

## Supplementary Information

**Table S1.** Quantitative description of *G. kola* seeds. Values are expressed as means with standard deviation. Means followed by the same letter within a column are not significantly different at  $p > 0.05$  (Tukey HSD test).

|                         | No. of samples | Seed length (cm)         | Seed width (cm)          | Seed weight (g)          | No of seeds per fruit    | Fruit seed mass (g)      | Fruit seed mass ratio (%) |
|-------------------------|----------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|---------------------------|
| <i>Central region</i>   |                |                          |                          |                          |                          |                          |                           |
| Akok                    | 444            | 2.87 ± 0.46              | 1.58 ± 0.21              | 4.52 ± 1.61              | 2.28 ± 1.01              | 9.97 ± 6.54              | 6.44 ± 3.23               |
| Lekie-Assi              | 272            | 3.71 ± 0.48              | 1.82 ± 0.24              | 7.95 ± 2.08              | 2.56 ± 1.11              | 19.9 ± 10.4              | 9.94 ± 3.94               |
| Bot-Makak               | 142            | 3.05 ± 0.44              | 1.79 ± 0.24              | 6.29 ± 2.01              | 1.92 ± 0.97              | 9.67 ± 6.47              | 5.03 ± 2.72               |
| Nkenglikok              | 271            | 3.13 ± 0.45              | 1.83 ± 0.23              | 6.40 ± 1.99              | 2.37 ± 1.14              | 14.8 ± 8.64              | 8.45 ± 4.69               |
| C total                 | 1,172          | 3.16 ± 0.56 <sup>A</sup> | 1.72 ± 0.26 <sup>A</sup> | 6.06 ± 2.31 <sup>A</sup> | 2.28 ± 1.07 <sup>A</sup> | 12.3 ± 8.38 <sup>A</sup> | 7.23 ± 3.98 <sup>A</sup>  |
| <i>South region</i>     |                |                          |                          |                          |                          |                          |                           |
| Ebolowa                 | 550            | 3.14 ± 0.50              | 1.65 ± 0.26              | 5.61 ± 2.18              | 2.86 ± 0.92              | 15.6 ± 8.02              | 9.48 ± 4.13               |
| Kye-Ossi                | 437            | 2.87 ± 0.59              | 1.58 ± 0.28              | 5.06 ± 2.67              | 2.40 ± 1.01              | 11.0 ± 9.17              | 7.47 ± 4.77               |
| Sangmelima              | 311            | 3.37 ± 0.83              | 1.68 ± 0.25              | 6.58 ± 2.17              | 2.75 ± 1.06              | 17.0 ± 9.88              | 9.71 ± 3.60               |
| Zoétélé                 | 328            | 3.51 ± 0.48              | 1.72 ± 0.22              | 6.77 ± 1.88              | 3.12 ± 0.85              | 20.7 ± 8.19              | 10.9 ± 4.23               |
| S total                 | 1,626          | 3.18 ± 0.64 <sup>B</sup> | 1.65 ± 0.26 <sup>A</sup> | 5.90 ± 2.35 <sup>B</sup> | 2.74 ± 1.00 <sup>B</sup> | 15.4 ± 9.39 <sup>B</sup> | 9.17 ± 4.42 <sup>B</sup>  |
| <i>Southwest region</i> |                |                          |                          |                          |                          |                          |                           |
| Kumba                   | 454            | 2.98 ± 0.38              | 1.21 ± 0.21              | 6.29 ± 1.65              | 2.69 ± 1.01              | 16.7 ± 7.89              | 13.9 ± 6.32               |
| Lebialem                | 439            | 2.60 ± 0.51              | 1.28 ± 0.27              | 5.41 ± 1.60              | 2.42 ± 1.06              | 12.3 ± 6.73              | 9.02 ± 4.25               |
| Mamfé                   | 405            | 3.07 ± 0.51              | 1.50 ± 0.28              | 6.81 ± 2.33              | 2.34 ± 1.03              | 15.7 ± 7.37              | 11.3 ± 3.81               |
| Tombel                  | 451            | 3.01 ± 0.50              | 1.18 ± 0.22              | 5.86 ± 2.02              | 2.49 ± 1.07              | 14.2 ± 8.14              | 10.3 ± 4.73               |
| SW total                | 1,749          | 2.91 ± 0.51 <sup>C</sup> | 1.28 ± 0.27 <sup>B</sup> | 6.09 ± 1.98 <sup>C</sup> | 2.48 ± 1.05 <sup>B</sup> | 14.7 ± 7.71 <sup>C</sup> | 11.1 ± 5.15 <sup>C</sup>  |
| Total                   | 4,547          | 3.07 ± 0.59              | 1.53 ± 0.33              | 6.01 ± 2.21              | 2.52 ± 1.05              | 14.4 ± 8.56              | 9.49 ± 4.88               |
| Min                     | 142            | 0.90                     | 0.50                     | 2.10                     | 1.00                     | 0.6                      | 0.49                      |
| Max                     | 550            | 5.40                     | 3.6                      | 19.9                     | 5.00                     | 67.0                     | 41.4                      |
| CV%                     |                | 19.2                     | 21.6                     | 36.8                     | 41.7                     | 59.7                     | 51.4                      |

