Experimental results and modelling of humidity control strategies for greenhouses in continental and coastal settings in the Mediterranean region. I: Experimental results and model development

A. Perdigones1, V. Valiño1, J. L. García1*, F. Baptista2, J. I. Montero3, R. M. Benavente1 and S. de la Plaza1

1 Departamento de Ingeniería Rural. ETSI Agrónomos. Universidad Politécnica de Madrid (UPM). 28040 Madrid. Spain
2 Departamento de Engenharia Rural. Universidade de Évora. Apdo. 94. 7002-554 Évora. Portugal
3 Institut de Recerca i Tecnologia Agroalimentàries (IRTA). Ctra. de Cabrils. 08348 Cabrils (Barcelona). Spain

Abstract
Experimental strategies for controlling humidity were compared in a greenhouse sited in Madrid, a continental site in the Mediterranean region. Small roof window apertures significantly reduced the relative humidity with only a limited increase in associated energy consumption. A simplified climate model with four energy exchange terms (heating, insolation, losses through structure, and losses through windows) and three mass exchange terms (evapotranspiration, losses through structure, and losses through windows) was validated, allowing relative humidity to be predicted with an error of < 9%.

Additional key words: energy consumption, heating, moisture content, ventilation.