Lampan Khurnpoon 2007: Changes in Cell Wall Composition and Enzyme Activities in Husk Dehiscence of 'Monthong' Durians. Doctor of Philosophy (Horticulture), Major Field: Horticulture, Department of Horticulture.
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'Monthong' durians were harvested at 106 days after anthesis and stored at room temperature (28±3°C) for 10 days. Husk dehiscence started after 4 days in storage. Water-soluble pectin increased during dehiscence with no difference between the husk and the dehiscence zone (DZ). Chelator-soluble pectin continuously increased in both tissues during the storage duration, while from the beginning the concentration was higher in the DZ than in the husk. Na_2CO_3-soluble pectin slightly increased with no difference between the husk and the DZ during the period of storage. The molecular size distribution of three pectin fractions exhibited a shift downward to smaller molecular weights in the DZ than those in the husk, showing that the depolymerization of cell wall pectin increased, as dehiscence progressed. Hemicellulose fractions, both in 1 and 4 M KOH-soluble fractions, decreased during dehiscence, but there was not significantly difference between the husk and the DZ. The molecular size distribution of hemicellulose fractions was not different between the husk and the DZ. The molecular weight profiles of these two fractions exhibited a decreased in both the husk and the DZ. Pectinmethylesterase (PME), β-galactosidase (β-gal) and endo-(1,4)β-D-glucanase (EGase) activities in the husk and the DZ, were about the same, while the activity of polygalacturonase (PG) in the DZ was about two times higher than that in the husk at the beginning. β-gal activity in the DZ began to increase after day 2, reaching a peak on day 4, and then declined. Similar trends were observed in the husk, but occurred 2 days earlier. EGase activity in the husk became stable after day 2, while continuing to increase in the DZ towards the end of storage.

Another set of fruit samples was sprayed with 50 ppm gibberellic acid (GA_3) on two locules, whereas the other two locules were not sprayed. The fruit samples were then stored at room temperature for ripening. It was observed that the GA_3 treatment delayed fruit dehiscence and preserved the green color of the peel. The treatment effect the solubilization of all three pectin fractions, which mainly reduced the increase in chelator-soluble pectin concentration, but otherwise had little effect on the change in water-and Na_2CO_3-soluble pectin. Hemicellulose fractions, both in 1 and 4 M KOH-soluble fractions, only decreased slowly with the GA_3 treatment, but they were otherwise not different from the control during 4 days in storage. After day 4, the decreasing in 4 M KOH-soluble fractions was reduced by the GA_3 treatment. During the process of fruit dehiscence this treatment also reduced the activities of all four cell wall degrading enzymes: PG, EGase, PME and β-gal.

Lampan Khurnpoon — Jingtair Siriphanich — 20 / Feb / 07

Student's signature — Thesis Advisor's signature