**Table S1** List of *Dioscorea dumetorum* accessions studied

|  |  |  |  |
| --- | --- | --- | --- |
| **N** | **ACCESSIONS** | **COUNTRY** | **SEX** |
| 1 | TDd 3829 | Benin  | M |
| 2 | TDd 3908 | Benin  | M |
| 3 | TDd 3848 | Benin  | M |
| 4 | TDd 3717 | Congo | M |
| 5 | TDd 3114 | Gabon  | M |
| 6 | TDd 3109 | Ghana  | F |
| 7 | TDd 3101 | Ghana  | F |
| 8 | TDd 3112 | Nigeria  | F |
| 9 | TDd 3687 | Nigeria  | F |
| 10 | TDd 08-38-79 | Nigeria  | F |
| 11 | TDd 08-14-55 | Nigeria  | F |
| 12 | TDd 08-13-1 | Nigeria  | F |
| 13 | TDd 08-38-57 | Nigeria  | F |
| 14 | TDd 3098 | Nigeria  | M |
| 15 | TDd 3790 | Nigeria  | M |
| 16 | TDd 3909 | Nigeria  | M |
| 17 | TDd 04-146 | Nigeria  | M |
| 18 | TDd 08-42 | Nigeria  | M |
| 19 | TDd 3947 | Nigeria  | M |
| 20 | TDd 08-14-25 | Nigeria  | M |
| 21 | TDd 08-37-9 | Nigeria  | M |
| 22 | TDd 08-36-15 | Nigeria  | M |
| 23 | TDd 08-38-14 | Nigeria  | M |
| 24 | TDd 3779 | Nigeria  | M |
| 25 | TDd 3093 | Togo  | F |
| 26 | TDd 3102 | Togo  | F |
| 27 | TDd 05-23 | Togo  | F |
| 28 | TDd 05-24 | Togo  | F |
| 29 | TDd 05-27 | Togo  | F |
| 30 | TDd 3104 | Togo  | F |
| 31 | TDd 4088 | Togo  | F |
| 32 | TDd 3095 | Togo  | M |
| 33 | TDd 3106 | Togo  | M |
| 34 | TDd 3110 | Togo  | M |
| 35 | TDd 4118 | Togo  | M |
| 36 | TDd 05-2 | Togo  | M |
| 37 | TDd 05-3 | Togo  | M |
| 38 | TDd 05-5 | Togo  | M |
| 39 | TDd 05-6 | Togo  | M |
| 40 | TDd 05-8 | Togo  | M |
| 41 | TDd 05-9 | Togo  | M |
| 42 | TDd 05-10 | Togo  | M |
| 43 | TDd 05-12 | Togo  | M |
| 44 | TDd 05-16 | Togo  | M |
| 45 | TDd 05-17 | Togo  | M |
| 46 | TDd 05-20 | Togo  | M |
| 47 | TDd 05-25 | Togo  | M |
| 48 | TDd 05-26 | Togo  | M |
| 49 | TDd 05-07 | Togo  | M |
| 50 | TDd 3097 | Togo  | M |
| 51 | TDd 3100 | Togo  | M |
| 52 | TDd 3107 | Togo  | M |
| 53 | TDd 3111 | Togo  | M |

M: Male; F: Female

**Table S2**: List of qualitatively and quantitative scored traits assessed during growth and after harvest of *D. dumetorum* during 2010 yam growing season at IITA, Ibadan, Nigeria.

|  |  |  |
| --- | --- | --- |
| N | Character | State |
| 1. | Presence/ Absence of Spines on leaf | Absent=0; Present=1 |
| 2. | Presence Spines on stem | Absent=0; Present=1 |
| 3. | Twining direction | Anticlockwise=1; Clockwise=2 |
| 4. | Distance between lobes | No measurable distance=1; Intermediate=5 |
| 5. | Leaf arrangement | Trifoliate (3)=1; Quinate (5)=2, More than (5)=3 |
| 6. | Leaf colour | Light green=0; Green=1; Deep green=2 |
| 7. | Leaf shape | Ovate=6; Cordate=7 |
| 8. | Leaf Apex shape | Obtuse=1; Acute=2 |
| 9. | Number of veins per leaf | 5, 6, 7, 8 |
| 10. | Hairiness of upper surface | Sparse=3; Dense=7 |
| 11. | Hairiness of lower surface | Sparse=3; Dense=7 |
| 12. | Sex | Male=1; Female=2; Monoecious=3; None=4 |
| 13. | Days to shoot emergence (i.e plant accessed at 45 days and at 90 days) | Low=3; Medium=5; High=7 |
| 14. | Undulation of leaf margin | Few=3; Many=7 |
|  |  |  |
| 15. | Adult stem colour | Light green=1; Green=5; Deep green=6 |
| 16. | Tuber shape | Round=1; Oval=2; Oval-Oblong=3; Cylindrical=4; Flattened=5 |
| 17. | Tuber skin colour | White=1; Yellow=2; Creamy=3; 4=Light yellow |
| 18. | Inflorescence type | Raceme=2; Panicle=3 |

