Tropentag, October 9-11, 2007, Witzenhausen

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

Partial Canopy Shading as a Remedy of Leaf Chlorosis and its Influence on Flowering of Lychee Trees

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Abstract

Lychee (*Litchi chinensis* Sonn.) is one of the most important cash crops of northern Thailand. As the trees require low temperatures to induce flowering, lychee production is restricted to upland areas with shallow top soils which lack in many nutrients, especially micro-nutrients, such as B and Zn. It was observed that many trees are affected by leaf chlorosis with negative impact on plant performance. The hypothesis was that these chlorosis are a result of micro-nutrient deficiency in combination with high light intensity, as they occur during the winter months of November and December, where light intensity is highest due to cloudless sky.

To overcome the leaf chlorosis and to analyse their impact on flower induction, ten 15-year-old 'Hong Huay' lychee trees were partially shaded with black polyvinyl screens (light transmittance: 50 %). The shading took place in October 2006 (two months before flowering) and was applied to single branches of southwest exposition whose leaves are especially susceptible to chlorosis. Between October 2006 and April 2007, the chlorophyll concentration in lychee leaves with and without shading was determined by use of a SPAD metre (Minolta 501) as an indicator for occurrence and intensity of chlorosis. Flowering was evaluated in February 2007. The photosynthetic rate was determined by use of gas exchange measurements (CIRAS 1, PP systems) for shaded and non-shaded and chlorotic and non-chlorotic leaves, respectively.

Shading had a significant effect on leaf chlorophyll concentration after one month. SPAD reading of shaded leaves - without typical Zn deficiency symptoms - was higher (SPAD value 40–60) as compared to non-shaded leaves (SPAD value 20–30). In contrast to expectations, the percentage of flowering was negatively affected by shading. The photosynthetic rate was significantly higher in leaves without chlorosis as compared to chlorotic leaves and shaded leaves.

These results show that high light intensity was mainly responsible for chlorosis. By shading, the occurrence and intensity of chlorosis could be decreased. However, shaded leaves had a lower photosynthetic rate, so that the plant performance and particularly flower induction were adversely affected. Other measures to prevent chlorosis, e.g. improvement of the nutritional status are required.

Keywords: Chlorophyll, *Litchi chinensis*, micro-nutrients, photosynthesis

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