

HYPERACCUMULATION OF Pb, Tl AND Zn BY A MOUNTAIN POPULATION OF *BISCUTELLA LAEVIGATA* SSP. *LAEVIGATA*

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Beyond genetic and phenotypic factors, the levels of contamination and the species of metals also exert a strong pressure on the adaptation of plants to polluted soils.

This paper presents data that demonstrate the high capability adaptation of *Biscutella laevigata* subsp. *laevigata* in different ecological conditions, consisting in our case in a wide range of concentration of metals in the substrates. Also we support the first evidence of thallium hyperaccumulation by *Biscutella laevigata* recorded in Italy.

In the framework of a wider investigation on the heavy metal plant community in the mining area of Cave del Predil (Julian Alps, Italy), we were intrigued by the high concentrations of thallium measured in the substrates collected in the valley. *Biscutella laevigata*, a mountains species, present also in the calcareous dry grasslands in plains and distributed in Europe from Eastern Pyrenean Mountains to the Transylvanian Alps appeared as the most efficient species in the accumulation of Tl.

In order to evaluate the differences in terms of metal tolerance and hyperaccumulation between the mountain population of *Biscutella laevigata* ssp. *laevigata* and a plain one, seeds were collected at (i) the former mining site of Cave del Predil (about 910 m a.s.l.) and (ii) at Codroipo (about 35 m a.s.l.). The seeds were germinated in growth media and after 80 days the seedlings were transplanted in 2 L pots containing mine tailings very rich in metals and an agricultural soil. The mountain plants tolerated the presence of heavy metal, in fact they grown normally up to flowering. On the contrary the plain plants showed severe symptoms of metal toxicity and they stopped growing after the third fully expanded leaves. After flowering the plants have been harvested. Plant fractions were ICP analyzed to determine the metal concentration in the tissue. In the roots and shoots of the mountain population were found up to 32,661 mg kg⁻¹ of Tl, 4,726 of mg kg⁻¹ of Pb and 3,841 mg kg⁻¹ of Zn.

Moreover a molecular analysis was carried out to distinguish the two populations of *B. laevigata*: we used a barcoding approach. The nuclear ITS (~700 bp) and the plastid intergenic spacer psbA-trnH (~400 bp) were PCR amplified with universal primers and sequenced with an ABI Prism 3730 Automated DNA sequencer considering a significant number of individuals for each populations. The two populations were clearly distinguishable, in particular considering the plastid sequence a poly T (position 208 to 222) was always two T longer in the population of Codroipo than in the population of Cave del Predil, moreover in position 291 there was a population-specific SNP (C/G) useful to discriminate the two populations.