**Table S3** Thin-layer chromatography of tuber extracts of 15 selected *Dioscorea dumetorum* clones

|  |  |
| --- | --- |
| Accessions | Class of metabolites and Rf values |
| Saponins | Alkaloids | Flavonoids |
| 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| TDd 05-17 | 0.61 | - | - | 0.40 | 0.61 | - | 0.52 | 0.60 | 0.68 |
| TDd 05-25 | 0.68 | 0.64 | - | 0.44 | 0.57 | - | 0.50 | 0.62 | 0.68 |
| TDd 3097 | 0.59 | 0.74 | - | 0.41 | 0.56 | 0.65 | 0.50 | 0.60 | - |
| TDd 3102 | 0.63 | 0.69 | - | 0.42 | 0.45 | 0.52 | 0.42 | 0.52 | - |
| TDd 3112 | 0.67 | 0.66 | - | 0.41 | 0.53 | 0.66 | 0.67 | - | - |
| TDd 3790 | 0.64 | - | - | 0.38 | 0.41 | 0.55 | 0.69 | - | - |
| TDd 3848 | 0.69 | 0.60 | - | 0.58 | - | - | 0.65 | - | - |
| TDd 3947 | 0.67 | 0.69 | - | 0.39 | 0.43 | 0.58 | 0.40 | 0.50 |  |
| TDd 4088 | 0.58 | - | - | 0.42 | 0.43 | 0.57 | 0.40 | 0.50 | 0.68 |
| TDd 4118 | 0.57 | 0.46 | - | 0.34 | 0.39 | 0.46 | 0.57 | - | - |
| TDd 08-13-1 | 0.69 | 0.62 | - | 0.41 | 0.44 | 0.56 | 0.40 | 0.50 | 0.52 |
| TDd 08-36-15 | 0.68 | - | - | 0.33 | 0.40 | 0.53 | 0.57 | 0.67 | - |
| TDd 08-38-57 | 0.64 | - | - | 0.42 | 0.56 | 0.61 | 0.50 | 0.62 | - |
| TDd 08-38-79 | 0.62 | 0.71 | - | 0.45 | 0.58 | 0.66 | 0.50 | 0.70 | - |
| TDd 08-42 | 0.69 | 0.44 | 0.71 | 0.41 | 0.44 | 0.51 | 0.44 | 0.52 | - |

Saponins: solvent system = chloroform: glacial acetic acid: methanol: water (8.5:4.25:1:0.5), spraying reagent = Iodine vapour; Alkaloids: solvent system = Chloroform: methanol (15:1), spraying reagent = Dragendorff reagent; Flavonoids: solvent System = n-butanol: glacial acetic acid: water (2: 0.5: 1.5), spraying reagent: Anisaldehyde in sulphuric acid. 1, 2, 3: Spots of sample extract on pre-coated plates.

**Table S4** Agglomerative Hierarchical Clustering Ward (minimum variance within group) method for 53 *D. dumentorum* clones using results obtained from the ploidy level, morphological traits and qualitative phytochemical analyses

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| NCL |  Cluster Joined | RSQ | PSF | PST2 |
| 10 | CL11 | CL22 | 0.628 | 8 | 2.7 |
| 9 | CL15 | CL20 | 0.601 | 8.3 | 3.7 |
| 8 | CL17 | CL19 | 0.569 | 8.5 | 4 |
| 7 | CL14 | CL9 | 0.536 | 8.9 | 4.8 |
| **6** | **CL13** | **CL23** | 0.5 | 9.4 | **2.3** |
| 5 | CL8 | CL10 | 0.453 | 9.9 | 4.1 |
| 4 | CL25 | CL5 | 0.391 | 10.5 | 4.5 |
| 3 | CL4 | CL12 | 0.323 | 11.9 | 4.1 |
| 2 | CL7 | CL6 | 0.185 | 11.6 | 14.2 |
| 1 | CL2 | CL3 | 0 | . | 11.6 |

RSQ- R Square measure of the proportion of total variance within groups; PSF- Pseudo F; PST2- Pseudo t2.

**Table S5** Association based on Likelihood Ratio Chi-Square test and Cr. V= Crammer’s V value among variables

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Variables | VR4 | VR6 | VR7 | VR9 | VR12 | VR15 |
| VR5 | 0.17 | -0.08 | -0.24 | -0.06 | -0.08 | 0.39 \*\* |
| VR7 | -018 | 0.45 \*\* | 1 | 0.01 | 0.08 | 0.27 |
| VR8 | 0.06 | 0.04 | -0.35 \* | 0.11 | -0.11 | 0.28 |
| VR9 | 0.33 \* | 0.12 | 0.01 | 1 | -0.33 | 0.22 |
| VR10 | -0.54 \*\* | 0.07 | 0.09 | -0.29 \* | 0.13 | 0.22 |
| VR12 | -0.35 \*\* | -0.03 | 0.08 | -0.33 \* | 1 | 0.24 |
| VR16 | 0.32 | 0.26 | 0.21 | 0.15 | 0.31 \* | 0.25 |
| VR21 | 0.27 | 0.12 | 0.12 | -0.12 | 0.71 \*\* | 0.16 |
| VR22 | -0.06 | -0.19 | 0.02 | -0.12 | 0.05 | 0.48 \* |
| VR23 | 0.19 | 0.02 | -0.30 | 0.12 | -0.04 | 0.22 |
| VR24 | 0.19 | 0.02 | -0.30 | 0.12 | -0.04 | 0.22 |

\*: significant at P<= 0.05; \*\* significant at P<= 0.001. VR4= Presence of spine, VR5= Twining direction, VR6= Leaf arrangement, VR7= Leaf shape, VR8= Distance between lobes, VR9= Inflorescence type, VR10= Spineness of root, VR12= Ploidy, VR15= No of veins, VR16= Terpenoids, VR21= Tuber bark colour, VR22= Undulation of leaf margin, VR23= Hairiness of upper leaf surface, VR24= Hairiness of lower leaf surface