Investigating Tissue Regeneration in Kalanchoe laetivirens (Mother of Thousands) Using Bioactive Compounds From Musa paradisiaca (Plantain) and Psidium guajava (Guava)

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Crop damage caused by environmental stress and diseases pose a significant challenge to global food security and agricultural sustainability. Conventional chemical treatments can have harmful ecological effects, highlighting the need for natural alternatives that promote plant resilience. This study investigated the regenerative potential of compounds from Musa paradisiaca (plantain) and Psidium guajava (guava) on Kalanchoe laetivirens (Mother of Thousands), a plant known for its wound-healing properties. It was hypothesized that these plant-derived extracts would enhance tissue regeneration by improving moisture retention and accelerating wound closure. To test this, gelatin-based patches infused with Musa paradisiaca and Psidium guajava extracts were applied to Kalanchoe laetivirens leaves with three standardized wound types: straight cuts, insect bruises, and accidental tears. Tissue regeneration was observed over four days, assessing wound contraction, hydration, and structural integrity. Results showed that Musa paradisiaca facilitated early tissue stabilization, while Psidium guajava promoted wound contraction and moisture retention. The combination of both extracts yielded the most effective healing response, significantly outperforming untreated leaves, which exhibited dehydration and minimal recovery. These findings support the potential of bioactive plant compounds as sustainable alternatives to synthetic agricultural treatments. By enhancing plant wound healing and resilience, natural biostimulants could contribute to reducing chemical dependency in agriculture, improving crop recovery, and mitigating environmental impact. Future research should focus on isolating specific active compounds and exploring large-scale applications in commercial farming.

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