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The effect of sucrose and a gelling agent on the direct somatic embryogenesis capacity of decaffeinated genotypes of *Coffea arabica* L.

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INTRODUCTION & AIM

The global coffee market is prosperous and can grow further with the availability of low-caffeine coffees created with genetic improvement. However, the multiplication of plants in the selection phase through seed germination should be avoided due to genetic segregation. It is recommended that these be obtained via indirect or direct somatic embryogenesis. In the direct route, *Coffea arabica* forms few somatic embryos. The osmotic concentration of the culture medium can affect the somatic embryogenesis of different species.

This study aimed to evaluate the effect of sucrose and a gelling agent on the direct somatic embryogenesis of low-caffeine genotypes.

METHOD

Leaves collected from thirteen genotypes of *C. arabica* plants in the F3 generation and from the Obatã and Catuaí Vermelho cultivars belonging to the low-caffeine breeding program of the Instituto Agronômico de Campinas, SP, Brasil, were used (Figure 1).

Figure 1 – Coffee Germplasm Bank (IAC), Campinas, São Paulo, Brazil.

Explants obtained from these leaves were subjected to the direct route. For this purpose, a culture medium with half the concentration of MS (Murashige & Skoog, 1962) salts with 10 µM of 2-Isopentenyladenine and the addition of 20 or 30 g/L of sucrose and gelled with 5 g/L of agar or 2 g/L of Phytagel was used. Each treatment consisted of ten replications (Figure 2).

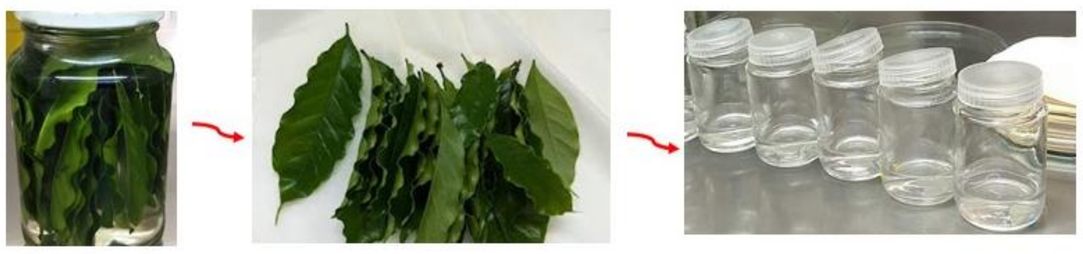

Figure 2 – Leaf disinfection process and obtaining explants.

RESULTS & DISCUSSION

Explants of all genotypes formed somatic embryos by direct somatic embryogenesis (Figure 3). However, the response varied between genotypes. The genotypes 2, 7 and 14 had reduced responses in all treatments tested compared to the others (Figure 4).

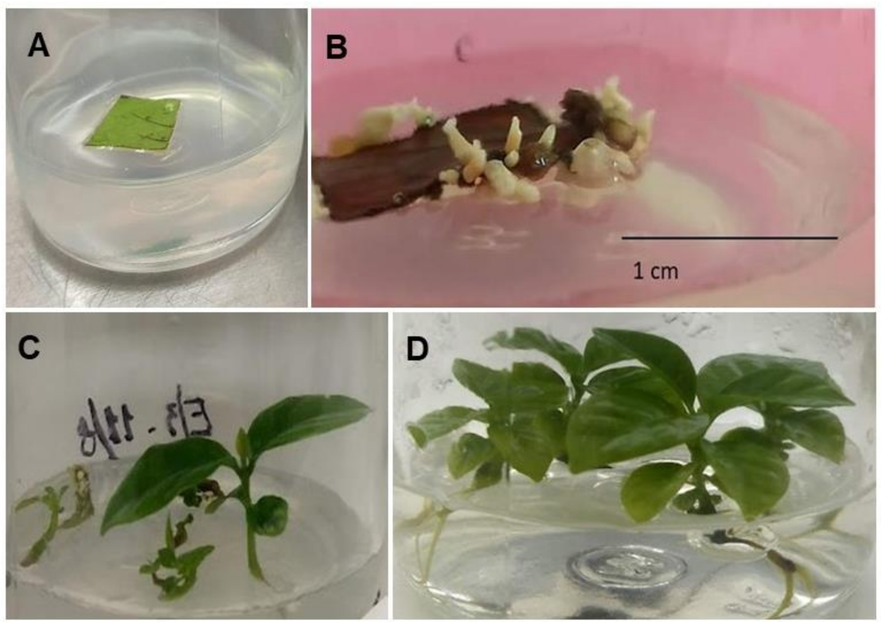

Figure 3 – Leaf disinfection process and obtaining leaf explants.

RESULTS & DISCUSSION

The combination of 20 g/L of sucrose and agar is standard for direct pathway induction in *C. arabica* (Figure 4A). However, Phytagel combined with 20 or 30 g/L of sucrose caused a change in the osmotic concentration of the culture medium, which promoted the direct genotype pathway, respectively in the Figures 4B and 4C.

