

## 지하공기 이용 히트펌프시스템의 망고온실 난방효과

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### Heating Effect of Greenhouse Cultivated Mangos by Heat Pump System using Underground Air as Heat Source

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Underground air is a special energy source in Jeju and distributes lava cave, pyroclastic, open joint, and crushing zone. A possible area to utilize underground air is 85% of Jeju except to the nearby area of Sambang Mt. and 25m high coastal area from sea level. In Jeju, underground air is used for heating agricultural facilities such as greenhouse cultivated mangos, Hallbong and mandarin orange, pigsty, mushroom cultivation house, etc. and fertilizing natural CO<sub>2</sub> gas by suppling directly into agricultural facilities. But this heating method causes several problem because the underground air has over 90% relative humidity and is inadequate in heating for crops.

Mangos are the most widely grown tropical fruit trees and have been cultivated since 1993 in Jeju. In Jeju, the cultivating area is about 20ha and amount of harvest is 275ton/year in 2010.

In this study, the heat pump system using underground air as heat source was installed in mangos greenhouse which area is 495m<sup>2</sup>. The capacity of heat pump system and heat storage tank was 10RT, 5ton respectively and heating effect and heating performance of the system were analysed.

**Key words :** Underground air(지하공기), Heat pump system(히트펌프), Mango(망고), Greenhouse(온실), Key word(주요용어), Key word(주요용어)

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### Estimation of Greenhouse Heating performance for Ground Filtration Water Source Heat Pump

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This study was carried out in order to estimate the greenhouse performance for Ground filtration water source heat pump which was installed for supplying the heat to the paprika greenhouse in Jinju city. Experimental area of Greenhouse was 3,300m<sup>2</sup>, For keeping the heat from greenhouse, single plastic covering and double thermal screen was installed. With considering all of greenhouse insulation condition and designed heating temperature, heating capacity for experimental greenhouse was calculated as 320,000kcal/hr. Coefficient of performance(COP) of Ground filtration water source heat pump was gauged and greenhouse heating performance was tested from February 1 to February 28 in 2011. The result showed that COP of heat pump was in the range of 3.7~4.7 and COP of heating system was in the range of 3.0~3.5. The value of COP was very high and the temperature inside greenhouse was well corresponded to the setting temperature of greenhouse environment controlling system. lots of Ground filtration water made the the number of well fewer and the expense for installing heating system cheaper than that of geothermal system used customarily. and this system went beyond the limitation of intaking amount of groundwater in normal Groundwater source heat pump.

**Key words :** Ground filtration water source heat pump(여과수열원 히트펌프), heating performance(난방 성능), Greenhouse(온실)

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