Geophysical Research Abstracts,
Vol. 10, EGU2008-A-05431, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-05431
EGU General Assembly 2008

Environmental, agricultural and ecological impacts of municipal plant wastes incorporated into a silty soil (Haute-Normandie, Northern-Western France).

P. Le Gouée (1), D. Delahaye (2), M. Marie (1), J. Douvinet (1) , M. Bermond (1)

(1) University of Caen Basse-Normandie, Géophen Laboratory, UMR LETG 6554 CNRS, France (2) University of Caen Basse-Normandie, Géophen Laboratory, UMR LETG 6554 CNRS, France (patrick.legouee@unicaen.fr / daniel.delahaye@unicaen.fr)

The soil erosion represents an important risk for agricultural lands and the areas located at the downstream: losses of soils, mud flows, turbidity and water pollution. In France, the intensive agricultural areas on silty soil appear among most sensitive to the soil erosion because of the evolution of the farming systems and the agricultural practices (Boiffin *et al.*, 1988, Souchère et *al.*, 2003). The erosion is related to the strong erodibility of soils caused by the silty texture and especially by the carbon lost from the soil (Ciavatta 2007,). For a few years, the fight against the erodibility has been carried out by the mixing of organic wastes in the soils (Tejada, 2006).

Since the year 2000, this technique is tested in Haute-Normandie (Northern-Western France). Two parcels have been selected in order to compare the edaphic properties of the same soil which received a standard fertilization (parcel 1) and a fertilization by incorporation of compost resulting from municipal plant wastes which the agronomic composition and the heavy metals content are known (parcel 2). Both parcels show the same pedological characteristics (neoluvisol). Between 2000 and 2007, the crop rotations, the work of soil the intercrops management have been similar. 7 years after the beginning of the experimentation, we have been analyzed the physical, hydrous and chemical properties of the surface horizons. For the physical properties, the following parameters have been retained: structural stability and micromorphologic structuring. For the hydrous properties, the useful available water (UAW), the curves of character-

istic moistures and the percolation have been studied. For the chemical properties, the agronomic composition and the heavy metals content have been given.

The results show that the mixing of the compost improved considerably the qualities of the silty soil. The structural stability index (Le Bissonnais and Souder, 1995) reveals a significant reduction of the soil erodibility. The micromorphologic analysis (thin sections) shows a substantial increase to the mesopores (30-50μm) and macropores ($> 50\mu$m). The reason is that the conservation of the aggregates structure leads to the preservation of the inter-aggregates porosity. This is also explained by a stronger biological activity supporting the biological porosity development. If the compost does not improve the UAW, it modifies the curve of characteristic moistures. That results in a UAW destocking slower and less early in drying climatic conditions. In addition, the percolation is better for the soil affected by compost because of the well preservation of the biological and inter-aggregates porosity during wet conditions. The pH, soil carbon and C/N have been improved and explain the increase of the soil biological activity. The heavy metals content remained stable during the experimental period.

In conclusion, we think that the municipal plant wastes reduce significantly the risk of the soil erosion, which has been the initially aim. In addition, we note that the agronomic properties have been also clearly improved on the physical, hydrous and chemical levels. Lastly, the increase of the biological activity contributes to consolidate the biodiversity and the general quality of the soil. The generalization of this practice is now considered in Haute-Normandie within the scope of the development of a municipal plant wastes network.

Boiffin J., Papy F., Eimberck M., 1988 - *Influence des systèmes de culture sur les risques d'érosion par ruissellement concentré. I - Analyse des conditions de déclenchement de l'érosion*. Agronomie, 8, p. 663-673.

Ciavatta C., 2007 - *Organic wastes in soils: Biogeochemical and environmental aspects*. Soil Biology & Biochemistry, 39, p. 1239–1243.

Le Bissonnais Y., Le Souder C., 1995 - *Mesurer la stabilité structurale des sols pour évaluer leur sensibilité à la battance et à l'érosion*. Etude et Gestion des sols,

Souchère V., King C., Dubreuil N., Lecomte V., Le Bissonnais Y. Chalat M., 2003 - *Grassland decrease : role of socio-economic factors and consequences for runoff and soil erosion*. Environmental Science & Policy, 6(1), p. 7-16.

Tejada M., Gonzalez JL., 2006 - *The relationships between erodibility and erosion in a soil treated with two organic amendments*. Soil & Tillage Research, 91, p. 186–198.