Supplementary table 1 List of 58 coffee (*Coffea arabica* L.) accessions used in the study collected from Amaro kelo woreda of Segen zone in 2013 with their respective specific collection Kebeles (PAs), and localities

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Acc.No | Kebele (PA) | Locality | Alt (masl) | Acc.No | Kebele (PA)  | Locality | Alt (masl) |
| Ak-1 | Kereda | Hurbo | 1380 | Ak-30 | Danobulto | Shashe | 1500 |
| Ak-2 | Kereda | Hurbo | 1380 | Ak-31 | Kele kebele | Tsele | 1900 |
| Ak-3 | Kereda | Hurbo | 1380 | Ak-32 | Kele kebele | Tsele | 1900 |
| Ak-4 | Kereda | Hurbo | 1380 | Ak-33 | Kabo | Tsele | 2000 |
| Ak-5 | Kereda | Hurbo | 1380 | Ak-34 | Kabo | Tsele | 2000 |
| Ak-6 | Kereda | Hurbo | 1380 | Ak-35 | Kele | Tsele | 1900 |
| Ak-7 | Golbe | Gudeda | 1880 | Ak-36 | Kele town | Kele-01 | 1600 |
| Ak-8 | Golbe | Golbe | 1880 | Ak-37 | Kele town | Kele-02 | 1600 |
| Ak-9 | Golbe | Golbe | 1880 | Ak-38 | Kele town | Kele-03 | 1600 |
| Ak-10 | Golbe | Golbe | 1880 | Ak-39 | Kele town | Kele-04 | 1600 |
| Ak-11 | Golbe | Golbe | 1880 | Ak-40 | Sharo | Angushi sharo | 1600 |
| Ak-12 | Golbe | Golbe | 1880 | Ak-41 | Sharo | Angushi sharo | 1600 |
| Ak-13 | Golbe | Gudeda | 1880 | Ak-42 | Sharo | Angushi sharo | 1600 |
| Ak-14 | Kerma | Dogodo-1 | 1660 | Ak-43 | Sharo | Angushi sharo | 1600 |
| Ak-15 | Kerma | Dogodo-1 | 1660 | Ak-44 | Sharo | Angushi sharo | 1600 |
| Ak-16 | Kerma | Dogodo-2 | 1660 | Ak-45 | Sharo | Angushi sharo | 1650 |
| Ak-17 | Kerma | Dogodo-3 | 1660 | Ak-46 | Sharo | Angushi sharo | 1650 |
| Ak-18 | Kerma | Dogodo-4 | 1660 | Ak 47 | Darba | Mane na | 1700 |
| Ak-19 | Kerma | Dogodo-5 | 1580 | Ak 48 | Darba | Sibale | 1670 |
| Ak-20 | Kerma | Dogodo-6 | 1580 | Ak 49 | Darba | Sibale | 1670 |
| Ak-21 | Kerma | Merere-1 | 1580 | Ak 50 | Darba | Mane na | 1690 |
| Ak-22 | Kerma | Merere-1 | 1580 | Ak 51 | Darba | Mane na | 1590 |
| Ak-23 | Danobulto | Shashe | 1500 | Ak 52 | Tifata | Tsilalo omo | 1680 |
| Ak-24 | Danobulto | Shashe | 1500 | Ak 53 | Tifata | Tsilalo omo | 1680 |
| Ak-25 | Danobulto | Shashe | 1500 | Ak 54 | Tifata | Kepe | 1650 |
| Ak-26 | Danobulto | Shashe | 1600 | Ak 55 | Tifata | Kepe  | 1650 |
| Ak-27 | Danobulto | Shashe | 1600 | Ak 56 | Tifata | Afa Tsilalo | 1700 |
| Ak-28 | Danobulto | Shashe | 1600 | Ak 57 | Tifata | Abetu kotsare | 1700 |
| Ak-29 | Danobulto | Shashe | 1500 | Ak 58 | Gumute | Boyo | 1600 |

