



Tropentag, October 9-11, 2007, Witzenhausen

“Utilisation of diversity in land use systems:  
Sustainable and organic approaches to meet human needs”

## Effect of Greenhouse Cooling Method on the Growth and Yield of Tomato in the Tropics

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### Abstract

Cooling greenhouses in the humid tropics is especially challenging due to the high intensity of solar radiation and humidity prevalent in these regions. The effect of natural ventilation and evaporative cooling on the greenhouse microclimate, growth and production of tomato *Solanum lycopersicum* cv FMTT260 were evaluated. The research was carried out in two greenhouses (measuring 20 m long by 10 m wide) at the experimental site of the “Protected Cultivation Project” on the campus of the “Asian Institute of Technology” (AIT), situated 44 km north of Bangkok in Khlong Luang, Pathum Thani, central Thailand, (14° 04' N, 100° 37' E, altitude 2.3 m). The naturally ventilated greenhouse was covered with a UV-absorbing plastic film on the roof and a 50-mesh insect proof net on the sidewalls and roof ventilation opening. The evaporative cooled greenhouse was completely covered with the UV-absorbing plastic film and was equipped with a fan and pad cooling system. In each greenhouse, 300 tomato plants were grown at a density of 1.5 plants m<sup>-2</sup> and maintained for 15 to 20 weeks. Results from two seasons show that the cooling method influenced the greenhouse microclimate, plant growth and yield. Although evaporative cooling lowered greenhouse temperature, the unwanted increase in humidity resulted in fungi infections and reduced transpiration. Plants grown in evaporatively cooled greenhouse were 30 cm to 45 cm shorter than those grown in naturally ventilated one. Differences were also noted in flowering, leaf area, dry matter partitioning and harvested yield. The significance of cooling method and greenhouse covering material on plant growth and production in protected cultivation systems in the tropics is discussed.

**Keywords:** Evaporative cooling, greenhouse, microclimate, natural ventilation, nets, tomato, tropics