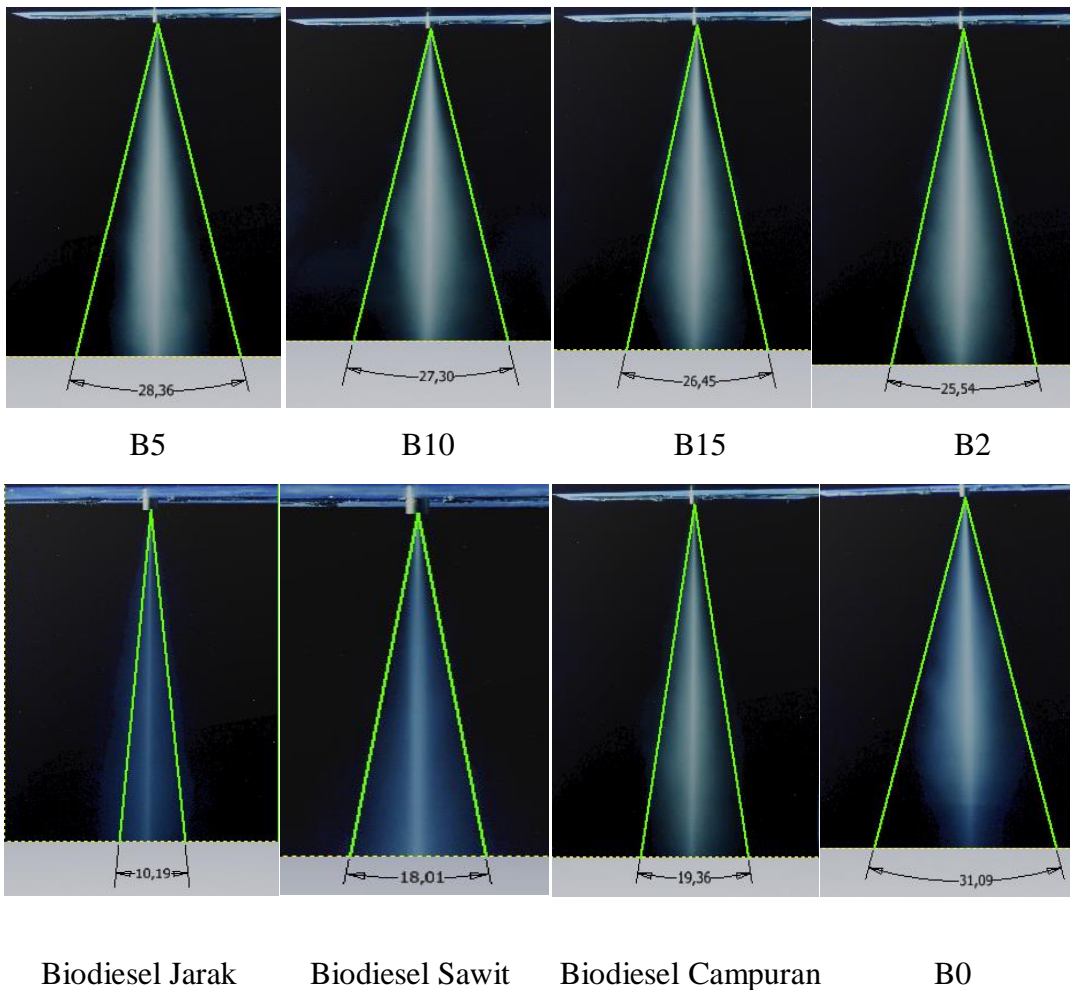


### Lampiran 1. Hasil Pengujian Sudut Karakteristik Injeksi



Tabel 4.5 Hasil Pengujian Sudut Semprotan Injektor.

| No | Nama Sampel | Viskositas (cSt) | Semprotan Sudut (°) |
|----|-------------|------------------|---------------------|
| 1  | Jarak       | 70,3             | 10,13               |
| 2  | Sawit       | 5,9              | 18,01               |
| 3  | B Campuran  | 19,8             | 19,36               |
| 4  | B20         | 4,5              | 25,54               |
| 5  | B15         | 3,5              | 26,45               |
| 6  | B10         | 3,3              | 27,30               |
| 7  | B5          | 3,2              | 28,36               |
| 8  | B0          | 2,9              | 31,09               |