Supplementary table 2 Data collected on 17 quantitative and 10 qualitative traits on four sample trees of four-year-old tree per row on each plot

|  |  |  |
| --- | --- | --- |
| **Quantitative traits**  | **Abbreviation**  | **Description of traits s**  |
| Coffee bean yield (kg/ha) | YLD | Weight of fresh cherries in gram per plot were recorded, and converted into red cherries of coffee in gram per tree (mean of four trees). Coffee bean yield (quintal/ha) = fresh cherries in gram per tree x 0.00417. Coffee bean yield (kg/ha) was calculated as (clean coffee bean (quintal/ha) x 100).  |
| Plant height (cm) | PH | The length from the ground level to the tip of the tree per four trees was measured using tape meter. |
| Height up to first primary branch (cm) | HUFPB | Height from the ground up to first primary branch was measured, using tape meter |
| Main stem diameter (mm) | SD | Measured as a diameter of the main stem at five cm above the ground using caliper  |
| Canopy diameter (cm) | CD | was estimated as average length of tree canopy in east-west and north-south direction, using tape meter  |
| Average Inter-node length on orthotropic branch (cm) | AINL | Computed per tree as (TH–HFPB)/TNN-1, where TH = total plant height, HFPB =height up to first primary branch, TNN = total number of main stem nodes  |
| Number of bearing primary branches (no) | NBPB | Numbers of bearing primary branches were counted per trees |
| Number of primary branches (no) | NPB | Total numbers of primary branches were counted per trees. |
| Length of longest primary branch (cm) | LLPB | The lengths of longest selected first primary branches were measured using tape meter. |
| 100 Bean weight (g) | HBW | Calculated as (bean weight at 0% moisture content x 100/ (bean No x 0.89) |
| Bean length (mm) | BL | Average of five normal beans measured at the longest part. |
| Bean width (mm) | BW | Average of five normal beans measured at the widest part |
| Bean thickness (mm) | BT | Average of five normal beans measured at the thickest part.  |
| Fruit length (mm) | FL | Average of five normal and mature green fruits measured at the longest part, using digital caliper |
| Fruit width (mm) | FW | Average of five normal and mature green fruits measured at the widest part using digital caliper. |
| Leaf width (cm) | LW | Average of five normal (node 3 from the terminal bud) leaves measured at the widest part |
| Leaf area (cm2) | LS | Calculated by multiplying leaf length and width by a constant 0.67 |
| **Qualitative traits** | **Description of the traits** |
| Growth habit  | The growth habit of the studied germplasm classified as: open, intermediate, and compact  |
| Stem habit  | classified into stiff and flexible stem habit  |
| Branching habit  | 1. grouped the accessions into with very few branches (primary) and many branches (primary) with few secondary branches
 |
| Angle of insertion on main stem | 1. The germplasm was categorized into horizontal spreading and semi-erect based on this trait
 |
| Young leaf tip color | Used to group the accessions with light green, green, bronze, light bronze and reddish bronze tip color |
| Leaf shape | Used to classify the Amaro coffee accessions into with ovate and lanceolate leaf shape |
| Leaf apex shape | Used to group the accessions into acuminate and apiculate leaf apex shape |
| Stipule shape | Used to classify the germplasm into ovate, triangular and deltate stipule shaped |
| Fruit shape | Classified the accessions into round, obovate, elliptic and oblong fruit shaped |
| Overall appearance | classified the accessions as elongated conical, pyramidal and bushy in overall growth habit |

Supplementary table 3 Inter cluster genetic divergence (D2) based on ten qualitative traits

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Cluster | I | II | III | IV | V | VI |
| I |  | 59.71\*\* | 106.45\*\* | 60.96\*\* | 59.34\*\* | 188.70\*\* |
| II |  |  | 158.24\*\* | 122.24\*\* | 21.79\*\* | 254.80\*\* |
| III |  |  |  | 99.27\*\* | 162.25\*\* | 72.85\*\* |
| IV |  |  |  |  | 68.67\*\* | 80.90\*\* |
| V |  |  |  |  |  | 212.05\*\* |
| VI |  |  |  |  |  |  |

\*\*=Highly significant, (p<0.01) χ2=21.67, (p<0.05) χ2=16.92