 | 42,90  | 36,40 | 3,25 | 41,33  | 33,61 | 3,86 | 38,53        | 31,24        | 3,65        |
| 19        | 32,01   | 20,56 | 5,73 | 28,48  | 16,91 | 5,79 | 28,02  | 20,49 | 3,77 | 29,50        | 19,32        | 5,09        |
| 20        | 31,64   | 24,28 | 3,68 | 32,41  | 26,59 | 2,91 | 30,12  | 22,08 | 4,02 | 31,39        | 24,32        | 3,54        |
| 21        | 32,77   | 25,68 | 3,55 | 34,81  | 24,32 | 5,25 | 31,16  | 23,85 | 3,66 | 32,91        | 24,62        | 4,15        |
| Jumlah    |         |       |      |        |       |      |        |       |      | 712,87       | 537,72       | 87,57       |
| Rata-rata |         |       |      |        |       |      |        |       |      | <b>33,95</b> | <b>25,61</b> | <b>4,17</b> |

## d. Perhitungan Nilai Turunan Dimensi Serat

$$\text{Bilangan runkel} = \frac{2 \times 4,17}{25,61} = 0,33$$

$$\text{Bilangan Muhsteph} = \frac{33,95^2 - 25,61^2}{25,61^2} \times 100\% = 43\%$$

$$\text{Daya tenun} = \frac{79,05}{33,95} = 2,33$$

$$\text{Koefisien Kekakuan} = \frac{4,17}{33,95} = 0,12$$

$$\text{Bilangan fleksibilitas} = \frac{25,61}{33,95} = 0,75$$

Lampiran 6. Data Hasil Pengukuran Dimensi Serat dan Nilai Turunan Dimensi Serat Kayu Melinjo (lanjutan)

9. Kayu Melinjo (*Gnetum gnemon*) Ulangan ke-III

a. Data Panjang Serat

|    |               |    |         |    |         |           |           |
|----|---------------|----|---------|----|---------|-----------|-----------|
| No | Panjang Serat | 26 | 1417.12 | 53 | 1542.63 | 80        | 1714.25   |
|    |               | 27 | 1429.55 | 54 | 1546.56 | 81        | 1716.37   |
| 1  | 1206.69       | 28 | 1435.17 | 55 | 1548.66 | 82        | 1720.76   |
| 2  | 1210.56       | 29 | 1436.35 | 56 | 1552.61 | 83        | 1726.00   |
| 3  | 1265.49       | 30 | 1440.07 | 57 | 1563.81 | 84        | 1730.88   |
| 4  | 1280.56       | 31 | 1454.92 | 58 | 1564.32 | 85        | 1743.60   |
| 5  | 1302.04       | 32 | 1456.60 | 59 | 1570.73 | 86        | 1746.20   |
| 6  | 1310.24       | 33 | 1465.41 | 60 | 1574.96 | 87        | 1746.85   |
| 7  | 1311.84       | 34 | 1465.77 | 61 | 1584.03 | 88        | 1771.91   |
| 8  | 1315.98       | 35 | 1476.12 | 62 | 1584.40 | 89        | 1773.89   |
| 9  | 1322.74       | 36 | 1486.01 | 63 | 1585.13 | 90        | 1778.34   |
| 10 | 1325.87       | 37 | 1486.67 | 64 | 1588.97 | 91        | 1780.00   |
| 11 | 1333.05       | 38 | 1486.87 | 65 | 1595.03 | 92        | 1781.95   |
| 12 | 1336.91       | 39 | 1494.73 | 66 | 1596.70 | 93        | 1788.66   |
| 13 | 1346.02       | 40 | 1504.19 | 67 | 1596.74 | 94        | 1789.24   |
| 14 | 1346.81       | 41 | 1505.88 | 68 | 1609.68 | 95        | 1801.70   |
| 15 | 1356.15       | 42 | 1506.21 | 69 | 1610.94 | 96        | 1818.31   |
| 16 | 1363.58       | 43 | 1512.86 | 70 | 1617.25 | 97        | 1851.52   |
| 17 | 1371.37       | 44 | 1513.13 | 71 | 1624.15 | 98        | 1870.78   |
| 18 | 1383.68       | 45 | 1514.09 | 72 | 1638.63 | 99        | 1880.45   |
| 19 | 1385.18       | 46 | 1514.63 | 73 | 1642.38 | 100       | 1887.03   |
| 20 | 1387.48       | 47 | 1519.43 | 74 | 1664.03 | Total     | 154540.24 |
| 21 | 1395.82       | 48 | 1522.65 | 75 | 1664.80 |           |           |
| 22 | 1411.44       | 49 | 1531.58 | 76 | 1674.06 | Rata-rata | 1545.40   |
| 23 | 1413.11       | 50 | 1531.64 | 77 | 1693.26 |           |           |
| 24 | 1413.50       | 51 | 1532.13 | 78 | 1700.55 |           |           |
| 25 | 1414.40       | 52 | 1533.35 | 79 | 1702.90 |           |           |

