**Table S1.** In-shell fruit physical traits according with nut caliber.

| Caliber (mm) | Lenght (mm) | Width (mm) | Thickness (mm) | Roundness index | Thickness of the Shell (mm) | Shell Moisture (%) | Kernel Yield (%) |
|---|---|---|---|---|---|---|---|
| **12.5–14** | 15.3 ± 1.2 | 12.1 ± 1.4 | 10.5 ± 1.1 | 1.37 ± 0.06 | 0.89 ± 0.06 | 14.3 ± 0.5 | 48.8 ± 0.6 |
| **14–14.5** | 15.7 ± 1.4 | 12.9 ± 1.3 | 11.2 ± 1.0 | 1.32 ± 0.03 | 0.89 ± 0.06 | 13.9 ± 0.4 | 48.2 ± 0.3 |
| **14.5–15** | 15.6 ± 1.7 | 13.0 ± 1.7 | 11.4 ± 1.3 | 1.29 ± 0.02 | 0.98 ± 0.16 | 14.0 ± 0.5 | 48.1 ± 0.3 |
| **15–15.5** | 16.0 ± 1.7 | 13.6 ± 1.7 | 11.7 ± 1.4 | 1.28 ± 0.03 | 1.05 ± 0.15 | 14.2 ± 0.1 | 47.9 ± 0.4 |
| **15.5–16** | 16.6 ± 1.8 | 14.1 ± 1.6 | 12.3 ± 1.2 | 1.26 ± 0.02 | 1.04 ± 0.14 | 14.2 ± 0.4 | 47.8 ± 0.6 |
| **16-17** | 16.9 ± 1.9 | 14.7 ± 1.8 | 12.6 ± 1.2 | 1.24 ± 0.01 | 1.05 ± 0.10 | 14.5 ± 0.3 | 47.6 ± 0.7 |
| **Over 17** | 16.5 ± 2.7 | 15.1 ± 2.7 | 13.0 ± 2.0 | 1.18 ± 0.01 | 1.10 ± 0.01 | 14.3 ± 0.3 | 45.9 ± 0.9 |

**Table S2.** In-shell fruit physical traits according with hazelnut cultivar.

| Cultivar | Lenght (mm) | Width (mm) | Thickness (mm) | Roundness index | Thickness of the Shell (mm) | Shell Moisture (%) | Kernel Yield (%) |
|---|---|---|---|---|---|---|---|
| **Negret** | 15.3 ± 0.7 | 12.9 ± 0.7 | 11.3 ± 0.6 | 1.28 ± 0.02 | 1.05 ± 0.05 | 13.9 ± 0.2 | 46.9 ± 0.3 |
| **Pauetet** | 18.4 ± 0.5 | 15.9 ± 0.7 | 13.5 ± 0.5 | 1.26 ± 0.02 | 0.90 ± 0.03 | 14.7 ± 0.2 | 48.6 ± 0.2 |

