

Article

Effect of Greenhouse Film Cover on the Development of Fungal Diseases on Tomato (*Solanum lycopersicum* L.) and Pepper (*Capsicum annuum* L.) in a Mediterranean Protected Crop

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Abstract: Greenhouses on the Mediterranean coast mainly use plastic materials as their cover. The influence of light exerted by these materials directly affects the crops by modifying the environment in which they develop. The aim of this study was to analyze the effect of the use of two plastic films in an experimental greenhouse on the development of fungal diseases in two spring–summer crop cycles: tomato (*Solanum lycopersicum* L.) from February to July 2021 and pepper (*Capsicum annuum* L.) from February to July 2022. The study was carried out in Almería (Spain) in a multispan greenhouse divided transversely into two sectors by a polyethylene sheet. A commercial film was installed in the east sector (90% of transmissivity and 55% diffusivity) and an experimental film was installed in the west sector (85% of transmissivity and 60% diffusivity). In addition, the effect of the yield and quality of the harvested fruit was determined. In this study, two diseases were established naturally on the crop: (i) powdery mildew (*Leveillula taurica*) in both the tomato and the pepper crop cycles and (ii) early blight (*Alternaria solani*) in the tomato. The analyses of both diseases showed that the areas of the greenhouse that used the plastic cover, which presented a lower sunlight transmissivity, showed higher levels of disease than the areas that used the plastic cover that allowed greater transmissivity of light within the greenhouse, differing statistically in some phases of the crop. The marketable yield was 4.2% (for tomato) and 3.1% (for pepper) higher in the sector with the experimental film with high transmissivity. For both crops, the quality of the fruits did not show statistically significant differences.

Keywords: greenhouse; cover film; protected cultivation; fungal infection

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1. Introduction

Almería is the Mediterranean region with the highest concentration of greenhouses in Europe and in the world, with a greenhouse land surface of 32,827 ha in 2021 [1]. Mediterranean greenhouses are mainly composed of tensile steel cable structures supported by columns and covered with transparent plastic roofs [2]. These greenhouses protect crops from external environmental conditions using mainly passive climate systems without energy inputs [3], making them more sustainable with a lower carbon footprint [4].

Plastic covers can increase the level of diffuse radiation inside greenhouses, reaching diffuse radiation in the shaded areas and providing higher rates of photosynthetic activity in crops [5]. Under cover materials that transform direct light into diffuse light, the light profiles are more homogeneous and can increase yield [6–8] of tomato (9%) [9] and