## Lampiran 2. Hasil Pengujian Densitas Bahan Bakar

| NO | SAMPLE                 | Pengujian | Berat gelas ukur (g) | PENGUJIAN DENSITAS SUHU 40°C  |             |           |                 |                               |
|----|------------------------|-----------|----------------------|-------------------------------|-------------|-----------|-----------------|-------------------------------|
|    |                        |           |                      | berat minyak + gelas ukur (g) | Volume (ml) | Berat (g) | Densitas (g/ml) | Densitas (kg/m <sup>3</sup> ) |
| 1  | Biodiesel Minyak Jarak | 1         | 96,8965              | 143,210                       | 50          | 46,3135   | 0,926273        | 926,277                       |
|    |                        | 2         | 96,8963              | 143,190                       | 50          | 46,2937   | 0,925871        | 925,874                       |
|    |                        | 3         | 96,8943              | 143,210                       | 50          | 46,3157   | 0,926312        | 926,314                       |
| 2  | Biodiesel Minyak Sawit | 1         | 96,8965              | 139,231                       | 50          | 42,3335   | 0,846671        | 846,676                       |
|    |                        | 2         | 96,8963              | 139,230                       | 50          | 42,3337   | 0,846671        | 846,674                       |
|    |                        | 3         | 96,8943              | 139,210                       | 50          | 42,3157   | 0,846314        | 846,314                       |
| 3  | BJBS (3 : 2)           | 1         | 96,8965              | 142,726                       | 50          | 45,8298   | 0,916596        | 916,596                       |
|    |                        | 2         | 96,8963              | 142,728                       | 50          | 45,8296   | 0,870349        | 870,349                       |
|    |                        | 3         | 96,8943              | 142,723                       | 50          | 45,8294   | 0,916588        | 916,588                       |
| 4  | Solar (B0)             | 1         | 96,8965              | 138,234                       | 50          | 41,3375   | 0,826751        | 826,751                       |
|    |                        | 2         | 96,8963              | 138,239                       | 50          | 41,3417   | 0,826834        | 826,834                       |
|    |                        | 3         | 96,8943              | 138,229                       | 50          | 41,3347   | 0,826694        | 826,694                       |
| 5  | B5                     | 1         | 96,8965              | 138,653                       | 50          | 41,7567   | 0,835134        | 835,134                       |
|    |                        | 2         | 96,8963              | 138,642                       | 50          | 41,7463   | 0,834926        | 834,926                       |
|    |                        | 3         | 96,8943              | 138,646                       | 50          | 41,7519   | 0,835038        | 835,038                       |
| 6  | B10                    | 1         | 96,8965              | 138,246                       | 50          | 41,3502   | 0,827004        | 827,004                       |
|    |                        | 2         | 96,8963              | 138,244                       | 50          | 41,3485   | 0,826971        | 827,971                       |
|    |                        | 3         | 96,8943              | 138,253                       | 50          | 41,3594   | 0,827188        | 827,188                       |
| 7  | B15                    | 1         | 96,8965              | 138,855                       | 50          | 41,9589   | 0,839178        | 839,178                       |
|    |                        | 2         | 96,8963              | 138,895                       | 50          | 41,9989   | 0,839978        | 839,978                       |
|    |                        | 3         | 96,8943              | 138,511                       | 50          | 41,6169   | 0,832338        | 832,338                       |
| 8  | B20                    | 1         | 96,8965              | 138,746                       | 50          | 41,8499   | 0,836998        | 836,998                       |
|    |                        | 2         | 96,8963              | 138,769                       | 50          | 41,8734   | 0,837468        | 837,468                       |
|    |                        | 3         | 96,8943              | 138,767                       | 50          | 41,8731   | 0,837468        | 837,468                       |

