Piyarat Pongsai 2009: Effect of Controlled Atmosphere Storage and Modified Atmosphere Packaging using High Gas Permeable Films on Quality of Rambutan (*Nephelium lappaceum* Linn.) cv. Rong-Rien. Master of Science (Packaging Technology), Major Field: Packaging Technology, Department of Packaging Technology. Thesis Advisor: Associate Professor Vanee Chonhenchob, Ph.D. 193 pages.

Effect of controlled atmosphere storage and modified atmosphere packaging using high gas permeable films on quality of rambutans (*Nephelium lappaceum* Linn.) cv. Rong-Rien stored at 12°C was studied. The oxygen and carbon dioxide tolerance limits of rambutans were 5% and 15%, respectively. Rambutans stored in 20%CO_2 (with air and nitrogen balance) showed physiological disorder due to CO_2 injury, which appeared as brown skin and pale green to brown spintern. The optimum controlled atmosphere (CA) for rambutans was 5-10%O_2+5-10%CO_2. The effect of modified atmosphere packaging (MAP) of rambutans was studied by packing 230-250 grams of rambutans in the trays sealed with 3 types of films; LDPE-1, PE-1, and PE-2, which had oxygen transmission rates of 3,800, 7,000 and 12,000 cm^3/m^2.day, respectively. Equilibrium modified atmospheres (EMA) in high gas permeable film packages (PE-2 and PE-1) were 3.6%O_2+9.8%CO_2 and 2.6%O_2+16.1%CO_2, respectively. Carbon dioxide accumulation was observed in LDPE-1 packages, which reached 25.2% in 6 days. Gas atmospheres established in the packages were associated with the shelf life of rambutans. PE-2 had the longest shelf life of 15-17 days, followed by PE-1 (9-11 days) and LDPE-1 (6-8 days). CO_2 injury was observed in the rambutans in LDPE-1 and PE-1 due to high carbon dioxide levels in the packages. Two kilograms of rambutans were packed in the box liner bags; PE-2 and LDPE-2 (OTR = 5,000 cm^3/m^2.day). Equilibrium modified atmospheres in PE-2 and LDPE-2 liner bags were 4.9%O_2+5.1%CO_2 and 3.1%O_2+11.0%CO_2, respectively. Shelf life of rambutans in PE-2 and LDPE-2 liner bags were 12-14 and 9-11 days, respectively. Distribution studies of rambutans were compared between simulated air shipment and cold chain controlled at 12°C. Rambutans under simulated air shipment for 36 days in the trays without heat-sealed films showed severe browning of the spinterns over the acceptable limit after the simulation, while those in PE-2 maintained acceptable quality for 1 day after the simulation. Modified atmosphere packaging of rambutans using high gas permeable film (PE-2) under cold chain condition (12°C) had the longest shelf life of 15-17 days.

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