

Comparison of Humidity Conditions in Unheated Tomato Greenhouses with Different Natural Ventilation Management and Implications for Climate and *Botrytis cinerea* Control

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Abstract

The objective of the research was to investigate the influence of nocturnal ventilation on the humidity conditions in unheated tomato greenhouses and the consequences for *Botrytis cinerea* control. Experiments were carried out at the Instituto Superior de Agronomia in Lisbon in two identical adjacent double-span greenhouses covered with three layer co-extruded film. The climate was controlled by natural ventilation, using continuous apertures located on the roof and side walls over the entire length of the greenhouses. Two different natural ventilation treatments were randomly assigned to the greenhouses. One treatment was permanent ventilation (PV), with the vents open during the day and night, while the other was classical ventilation (CV), in which the vents were open during the day and closed during the night. A spring tomato crop (*Lycopersicon esculentum* Miller), cultivar *Zapata* was grown directly in the soil between the end of February and the end of July. The growing technique was the usual for greenhouse tomatoes in Portugal. Trickle ferti-irrigation tubes were located between each two rows of plants. Climatic data were measured with three meteorological stations, one located in the centre of each greenhouse and one outside. All data were averaged and recorded on an hourly basis using two data logger systems. The number of leaflets with lesions caused by *B. cinerea* were counted and removed from the greenhouse from the randomly selected groups of plants. A significant reduction of air humidity occurred in the nocturnally ventilated greenhouse. Nocturnal or permanent ventilation was shown to give a great contribution to reducing disease severity on tomato leaves caused by *B. cinerea*. Nocturnal ventilation management is an environmental control technique which can be used as a prophylactic control measure, since it reduces the severity of *B. cinerea* on tomato crops grown in unheated greenhouses, enabling a reduction in chemical use and lowering both production costs and environmental impacts.

INTRODUCTION

In Mediterranean countries, like Portugal, most greenhouses are very simple constructions, covered with polyethylene films and without heating systems. Environmental control is essentially achieved using various ventilation techniques to control temperature and humidity, which are in most cases far from ideal and strongly dependent of outside conditions.

Most crops can withstand a wide range of relative humidity, from very low to very