

Teerarat Chamchaiyaporn 2014: Effects of Kaolin on Photosynthesis, Carbohydrate Content, Fruit Yield and Fruit Quality in Mango (*Mangifera indica* L.) cv. Nam Dok Mai. Doctor of Philosophy (Botany), Major Field: Botany, Department of Botany. Thesis Advisor: Associate Professor Kanapol Jutamanee, Ph.D. 140 pages.

Mango (*Mangifera indica* L.) is a major exported fruit where the fruit yield and quality needed to be improved in order to increase the economic value. Kaolin application through the mango leaf coating can play an important role in the improvement of Thai mango production under the tropical climatic condition. The objectives of this study were to: 1) Compare the suspension, precipitation and light transmission properties of four coating materials—kaolin, bentonite, calcium carbonate and dolomite, as well as the leaf coating properties by measuring of photosynthesis after the application of materials. 2) Investigate the effects of kaolin coating on leaf gas exchange, carbohydrate and sugar contents, as well as the mango fruit yield and quality. The results showed that kaolin suspended well in water and showed the slowest rate of precipitation when compared to the other coating materials studied. In addition, kaolin was the most effective leaf coating material for reducing light transmission as it had the lowest photon transmittance through a glass plate. Mango leaves at 70 days of age treated with kaolin spraying twice a week had net photosynthesis (A) and stomatal conductance ( $g_s$ ) values higher than those of the mango leaves in untreated control group. However, under low light intensity condition, kaolin sprayed mango leaves tended to have more adverse effects on photosynthetic rate than the untreated leaves at 90 days of leave age. At 110 days of leave age, mango leaves on once and twice a week kaolin leave sprayed group tended to have a higher  $g_s$  value than those on control unsprayed group, but there were no significantly different in A values among the mango leaves in all treatment. At 145 days of leaf age, the mango leaf treated with twice a week kaolin leave spraying showed a significantly higher ( $P < 0.05$ ) A value than those of once a week kaolin leave spraying, but no significantly differences from the untreated control group. Foliar application of kaolin twice a week at 70 days of leaf age tended to provide a higher leaf in the maximum rate of rubulose-1,5-bisphosphate (RuBP) carboxylation ( $V_{c \max}$ ) than those of the control by 80%, whereas, at 110 days of leaf age, kaolin application twice a week tended to provide a higher leaf in the balance between RuBP carboxylation and RuBP regeneration ( $J_{\max} / V_{c \max}$ ) than those of the control by 180%. There was no significantly difference in the triose phosphate use (TPU) among treatments throughout the study period, and there was no significance in chlorophyll content in mango leaves among the treatment. Foliar application of kaolin once or twice a week on mango leaves had higher sucrose content than those without kaolin treatment at all fruit ages. Glucose and fructose contents in both mango leaves and shoot tips tended to increase from the fruit age 2 weeks, attained the maximum at the fruit age 8 weeks and then decrease until the fruit age 13 weeks. However, glucose and fructose contents in mango shoot tips were higher than those in the leaves. At the fruit aged 13 weeks, the content of glucose, fructose and sucrose in both mango leaves and shoot tips were dramatically reduced while the total carbohydrate contents were maintained at a high level. Kaolin leave spraying of the mango tree can not only increase the total number and weight of the mango fruit but also reduce of severity of anthracnose and fruit rot during the post-harvest ripening period. This suggested that kaolin leaf coating of mango is an useful technology for the plant photosynthesis and the fruit quality improvement under a high temperature and excess solar radiation environment.

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Thesis Advisor's signature