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Protected Cultivation of Tomato to Enhance Plant Productivity and Reduce Pesticide Use

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Abstract

Vegetable farming is an important source of income in mountainous areas of northern Thailand. Field cropping of vegetables or ill managed greenhouse production generates problems, especially the excessive use of agro-chemicals. In contrast, the production in state-of-the-art greenhouses, which are insect-proof, can reduce pesticide use, and improve water and fertiliser use efficiency. The aim of the presented study was to compare the overall pesticide use between greenhouse production and field cropping and investigate the influence of UV radiation on plant health and yield formation in tomato (*Solanum lycopersicum* L.). Three varieties were planted in a substrate from peat and coconut fiber and randomly arranged in 4 blocks with 8 plants of each variety in two greenhouses and in the open air. One greenhouse was covered with a UV opaque and another with a UV open plastic film. Photosynthetic active radiation and UV radiation were monitored continuously along with climatic data in each greenhouse and outside. Pest infestation was monitored visually and pest management was responsive. Plant growth and the number of fruit were monitored once per week. Ten weeks after planting, two plants of each block and variety were destructively sampled and analysed for nutrient partitioning. Tomatoes were continuously harvested starting from the eighth week and analysed for mineral composition and classified into marketable yield, undersized fruit and fruit affected by cracking and blossom end rot (BER). As expected, pesticide use inside the greenhouse could be reduced substantially, but crop damage which required pesticide spraying was caused by thrips. The infestation was lower under UV opaque foil due to lack in orientation of the pest insects in absence of UV radiation. In both greenhouses plant growth was enhanced as compared to outside. The occurrence of BER was slightly higher inside, possibly due to higher temperatures during an extraordinarily long dry season. An appropriate set up of greenhouses can substantially improve the productivity and reduce the use of pesticides. These findings need to be confirmed under conditions in the practice and the real yield potential under the conditions in northern Thailand must be analysed.

Keywords: Blossom end rot, greenhouse, *Solanum lycopersicum*, Thailand, thrips