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Effect of Mercuric Chloride ($HgCl_2$) on the Establishment of Contamination-Free Cultures from Different Explants of *Viola odorata* L.

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Abstract

Surface sterilization is a critical prerequisite for the successful establishment of contamination-free cultures in plant tissue culture. The present study aimed to standardize the concentration of mercuric chloride ($HgCl_2$) for effective surface sterilization of different explants of *Viola odorata* L., including leaves, petioles, and nodal segments. Healthy explants were collected from field-grown plants and pre-treated with running tap water, Bavistin, and Tween-20 before exposure to different concentrations of $HgCl_2$ (0.05%, 0.10%, 0.15%, 0.20%, and 0.25%) for 3 minutes. Sterilized explants were inoculated onto Murashige and Skoog (MS) medium under aseptic conditions, and observations on contamination, mortality, and survival were recorded after four weeks. Increasing $HgCl_2$ concentration progressively reduced microbial contamination but also increased explant mortality at higher concentrations. For leaf explants, treatment with 0.15% $HgCl_2$ resulted in the highest survival rate (88.80%) with low contamination (9.62%) and minimal mortality (1.57%). Petiole explants exhibited maximum survival (81.31%) at 0.10% $HgCl_2$, whereas nodal segments showed the best response at 0.20% $HgCl_2$ with 70.20% survival and only 11.60% contamination. The findings demonstrate that the optimal $HgCl_2$ concentration varies with explant type and that appropriate sterilization protocols are essential for achieving aseptic cultures while maintaining explant viability. The standardized protocol developed in this study provides a reliable foundation for subsequent *in vitro* propagation and tissue culture applications in *Viola odorata* L.

Keywords: *Viola odorata* L., mercuric chloride ($HgCl_2$), surface sterilization, aseptic culture, explant survival, contamination control, tissue culture, *in vitro* propagation, MS medium, medicinal plant.