

## 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
Lebiale	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
Zoétélé	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
Lebiale	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.

<i>Shape of seeds</i>	Central region		South region		Southwest region		Total	
	No.	%	No.	%	No.	%	No.	%
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.

<i>Shape of fruits</i>	Central region		South region		Southwest region		Total	
	No.	%	No.	%	No.	%	No.	%
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