Geophysical Research Abstracts
Vol. 19, EGU2017-13368, 2017
EGU General Assembly 2017


# Organic amendments as restoration techniques in degraded arid and semiarid systems: A review

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There is an increasing concern at the global scale about interrelated environmental problems such as soil degradation, desertification, erosion, and climate change impacts (Hueso-Gonzalez et al., 2014). Indiscriminate use of agro-chemicals, excessive and deep tillage, excessive irrigation, among many others factors, have largely contributed to soil degradation, particularly in arid and semi-arid areas (Lal, 2008). Soil is an essential non-renewable resource with extremely slow formation and regeneration potential (Muñoz-Rojas et al., 2016a and c, Martínez-Murillo et al., 2016). The decline in organic matter content of many soils is becoming a major cause of soil degradation, particularly in dryland regions (Muñoz-Rojas et al., 2016b) where low soil fertility cannot maintain sustainable production in many cases (Hueso-González et al., 2015). The use of soil organic amendments is a common practice in agricultural management and land restoration that can help to improve physical and chemical soil properties, soil structure, temperature and humidity conditions, as well as nutrient contents which are essential for plant growth (Guerrero et al., 2001). Under degraded conditions, several studies have shown their benefits for improving soil physical, chemical and biological properties (Jordan et al., 2010 and 2011). However, there are many research gaps in the knowledge of the effects of climatic conditions on their application, as well as the adequate types of amendment and doses and decomposition rates, (Hueso-Gonzalez,2016). All these factors are crucial for the success in their application. Here, we review long-term experiments worldwide studying the benefits associated with the application of organic materials, particularly, in restoration of arid and semiarid ecosystems together with the possible threats and risks that can result from their use. We will specifically adress: (1) type of amended and benefits arising from their use, (2) application methods and more common doses and, (3) risk derivates for their application.

References:

Guerrero, C., Gómez, I., Moral, R., Mataix-Solera, J., Mataix-Beneyto, J., Hernández, T.: Reclamation of a burned forest soil with municipal waste compost: macronutrient dynamic and improved vegetation cover recovery, Bioresource Technology, 76, 221-227, 2001.

Hueso-González, P., Martínez-Murillo, J.F., and Ruiz Sinoga., J.D.: The impact of organic amendments on forest soil properties under Mediterranean climatic conditions, Land Degradation and Development, 25, 604-612, 2014.

Hueso-González, P., Martínez-Murillo, J.F., and Ruiz Sinoga., J.D.: Effects of topsoil treatments on afforestation in a dry-Mediterranean climate (Southern Spain), Solid Earth, 7, 1479–1489, 2016.

Hueso-González, P., Ruíz Sinoga, J.D., Martínez-Murillo, J.F., and Lavee, H.: Overland flow generation mechanisms affected by topsoil treatment: Application to soil conservation, Geomorphology, 228, 796-804, 2015.

Jordán, A., Zavala, L.M., Gil, J.: Effects of mulching on soil physical properties and runoff under semi-arid conditions in southern Spain, Catena 81, 77-85, 2010.

Jordán, A., Zavala, L.M., Muñoz-Rojas, M. 2011. Mulching, effects on soil physical properties. In: Glinski, J., Horabik, J., Lipiec, J. (Eds.), Encyclopedia of Agrophysics. Springer, Berlin, pp. 492–496.

Lal R.: Soils and sustainable agriculture. A review, Agron. Sustain. Dev. 28, 57–64, 2008.

Muñoz-Rojas, M., Erickson, T.E., Dixon, K.W., Merritt, D.J.: Soil quality indicators to assess functionality of restored soils in degraded semiarid ecosystems, Restor. Ecol., 2016a.

Muñoz-Rojas, M., Erickson, T.E., Martini, D., Dixon, K.W., Merritt, D.J.: Soil physicochemical and microbiological indicators of short, medium and long term post-fire recovery in semi-arid ecosystems, Ecol. Indic., 63,14-22, 2016b.

Muñoz-Rojas, M., Erickson, T.E., Martini, D., Dixon, K.W., Merritt, D.J.: Climate and soil factors influencing seedling recruitment of plant species used for drylands restoration, SOIL, 2, 287-298, 2016c.

Martínez-Murillo, J.F., Hueso-González, P., Ruiz-Sinoga, J.D., Lavee, H.: Short-Experimental fire effects in soil and water losses in southern of Spain. Land Degradation and Development, 27, 1513-1522, 2016.