

Characterization of Native Plants with Phytoremediation Potential in Ancash - Peru Respect to their Capacity of Propagation and Accumulation of Heavy Metals

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Extended Abstract

The toxicity of heavy metals produced by mine tailings attempts against health in all the countries that face this problem [1]. In Peru, the Ancash department is a region which possesses more than 1251 reported high risks mine tailings until 2015, some of them are: “Alianza” (680 000 m²), “Huancapetí” (400 000 m²), “La Romina” (260 000 m²), “Pasto Bueno” (85 000 m²), “California y Tungsteno” (60 000 m²), and “Mesapata” (54 500 m²) [2,3,4]. As a response, phytoremediation emerges as an eco-friendly and cost-efficient method suitable to treat these problems, in a process in which plants are able to capture, stock or degrade heavy metals [5]. Previously, up until 12 native genus with phytoremediation potential coming from contaminated areas of Recuay, Cátac and Huancapetí (Ancash) were identified [6,7,8]. With the purpose of continuing with this study, we proposed the evaluation the propagation potential and the characterization of the hyperaccumulation capacity of heavy metals in these plants. The study was carried out in a greenhouse located at 3433 mslm to simulate their natural environment. Plants were grown either through seeds or cuttings according to the species, and their size was measured every 15 days during three months. After this time, plants with the best germination rate were selected to go through the heavy metal exposure treatment. In this experiment each plant genus was grown in either of three groups: in peat (control group), in soil belonging to mine tailing (first treatment) and in peat in which it was added solutions of different heavy metals (second treatment). After three months of treatment, heavy metal concentration in soils, roots and shoots were measured, as well as dry weight of the later two. In order to analyze the data, we obtained a ratio of the accumulation percentage between the end and the beginning of the treatment in roots and shoots for each plant. The results showed that the absorption efficiency varies depending on the evaluated species, as well as it varies between roots and shoots. We have 4 heavy metals of high interest, Aluminium, Cadmium, Copper and Lead. In the case of the mine tailings treatment, *Werneria* was the genus that accumulated the most amount of aluminium in its shoots and roots (20 times and 4 times more than the control, respectively) followed by *Senecio* and *Juncus* which accumulated approximately 12 times more in its shoots compared to control. *Calamagrostis*, *Festuca*, *Juncus*, *Senecio*, *Stipa* and *Werneria* showed an accumulation of cadmium up until 9 times in shoots. *Calamagrostis*, *Juncus*, *Pennisetum*, *Senecio* and *Stipa* accumulated lead up until 30 times more in shoots. In case peat with heavy metals added, there were no differences of aluminium accumulation. *Calamagrostis*, *Festuca*, *Juncus*, *Senecio*, *Stipa* and *Werneria* showed an accumulation average of 15 times more of cadmium in shoots compared to the control. Lead was hyper-accumulated by *Calamagrostis*, *Juncus*, *Pennisetum*, *Senecio* and *Stipa*, with an average of 100 times more than the control group in shoots. Finally, *Calamagrostis*, *Festuca*, *Senecio* and *Werneria* accumulated the greater amount of copper with an average of 10 times more in comparison to the control group in roots, independently of the treatment. Aside from that, out of all the species evaluated, only *Pennisetum*, *Juncus*, *Festuca* and *Senecio* generated a high amount of biomass in either their roots or shoots, another requirement to make them good candidates for phytoremediation. By crossing the metal biomass information we conclude that *Juncus*, *Festuca* and *Pennisetum* emerge as the plants with the highest phytoremediation potential for the Ancash department in Recuay, Cátac and Huancapetí.

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