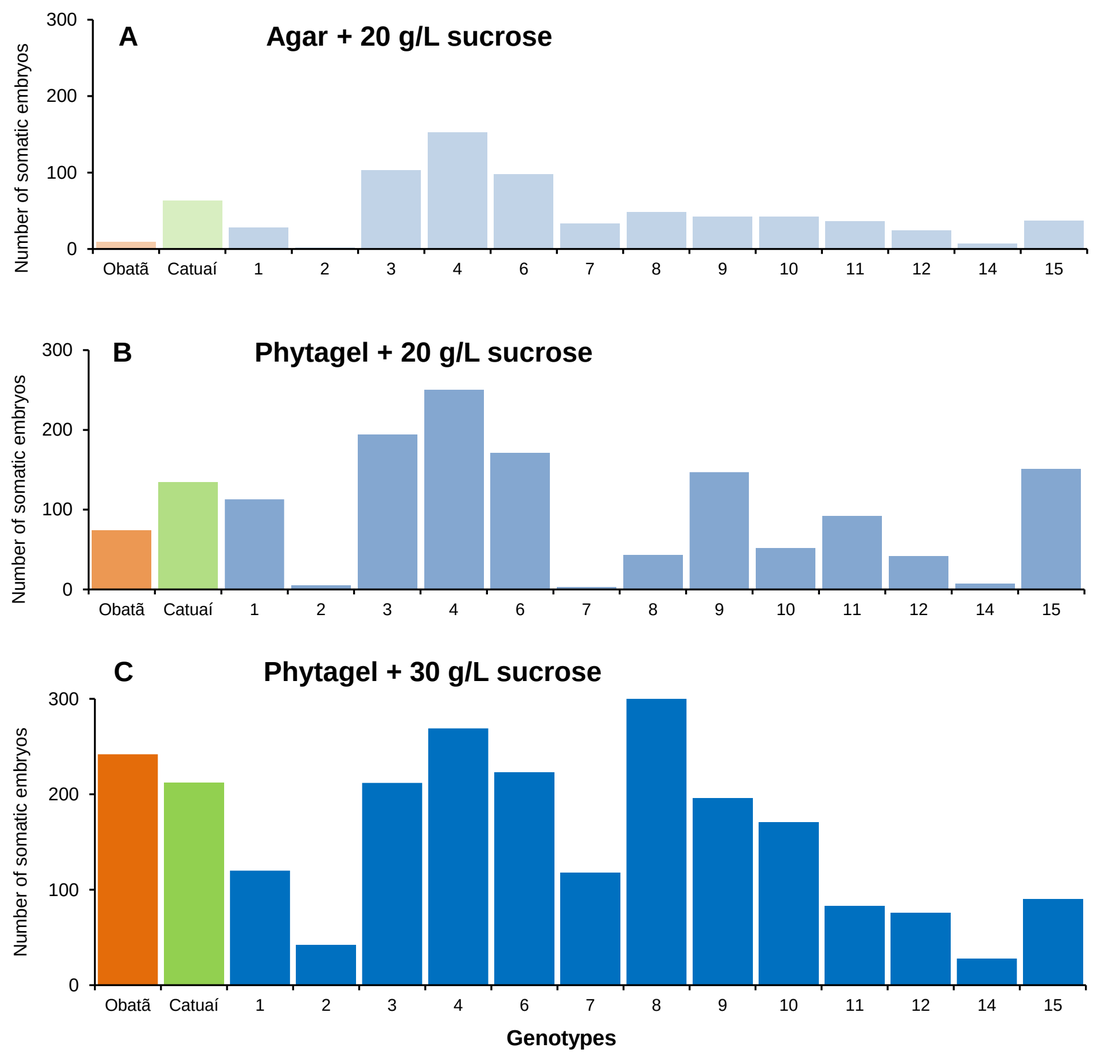

Figure 4 – Number of somatic embryos formed from leaf explants of *C. arabica* of the cultivars Obatã and Catuaí and thirteen genotypes grown in medium with the addition of agar and/or Phytagel and 20 or 30 g/L of sucrose, at 25 ºC and in the absence of light.

Explants of the 13 genotypes in the presence of 20 g/L of sucrose with agar or Phytagel formed a total of 1.821 and 2.645 somatic embryos, respectively. But, those treated with 30 g/L sucrose and Phytagel had 3.775 embryos (Figure 5).

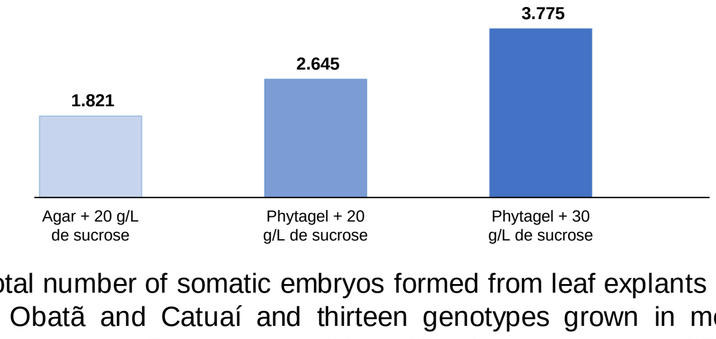

Figure 5 – Total number of somatic embryos formed from leaf explants of *C. arabica* of the cultivars Obatã and Catuaí and thirteen genotypes grown in medium with the addition of agar and/or Phytagel and 20 or 30 g/L of sucrose, at 25 ºC and in the absence of light.

CONCLUSION

These results showed that the osmotic concentration may participate directly or indirectly in the control of the direct somatic embryogenesis of *C. arabica*.

FUTURE WORK / REFERENCES

Our next step will be to test other concentrations of sucrose with the aim of verifying whether this factor can play a greater role in controlling the occurrence of direct somatic embryogenesis in *C. arabica*.

Murashige, T.; Skoog, F. A revised medium for rapid growth and bioassays with tabacco tissue culture. Physiology Plantarum, 15: 473-497, 1962.