

**Table 3.** Biochemical composition between Iron deficient and normal Kanva-2 variety of mulberry

Biochemical constituents	Iron deficient leaf	Normal leaf	t value
Nitrogen (%)	2.99 ± 0.039	4.50 ± 0.056	33.35
Phosphorus (%)	0.011 ± .00058	0.032 ± 0.00082	21.00
Potassium (%)	1.47 ± 0.018	2.25 ± 0.021	60.42
Calcium (%)	2.46 ± 0.061	2.39 ± 0.020	NS
Magnesium (%)	2.09 ± 0.052	1.98 ± 0.082	NS
Iron(ppm)	228 + 1.080	309+1.291	45.05
Crude protein (%)	18.69 + 0.241	28.13 ± 0.353	33.19
Chlorophyll a (mg/g fresh weight)	0.16 ± 0.003	1.84 ± 0.015	96.99
Chlorophyll b (mg/g fresh weight)	0.06 ± 0.003	0.79 ± 0.006	238.29
Total chlorophyll (mg/g fresh weight)	0.21 ± 0.003	2.62 ± 0.003	417.42

Significant at P < 0.05; NS - Not significant

- Manimegalai, S., Subramanian, A. and Chandramohan, N. (2000). Efficacy of bed disinfectants and botanicals against grasserie disease of silkworm, *Bombyx mori* L. *Sericologia*, **40**: 585-590.
- Piper, C.S. (1966). Soil and Plant Analysis. Hans Publishers, Bombay.
- Sadasivam, S. and Manickam.A.(1996). *Biochemical Methods. New Age International (P) Ltd, New Delhi*, pp. 190-192.
- Sadasivam, S. and Manickam.A.(1996). *Biochemical Methods. New Age International (P) Ltd, New Delhi*, pp. 190-192.
- Singhvi, N.R., Kodandaramaiah, J., Munirathnam Reddy, M., Katiyar, R.S. and Sarkar, A. (2002). Symptomatological study of nutrient deficiency in mulberry variety VI under field conditions. *Indian J. Seric.*, **41**: 66-69.
- Subbaswamy, M.R., Singhvi, N.R., Magudam, S.B., Vedavyasa, K., Srinivasan, E.B., Reddy, M.M., Sarkar, A. and Datta. R.K. (2001). Mulberry nutrition and flacherie occurrence at field level. *Indian Silk*, **40**: 13-14.

(Received : July 2004; Revised : October 2004)

Madras Agric. J. 92 (1-3) : 172-178 Jan-March 2005

<https://doi.org/10.29321/MAJ.10.A00027>

## Effect of media and growth regulators on multiple shoot production in shoot tip explants of gerbera

L. JEEVA JOTHI, G.BALAKRISHNAMOORTHY, M.VIJAYA KUMAR AND R.MURUGESAN  
*Horticultural Research Station, Yercaud - 636 602*

Gerbera, one of the popular cut flowers in the domestic and international trade has attracted several private organisations. Cut gerberas are normally propagated through divisions, which is too slow to meet the growing demand for

planting materials. Hence, tissue culture is the only alternative to produce large quantity of plants in a short time. The success of mass multiplication through *in vitro* depends on the composition of media, concentration of growth

regulators and the cultivars used. In the present experiment, the influence of three media with different concentrations of BA on the production of multiple shoots in ten cultivars of gerbera was studied at Horticultural Research Station, Yercaud between 1998 to 2001.

Shoot tip explants collected from field grown plants of ten cultivars of gerbera namely Can Can, Gold Spot, Impala, Niveda, Rosabella, Sunset, Supreme, Terracerise, YCD.1 and YCD.2 were cultured in gerbera multiplication medium (Murashige and Skoog, 1974). The axillary shoots were separated and sub cultured to obtain multiple shoots in three media viz MS, G and  $\frac{1}{2}$  MSH (MS macro half strength and Heller's micronutrients) supplemented with BA at 3.0, 4.0 and 5.0 mg l<sup>-1</sup>. Ten explants were sub cultured for each treatment and replicated thrice. Observations on the number of multiple shoots produced, mean length, fresh weight and dry weight of multiple shoots were recorded 25 days after sub culturing. The observations were statistically analysed and presented in Tables 1,2,3, and 4.