\*CV= coefficient of variation

**Table S2.** Quantitative description of *G. kola* fruits. Values are expressed as means with standard deviation. Means followed by the same letter within a column are not significantly different at  $p > 0.05$  (Tukey HSD test).

|                         | No. of samples | Fruit diameter (cm)      | Fruit length (cm)        | Fruit weight (g)        |
|-------------------------|----------------|--------------------------|--------------------------|-------------------------|
| <i>Central region</i>   |                |                          |                          |                         |
| Akok                    | 193            | 6.81 ± 0.86              | 6.79 ± 1.10              | 153 ± 62.7              |
| Lekie-Assi              | 43             | 7.24 ± 1.02              | 7.71 ± 1.21              | 204 ± 61.6              |
| Bot-Makak               | 40             | 7.18 ± 0.90              | 7.46 ± 1.25              | 196 ± 77.3              |
| Nkenglikok              | 110            | 7.31 ± 1.20              | 6.98 ± 1.25              | 190 ± 93.2              |
| C total                 | 409            | 7.02 ± 1.05 <sup>A</sup> | 7.01 ± 1.20 <sup>A</sup> | 173 ± 78.3 <sup>A</sup> |
| <i>South region</i>     |                |                          |                          |                         |
| Ebolowa                 | 191            | 6.85 ± 1.03              | 9.98 ± 2.08              | 173 ± 71.9              |
| Kye-Ossi                | 179            | 6.48 ± 0.78              | 10.2 ± 1.49              | 144 ± 52.8              |
| Sangmelima              | 113            | 6.86 ± 1.32              | 10.7 ± 2.21              | 181 ± 98.7              |
| Zoételé                 | 105            | 7.25 ± 0.94              | 11.4 ± 1.68              | 197 ± 73.4              |
| S total                 | 588            | 6.81 ± 1.04 <sup>B</sup> | 10.4 ± 1.94 <sup>B</sup> | 170 ± 75.7 <sup>A</sup> |
| <i>Southwest region</i> |                |                          |                          |                         |
| Kumba                   | 167            | 6.69 ± 0.83              | 6.13 ± 1.06              | 127 ± 45.4              |
| Lebialem                | 182            | 6.91 ± 0.77              | 6.07 ± 0.97              | 138 ± 46.0              |
| Mamfé                   | 173            | 6.85 ± 0.77              | 6.45 ± 1.12              | 141 ± 50.0              |
| Tombel                  | 181            | 6.78 ± 1.05              | 6.84 ± 1.26              | 147 ± 65.6              |
| SW total                | 703            | 6.81 ± 0.87 <sup>C</sup> | 6.38 ± 1.15 <sup>C</sup> | 138 ± 52.8 <sup>B</sup> |
| Total                   | 1,700          | 6.86 ± 0.98              | 7.94 ± 2.37              | 157 ± 69.7              |
| Min                     | 40             | 4.33                     | 3.7                      | 50.3                    |
| Max                     | 193            | 10.9                     | 19.2                     | 515.9                   |
| CV%                     |                | 14.3                     | 29.9                     | 44.2                    |

