

The Effects of the Physical and Chemical Properties of the Growing Media on the Rooting and Growth of Herbaceous Plant Cuttings in Cell Tray Culture

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Though many media for cell-tray culture are now available, the physical and chemical properties of these media are not known and their effects on the rooting and growth of cuttings is not clear.

For this research we made nine media (Table 1) with three percentage air space levels at pF1.0 water tension and three levels of NO₃-N. The minimum concentrations of phosphorus and potassium in the nine media were adjusted to 60 mg 100 g⁻¹ and 100 mg 100 g⁻¹, respectively, by the addition of super-phosphate and potassium sulphate.

Thirty stem cuttings of *Campanula* 'Alpine Blue', *Petunia* 'Million Bells', *Impatiens* New guinea hybrid 'Prepona', and *Mentha spicata* (syn. *M. viridis*) were taken on 27 May 1998, set in a 128-cell (five plants of each in each medium), cell tray and the rooting rate, root length, plant height, and fresh weight of the whole plants were recorded on 20 June 1998.

Table 1. Air space percent and NO₃-N concentration in the media.

Media	1	2	3	4	5	6	7	8	9
Air space	63	63	63	79	79	79	105	105	105
NO ₃ -N (mg 100 g ⁻¹)	31	58	75	31	58	75	31	58	75

Table 2. Effect of air space in the media on the growth of cuttings.

	Air space(%)	<i>Petunia</i>	<i>Impatiens</i>	<i>Mentha</i>
Fresh weight (g)	6.3	0.25	2.11	0.87
	7.9	0.23	2.39	1.36
	10.5	0.23	2.46	1.55
Plant height (cm)	6.3	3.09	3.08	7.16
	7.9	3.15	2.82	8.09
	10.5	2.54	3.01	11.74
Root length (cm)	6.3	8.69	3.97	11.12
	7.5	7.92	4.03	10.88
	10.5	12.10	3.93	12.41

Table 3. Effect of NO₃-N concentration in the media on the growth of cuttings.

	NO ₃ -N (mg 100 g ⁻¹)	<i>Petunia</i>	<i>Impatiens</i>	<i>Mentha</i>
Fresh weight (g)	31	0.22	1.99	1.47
	58	0.28	2.36	1.22
	75	0.20	2.61	2.07
Plant height (cm)	31	2.77	2.79	10.31
	58	3.27	2.84	9.71
	75	2.85	3.25	8.21
Root length (cm)	31	10.25	3.99	11.80
	58	10.10	3.61	10.38
	75	8.35	4.33	12.13

Of the three air-space levels of the media, the fresh weight of *Impatiens* and *M. spicata* were highest in the medium containing 10.5% water. The fresh weight of *Petunia* was almost the same in all water content levels, however, root length was significantly longer in the medium with 10.5% air space. Growth and rooting of all plants was significantly lower in media with 6.3% air space. These results suggest that a 6.3% water content, namely, 6.3% air space at pF1.0 water tension is not sufficient for the rooting and growth of the cuttings, but more than 10.5% air space is sufficient.

In the three NO₃-N concentration levels the fresh weight of *Impatiens* and *M. spicata* was largest in 75 mg 100 g⁻¹ and smallest in 31 mg 100 m g⁻¹ and 58 mg 100 g⁻¹, respectively. The root lengths of *Petunia* showed no significant difference in any of the three NO₃-N levels.

An interactive effect on the fresh weight of the plants was recognized between the water content levels and the NO₃-N levels in the media, i.e, the weight of *Petunia* was highest with a 10.5% air space and 58 mg 100 g⁻¹ NO₃-N, while *Impatiens* and *M. spicata* were largest with a 10.5% air space and 75 mg 100 g⁻¹ NO₃-N.

These results indicate that the medium containing about 10% air space at pF1.0 water tension with 75 mg 100 g⁻¹ NO₃-N is effective for rooting cuttings of herbaceous plants, however, the mortality rate of *Campanula* was extremely high in all media, so more tests using other species are required to produce a medium suitable for general use.