#### *Influence of media on multiple shoot production*

The explants cultured in G medium recorded the highest number of multiple shoots (5.33), the mean longest shoot (4.68 cm), the highest mean fresh weight of 1.059 g and the highest mean dry weight of 0.206 g followed by MS medium, while the lowest values were recorded in  $\frac{1}{2}$  MSH medium. The presence of macronutrients viz calcium nitrate, sodium hydrogen phosphate and potassium chloride in G medium might have resulted in the higher production of multiple shoots. Further, G medium had high concentration of organic constituents viz., thiamine HCl (300 fold) pyridoxine (2 fold) and nicotinic acid (20 fold), which might have contributed for, increased production of vegetative growth. Barwale *et al.* (1986) observed that increasing the concentration of thiamine 17 times increased production of somatic embryos. This finding lends support to the earlier reports of Sree devi (1995).

#### *Influence of concentration of Benzyl adenine*

Pierik *et al.* (1982) also reported that *in vitro* clonal propagation of gerbera depended on the choice of the cultivar and the cytokinin level in the medium. In this experiment, there was an increase in the number of shoots with the increase in the concentration of BA from 3.0 to 5.0 mg l<sup>-1</sup>. Among the three concentrations of BA tested, the medium supplemented with 5.0 mg l<sup>-1</sup> of BA recorded the greatest number of multiple shoots (4.97), followed by BA 4.0 mg l<sup>-1</sup> (4.44) and the lowest in BA 3.0 mg l<sup>-1</sup> (3.68). The longest shoots of 4.86 cm were produced in BA, 4.0 mg l<sup>-1</sup> followed by 3.0 mg l<sup>-1</sup> (3.95 cm). BA at 5.0 mg l<sup>-1</sup> recorded the highest mean fresh & dry weights of 0.856 g and 0.151 g respectively while the lowest values were recorded in BA at 3.0 mg l<sup>-1</sup> (0.542 g and 0.092 g).

#### *Effect of cultivars*

According to Messequer and Mele (1987), the effect of cytokinin in organ cultures varied according to the particular compound used as well as the variety of explants. Out of the ten cultivars, YCD 1 recorded the highest number of shoots (5.56), the mean longest shoot (5.45 cm), fresh weight (0.990 g) and dry weight of shoot (0.172 g) while, Cv. Rosabella registered the lowest values for the above characters. George (1993) the gerbera cultivars differed in the capacity to regenerate on any given medium with specific combinations of growth regulators.

The ideal medium for the production of multiple shoots was found to be G medium, which recorded the highest number of shoots, the mean longest shoots, the greatest fresh weight and dry weight of shoots. Higher concentration of BA (5.0 mg l<sup>-1</sup>) produced the highest number of shoots and recorded the highest mean fresh & dry weights. Out of the ten cultivars, YCD.1 recorded the highest number of shoots, the mean longest shoots, the highest fresh and dry weights of shoots.





Table 3. Effect of media and BA on the fresh weight of multiple shoots in gerbera cultivars