\*CV= coefficient of variation

**Table S3.** Shape description of *G. kola* seeds.

|                       | Central region |      | South region |      | Southwest region |      | Total |      |
|-----------------------|----------------|------|--------------|------|------------------|------|-------|------|
|                       | No.            | %    | No.          | %    | No.              | %    | No.   | %    |
| <i>Shape of seeds</i> |                |      |              |      |                  |      |       |      |
| Ovate                 | 11             | 0.94 | 23           | 1.41 | 22               | 1.26 | 56    | 1.23 |
| Oblong                | 537            | 45.8 | 634          | 39.0 | 422              | 24.1 | 1,593 | 35.0 |
| Oblong-elongated      | 537            | 45.8 | 862          | 53.0 | 1,219            | 69.7 | 2,618 | 57.6 |
| Irregular             | 8              | 0.68 | 4            | 0.25 | 14               | 0.80 | 26    | 0.57 |
| Ellipsoid             | 65             | 5.55 | 87           | 5.35 | 34               | 1.94 | 186   | 4.09 |
| Globose               | 13             | 1.11 | 15           | 0.92 | 36               | 2.06 | 64    | 1.41 |
| Double-seeds          | 1              | 0.09 | 1            | 0.06 | 2                | 0.11 | 4     | 0.09 |

**Table S4.** Shape description of *G. kola* fruits.

|                        | Central region |      | South region |      | Southwest region |      | Total |      |
|------------------------|----------------|------|--------------|------|------------------|------|-------|------|
|                        | No.            | %    | No.          | %    | No.              | %    | No.   | %    |
| <i>Shape of fruits</i> |                |      |              |      |                  |      |       |      |
| Elliptical             | 144            | 39.3 | 175          | 30.2 | 141              | 20.1 | 460   | 28.0 |
| Flattened              | 102            | 27.9 | 91           | 15.7 | 196              | 28.0 | 389   | 23.6 |
| Irregular              | 7              | 1.91 | 4            | 0.69 | 0                | 0    | 11    | 0.67 |
| Kidney-shaped          | 0              | 0    | 10           | 1.73 | 26               | 3.71 | 36    | 2.19 |
| Oblate                 | 11             | 3.01 | 17           | 2.94 | 10               | 1.43 | 38    | 2.31 |
| Rhomboidal             | 18             | 4.92 | 80           | 13.8 | 96               | 13.7 | 194   | 11.8 |
| Spherical              | 84             | 23.0 | 202          | 34.9 | 232              | 33.1 | 518   | 31.5 |

**Table S5.** Quantitative description of *G. kola* trees. Values are expressed as means with standard deviation. Means followed by the same letter within a column are not significantly different at  $p > 0.05$  (Tukey HSD test).

