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Preventing tissue necrosis with activated charcoal alternatives during shoot multiplication of coconut

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The demand for coconut products, such as coconut-oil, -water and -milk, is rising worldwide. However, the coconut production is currently not able to keep up with the demand due to ageing plantations, pests, and diseases. High quantities of high producing, disease resistant, and drought tolerant coconut plantlets are therefore urgently needed. Our lab developed an innovative clonal micropropagation method, that enables mass production of desired varieties. With current *in vitro* methods and during the propagation phase, tissue browning or necrosis of parts of the proliferating material occurs routinely. Different components including activated charcoal (AC), ascorbic acid, and silver thiosulfate, were added to the proliferation medium to investigate their potential reducing effect on browning. While AC was previously shown to prevent tissue necrosis during somatic embryogenesis in coconut, without interrupting the proliferation process, we demonstrated that the addition of 1g/L AC prevented shoot propagation. Therefore, we opted for components that do not interfere with the plant growth regulators present in the medium, such as ascorbic acid, which prevents oxidation and silver thiosulfate, an ethylene inhibitor. While different concentrations of ascorbic acid were shown not to affect tissue necrosis, silver thiosulfate had a positive trend with increasing concentrations preventing more tissue necrosis. Tissue necrosis mostly started 4-5 weeks after subculture, suggesting that shorter subculture cycles could also help mitigating this problem.

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