### Lampiran 3. Hasil Pengujian Viskositas Bahan Bakar

| NO | VISKOSITAS                | Pengujian | PENGUJIAN VISKOSITAS SUHU 40°C |     |              |      |              |      |
|----|---------------------------|-----------|--------------------------------|-----|--------------|------|--------------|------|
|    |                           |           | 6 rpm                          |     | 12 rpm       |      | 30 rpm       |      |
|    |                           |           | Data (mPa.s)                   | %   | Data (mPa.s) | %    | Data (mPa.s) | %    |
| 1  | Biodiesel<br>Minyak Jarak | 1         | 70                             | 7   | 68           | 13,3 | 68,2         | 34,1 |
|    |                           | 2         | 67                             | 6,7 | 69,5         | 13,9 | 69,4         | 34,7 |
|    |                           | 3         | 65                             | 6,5 | 58           | 11,6 | 57,8         | 28,9 |
| 2  | Biodiesel<br>Minyak Sawit | 1         | 9                              | 0,9 | 4            | 0,8  | 4,8          | 2,4  |
|    |                           | 2         | 21                             | 2,1 | 8            | 1,6  | 5            | 2,5  |
|    |                           | 3         | 13                             | 1,3 | 4            | 0,8  | 5,4          | 2,7  |
| 3  | BJBS<br>(3/2)             | 1         | 35                             | 3,5 | 6            | 1,2  | 8            | 4    |
|    |                           | 2         | 31                             | 3,1 | 6,5          | 1,3  | 8            | 4    |
|    |                           | 3         | 32                             | 3,2 | 7            | 1,4  | 7,4          | 3,8  |
| 4  | Solar<br>(B0)             | 1         | 10                             | 1   | 4            | 0,8  | 2,4          | 1,2  |
|    |                           | 2         | 9                              | 0,9 | 5,5          | 1,1  | 2,4          | 1,2  |
|    |                           | 3         | 11                             | 1,1 | 7            | 1,4  | 2,4          | 1,2  |
| 5  | B5                        | 1         | 15                             | 1,5 | 9,5          | 1,9  | 4            | 2    |
|    |                           | 2         | 17                             | 1,7 | 7            | 1,4  | 4            | 2    |
|    |                           | 3         | 18                             | 1,8 | 8,5          | 1,7  | 3,8          | 1,9  |
| 6  | B10                       | 1         | 18                             | 1,8 | 9,5          | 1,9  | 4            | 2    |
|    |                           | 2         | 19                             | 1,9 | 6            | 1,2  | 4,2          | 2,1  |
|    |                           | 3         | 18                             | 1,8 | 8,5          | 1,7  | 4,2          | 2,1  |
| 7  | B15                       | 1         | 11                             | 1,1 | 5,5          | 1,1  | 3,8          | 1,9  |
|    |                           | 2         | 12                             | 1,2 | 3,5          | 0,7  | 3,8          | 1,9  |
|    |                           | 3         | 13                             | 1,3 | 6,5          | 1,3  | 3,6          | 1,8  |
| 8  | B20                       | 1         | 11                             | 1,1 | 4            | 0,8  | 3,6          | 1,8  |
|    |                           | 2         | 12                             | 1,2 | 3,5          | 0,7  | 3,6          | 1,8  |
|    |                           | 3         | 12                             | 1,2 | 6            | 1,2  | 3,6          | 1,8  |

#### Lampiran 4. Hasil Pengujian Flashpoint Bahan Bakar

| NO | SAMPLE                 | Pengujian | PENGUJIAN FLASH POINT ( <sup>0</sup> C) |             |            |
|----|------------------------|-----------|---|-------------|------------|
|    |                        |           | Pengkabutan                             | Flash Point | Fire Point |
| 1  | Biodiesel Minyak Jarak | 1         | 169                                     | 216         | 230        |
|    |                        | 2         | 168                                     | 200         | 220        |
|    |                        | 3         | 169                                     | 198         | 216        |
| 2  | Biodiesel Minyak Sawit | 1         | 155                                     | 216         | 226        |
|    |                        | 2         | 153                                     | 210         | 222        |
|    |                        | 3         | 150                                     | 208         | 219        |
| 3  | BJBS (3 : 2)           | 1         | 112                                     | 178         | 219        |
|    |                        | 2         | 101                                     | 169         | 208        |
|    |                        | 3         | 100                                     | 167         | 200        |
| 4  | B5                     | 1         | 117                                     | 131         | 139        |
|    |                        | 2         | 106                                     | 128         | 139        |
|    |                        | 3         | 94                                      | 121         | 129        |
| 5  | B10                    | 1         | 98                                      | 123         | 139        |
|    |                        | 2         | 96                                      | 119         | 129        |
|    |                        | 3         | 96                                      | 117         | 126        |
| 6  | B20                    | 1         | 97                                      | 135         | 149        |
|    |                        | 2         | 94                                      | 131         | 140        |
|    |                        | 3         | 90                                      | 129         | 137        |
| 7  | B20                    | 1         | 97                                      | 119         | 124        |
|    |                        | 2         | 94                                      | 114         | 120        |
|    |                        | 3         | 93                                      | 110         | 118        |

**Lampiran 6. Hasil Pengujian Nilai Kalor Bahan Bakar**

| NO | SAMPLE          | Pengujian | PENGUJIAN NILAI KALOR |               |            |
|----|-----------------|-----------|-----------------------|---------------|------------|
|    |                 |           | Massa (g)             | Kalor (cal/g) | Rata-rata  |
| 1  | B5              | 1         | 0,7096                | 9893,6456     | 9912,77235 |
|    | (50/95)         | 2         | 0,7019                | 9931,8991     |            |
| 2  | B10             | 1         | 0,7019                | 9870,6563     | 9857,7287  |
|    | (10/90)         | 2         | 0,7017                | 9844,8011     |            |
| 3  | B15             | 1         | 0,7117                | 9802,0459     | 9816,1158  |
|    | (15/85)         | 2         | 0,7189                | 9830,1857     |            |
| 4  | B20             | 1         | 0,7191                | 9777,3094     | 9767,2049  |
|    | (20/80)         | 2         | 0,7159                | 9757,1004     |            |
| 5  | BJBS            | 1         | 0,7107                | 9062,4521     | 9042,8975  |
|    | (30/20)         | 2         | 0,7186                | 9023,3429     |            |
| 6  | Biodiesel Jarak | 1         | 0,7157                | 8803,153      | 8807,3435  |
|    |                 | 2         | 0,7272                | 8811,534      |            |
| 7  | Biodiesel Sawit | 1         | 0,7139                | 9519,5877     | 9497,813   |
|    |                 | 2         | 0,7255                | 9476,0383     |            |
| 8  | SOLAR (B0)      | 1         | 0,7237                | 10558,18      | 10592,1565 |
|    |                 | 2         | 0,7225                | 10626,133     |            |

**Lampiran 6. Hasil Pengujian Unjuk Kerja Mesin Diesel Bahan Bakar**

| Putaran Mesin (RPM) |       |       |       |       |       |
|---------------------|-------|-------|-------|-------|-------|
| Beban               | B0    | B5    | B10   | B15   | B20   |
| 0                   | 2587  | 2580  | 2574  | 2568  | 2575  |
| 500                 | 2550  | 2545  | 2541  | 2534  | 2525  |
| 1000                | 2497  | 2478  | 2454  | 2441  | 2442  |
| 1500                | 2488  | 2462  | 2448  | 2432  | 2432  |
| 2000                | 2465  | 2454  | 2442  | 2428  | 2423  |
| 2500                | 2440  | 2442  | 2438  | 2419  | 2418  |
| Ampere              |       |       |       |       |       |
| Beban               | B0    | B5    | B10   | B15   | B20   |
| 0                   | 0     | 0     | 0     | 0     | 0     |
| 500                 | 9,63  | 9,24  | 8,97  | 9,21  | 9,01  |
| 1000                | 15,98 | 15,64 | 15,2  | 15,38 | 15,97 |
| 1500                | 19,71 | 19,12 | 18,55 | 19,55 | 18,32 |
| 2000                | 19,63 | 19,07 | 19,42 | 19,41 | 19,8  |
| 2500                | 19,4  | 19,57 | 19,05 | 19,68 | 19,38 |
| Volt                |       |       |       |       |       |
| Beban               | B0    | B5    | B10   | B15   | B20   |
| 0                   | 353   | 334   | 318   | 346   | 317   |
| 500                 | 299   | 284   | 264   | 301   | 270   |
| 1000                | 227   | 216   | 204   | 220   | 199   |
| 1500                | 158   | 152   | 144   | 153   | 141   |
| 2000                | 109   | 106   | 102   | 108   | 98.2  |
| 2500                | 74,7  | 79,9  | 75,2  | 72,2  | 71,8  |