|                         | No. of samples | Tree age                 | Crown diameter (m)       | DBH (cm)                 | Tree height (m)          | Trunk height (m)         |
|-------------------------|----------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| <i>Central region</i>   |                |                          |                          |                          |                          |                          |
| Akok                    | 30             | 55.9 ± 23.1              | 9.06 ± 4.33              | 37.3 ± 14.1              | 16.3 ± 4.95              | 7.40 ± 5.88              |
| Lekie-Assi              | 17             | 48.9 ± 22.4              | 9.34 ± 3.05              | 42.6 ± 15.5              | 13.5 ± 3.18              | 4.64 ± 3.32              |
| Bot-Makak               | 18             | 45.9 ± 16.8              | 7.04 ± 2.90              | 38.8 ± 16.3              | 13.9 ± 4.39              | 5.34 ± 2.97              |
| Nkenglikok              | 16             | 49.5 ± 22.5              | 11.1 ± 2.95              | 40.3 ± 14.0              | 12.8 ± 2.28              | 4.51 ± 2.37              |
| C total                 | 81             | 51.0 ± 21.6 <sup>A</sup> | 9.15 ± 3.68 <sup>A</sup> | 39.3 ± 14.7 <sup>A</sup> | 14.5 ± 4.25 <sup>A</sup> | 5.79 ± 4.40 <sup>A</sup> |
| <i>South region</i>     |                |                          |                          |                          |                          |                          |
| Ebolowa                 | 23             | 29.9 ± 14.4              | 10.4 ± 2.93              | 76.0 ± 40.2              | 13.5 ± 3.75              | 5.71 ± 4.05              |
| Kye-Ossi                | 20             | 23.7 ± 7.15              | 8.31 ± 2.45              | 70.2 ± 19.7              | 11.9 ± 2.64              | 3.45 ± 1.73              |
| Sangmelima              | 12             | 38.0 ± 6.73              | 10.1 ± 3.12              | 98.2 ± 20.2              | 15.4 ± 1.80              | 6.70 ± 2.30              |
| Zoétélé                 | 11             | 51.8 ± 24.7              | 9.42 ± 2.81              | 124 ± 56.7               | 14.8 ± 4.20              | 7.23 ± 3.04              |
| S total                 | 66             | 33.2 ± 16.8 <sup>B</sup> | 9.55 ± 2.88 <sup>B</sup> | 86.3 ± 40.1 <sup>B</sup> | 13.6 ± 3.44 <sup>B</sup> | 5.46 ± 3.29 <sup>B</sup> |
| <i>Southwest region</i> |                |                          |                          |                          |                          |                          |
| Kumba                   | 20             | 23.1 ± 12.1              | 9.77 ± 2.90              | 29.6 ± 11.4              | 12.6 ± 3.49              | 3.24 ± 1.40              |
| Lebialem                | 20             | 29.2 ± 23.2              | 2.79 ± 2.53              | 27.2 ± 14.7              | 14.4 ± 7.69              | 2.88 ± 1.41              |
| Mamfé                   | 20             | 35.4 ± 16.1              | 10.3 ± 2.78              | 42.8 ± 14.6              | 15.9 ± 3.51              | 5.15 ± 3.78              |
| Tombel                  | 20             | 26.5 ± 11.6              | 12.0 ± 2.67              | 36.3 ± 10.8              | 11.8 ± 2.60              | 3.33 ± 0.95              |
| SW total                | 80             | 28.5 ± 16.7 <sup>C</sup> | 10.5 ± 2.82 <sup>C</sup> | 33.9 ± 14.1 <sup>C</sup> | 13.7 ± 4.92 <sup>C</sup> | 3.65 ± 2.32 <sup>C</sup> |
| Total                   | 227            | 37.9 ± 21.0              | 9.73 ± 3.21              | 51.1 ± 33.5              | 13.9 ± 4.30              | 4.94 ± 3.57              |
| Min                     | 11             | 7.00                     | 2.60                     | 11.5                     | 6.30                     | 0.10                     |
| Max                     | 30             | 120                      | 22.6                     | 280                      | 45.0                     | 25.0                     |
| CV%                     |                | 55.5                     | 33.0                     | 65.7                     | 30.9                     | 72.3                     |

\*CV= coefficient of variation

**Table S6.** Quantitative description of *G. kola* leaves. Values are expressed as means with standard deviation. Means followed by the same letter within a column are not significantly different at  $p > 0.05$  (Tukey HSD test).

