*I World Congress on Conservation Agriculture*
*Madrid, 1-5 October, 2001*

# CHANGE IN SOIL STRUCTURE UNDER DIRECT DRILLING AS A FUNCTION OF CROPPING SYSTEM

G. Richard
INRA Unité d'Agronomie de Agronomie Laon-Péronne, *02007 Laon cedex, France*
*e-mail : richard@laon.inra.fr*

A main objective of tillage is to improve soil structure and its consequences on crop establishment, root functioning, air and water transfer. Ploughing is very important because it induces great change in soil structure, which, however, are some times negative: creation of a plough pan for example. The question is to determine if it is possible to maintain an adequate soil structure without tillage or with reduced tillage.

The long-term field experiments which are conducted in France since 1970 show that structural porosity in no-tilled plots is lower than in ploughed plots after few years of direct drilling. This structural porosity (from 5 to 10 %) mainly results from cracks, earthworm and root channels. It depends on soil type.

However, the change with time in structural porosity show that soil porosity is not stable. Some times, structural porosity decreases from one year to another: in spite of a lower sensivity to soil compaction under direct drilling, severe compaction can occur in wet conditions. The reverse is also true: structural porosity can increase from one year to another, perhaps because of climate action. These small changes in structural porosity (few %) can greatly affect water transfer within the soil profile.

Therefore, it is not sufficient to predict soil structure at the equilibrium under direct drilling. It is necessary to predict the dynamics of the change in soil structure as a function of annual soil compaction intensity and structure regeneration by climate and biological activity, and finally as a function of cropping system. A new field experiment is conducted in northern France by INRA, Agronomy Unit of Laon-Péronne, where the effect of conventional tillage and zero-tillage on soil structure is compared under three cropping systems which induce a large range of annual compaction intensity.