

Mulching and soil tillage influence on the thermal behaviour of a Luvisol surface layer

J. A. Andrade¹, C.A. Alexandre² & G. Basch³

^{1,2}Departamento de Geociências, Universidade de Évora
Apartado 94, 7002-522 Évora, Portugal, Tel. nº 266745300, Fax. Nº 266-74539.
e-mail: zalex@uevora.pt; e-mail: cal@uevora.pt

³Departamento de Fitotecnia, Universidade de Évora
Apartado 94, 7002-522 Évora, Portugal
e-mail: gb@uevora.pt

Abstract

Important energy exchanges at soil surface regulate the thermal environment within top soil layer and the boundary layer above it. By this reason, the application of mulches or the modelling of micro relief by soil tillage are common practises to modify the thermal regime of a soil.

The aim of this study is to compare the effect on thermal behaviour of a Luvisol resulting of soil tillage and the application of stubble mulch and, different amounts of straw mulch. For this purpose, experiments were performed from January to May 2007 in a field sowed with winter wheat. Temperatures were measured with copper-constantan (Type T) thermocouples placed over straw and over stubble, at soil surface and at 2, 4 and 8 cm depth. Temperatures above canopy were also recorded.

Daily mean temperatures and thermal amplitudes in the top soil layer covered by straw mulch were smaller than those verified either by stubble mulch or with soil tillage. Daily minimum temperatures in mobilized plots or covered by stubble mulch were smaller than those verified in plots covered by straw mulch, therefore being the former treatments more susceptible to frost than the later ones. Thermal differences between the four plots decreased significantly with wheat growth. Implications of these techniques of soil temperature control for crop growth are also discussed.