Table S1. Characteristics of nuts were measured in the walnut genotypes.

|  |  |  |  |
| --- | --- | --- | --- |
| Measurement method | Unit | Abbreviation | Characteristics |
| Caliper | mm | NuLe | Nut Length |
| Caliper | mm | NuWi | Nut Width |
| Caliper | mm | NuTh | Nut Thickness |
| Scale | g | NuWe | Nut weight |
| Caliper | mm | KeLe | Kernel Length |
| Caliper | mm | KeWi | Kernel Width |
| Caliper | mm | KeTh | Kernel Thickness |
| Scale | g | KeWe | Kernel weight |
| (Kernel weight per nut weight) ×100 | % | KePe | Kernel Percentage |
| Caliper | mm | SheTh | Shell Thickness |
| Scale | g | SheWe | Shell weight |
| Caliper | mm | ThMi | Packing tissue thickness |
| Caliper | mm | LeMi | Packing tissue length |
| Scale | g | WeMi | Packing tissue weight |

Table S2. Analysis of molecular variance (AMOVA) using 45 accessions from 4 regions using 16 SCOT markers.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Source of variation | Degrees of freedom | Sum of squares | Variance components | Percentage variation | P value |
| Among groups | 3 | 187.57 | 62.52 | 16 | <0.01 |
| Among individuals within groups | 41 | 894.38 | 21.81 | 84 | <0.01 |
| Total | 44 | 1081.95 | 84.33 | 100 |  |

Table S3. Means comparison of quantitative traits of 45 studied walnut genotypes based on cluster analysis.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Trait | Significant levels | Group 1 | Group 2 | Group 3 |
| Nut Length one year | \*\* | b 34.36 | b 35.5 | a 38.74 |
| Nut Length second year | \*\* | 36.14 b | b 37.25 | a 40.13 |
| Nut Width one year | \*\* | 31.22 b | a 34.26 | a 33.62 |
| Nut Width second year | \*\* | 31.34 b | 34.59 a | 33.66 a |
| Nut Thickness one year | \*\* | 30.70 b | 35.25 a | 34.08 a |
| Nut Thickness second year | \*\* | c 31.23 | a 35.61 | b 34.20 |
| Nut weight one year | \*\* | b 10.77 | a 12.75 | a 13.49 |
| Nut weight second year | \*\* | b 10.19 | a 12.04 | a 12.89 |
| Kernel Length one year | \*\* | b 26.81 | a 28.64 | a 29.65 |
| Kernel Length second year | \*\* | b 27.38 | ab 28.83 | a 29.99 |
| Kernel Width one year | \*\* | c 25.85 | 30.46 a | b 28.26 |
| Kernel Width second year | \*\* | c 25.29 | a 29.33 | b 27.19 |
| Kernel Thickness one year | \* | b 10.18 | a 10.62 | ab 10.53 |
| Kernel Thickness second year | \*\* | b 9.57 | a 10.42 | b 9.70 |
| Kernel weight one year | \*\* | c 5.25 | a 7.51 | b 6.13 |
| Kernel weight second year | \*\* | c 4.29 | a 5.97 | b 5.27 |
| Kernel percentage one year | \*\* | b 48.74 | a 55.87 | b 45.09 |
| Kernel percentage second year | \*\* | b 42.02 | a 49.65 | b 40.93 |
| Shell Thickness one year | \*\* | b 1.76 | b 1.51 | 2.19a |
| Shell Thickness second year | \*\* | b 1.87 | b 1.61 | a 2.22 |
| Shell weight one year | \*\* | b 5.05 | b 5.02 | a 6.55 |
| Shell weight second year | \*\* | b 5.20 | b 5.39 | a 6.70 |
| packing tissue thickness one year | \* | b 2.33 | a 2.82 | a 2.84 |
| packing tissue thickness second year | \* | b 2.80 | ab 3.28 | a 3.37 |
| packing tissue length one year | \*\* | b 23.18 | a 25.58 | a 26.74 |
| packing tissue length second year | \*\* | 25.08 b | a 26.95 | a 28.24 |
| packing tissue Weight one year | \*\* | b 0.25 | a 0.33 | a 0.36 |
| packing tissue Weight second year | \*\* | b 0.29 | 0.33 a | a 0.44 |

\*, \*\* According to the significance level in the probability level 5% and 1%.