**Table S3.** Kernel characteristics according with caliber.

| | **Kernel Caliber (mm)** | | | | | |
|---|---|---|---|---|---|---|
| | **Below 9** | **9–10** | **10–11** | **11–12** | **12–13** | **Over 13** |
| | **Kernel dimensions** | | | | | |
| **Length (mm)** | 11.6 ± 0.3 | 12.4 ± 0.3 | 12.5 ± 0.3 | 13.3 ± 0.2 | 13.6 ± 0.2 | 14.1 ± 0.1 |
| **Width (mm)** | 7.9 ± 0.1 | 8.9 ± 0.1 | 9.8 ± 0.2 | 10.8 ± 0.2 | 112.0 ± 0.1 | 12.8 ± 0.1 |
| **Thickness (mm)** | 7.5 ± 0.1 | 8.3 ± 0.1 | 8.9 ± 0.1 | 9.9 ± 0.3 | 10.8 ± 0.1 | 11.3 ± 0.2 |
| **Roundness index** | 1.50 ± 0.03 | 1.44 ± 0.03 | 1.34 ± 0.03 | 1.30 ± 0.03 | 1.19 ± 0.02 | 1.17 ± 0.01 |
| | **Kernel skin color** | | | | | |
| **L*** | 26.0 ± 1.2 | 25.7 ± 2.2 | 26.3 ± 1.3 | 25.4 ± 2.0 | 25.7 ± 1.8 | 25.7 ± 2.1 |
| ***a**** | 7.9 ± 0.3 | 7.3 ± 0.5 | 7.8 ± 0.1 | 7.5 ± 0.5 | 7.9 ± 0.4 | 7.9 ± 0.6 |
| ***b**** | 13.1 ± 0.8 | 12.5 ± 1.4 | 12.7 ± 0.7 | 11.9 ± 1.1 | 12.0 ± 0.9 | 12.0 ± 1.2 |
| **Chroma** | 15.3 ± 0.8 | 14.5 ± 1.4 | 14.9 ± 0.7 | 14.1 ± 1.2 | 14.4 ± 0.9 | 14.4 ± 1.3 |
| **Hue (degrees)** | 58.9 ± 1.2 | 59.3 ± 1.2 | 58.1 ± 1.4 | 57.6 ± 0.9 | 56.5 ± 0.8 | 56.6 ± 0.6 |
| | **Roasting and Blanching aptitude** | | | | | |
| **R1 (%)** | 42.0 ± 2.0 | 54.0 ± 2.0 | 65.5 ± 6.9 | 65.3 ± 4.5 | 66.5 ± 7.3 | 66.5 ± 6.0 |
| **R2 (%)** | 92.5 ± 0.1 | 90.5 ± 3.3 | 95.3 ± 2.6 | 93.0 ± 3.0 | 92.8 ± 2.8 | 92.3 ± 3.5 |
| **B1 (%)** | 12.0 ± 2.0 | 24.5 ± 3.5 | 26.8 ± 3.9 | 34.8 ± 10.1 | 36.8 ± 9.7 | 43.8 ± 11.3 |
| **B2 (%)** | 59.0 ± 0.1 | 52.3 ± 12.0 | 51.5 ± 11.7 | 68.5 ± 15.2 | 70.8 ± 9.1 | 72.8 ± 12.5 |
| | **Chemical characteristics** | | | | | |
| **Acidity (% oleic acid)** | 0.32 ± 0.02 | 0.23 ± 0.04 | 0.27 ± 0.08 | 0.22 ± 0.06 | 0.21 ± 0.01 | 0.23 ± 0.03 |
| **Water activity** | 0.632 ± 0.012 | 0.658 ± 0.015 | 0.660 ± 0.009 | 0.656 ± 0.014 | 0.639 ± 0.016 | 0.637 ± 0.010 |
| **Moisture (%)** | 5.2 ± 0.1 | 5.3 ± 0.1 | 5.0 ± 0.1 | 4.8 ± 0.2 | 4.4 ± 0.3 | 4.6 ± 0.2 |
| **Fat (%)** | 58.1 ± 2.7 | 61.9 ± 1.9 | 63.1 ± 0.2 | 63.3 ± 0.3 | 63.8 ± 0.3 | 64.0 ± 0.1 |
| **Protein (%)** | NA | 16.0 ± 0.3 | 16.1 ± 0.5 | 15.5 ± 0.3 | 15.1 ± 0.1 | 15.3 ± 0.2 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Crude fiber (%)** | NA | 11.9 ± 1.3 | 10.6 ± 0.4 | 12.0 ± 0.5 | 12.2 ± 0.8 | 11.7 ± 0.3 |
| **Total sugars (%)** | NA | 3.3 ± 0.3 | 3.2 ± 0.2 | 2.6 ± 0.2 | 2.6 ± 0.2 | 2.3 ± 0.3 |
| **Minerals (%)** | NA | 2.1 ± 0.1 | 2.0 ± 0.1 | 2.1 ± 0.1 | 1.9 ± 0.1 | 2.2 ± 0.1 |
| **Palmitic acid (C16:0 %)** | 5.7 ± 0.1 | 5.7 ± 0.1 | 5.7 ± 0.1 | 5.8 ± 0.1 | 5.8 ± 0.1 | 5.8 ± 0.1 |
| **Oleic acid (C18:1 %)** | 69.9 ± 1.2 | 72.6 ± 1.2 | 75.4 ± 0.9 | 77.8 ± 0.7 | 80.4 ± 0.8 | 82.1 ± 0.6 |
| **Linoleic acid (C18:2 %)** | 22.1 ± 1.3 | 19.4 ± 1.4 | 16.6 ± 1.0 | 13.9 ± 0.8 | 11.2 ± 0.9 | 9.4 ± 0.7 |
| **Linolenic acid (C18:3 %)** | 0.120 ± 0.001 | 0.103 ± 0.003 | 0.093 ± 0.003 | 0.083 ± 0.002 | 0.078 ± 0.002 | 0.070 ± 0.001 |
| **$\alpha$-tocopherol (mg kg-1)** | NA | 181 ± 4 | 191 ± 17 | 187 ± 1 | 190 ± 7 | 208 ± 3 |
| **Oil stability (h 120ºC)** | 4.93 ± 0.30 | 5.75 ± 0.31 | 6.27 ± 0.23 | 6.58 ± 0.49 | 7.61 ± 0.39 | 8.62 ± 0.26 |

