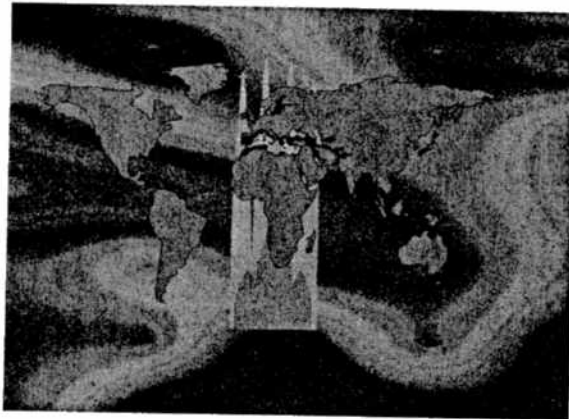


# **6th International Meeting on Soils with Mediterranean Type of Climate**

**6th IMSMTC**



**EXTENDED ABSTRACTS**

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## REDUCTION OF INFILTRATION RATE AS A CONSEQUENCE OF DIRECT SOWING

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### INTRODUCTION

Tillage practices involve important changes in physical aspects of the soil surface. Traditionally, this work is responsible for the increase in crop production, because it improves soil conditions for crop planting and growth. Moreover, these transformations modify other soil surface conditions (hydrological properties, soil water content, etc.) that can be of relevance when useful water for plant growth is restricted by climatic conditions, as is the case in Mediterranean conditions. On the Torre Marimon farm (near Barcelona, Spain) one hectare was assigned for the application of three different dry-farming techniques with the aim of evaluating the effect on topsoil properties. Ploughing modify the infiltration rate immediately, but different tillage systems can reduce stable infiltration over a long time scale. The aim of this experiment is to evaluate the impact of tillage system on saturated infiltration and the basic hydraulic parameters of soil.

### MATERIALS AND METHODS

The experiment was designed using a crop rotation of peas-wheat-wheat-barley (CAÑAMERAS et al. 1998). Three plots of 2700 m<sup>2</sup> each (30m x 90 m) have been cultivated parallel to the slope since 1993-94 using conventional tillage (CT), minimum tillage (MT) and direct sowing (NT). The general slope of the area is 8.2%. The soil is a silt loam (34% sand, 54% silt, 12% clay) Calcixerollic Xerochrept, with 2,5% stoniness (w/w). It is a carbonated soil (12.3 % CaCO<sub>3</sub>) with an average organic matter content of 1.75%.

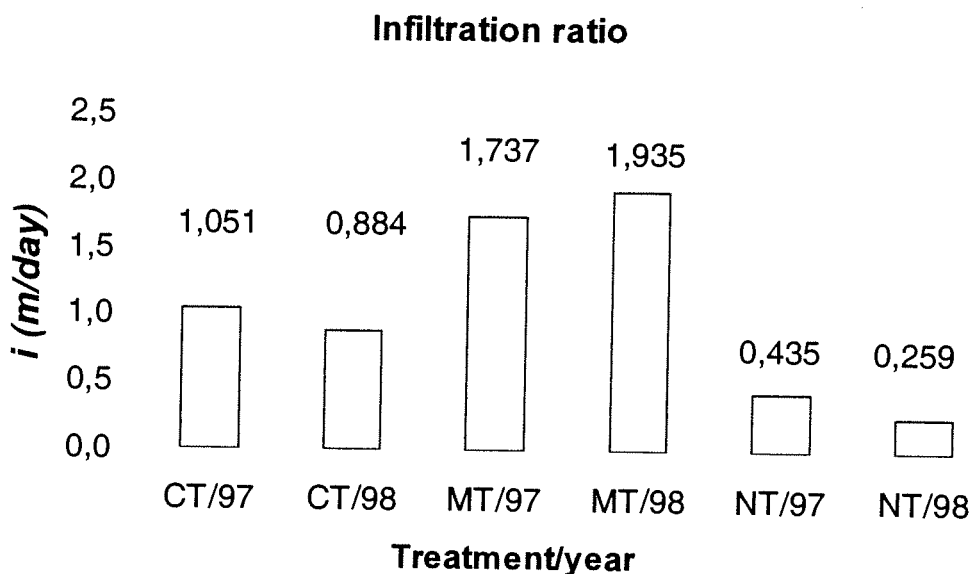
Two series of infiltration measurements were taken using a double ring infiltrometer in 1997 and 1998 after harvesting (July). Bulk density (excavation method) and soil water content (TDR) was monitored. Three different samples were taken following the slope direction in each plot and each campaign. Infiltration was measured following the protocol described by BOUWER (1986) until the infiltration rate has become essentially constant (SIR). Sorptivity (S<sub>i</sub>) and A were calculated with the two parameter Philip equation (PHILIP, 1957) using filed data. The data was assessed by an analysis of variance at a 0.05 probability level.

