GENETIC CONTROL OF *IN VITRO* ORGANOGENESIS IN *PETUNIA x HYBRIDA* HORT.

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Despite the fact that *Petunia x hybrida* plant has become a model plant in genetic field, there are few reports about genetic model of *in vitro* organogenesis.

The aim of the present project was to formulate a hypothesis on the number of genes involved in the control of *in vitro* organogenesis in *Petunia x hybrida*. In previous experiments, we had already characterised 16 pure genotypes for their performances *in vitro*. Among them, we chose two lines, here reported as “K” and “L”, that showed opposite behaviours in culture. Line K showed the best performance, whilst line L was the worst for each of the following characters: callus formation ability (97.8%; 76.7% respectively), organogenesis ability (80.7%; 36.2% respectively) and average number of differentiated shoots per explant (6.7 ± 4.6; 2.6 ± 1.9 respectively).

Reciprocal crosses between these lines were performed; further, leaf explants of F1 progenies (KxL; LxK) were induced to differentiate *in vitro* on Murashige and Skoog medium added with 30 gl⁻¹ sucrose, 0.2 mgl⁻¹ IAA, and 1.0 mgl⁻¹ BAP, pH 5.8. Data on callus proliferation, explant shoot differentiation and number of differentiated shoots *per* explant were scored after 7, 14, 21, 28, 34 and 41 days of *in vitro* culture. The frequencies of explants producing callus in each F1 progeny (100.0% and 96.0%) were similar to the parental K genotype, but callus proliferation happened earlier than the parental K. These results suggested the involvement of dominant and additive genes. Interestingly, the frequencies of leaf explant differentiation (94.0% and 91.7%) and the average number of shoots *per* differentiated explant (11.6 ± 4.9 and 9.7 ± 4.1) outperformed the values observed in the line K, hence suggesting a heterosis effect. Moreover, the progenies of the two reciprocal crosses showed significant differences for each of the above mentioned characters, suggesting a maternal effect.

F2 seeds, obtained after self cross of F1 plants (KxL or LxK hybrids) were sown *in vitro*. Twenty one seedlings *per* each reciprocal cross progeny were collected and their leaves were cultured on the above mentioned differentiation medium. Data score, carried out as for the F1 progeny, was performed *per* each F2 progeny. The frequency of callus proliferation observed in both F2 progeny was according to a segregation rate of 13:3. This result suggested the involvement of two loci with a dominant and recessive epistatic action. In contrast, a segregation rate of 9:7 was observed in the frequency of explants differentiated shoots. This segregation rate was according to a genetic model of two complementary loci. Finally, segregation rate of F2 progeny which were differentiated a high or a low number of shoots *per* differentiated explant was doubtful. Result allowed us to hypothesize the presence of two epistatic loci but was not possible to understand what kind of epistatic interaction was present.