Particle size distribution generated by nanomist humidifier

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Introduction
Nanotechnology has gained greater interest in recent years as a result of the increase in engineered nano-particle production and their use in a growing number of sectors and products. This technique generates, extracts and delivers extremely fine water mist (Adiga et al. 2005). Because of being very fine particles, it is assumed that when the mist comes into contact with fiberboard containers, it does not make materials become wet, thereby maintaining the strength of container during a long storage period. Furthermore, it is predicted that there is the possibility of nanomist humidifier decreasing the population of microorganisms in air as a filter. Nanomist may collect the microorganisms into water in tank by separating them from the mist by the difference in mass. Presently, there is no study undertaken on nanomist size and its advantages for preserving fresh produce. This study was designed to characterize the particle size emitted by nanomist humidifier.

Materials and Methods
The measurements were undertaken inside the container equipped with nanomist and ultrasonic humidifiers (Mayekawa Co., Ltd, Japan), employing a scanning mobility particle sizer (SMSP model 3936, TSI Inc). The instrument consists of a condensation particle counter (CPC model 3775, TSI Inc) and an electrostatic classifier (EC model 3080), holding a differential mobility analyzer (DMA 3081). The flow rate was set to 0.3 l/min, the up scan time was 100 s and the size range 10-700 nm. The measurements were performed at the outlets of nanomist humidifier and ambient air, then taken with the different frequencies of nanomist generator at 5°C and 90 % relative humidity.

Results and Discussion
The curves of size distribution from nanomist and ambient air peak at a range from 76-82 nm (Fig.1). On the other hand, the number concentration (#/cm³) is completely different between nanomist and ambient air. The nanomist emits at very high concentration of 42,000 particles, approximately 5 times higher than ambient air. The frequency change of nanomist generator slightly alters the particle size. The difference is from 5-10 nm. However, the changed frequency of generator affect greatly on the concentration of particles, higher the frequency bigger the concentration (Fig.2).

Fig. 1. Particle size distribution from two sources

Fig. 2. Particle size distribution with changes of nanomist generator frequency

Reference: