**RGB pattern of images allows rapid and efficient prediction of antioxidant potential in *Calycophyllum spruceanum* barks**

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**Table SI 1**. Linear, quadratic, and interaction effects of extraction time, extraction temperature, and ethanol (%) by fractional factorial design (FFD) on total phenolic compounds (TPC), antioxidant activity by ABTS and FRAP methods.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| TPC | SS | df | MS | F-value | *p-value* | EE | SE | t-value |
| X1L | 5194433 | 1 | 5194433 | 915809.4 | <.0001 | -1074.39 | 1.12 | -956.98 |
| X1Q | 574905 | 1 | 574905 | 101359.1 | <.0001 | -309.54 | 0.97 | -318.37 |
| X2L | 287732 | 1 | 287732 | 50728.9 | <.0001 | 252.86 | 1.12 | 225.23 |
| X2Q | 53712 | 1 | 53712 | 9469.8 | <.0001 | 94.62 | 0.97 | 97.31 |
| X3L | 64814 | 1 | 64814 | 11427.2 | <.0001 | 169.72 | 1.59 | 106.89 |
| X3Q | 9483 | 1 | 9483 | 1671.9 | <.0001 | -56.22 | 1.37 | -40.89 |
| X1L by X2L | 197521 | 1 | 197521 | 34824.1 | <.0001 | -362.88 | 1.94 | -186.61 |
| X1L by X2Q | 610 | 1 | 610 | 107.6 | <.0001 | -17.47 | 1.68 | -10.37 |
| Error | 102 | 18 | 6 | - | - | - | - | - |
| Total SS | 6551114 | 26 | - | - | - | - | - | - |
| Lack of fit | 198131 | 2 | 99066 | 17465.8 | <.0001 | - | - | - |
| ABTS | SS | df | MS | F-value | *p-value* | EE | SE | t-value |
| X1L | 9.84E+14 | 1 | 9.84E+08 | 146111.5 | <.0001 | -14786.2 | 38.68 | -382.24 |
| X1Q | 1.36E+12 | 1 | 1355004 | 201.2 | <.0001 | 475.2 | 33.50 | 14.19 |
| X2L | 2.97E+14 | 1 | 2.97E+08 | 44039.5 | <.0001 | 8117.8 | 38.68 | 209.86 |
| X2Q | 2.60E+12 | 1 | 2598300 | 385.9 | <.0001 | 658.1 | 33.50 | 19.64 |
| X3L | 1.23E+13 | 1 | 12306982 | 1827.7 | <.0001 | -2338.8 | 54.70 | -42.75 |
| X3Q | 8.02E+09 | 1 | 8015 | 1.2 | 0.290 | 51.7 | 47.38 | 1.09 |
| X1L by X2L | 7.74E+13 | 1 | 77395254 | 11494.0 | <.0001 | -7183.1 | 67.00 | -107.21 |
| X1L by X2Q | 1.09E+13 | 1 | 10856404 | 1612.3 | <.0001 | -2329.9 | 58.02 | -40.15 |
| Error | 1.21E+11 | 18 | 6734 | - | - | - | - | - |
| Total SS | 1.46E+15 | 26 | - | - | - | - | - | - |
| Lack of fit | 8.83E+13 | 2 | 44125829 | 6553.1 | <.0001 | - | - | - |
| FRAP | SS | df | MS | F-value | *p-value* | EE | SE | t-value |
| X1L | 1.35E+15 | 1 | 1.35E+15 | 8423.206 | <.0001 | -17330.9 | 188.83 | -91.78 |
| X1Q | 3.69E+12 | 1 | 3.69E+12 | 22.975 | 0.0001 | -783.9 | 163.54 | -4.79 |
| X2L | 2.60E+14 | 1 | 2.60E+14 | 1619.232 | <.0001 | 7598.7 | 188.83 | 40.24 |
| X2Q | 6.66E+11 | 1 | 6.66E+11 | 4.153 | 0.056 | 333.3 | 163.54 | 2.04 |
| X3L | 1.40E+12 | 1 | 1.40E+12 | 8.743 | 0.008 | 789.7 | 267.05 | 2.96 |
| X3Q | 8.51E+12 | 1 | 8.51E+12 | 53.057 | <.0001 | 1684.6 | 231.27 | 7.28 |
| 1L by 2L | 6.05E+13 | 1 | 6.05E+13 | 377.252 | <.0001 | -6352.7 | 327.07 | -19.42 |
| 1L by 2Q | 7.50E+12 | 1 | 7.50E+12 | 46.735 | <.0001 | -1936.4 | 283.25 | -6.84 |
| Error | 2.89E+12 | 18 | 1.60E+11 | - | - | - | - | - |
| Total SS | 1.85E+15 | 26 | - | - | - | - | - | - |
| Lack of fit | 6.80E+13 | 2 | 3.40E+13 | 211.993 | <.0001 | - | - | - |

