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Gypsophila sphaerocephala Fenzl ex Tchihat.: A Boron Hyperaccumulator Plant Species That May Phytoremediate Soils with Toxic B Levels

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Abstract: Analyses were carried out to identify boron (B) hyperaccumulating plant species in an actively B- mined area of Kirka, Eskişehir, Turkey. Only 4 plant species, *Gypsophila sphaerocephala* Fenzl ex Tchihat. var. *sphaerocephala* (Caryophyllaceae), *Gypsophila perfoliata* L. (Caryophyllaceae), *Puccinellia distans* (Jacq.) Parl. subsp. *distans* (Gramineae) and *Elymus elongatus* (Host) Runemark subsp. *turcicus* (McGuire) Melderis (Gramineae), were identified in the highest B- containing sections of the mine. The species were found growing successfully under high total (8900 mg kg⁻¹) and available (277 mg kg⁻¹) soil B concentrations. Among these plant species, *G. sphaerocephala* contained considerably higher B concentrations in its above-ground parts (2093 ± 199 SD mg kg⁻¹, seeds; 3345 ± 341 SD mg kg⁻¹, leaves), compared to the roots (51 ± 11SD mg kg⁻¹) and organs of the other species as revealed by analyses using an ICP-AES (Varian, Vista model) instrument. This species was followed by *G. perfoliata* with respect to B concentrations in its various organs. This study shows that *G. sphaerocephala* was not only able to grow on heavily B-contaminated soils, but was also able to accumulate extraordinarily high concentrations of B. This provides a new plant genotype to explore the mechanism(s) of B hyperaccumulation which may lead to identifying the gene(s) conferring B-resistance and to phytomining of contaminated soils, especially where B-toxicity symptoms occur. To our knowledge, there are no reports available on the hyperaccumulation of B, although many reports are available on the phytoremediation of metalliferous soils that contain excess amounts of Zn, Mn, Cu, Co, Pb, Al and Ni.

Key Words: Boron mine, *Elymus*, ICP-AES, phytoremediation, *Puccinellia*, tolerance

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