This study is part of a LIFE+ project, "Environmental restoration of degraded soils and desertified by a new treatment technology for the recovery of the land" (Life 10 ENV/IT/000400 "New Life"). The aim is to test a new treatment - patented by the company M.C.M. Ecosistemi - for recovering soils to control desertification. The reconstitution treatment consists in chemical-mechanical actions when a desiccation is followed by a recovery - incorporating soil-improving agents and a final reconstitution. The effectiveness of the reconstitution will be tested on different soils, mainly of a municipal solid waste landfill near Piacenza. For this reason, experimental plots are prepared, in the plots the chemical-physical parameters of different types of soils - landfill and others - are compared with the same reconstituted soils. The plots soils will be constantly monitored.

The purpose of this work is to describe and compare the hydrological characters of natural and reconstituted soils using different techniques.

The soil-water retention analysis was performed in three ways:
- using field-cube plates on a multi-disturbed sample;
- using field-cube plates on a disturbed sample;
- using pot trial to determine the moisture at wilting point. The trial, begun in November 2013, is still in progress, and so in this work only partial results are presented. This test consists in water-leaching to a height of 1.5 m, then in stopping watering and closing the pots to avoid evaporation, in waiting until the plant dies and then determining the soil moisture - the soil wilting point.

The laboratory data were compared with the results of pedotransfer functions (PTFs) based on two models: van Genuchten and Brooks and Corey. The study focused on those developed on a European soils database: HYPRES (Wösten et al., 1999). From HYPRES two different classes of PTFs are derived: class PTFs - PTFs that predict the hydraulic behavior of the soils on the basis of their texture - and continuous PTFs - PTFs that predict the hydraulic behavior from data of texture, organic carbon content and bulk density. It can be argued that soil organic carbon concentration and bulk density take a great change in the PTFs that fail in describing the hydraulic behavior of these soils. The worst and different RMSE are in continuous PTFs. The best and similar RMSE are in class PTFs.

The Wösten et al., 1999 PTFs generated in HYPRES and by CalcPTF have been compared by IMSE in text.

The samples 3 and 4 - natural and reconstituted silty soil - have the measured moisture content at wilting point very close to each other. The sample 2 - reconstituted sandy soil - is the only one that has the measured moisture content at wilting point less than that by the PTFs.

The comparison between disturbed and undisturbed natural soils for suction values less than 100 KPa shows that undisturbed soils always have moisture contents lower than disturbed soils. For suction values greater than 100 KPa, with the exception of sample 3: silty soil - all undisturbed samples have higher moisture contents than disturbed samples. On the contrary the comparison between disturbed and undisturbed reconstituted soils shows that the undisturbed soils have always higher values of disturbed soils. The content of water available for the plants - calculated by the difference between soil moisture content at field capacity and at wilting point - is always higher for undisturbed samples.

It is not possible today to express opinions in using disturbed or undisturbed samples; it can be said that the analysis turns out to be easier and faster on disturbed samples, but that the disturbance applied by sieving and screening influences the content of water available for the plants.

On the contrary the comparison between disturbed and undisturbed reconstituted soils shows that the undisturbed soils have always higher values of disturbed soils. The content of water available for the plants - calculated by the difference between soil moisture content at field capacity and at wilting point - is always higher for undisturbed samples.

The histograms show the comparisons between the moisture content at wilting point determined by analyses and by PTFs; it can be seen that the trial in pot led to the greatest values than the laboratory tests, supporting the hypothesis that this is not a reliable and precise method, in addition to being very long and difficult to manage.

The samples 3 and 4 - natural and reconstituted silty soil - have the measured moisture content at wilting point very close to those of the PTFs.

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The histograms show the comparisons between the moisture content at wilting point determined by analyses and by PTFs (for sample 1: natural silty soil - lack the trial in pot because the test is not finished yet). The soil moisture content determined by the trial in pot results always greater than that by laboratory tests, supporting the hypothesis that this is a not reliable and precise method, in addition to taking very long and difficult to manage.

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