## b. Perhitungan Sampel Serat

$$\text{Rata-rata Panjang serat} = 154540,24/100 = \mathbf{1545,40}$$

$$\text{Range} = 1887,03 - 1206,69 = \mathbf{680,34}$$

$$\text{Jumlah Kelas Interval} = 1 + 3,3 \log 100 = \mathbf{8}$$

$$\text{Lebar Kelas Interval} = 680,34/8 = \mathbf{82,04}$$

| Kelas  | Interval |         | Xi       | Fi  | Xi2         | Xi x Fi   | Xi2xFi       |
|--------|----------|---------|----------|-----|-------------|-----------|--------------|
|        | L1       | L2      |          |     |             |           |              |
| 1      | 1206,69  | 1291,73 | 1249,21  | 4   | 1560525,62  | 4996,84   | 6242102,496  |
| 2      | 1291,73  | 1376,77 | 1334,25  | 13  | 1780223,06  | 17345,25  | 23142899,81  |
| 3      | 1376,77  | 1461,81 | 1419,29  | 15  | 2014384,10  | 21289,35  | 30215761,56  |
| 4      | 1461,81  | 1546,85 | 1504,33  | 22  | 2263008,75  | 33095,26  | 49786192,48  |
| 5      | 1546,85  | 1631,89 | 1589,37  | 17  | 2526097,00  | 27019,29  | 42943648,95  |
| 6      | 1631,89  | 1716,93 | 1674,41  | 10  | 2803648,85  | 16744,10  | 28036488,48  |
| 7      | 1716,93  | 1801,97 | 1759,45  | 14  | 3095664,30  | 24632,30  | 43339300,24  |
| 8      | >1801,97 |         | 1965,18  | 5   | 3861932,43  | 9825,90   | 19309662,16  |
| Jumlah |          |         | 12495,49 | 100 | 19905484,12 | 154948,29 | 243016056,17 |

$$L = \frac{154948,29}{100} \times 0,05 = \mathbf{77,47}$$

$$S^2 = \frac{240089725773,93 - \frac{(154948,29)^2}{100}}{100-1} = \mathbf{29558,89}$$