Cultivars	Fresh weight of multiple shoots (g)													Grand Mean			
	MS					G					½ MSH				Mean		
	BA3	BA4	BA5	Mean	BA3	BA4	BA5	Mean	BA3	BA4	BA5	Mean	BA3		BA4	BA5	
Can Can	0.495	0.688	0.850	0.678	1.007	1.206	1.472	1.228	0.180	0.407	0.396	0.328	0.561	0.767	0.906	0.745	
Gold Spot	0.406	0.528	0.629	0.521	0.708	0.948	0.844	0.833	0.297	0.446	0.564	0.436	0.470	0.641	0.679	0.597	
Impala	0.447	0.646	0.904	0.666	0.570	0.853	1.197	0.873	0.333	0.407	0.516	0.419	0.450	0.635	0.872	0.653	
Niveda	0.408	0.480	0.680	0.523	0.817	1.069	1.323	1.009	0.243	0.258	0.369	0.290	0.489	0.602	0.791	0.627	
Rosabella	0.345	0.592	0.567	0.501	0.703	0.808	0.908	0.806	0.117	0.297	0.324	0.246	0.388	0.566	0.600	0.518	
Sunset	0.450	0.668	0.799	0.639	1.083	1.146	1.260	1.163	0.207	0.256	0.378	0.280	0.580	0.690	0.812	0.694	
Supreme	0.648	0.848	1.026	0.841	0.766	1.116	1.113	0.998	0.272	0.473	0.564	0.436	0.562	0.812	0.901	0.758	
Terracerise	0.456	0.752	0.901	0.703	0.629	0.862	1.197	0.896	0.243	0.368	0.396	0.336	0.443	0.661	0.831	0.645	
YCD1	0.795	0.966	1.309	1.023	1.273	1.461	1.686	1.473	0.297	0.517	0.610	0.475	0.788	0.981	1.202	0.990	
YCD2	0.660	0.800	1.020	0.827	1.083	1.345	1.323	1.250	0.333	0.363	0.564	0.420	0.692	0.836	0.969	0.832	
Mean	0.511	0.697	0.869	0.692	0.864	1.081	1.232	1.059	0.252	0.379	0.468	0.367	0.542	0.719	0.856		
					SEd				CD (0.05)				CD (0.01)				
	V				0.013				0.026				0.036				
	M				0.007				0.014				0.019				
	B				0.007				0.014				0.019				
	V x M				0.023				0.045				0.060				
	B x M				0.013				0.025				0.033				
	V x B x M				0.040				0.079				0.104				

Table 4. Effect of media and benzyl adenine on dry weight of multiple shoots in gerbera cultivars

Cultivars	Dry weight of multiple shoots (g)															
	MS				G				½ MSH				Mean		Grand Mean	
	BA3	BA4	BA5	Mean	BA3	BA4	BA5	Mean	BA3	BA4	BA5	Mean	BA3	BA4		BA5
Can Can	0.084	0.112	0.145	0.114	0.191	0.234	0.287	0.237	0.024	0.052	0.056	0.044	0.099	0.133	0.163	0.132
Gold Spot	0.079	0.086	0.107	0.091	0.133	0.184	0.164	0.160	0.040	0.056	0.080	0.059	0.084	0.109	0.117	0.103
Impala	0.065	0.104	0.154	0.108	0.108	0.168	0.234	0.170	0.044	0.052	0.073	0.056	0.072	0.108	0.154	0.111
Niveda	0.072	0.078	0.116	0.089	0.155	0.207	0.258	0.207	0.032	0.032	0.051	0.038	0.086	0.106	0.141	0.111
Rosabella	0.066	0.096	0.096	0.086	0.133	0.156	0.176	0.155	0.016	0.032	0.046	0.031	0.072	0.095	0.106	0.091
Sunset	0.055	0.112	0.136	0.101	0.205	0.222	0.246	0.224	0.028	0.028	0.051	0.036	0.096	0.121	0.144	0.120
Supreme	0.074	0.138	0.174	0.129	0.144	0.245	0.217	0.202	0.036	0.060	0.080	0.059	0.085	0.148	0.157	0.130
Terracrise	0.063	0.122	0.154	0.113	0.119	0.167	0.234	0.173	0.032	0.046	0.056	0.045	0.071	0.112	0.148	0.110
YCD1	0.129	0.156	0.223	0.169	0.241	0.285	0.328	0.285	0.040	0.066	0.084	0.063	0.136	0.169	0.212	0.172
YCD2	0.106	0.130	0.174	0.137	0.205	0.261	0.258	0.241	0.044	0.047	0.082	0.058	0.118	0.146	0.171	0.145
Mean	0.079	0.113	0.148	0.114	0.163	0.213	0.240	0.206	0.034	0.047	0.066	0.049	0.092	0.125	0.151	

CD (0.01)

CD (0.05)

SEd

V

M

B

V x M

B x M

V x B

V x B x M

0.004

0.002

0.002

0.008

0.004

0.006

0.011

0.007

0.004

0.004

0.013

0.007

0.013

0.022

0.010

0.005

0.05

0.017

0.009

0.017

0.029