|                         | No. of samples | Blade length (cm)         | Blade width (cm)         | Petiole length (mm)       | Petiole width (mm)        |
|-------------------------|----------------|---------------------------|--------------------------|---------------------------|---------------------------|
| <i>Central region</i>   |                |                           |                          |                           |                           |
| Akok                    | 105            | 10.6 ± 2.71               | 4.35 ± 1.28              | 12.8 ± 4.61               | 1.99 ± 0.77               |
| Lekie-Assi              | 45             | 10.7 ± 2.57               | 4.34 ± 1.26              | 12.9 ± 3.68               | 2.21 ± 1.05               |
| Bot-Makak               | 55             | 10.2 ± 2.32               | 3.98 ± 1.04              | 11.7 ± 4.06               | 1.99 ± 0.60               |
| Nkenglikok              | 80             | 10.0 ± 3.08               | 4.07 ± 1.53              | 10.7 ± 4.01               | 1.82 ± 0.63               |
| C total                 | 310            | 10.4 ± 2.73 <sup>A</sup>  | 4.18 ± 1.29 <sup>A</sup> | 11.9 ± 4.27 <sup>A</sup>  | 2.00 ± 0.89 <sup>A</sup>  |
| <i>South region</i>     |                |                           |                          |                           |                           |
| Ebolowa                 | 114            | 10.4 ± 2.64               | 4.32 ± 1.14              | 12.1 ± 3.25               | 2.11 ± 0.68               |
| Kye-Ossi                | 100            | 11.2 ± 2.72               | 4.79 ± 1.43              | 13.8 ± 4.01               | 2.04 ± 0.59               |
| Sangmelima              | 60             | 10.0 ± 3.19               | 4.25 ± 1.18              | 11.7 ± 3.99               | 1.91 ± 0.90               |
| Zoétélé                 | 55             | 10.5 ± 2.75               | 4.53 ± 0.95              | 14.0 ± 3.31               | 2.15 ± 0.58               |
| S total                 | 329            | 10.6 ± 2.81 <sup>B</sup>  | 4.48 ± 1.23 <sup>B</sup> | 12.9 ± 3.76 <sup>AB</sup> | 2.06 ± 0.69 <sup>B</sup>  |
| <i>Southwest region</i> |                |                           |                          |                           |                           |
| Kumba                   | 104            | 13.6 ± 3.37               | 5.29 ± 2.01              | 11.9 ± 4.44               | 2.52 ± 0.81               |
| Lebialem                | 99             | 13.6 ± 2.68               | 5.29 ± 1.10              | 11.9 ± 4.22               | 2.71 ± 0.80               |
| Mamfé                   | 99             | 13.0 ± 3.32               | 5.27 ± 1.43              | 12.1 ± 4.43               | 2.41 ± 0.78               |
| Tombel                  | 99             | 11.6 ± 3.30               | 4.52 ± 1.50              | 11.7 ± 4.27               | 2.29 ± 0.84               |
| SW total                | 401            | 12.9 ± 3.28 <sup>AB</sup> | 5.09 ± 1.58 <sup>C</sup> | 11.9 ± 4.33 <sup>B</sup>  | 2.48 ± 0.82 <sup>AB</sup> |
| Total                   | 1,040          | 11.4 ± 3.20               | 4.63 ± 1.44              | 12.2 ± 4.15               | 2.20 ± 0.83               |
| Min                     | 45             | 2.80                      | 1.60                     | 2.00                      | 0.50                      |
| Max                     | 114            | 26.0                      | 17.8                     | 31.0                      | 10.0                      |
| CV%                     |                | 28.0                      | 31.1                     | 34.0                      | 37.7                      |

\*CV= coefficient of variation

**Table S7.** Shape description of *G. kola* trees.

|                                 | Central region |      | South region |      | Southwest region |      | Total |      |
|---------------------------------|----------------|------|--------------|------|------------------|------|-------|------|
|                                 | No.            | %    | No.          | %    | No.              | %    | No.   | %    |
| <i>Crown rating</i>             |                |      |              |      |                  |      |       |      |
| Perfect                         | 6              | 7.41 | 8            | 12.1 | 16               | 20   | 30    | 13.2 |
| Good                            | 42             | 51.8 | 25           | 37.9 | 34               | 42.5 | 101   | 44.5 |
| Tolerable                       | 22             | 27.2 | 17           | 25.8 | 26               | 20.0 | 55    | 24.2 |
| Poor                            | 9              | 11.1 | 15           | 22.7 | 12               | 15.0 | 36    | 15.9 |
| Very poor                       | 2              | 2.47 | 1            | 1.52 | 2                | 2.5  | 5     | 2.20 |
| <i>Crown shape</i>              |                |      |              |      |                  |      |       |      |
| Elliptical                      | 10             | 12.4 | 17           | 25.8 | 7                | 8.8  | 34    | 15.0 |
| Oblong                          | 10             | 12.4 | 7            | 10.6 | 20               | 25.0 | 37    | 16.3 |
| Pyramidal                       | 38             | 46.9 | 33           | 50.0 | 52               | 65.0 | 123   | 54.2 |
| Spherical                       | 23             | 28.4 | 9            | 13.6 | 1                | 1.3  | 33    | 14.5 |
| <i>Condition</i>                |                |      |              |      |                  |      |       |      |
| Healthy, cropping well          | 76             | 93.8 | 41           | 62.1 | 69               | 86.3 | 186   | 82.0 |
| Non-vigorous                    | 5              | 6.17 | 0            | 0    | 11               | 13.9 | 16    | 7.05 |
| Cropping poorly                 | 0              | 0    | 24           | 36.4 | 0                | 0    | 24    | 10.6 |
| Dying                           | 0              | 0    | 1            | 1.52 | 0                | 0    | 1     | 0.44 |
| <i>Branching</i>                |                |      |              |      |                  |      |       |      |
| Erect                           | 5              | 6.2  | 0            | 0    | 0                | 0    | 5     | 2.2  |
| Horizontal                      | 12             | 14.8 | 7            | 10.6 | 22               | 27.5 | 41    | 18.1 |
| Irregular                       | 54             | 66.7 | 58           | 87.9 | 58               | 72.5 | 170   | 74.9 |
| Semi-erect                      | 10             | 12.4 | 1            | 1.5  | 0                | 0    | 11    | 4.8  |
| <i>Trunk shape</i>              |                |      |              |      |                  |      |       |      |
| Forked from bottom              | 18             | 22.2 | 17           | 25.8 | 8                | 10.0 | 43    | 18.9 |
| Forking starts at less than 6 m | 15             | 18.5 | 11           | 16.7 | 14               | 17.5 | 40    | 17.7 |
| Forking starts above 6 m        | 19             | 23.5 | 11           | 16.7 | 21               | 26.3 | 51    | 22.5 |
| Straight stem                   | 26             | 32.1 | 26           | 39.4 | 35               | 43.8 | 87    | 38.4 |
| Twisted stem                    | 3              | 3.70 | 1            | 1.52 | 2                | 2.50 | 6     | 2.5  |

