

The concentrations of 19 elements in wild and genetically modified *Nicotiana langsdorffii* (*N. langsdorffii*) exposed to Chromium (VI) and to water deficit were determined and compared to provide new information about their response to abiotic stress.

Genetic modifications by GR and RoIC genes (encoding for the rat *glucocorticoid receptor* and for *Agrobacterium rhizogenes* RoIC, respectively) were investigated because they induce significant, but only partially known changes in the plant response to stress.

Simultaneous determination of Al, As, Ba, Ca, Cd, Co, Cr, Cs, Cu, Fe, K, Mg, Mn, Na, Pb, Rb, Sr, V and Zn was carried out by ICP-MS equipped with a collision/reaction cell (ICP-ORS-MS). The methodology was optimised by testing the grinding, homogenisation, digestion and analysis procedures, to reduce the uncertainty of the experimental results and to identify statistically significant differences between nine sample pools, for a total of 75 samples. The quality control procedure was carried out by blank control and by evaluating the detection limits and repeatability. Trueness was assessed by analysing certified reference material, NIST 1573a.

Significant differences were observed in the uptake and accumulation of several elements in the wild-type *N. langsdorffii* samples, either with respect to the plants submitted to water deficit and exposure to Cr(VI) or with respect to the genetically modified plants. The differences were highlighted by principal component analysis (PCA). The analysis of the element content of the whole plant, combined with the data found in the literature, allows us to hypothesise effects on the metabolic mechanism controlling the uptake and translocation of elements inside the vegetal organism. Because genetic and chemical stress decreases the nutrient concentration in the whole plant, we can say that the uptake at root level is affected. The increase in concentration of elements such as As, Sr and Al indicates a decreased selectivity in the uptake of potentially toxic elements and, consequently, highlights the effects on the plant's metabolic processes.