**Appendix A. Supplementary material**

**Table SI 1.** Models generated for analysis of variance of the total phenolic content (TPC), antioxidant activity by ABTS and FRAP methods on *Bertholletia excelsa* barks subjected to treatments, according to a Central Composite Rotational Design (CCRD)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Variables | Equation | R2 | CS | df | *p* |
| TFC | y=18.44+1.29X1-1.94X12+0.33X32-0.39X1X2-0.87X2X3 | 0.92 | 1.31 | 44 | 1.0000 |
| ABTS | y=293.53-76.01X12-26.21X1X2-26.15X1X3 | 0.68 | 922.08 | 44 | 0.0000 |
| DPPH | y=1865.87+309.15X1-436.14X12-170.24X22+87.78X3-118.65X32-81.39X1X3 | 0.89 | 2176.86 | 44 | 0.0000 |
| FRAP | y=2634.56+195.66X1-341.96X12+55.50X2-107.08X2X3 | 0.90 | 431.95 | 44 | 0.0000 |

Ethanol (X1), Temperature (X2), Time (X3). R2: correlation coefficients, CS: chi-square, df: degree of freedom

**Table SI 2**. ANOVA for fit quadratic models of total phenolic content (TPC), antioxidant activity by ABTS, DPPH and FRAP methods in *Bertholletia excelsa* barks by Central Composite Rotational Design (CCRD)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| TPC | SS | df | MS | F-value | *p*-value |
| X1L | 67.891 | 2 | 67.8906 | 111.7861 | 0.0000 |
| X1Q | 104.733 | 2 | 104.7329 | 172.442 | 0.0000 |
| X2L | 0.6404 | 2 | 0.6404 | 1.054 | 0.3110 |
| X2Q | 0.0778 | 2 | 0.0778 | 0.128 | 0.7223 |
| X3L | 1.9858 | 2 | 1.9858 | 3.270 | 0.0785 |
| X3Q | 2.9901 | 2 | 2.9901 | 4.923 | 0.0325 |
| X1L by X2L | 3.5909 | 2 | 3.5909 | 5.913 | 0.0199 |
| X1L by X3L | 0.1062 | 2 | 0.1062 | 0.175 | 0.6782 |
| X2L by X3L | 18.3337 | 2 | 18.3337 | 30.188 | 0.0003 |
| Error | 22.9835 | 38 | 0.6073 | - | - |
| Total SS | 275.099 | 45 | - | - | - |
| Lack of fit | 22.5652 | 5 | 4.5130 | 290.19 | 0.0000 |
| ABTS | SS | df | MS | F-value | *p*-value |
| X1L | 6847.7 | 2 | 6847.7 | 2.0318 | 0.162196 |
| X1Q | 160570.6 | 2 | 160570.6 | 47.644 | 0.00000 |
| X2L | 8976.2 | 2 | 8976.2 | 2.6634 | 0.11094 |
| X2Q | 3448.0 | 2 | 3448.0 | 1.0231 | 0.31818 |
| X3L | 66.6 | 2 | 66.6 | 0.0198 | 0.88895 |
| X3Q | 4351.6 | 2 | 4351.6 | 1.2912 | 0.26294 |
| X1L by X2L | 16482.3 | 2 | 16482.3 | 4.8906 | 0.03309 |
| X1L by X3L | 16411.2 | 2 | 16411.2 | 4.8695 | 0.03345 |
| X2L by X3L | 4.7 | 2 | 4.7 | 0.0014 | 0.97031 |
| Error | 128067.3 | 38 | 3370.2 | - | - |
| Total SS | 406536.0 | 45 | - | - | - |
| Lack of fit | 127470.6 | 5 | 25494.1 | 1410.04 | 0.00000 |
| DPPH | SS | df | MS | F-value | *p*-value |
| X1L | 3915734 | 2 | 3915734 | 116.412 | 0.00000 |
| X1Q | 5286580 | 2 | 5286580 | 157.166 | 0.00000 |
| X2L | 40124 | 2 | 40124 | 1.193 | 0.28163 |
| X2Q | 805424 | 2 | 805424 | 23.945 | 0.00002 |
| X3L | 315659 | 2 | 315659 | 9.384 | 0.00401 |
| X3Q | 391286 | 2 | 391286 | 11.633 | 0.00155 |
| X1L by X2L | 110131 | 2 | 110131 | 3.274 | 0.07829 |
| X1L by X3L | 158973 | 2 | 158973 | 4.726 | 0.03600 |
| X2L by X3L | 10359 | 2 | 10359 | 0.308 | 0.58218 |
| Error | 1278200 | 38 | 33637 | - | - |
| Total SS | 11259559 | 45 | - | - | - |
| Lack of fit | 1263382 | 5 | 252676 | 562.71 | 0.00000 |
| FRAP | SS | df | MS | F-value | *p*-value |
| X1L | 1568510 | 2 | 1568510 | 78.240 | 0.00000 |
| X1Q | 3249884 | 2 | 3249884 | 162.110 | 0.00000 |
| X2L | 126184 | 2 | 126184 | 6.294 | 0.01659 |
| X2Q | 3109 | 2 | 3109 | 0.155 | 0.69594 |
| X3L | 52764 | 2 | 52764 | 2.632 | 0.11302 |
| X3Q | 9415 | 2 | 9415 | 0.469 | 0.49731 |
| X1L by X2L | 75461 | 2 | 75461 | 3.764 | 0.05981 |
| X1L by X3L | 24958 | 2 | 24958 | 1.245 | 0.27152 |
| X2L by X3L | 275176 | 2 | 275176 | 13.726 | 0.00067 |
| Error | 761799 | 38 | 20047 | - | - |
| Total SS | 7294552 | 45 | - | - | - |
| Lack of fit | 758271 | 5 | 151654 | 1418.56 | 0.00000 |

Sum of Squares (SS), degree of freedom (df), Mean Square (MS), Linear and Quadratic (L and Q). Ethanol (X1L and X1Q), Temperature (X2L and X2Q) and Time (X3L and X3Q).

**Table SI 3.** Conditions optimized from the resolutions of equations with significant regression coefficients by statistical analysis obtained by the model to the total phenolic content (TPC), antioxidant activity by ABTS, DPPH and FRAP methods on *Bertholletia excelsa* barks subjected to treatments, according to a Central Composite Rotational Design (CCRD)

|  |  |
| --- | --- |
| Dependent Variables | Independent Variables |
| Ethanol (%) | Temperature (°C) | Time (min) |
| TPC | 58.86\* | 63.67 | 28.31 |
| ABTS | 50.00 | 60.00 | 75.00 |
| DPPH | 59.91 | 60.00 | 81.45 |
| FRAP | 58.58 | 60.00 | 87.96 |

\*Data decoded from the levels of the experimental design



**Figure Sl 1.** Pareto plots from interactions of conditions: ethanol (%), temperature (°C) and time (min) for each variable by Central Composite Rotational Design (CCRD) on the content of total phenolic content (TPC) (A) and antioxidant activity by ABTS (B), DPPH (C) and FRAP (D) methods on *Bertholletia excelsa* barks.