**Supplementary Information**

**Effects of La2O3 nanoparticles and bulk-La2O3 on the development of *Pfaffia glomerata* (Spreng.) Pedersen and respective nutrient elements concentration**

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**1. Results of CRM analysis by ICP OES and ICP-MS**

The results of CRM (BCR 670 and NIST 1515) analysis by ICP OES and ICP-MS after acid digestion of samples are shown in Table S1. No significant difference between certified and obtained concentration values at a confidence level of 95% (*t*-Student, ρ < 0.05) was observed.

**Table S1.** Results of CRM analysis by ICP OES and ICP-MS after acid digestion. Concentrations are expressed as mean and standard deviation (1SD); n = 3.

|  |  |  |
| --- | --- | --- |
| **Element** | **BCR 670 (µg g-1)** | **NIST 1515 (µg g-1)** |
| **Certified** | **Determined** | **Certified** | **Determined** |
| La | 0.487 ± 0.02 | 0.523 ± 0.03 | n.i. | n.d. |
| Ca\* | n.i. | n.d. | 1.526 ± 0.015 | 1.588 ± 0.144 |
| Cu | n.i. | n.d. | 5.64 ± 0.24 | 5.49 ± 0.31 |
| Fe | n.i. | n.d. | 83 ± 5 | 74 ± 5 |
| K\* | n.i. | n.d. | 1.61 ± 0,02 | 1.69 ± 0.14 |
| Mg\* | n.i. | n.d. | 0.271 ± 0.008 | 0.277 ± 0.012 |
| Mn | n.i. | n.d. | 54 ± 3 | 49 ± 2 |
| Mo | n.i. | n.d. | 0.094 ± 0.013 | 0.074 ± 0.011 |
| P\* | n.i. | n.d. | 0.159 ± 0.011 | 0.156 ± 0.015 |
| S\* | n.i. | n.d. | n.i. | 0.197 ± 0.056 |
| Zn | n.i. | n.d. | 12.5 ± 0.3 | 12.9 ± 0.9 |

\*: Concentration in %.

n.d.: not determined.

n.i.: not informed.

**2. Analytical characteristics of the LA-ICP-MS method and results of CRM analysis**

The methodology developed by Nunes *et al.*25was applied to obtain quantitative mapping of Cu, Mn, Mo and Zn in plants leaves. However, it was not possible to obtain calibration curves for Ca, Fe, Mg, P and S, probably due to isobaric or polyatomic ions interferences in LA-ICP-MS technique.22 The calibration curves equations, linear correlation coefficient, LOD and the LOQ for Cu, Mn, Mo and Zn are informed in Table S2.

**Table S2.** Parameters of calibration curve for LA-ICP-MS analysis. 13C was used as internal standard.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Element** | **Equation** | **R2** | **LOD (µg g-1)** | **LOQ (µg g-1)** |
| Cu | y = 0.0132x – 0.0064 | 0.9998 | 0.38 | 1.26 |
| Mn | y = 0.0376x – 0.4157 | 0.9990 | 0.92 | 2.74 |
| Mo | y = 0.0283x – 0.006 | 0.9972 | 0.14 | 0.22 |
| Zn | y = 0.0029x + 0.0028 | 0.9982 | 1.34 | 3.13 |

No significant difference between the certified concentration values for the CRM (NIST 1515) and Cu, Mn and Zn concentrations found were observed at a confidence level of 95% (*t*-Student, ρ <0.05). However, it was not possible to check the accuracy for Mo, because its concentration in the CRM was below the method LOQ. The results of the CRM analysis are given in Table S3.

**Table S3.** Results of the CRM (NIST 1515) analysis by LA-ICP-MS. Concentrations are expressed as mean and standard deviation (1SD); n = 3.

|  |  |
| --- | --- |
| **Element** | **Concentration (µg g-1)** |
| **Certificated** | **Determined** |
| Cu | 5.64 ± 0.24 | 5.76 ± 0.15 |
| Mn | 54 ± 3 | 56 ± 1 |
| Mo | 0.094 ± 0.013 | < 0.22\* |
| Zn | 12.5 ± 0.3 | 10.8 ± 0.9 |

\*LOQ: limit of quantification.