$$N = \frac{4 \times 29558,89}{77,47^2} = \mathbf{19,70}$$

## c. Perhitungan diameter serat, diameter lumen, dan tebal dinding sel

| N         | Ujung 1 |       |      | Tengah |       |      | Ujung2 |       |      | Rata-rata    |              |             |
|-----------|---------|-------|------|--------|-------|------|--------|-------|------|--------------|--------------|-------------|
|           | d       | l     | w    | d      | l     | w    | d      | l     | w    | d            | l            | w           |
| 1         | 36,42   | 28,83 | 3,80 | 36,45  | 23,75 | 6,35 | 27,54  | 20,05 | 3,75 | 33,47        | 24,21        | 4,63        |
| 2         | 35,98   | 26,50 | 4,74 | 40,19  | 31,21 | 4,49 | 36,90  | 28,69 | 4,11 | 37,69        | 28,80        | 4,45        |
| 3         | 31,32   | 20,56 | 5,38 | 33,29  | 23,52 | 4,89 | 32,39  | 25,24 | 3,58 | 32,33        | 23,11        | 4,61        |
| 4         | 40,51   | 29,56 | 5,48 | 36,42  | 28,42 | 4,00 | 29,75  | 23,05 | 3,35 | 35,56        | 27,01        | 4,28        |
| 5         | 37,00   | 25,70 | 5,65 | 35,16  | 31,29 | 1,94 | 39,42  | 32,26 | 3,58 | 37,19        | 29,75        | 3,72        |
| 6         | 32,20   | 24,10 | 4,05 | 42,41  | 32,80 | 4,81 | 33,24  | 26,54 | 3,35 | 35,95        | 27,81        | 4,07        |
| 7         | 39,10   | 26,45 | 6,33 | 37,36  | 29,65 | 3,86 | 35,64  | 30,08 | 2,78 | 37,37        | 28,73        | 4,32        |
| 8         | 32,49   | 25,23 | 3,63 | 42,82  | 34,80 | 4,01 | 33,68  | 23,76 | 4,96 | 36,33        | 27,93        | 4,20        |
| 9         | 34,31   | 27,83 | 3,24 | 42,43  | 27,61 | 7,41 | 35,22  | 17,06 | 9,08 | 37,32        | 24,17        | 6,58        |
| 10        | 39,13   | 28,85 | 5,14 | 34,56  | 28,82 | 2,87 | 30,59  | 25,23 | 2,68 | 34,76        | 27,63        | 3,56        |
| 11        | 35,21   | 23,59 | 5,81 | 28,52  | 23,59 | 2,47 | 30,22  | 25,94 | 2,14 | 31,32        | 24,37        | 3,47        |
| 12        | 44,92   | 35,04 | 4,94 | 33,43  | 29,65 | 1,89 | 41,56  | 33,69 | 3,94 | 39,97        | 32,79        | 3,59        |
| 13        | 31,91   | 22,32 | 4,80 | 34,14  | 19,19 | 7,48 | 33,64  | 26,70 | 3,47 | 33,23        | 22,74        | 5,25        |
| 14        | 33,54   | 27,11 | 3,22 | 34,45  | 22,94 | 5,76 | 27,47  | 22,35 | 2,56 | 31,82        | 24,13        | 3,84        |
| 15        | 30,91   | 20,10 | 5,41 | 31,58  | 24,49 | 3,55 | 31,29  | 23,31 | 3,99 | 31,26        | 22,63        | 4,31        |
| 16        | 30,46   | 22,07 | 4,20 | 38,73  | 24,59 | 7,07 | 29,27  | 22,41 | 3,43 | 32,82        | 23,02        | 4,90        |
| 17        | 32,68   | 22,94 | 4,87 | 36,26  | 27,97 | 4,15 | 39,48  | 27,01 | 6,24 | 36,14        | 25,97        | 5,08        |
| 18        | 35,48   | 23,94 | 5,77 | 34,83  | 27,15 | 3,84 | 38,53  | 30,38 | 4,08 | 36,28        | 27,16        | 4,56        |
| 19        | 31,68   | 25,36 | 3,16 | 37,53  | 28,55 | 4,49 | 30,32  | 22,84 | 3,74 | 33,18        | 25,58        | 3,80        |
| 20        | 31,40   | 24,21 | 3,60 | 36,27  | 25,38 | 5,45 | 31,47  | 21,87 | 4,80 | 33,05        | 23,82        | 4,61        |
| Jumlah    |         |       |      |        |       |      |        |       |      | 697,03       | 521,37       | 87,83       |
| Rata-rata |         |       |      |        |       |      |        |       |      | <b>34,85</b> | <b>26,07</b> | <b>4,39</b> |

## d. Perhitungan Nilai Turunan Dimensi Serat

$$\text{Bilangan runkel} = \frac{2 \times 4,39}{26,07} = 0,34$$

$$\text{Bilangan Muhsteph} = \frac{34,85^2 - 26,07^2}{26,07^2} \times 100\% = 44\%$$

$$\text{Daya tenun} = \frac{77,47}{34,85} = 2,22$$

$$\text{Koefisien Kekakuan} = \frac{4,39}{34,85} = 0,13$$

$$\text{Bilangan fleksibilitas} = \frac{26,07}{34,85} = 0,75$$