

Energy use for greenhouse heating in organic production in southern European countries

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Abstract

The vast majority of southern European greenhouses are unheated. Nevertheless, during the coldest months growth is retarded, since average minimum temperatures in the warmest European areas are between 7 and 9°C. Therefore heating is highly desirable in the winter, but in spite of the positive response of crops to heating its economic profitability is open to debate. Heating is accepted by most organic regulations in different countries; provided it is done efficiently and if the energy source is predominantly renewable energy, heating fits well with the concept of organic production, since it is aligned with the idea of achieving maximum potential of available resources. Little data is available on the energy use for heating in greenhouse horticulture in southern Europe. This study tries to cover this gap of knowledge since it presents the energy consumption for heating in three locations particularly devoted to greenhouse production: Almeria (southern Spain), Faro (southern Portugal) and Acate, Ragusa province (southern Italy). Daily heat requirements based on the temperature difference between the night set-point temperature and the minimum open air temperature were calculated by a simple model. Cumulative heat requirements were estimated by the summation of daily requirements. Calculations show that heat requirements grow exponentially with the set point temperature. As expected, calculations for Faro and Ragusa presented higher values since the open air night time temperature was lower than in Almeria. Heat requirement can be reduced with the help of energy saving techniques such as double walls and thermal curtains. Our study presents the expected energy savings for the three locations under consideration in greenhouses with a polyethylene thermal screen. It also shows that the greenhouse can benefit from the use of passive means, that is, without the application of external energy.

Keywords: energy saving, passive greenhouses, thermal curtain

INTRODUCTION

Currently there is no common regulation for energy use in Organic Greenhouse production (OGH), probably in view of the climate differences in the EU and abroad. The EU directive on organic agriculture does not set limitations on the use of energy, but rather promotes the responsible use of energy and of natural resources. Some countries, such as Sweden and Switzerland have developed their own standards, which specific restrictions on the amount of energy and on the energy sources (Stanghellini et al., 2016).

But while greenhouse heating is mandatory in central and eastern European countries, southern European areas in the vicinity of the Mediterranean Sea benefit from mild winter climates which make heating not essential. Actually most southern European greenhouses are unheated; therefore they seem to fit well with the concept of low inputs and low emissions associated to organic production.

Nevertheless, minimum winter temperatures are far below what it is considered as optimum for the majority of crops, and so such southern greenhouses suffer from cold

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