**Table S4.** Kernel characteristics according with hazelnut cultivar.

| | **Cultivar** | |
|---|---|---|
| | **'Negret'** | **'Pauetet'** |
| **Kernel dimensions** | | |
| **Length (mm)** | 12.9 ± 0.2 | 12.9 ± 0.3 |
| **Width (mm)** | 10.3 ± 0.5 | 10.5 ± 0.5 |
| **Thickness (mm)** | 9.6 ± 0.4 | 9.4 ± 0.4 |
| **Roundness index** | 1.33 ± 0.04 | 1.32 ± 0.04 |
| **Kernel skin colour** | | |
| **L*** | 27.2 ± 0.4 | 24.4 ± 1.1 |
| ***a**** | 8.0 ± 0.1 | 7.4 ± 0.3 |
| ***b**** | 13.0 ± 0.2 | 11.7 ± 0.7 |
| **Chroma** | 15.3 ± 0.2 | 13.9 ± 0.7 |
| **Hue (degrees)** | 58.4 ± 0.5 | 57.3 ± 0.7 |
| **Roasting and blanching aptitude** | | |
| **R1 (%)** | 66.2 ± 4.3 | 56.1 ± 1.6 |
| **R2 (%)** | 95.9 ± 0.9 | 88.9 ± 1.1 |
| **B1 (%)** | 40.0 ± 5.3 | 21.0 ± 1.7 |
| **B2 (%)** | 78.3 ± 5.2 | 44.1 ± 3.4 |
| **Chemical characteristics** | | |
| **Acidity (% oleic acid)** | 0.23 ± 0.02 | 0.27 ± 0.04 |
| **Water activity** | 0.636 ± 0.005 | 0.658 ± 0.008 |
| **Moisture (%)** | 4.7 ± 0.1 | 5.0 ± 0.1 |
| **Fat (%)** | 62.8 ± 0.8 | 63.6 ± 0.1 |
| **Protein (%)** | 15.5 ± 0.1 | 15.7 ± 0.3 |
| **Crude fiber (%)** | 11.7 ± 0.4 | 11.7 ± 0.5 |
| **Total sugars (%)** | 2.9 ± 0.2 | 2.6 ± 0.2 |
| **Minerals (%)** | 2.1 ± 0.1 | 2.0 ± 0.1 |
| **Palmitic acid (C16:0 %)** | 5.7 ± 0.1 | 5.9 ± 0.1 |
| **Oleic acid (C18:1 %)** | 75.8 ± 1.2 | 79.6 ± 1.0 |
| **Linoleic acid (C18:2 %)** | 16.2 ± 1.3 | 11.9 ± 1.0 |

| | | |
|---|---|---|
| **Linolenic acid (C18:3 %)** | 0.090 ± 0.005 | 0.081 ± 0.004 |
| **$\alpha$-tocopherol (mg kg-1)** | 189 ± 7 | 193 ± 5 |
| **Oil stability (h 120°C)** | 6.39 ± 0.36 | 7.57 ± 0.37 |