

Characteristics of organic and inorganic wastes for their use in land restoration

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Abstract

Several types of wastes and amendments, organic and inorganic, are usually used for agricultural and gardening purposes. However, most of them can be applied for soil rehabilitation and land restoration. When large areas must be restored, economical factors should be considered: availability of the waste, transport and facilities to be applied. The cost is a critical factor for the use of wastes (Tripathi et al., 1998). It is important to look for an adequate amendment for soil rehabilitation and with low cost. On the one hand, most of the works are centered in cost and bioenergy production (Daioglou et al., 2016). ON the other hand, the use of wastes for soil recovery has been centered in bioremediation and pollution (Shasavari et al., 2013). However, the cost of the application of residues for land rehabilitation should be considered.

In this work, the characteristics and cost of twelve wastes and amendments were compared in order to determine the best use thinking about soil rehabilitation (physical, chemical and biological properties), the properties of the following materials: sewage sludge compost, brown peat, black peat, fertilized peat, earthworm humus, straw hay, palmtree leaves, pine bark, exfoliated vermiculite, expanded perlite, limestone outcrops and volcanic crushed stones. All of them were analyzed following the UNE standards for soil amendments (density, organic matter content, Kjeldahl nitrogen, pH, electrical conductivity, soluble cations).

The results obtained show a great variability of properties between organic and inorganic amendments as it was expected. The organic amendments, sewage sludge compost, brown peat, black peat, fertilized peat, earthworm humus, straw hay, palmtree leaves and pine bark, show differences among those treated than those not composted or processed previously (straw hay, palmtree leaves and pine bark). For this group, sewage sludge compost is a good alternative for application in large areas related to the characteristics and availability at low cost. The use of compost as a soil conditioner is an excellent method that is inexpensive and effective.

For the inorganic and inert amendments (limestone outcrops, volcanic crushed stones, exfoliated vermiculite, expanded perlite), all of them gave similar results and natural limestone is a low cost alternative. This mineral raw is composed mainly of calcium carbonate and magnesium carbonate, obtained exclusively by crushing or grinding natural calcareous rock, and it also a waste from quarries and industrial processes.

The use of both wastes (composted sewage sludge and limestone raw materials) for soil rehabilitation facilitates residue accumulation and add a value for this wastes.

Keywords: cost; limestone residues; soil rehabilitation; sewage sludge

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