**Table S8.** Shape description of *G. kola* leaves.

|                            | Central region |      | South region |      | Southwest region |      | Total |      |
|----------------------------|----------------|------|--------------|------|------------------|------|-------|------|
|                            | No.            | %    | No.          | %    | No.              | %    | No.   | %    |
| <i>Shape of leaf blade</i> |                |      |              |      |                  |      |       |      |
| Elliptical                 | 78             | 25.2 | 111          | 33.7 | 35               | 8.7  | 224   | 21.5 |
| Irregular                  | 21             | 6.8  | 8            | 2.4  | 0                | 0    | 29    | 2.79 |
| Lanceolate                 | 55             | 17.7 | 38           | 11.6 | 55               | 13.7 | 148   | 14.2 |
| Oblong                     | 135            | 43.6 | 145          | 44.1 | 293              | 73.1 | 573   | 55.1 |
| Obovate                    | 9              | 2.90 | 14           | 4.26 | 4                | 1.00 | 27    | 2.60 |
| Triangular                 | 12             | 3.87 | 13           | 3.95 | 14               | 3.49 | 39    | 3.75 |

**Table S9.** Regression model table with full scores showing the top ten “elite” trees selected based on their fruit seed mass (70%), tree height (20%) and crown diameter (10%) parameters.

| Tree merge | Tree height (m) | Crown diameter (m) | Fruit seed mass (g) | Tree height (m) score | Crown diameter (m) score | Fruit seed mass (g) score | Tree score |
|------------|-----------------|--------------------|---------------------|-----------------------|--------------------------|---------------------------|------------|
| SEGD8      | 17.5            | 9.80               | 31.04               | 75.0                  | 35.35                    | 100.00                    | 84.14      |
| SZCV1      | 10.6            | 12.90              | 26.61               | 90.0                  | 51.01                    | 87.59                     | 79.41      |
| SSCF1      | 13.1            | 11.00              | 28.39               | 90.0                  | 41.41                    | 90.41                     | 79.28      |
| SZGF1      | 12.2            | 8.80               | 28.42               | 90.0                  | 30.30                    | 90.53                     | 76.84      |
| SWTSM1     | 10.0            | 13.82              | 26.02               | 100.0                 | 55.65                    | 81.84                     | 76.77      |
| CLME3      | 15.0            | 12.80              | 26.30               | 90.0                  | 50.50                    | 82.85                     | 75.86      |
| SWKMG1     | 17.0            | 13.48              | 25.22               | 75.0                  | 53.93                    | 78.94                     | 73.08      |
| SSPP2      | 14.9            | 9.00               | 26.46               | 90.0                  | 31.31                    | 83.43                     | 71.92      |
| SSPP1      | 12.3            | 6.80               | 27.06               | 90.0                  | 20.20                    | 85.60                     | 70.97      |
| SKOG3      | 8.90            | 7.00               | 26.73               | 100.0                 | 21.21                    | 84.42                     | 70.83      |