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Effects of $KClO_3$ and Water Deficit on Flowering and Growth Characteristics of Longan

CHITI SRITONTIP^{1,2}, PATUMPORN TIYAYON², PITTAYA SRUAMSIRI³, DARUNI NAPHRUM³, PAWIN
MANOCHAI⁴, MARTIN HEGELE², JENS WÜNSCHE²

¹Rajamagala University of Technology, Lampang Agricultural Research and Training Center, Thailand

²University of Hohenheim, Institute of Special Crop Cultivation and Crop Physiology, Germany

³Chiang Mai University, Department of Horticulture, Thailand

⁴Mae Jo University, Department of Horticulture, Thailand

Abstract

Longan is one of the most important subtropical fruit crops in Thailand, both in terms of crop yield and export volume. In 1998, Thai longan farmers began to apply potassium chlorate ($KClO_3$) for inducing off-season flowering and soil drench is most effective method. Nowadays fresh longan fruits are available in domestic markets almost all year round. However, irrigation management is critical for off-season longan production that falls into the rainy season. Due to high relative humidity, high soil moisture and also low light intensity the percentage of flowering is greatly reduced when compared to on(dry)-season production.

The objective of this study was (1) to study the time-dependent hormonal changes in various plant tissues following the application of $KClO_3$ and (2) to determine whether total carbohydrates may be limited under off-season fruit production system and by establishing three crops in two years. The experiment was carried out at the Lampang Agricultural Research and Training Center, northern Thailand, and consisted of 64 two-year-old longan trees (cv. Daw) randomly assigned to four treatments; well-watered $\pm KClO_3$ and water deficit $\pm KClO_3$. All trees were grown in lysimeter containers with a capacity of 150 L and treated with $KClO_3$ in November 2007.

It was found that in water deficit and full irrigation treatments approximately 90% of all buds flowered at 25–27 days after the application with $KClO_3$, whereas both treatments without $KClO_3$ application did not flower. The efficiency of photosystem II (Fv/Fm), leaf net CO_2 assimilation rate, transpiration rate and stomata conductance were reduced in all treatments except when full irrigation was applied. Leaf chlorophyll content was not significantly different between the treatments.

The change of plant bioregulators such as indole-3-acetic acid (IAA), gibberellins ($GA_{1,3,20}$ measured as GA_3 equivalents), and the cytokinins isopentenyladenin / isopentenyladenosin (iP/[9R]iP) and trans-zeatin/t-zeatin riboside (Z/[9R]Z) were determined in leaves, bark, wood and terminal bud and results will be presented at the Conference. Treatment effects on carbohydrate concentration, dry matter production, fruit yield and quality in longan will be determined destructively at harvest in June 2008.

Keywords: Carbohydrate, *Dimocarpus longan* L., longan, leaf photosynthesis, Thailand