

동계 근권 온도 및 가온방법이 양액재배 장미  
'리틀마블'의 생육과 수량에 미치는 영향

**Growth and Yield of Hydroponic Rose "Little Marble" as Affected by  
Root Zone Temperature and Heating Method in Winter Season**

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**Abstract**

This experiment was conducted to investigate the effect of root zone heating on the growth of cut minirose *Rosa hybrida* L. 'Little Marble' in winter season. Effects of four different root zone temperatures of 16, 20, 24°C and non-heating control on the growth and productivity were compared. Harvested cut-flowers were measured for stem length, stem diameter, fresh and dry weights, numbers of leaves, stems and flowers, days to flower, and chlorophyll concentration. The results showed that mean height was the greatest at 16°C. Days to flower was the shortest at 24°C. Fresh and dry weights of top (shoot+leaf+flower), shoot and leaf were the greatest at 20°C. Stem and flower numbers were the greatest at 16°C, but leaf number was the greatest at 20°C. Mean cut flower yield was the greatest at 16°C. Chlorophyll concentration was slightly higher at 16°C, but was not significantly different among the treatments. Stem diameter was the greatest at 20°C. Dry matter was the greatest at 24°C. Total yield of cut rose stems increased with increasing temperature. Combined heating could save 24% in fuel cost as compared to the air heating alone. The results obtained suggested that optimal root zone temperature for the growth of cut rose "Little Marble" was 20°C, and the greenhouse heating energy can be saved by minimal air heating combined with root zone heating to 20°C.

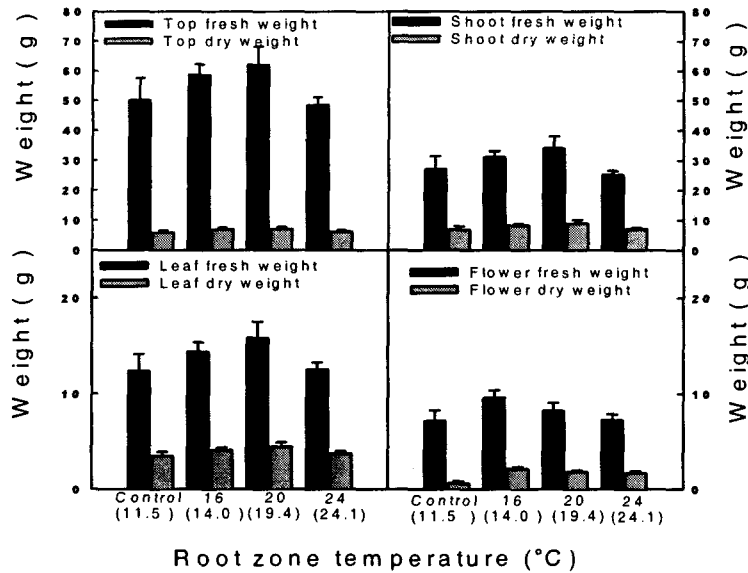


Fig. 1. Fresh and dry weights of top (shoot + leaf + flower), shoot, leaf and flower of *Rosa hybrida* 'Little Marble' cultured for 77 days as affected by root zone temperature. Each point represents an average value of 8 replicate of 3 plants each. Root zone temperatures in ( ) are actual temperatures measured in the rockwool slab.

Table 1. Comparison of fuel consumptions per 33a between root-zone heating and air heating methods for the production of *Rosa hybrida* 'Little Marble'.

Heating method	Energy source	Daily consumption		Monthly consumption		Consumption for 77 days	
		Energy (kcal)	Price (₩)	Energy (kcal)	Price (₩)	Energy (kcal)	Price (₩)
Root zone	Electricity (20°C)	116,100	22,200	3,483,000	666,000	8,939,700	1,709,400
	Diesel (10°C)	298,700	41,200	8,961,000	1,236,000	22,666,600	3,172,400
	Electricity + Diesel	414,800	63,400	12,444,000	1,902,000	31,939,600	4,881,800
Air	Diesel (19°C)	271,169	83,333	8,135,070	2,500,000	20,880,013	6,416,667