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

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Variable | FFD - Equations | R2 | CS | df | p |
| TPC | y = 322.18 – 548.84X1+309.54X12+126.43X2-94.61X22+84.86X3+56.22 X32-181.44X1X2+17.47 X1X22 | 0.99 | 0.28 | 26 | 1.00 |
| ABTS | y = 8797.00 – 8946.35X1 – 475.22X124058.88X2-658.07X22-1169.38X3-3591.55X1X2+2329.85X1X22 | 0.99 | 10.46 | 26 | 0.99 |
| FRAP | y = 11599.31-9956.40X1+783.86X123799.34X2+394.83X3-1684.61X32-3176.36X1X2+19.36X1X22 | 0.99 | 137.75 | 26 | 0.00 |
| Variable | CCRD - Equations | R2 | CS | df | p |
| TPC | y = 679.18 – 211.39X1 + 21.83X12 + 65.18X2 – 36.86X22 | 0.99 | 18.78 | 19 | 0.47 |
| ABTS | y = 18807.81 – 3779.90X1 – 991.26X12 + 2015.11X2 | 0.97 | 574.92 | 19 | <.0001 |
| FRAP | y = 18729.55 – 4751.22X1 – 1157.62X12 +3766.12X2 – 992.45X22 | 0.97 | 1351.59 | 19 | <.0001 |

**Table SI 2.** Models generated for analysis of variance of the total phenolic compounds (TPC), antioxidant activity by ABTS and FRAP methods on *Calycophyllum spruceanum* barks subjected to treatments, according to a fractional factorial design (FFD) and central composite rotational design (CCRD).

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

**Table SI 3**. Linear, quadratic, and interaction effects of extraction temperature, and ethanol (%) by central composite rotational design (CCRD) on total phenolic compounds (TPC), antioxidant activity by ABTS and FRAP methods.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| TPC | SS | df | MS | F-value | *p-value* | EE | SE | t-value |
| X1L | 712815.2 | 1 | 712815.2 | 846.67 | <.0001 | 679.18 | 14.51 | 46.82 |
| X1Q | 4323.0 | 1 | 4323.0 | 5.13 | 0.039 | -422.77 | 14.53 | -29.10 |
| X2L | 67783.2 | 1 | 67783.2 | 80.51 | <.0001 | 43.66 | 19.26 | 2.27 |
| X2Q | 12329.1 | 1 | 12329.1 | 14.64 | 0.001 | 130.37 | 14.53 | 8.97 |
| X1L by X2L | 1496.4 | 1 | 1496.4 | 1.78 | 0.203 | -73.72 | 19.26 | -3.83 |
| Error | 11786.6 | 14 | 841.9 | - | - | -27.35 | 20.52 | -1.33 |
| Total SS | 821829.8 | 19 | - | - | - | - | - | - |
| Lack of fit | 11245.9 | 3 | 3748.6 | 76.25 | <.0001 | - | - | - |
| ABTS | SS | df | MS | F-value | *p-value* | EE | SE | t-value |
| X1L | 2.28E+08 | 1 | 227922560 | 330.63 | <.0001 | 18807.81 | 415.13 | 45.31 |
| X1Q | 8915425 | 1 | 8915425 | 12.93 | 0.003 | -7559.81 | 415.76 | -18.18 |
| X2L | 64777215 | 1 | 64777215 | 93.97 | <.0001 | -1982.53 | 551.28 | -3.60 |
| X2Q | 2422888 | 1 | 2422888 | 3.51 | 0.081 | 4030.21 | 415.76 | 9.69 |
| X1L by X2L | 2339 | 1 | 2339 | 0.003 | 0.954 | -1033.51 | 551.28 | -1.87 |
| Error | 9651078 | 14 | 689363 | - | - | -34.20 | 587.10 | -0.05 |
| Total SS | 3.11E+08 | 19 | - | - | - | - | - | - |
| Lack of fit | 8467160 | 3 | 2822387 | 26.22 | <.0001 | - | - | - |
| FRAP | SS | df | MS | F-value | *p value* | EE | SE | t-value |
| X1L | 3.6E+08 | 1 | 360110537 | 268.70 | <.0001 | 18729.55 | 578.82 | 32.35 |
| X1Q | 12158904 | 1 | 12158904 | 9.07 | 0.009 | -9502.43 | 579.69 | -16.39 |
| X2L | 2.26E+08 | 1 | 226263716 | 168.83 | <.0001 | -2315.23 | 768.65 | -3.01 |
| X2Q | 8936856 | 1 | 8936856 | 6.67 | 0.021 | 7532.25 | 579.69 | 12.99 |
| X1L by X2L | 2517848 | 1 | 2517848 | 1.88 | 0.192 | -1984.91 | 768.65 | -2.58 |
| Error | 18762409 | 14 | 1340172 | - | - | -1122.02 | 818.59 | -1.37 |
| Total SS | 6.23E+08 | 19 | - | - | - | - | - | - |
| Lack of fit | 18700152 | 3 | 6233384 | 1101.36 | <.0001 | - | - | - |

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