### RESULTS

Most of the results are summarised in Figures 1 and 2.

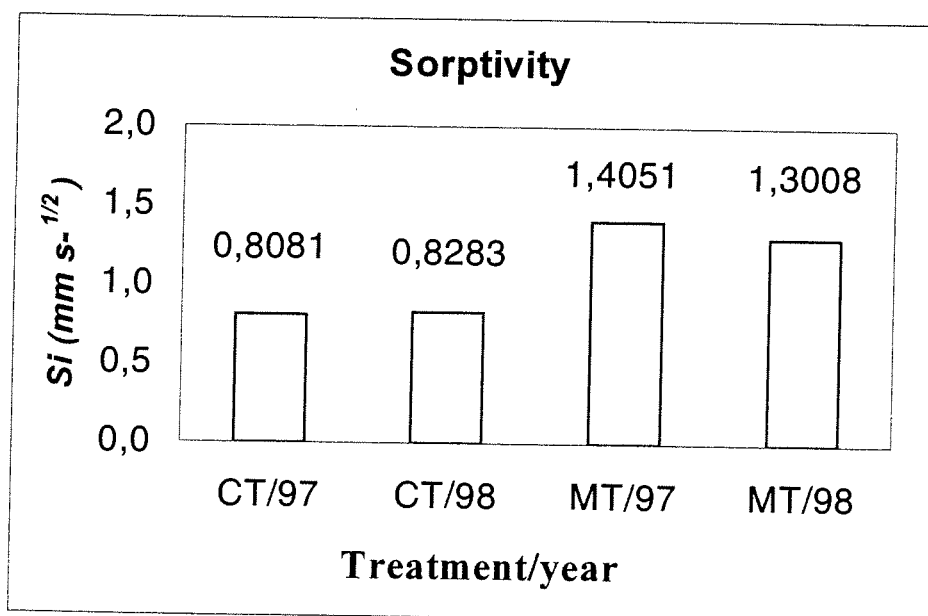
In the NT treatment the SIR is reduced by 64% of the SIR value of the CT plot. That corresponds to an average decrease of 10% per year since the start of the experiment. This reduction is attributable to the increase in soil bulk density in the NT plot as a consequence of continuous no tillage system being applied throughout six agricultural cycles. In these conditions, the soil has reduced its capacity to recharge itself with water and increased its

capacity to generate runoff during intense rains.



The adjustment to the PHILIP equation was done for two of the MT and CT field data series. For the NT, the results obtained were not consistent because the value of A parameter was negative in all the samples. For the MT and CT treatments, Sorptivity presents different tendencies indicating that the MT plot is more capable of water infiltration at the beginning of the rains. This effect is not cumulative as the values of  $i$  and  $S_i$  for different years indicate (figure 2).

Consequently the results indicate that the soil tillage system does not modify hydrological parameters significantly, but a tendency to reduce  $i$  appears in silt loam soil when direct sowing is applied over a long period.



## Section VI. Soil Technology

### REFERENCES

BOUWER, H. (1986). Intake rate: Cylinder infiltrometer. In: Klute, A.(ed.) Methods of soil analysis, Part 1. Physical and mineralogical methods. Agronomy Monograph n° 9 (2<sup>nd</sup>. Edition). Madison. pp 825-843.

CAÑAMERAS, N; DALMAU,L; HERETER,A;JOSA,R;VERDÚ,A.M.C;GIL,E, AND GORCHS,G. 1998. Aproximació a les condicions del moviment de l'aigua en una conca experimental de Torre Marimon. Arxius de l'Escola Superior d'Agricultura de Barcelona. Sèrie 5. N. 1: 55-63.

PHILIP (1957). The theory of infiltration. 1. The infiltration equation and its solution. Soil Sci. 83: 345-357.

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