Microclimatic Conditions at the interior of small-sized insect-proof nethouses with tomato cultivation

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**Abstract.** The use of nethouses as means of crop protection has significantly expanded over the last decade. Insect-proof nethouses can be very efficient especially in the summer period, since they offer protection of the cultivation from harmful insects and environmental hazards. Along with their environmentally friendly character (reduction of insecticides and irrigation needs) they can be a suitable substitute for the open field cultivations which are often severely damaged by enemies and harsh conditions.

Two low-rise steel frame insect-proof nethouses were installed in the field and used for Bellfort tomato cultivation. Open field cultivation was used as control for comparison purposes. Two types of enhanced insect-proof nets were employed as covering materials. The OptiNet 50 mesh (Ginegar, IL) and the 3353BT Biorete 50 Mesh AirPlus (Arrigoni, IT). The first was able to exclude insects by integrating both physical and optical protection through additives which blocked the insects’ vision. Τhe second allowed for better ventilation as compared to typical 50 mesh insect-proof nets.

The aim was to measure the microclimatic conditions of the insect-proof nethouses (temperature, relative humidity (RH) and radiation) and evaluate how they affect the cultivation growth and the crop production quality and quantity. Data were recorded during the summer (June - August 2021), when increased temperatures and RH in the interior of nethouses have been reported. The temperature and the RH values inside the experimental nethouses during the specific period were found to be like the corresponding field values. This may be attributed to the small size of the insect-proof nethouses and the small number of the protected plants. The total radiation transmission at the nethouses interior was found to be approximately 60% for the OptiNet and 89% for the AirPlus net of the incoming solar radiation offering mild shading conditions. The average indoor air velocities were lower than the corresponding outdoor value at height equal to the ¾ of the nethouse height, by 59% for the OptiNet and by 42% for the AirPlus, respectively. It may be assumed that the combination of shading with lower indoor air velocities reduced evapotranspiration of the protected plants. As a result, the plants in the nethouses appeared to be healthier and grew faster with their height being almost double the height of the open field plants. Fruits of bigger size and a higher total yield were harvested from the protected cultivations than from the open field during the harvesting period (9/8 – 2/9/2021). Total yield increase as compared to open field: Airplus: 60%, OptiNet: 157%. Total number of fruits increase as compared to open field: Airplus: 52%, OptiNet: 79%.