COCONUT PALM CLONING THROUGH BUD MULTIPLICATION:

A WELCOME TOOL FOR MASS CLONAL PROPAGATION AND CONSERVATION OF COCONUT GENETIC RESOURCES

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Pest and diseases such as lethal yellowing and the rhinoceros beetle, the occurrence of more intense cyclones due to climate changes as well as ageing plantations make that there is an enormous demand for good quality coconut planting materials. Additionally, coconut genetic resources, essential for breeding superior palms and that are currently all maintained in field collection are suffering from the same dangers making that the coconut biodiversity is thus threatened.

A clonal multiplication systems for coconuts, called somatic embryogenesis was already developed a few decades ago but never made it to a real commercial stage. Reasons for this are probably relatively low induction and multiplication rates and the fact that laboratories applying such technique require very specialized and skilled staff. An alternative technology leading to clonal plant multiplication was thus highly desired.

At the KU Leuven Laboratory for Tropical Crop Improvement, Leuven Belgium and in collaboration with the Alliance of Bioversity International and CIAT, such technology was developed. Bart Panis and PhD student Hannes Wilms drew their inspiration from another fruit crop: the banana. From their work on banana plants, it was suspected that a certain plant hormone, TDZ, could also be successful in multiplying coconut trees.

The scientists first extracted the coconut embryo from the nut and then applied the plant hormone to the meristem - or growing point - contained in the embryo. In this way, they succeeded in having the embryo form not only one shoot, but several side shoots. They managed, in turn, to split these shoot clusters and allow new side shoots to grow on them as well. As such, thousands of new specimens of a single coconut plant can be obtained that share the mother plant's exact same genetic profile offering enormous potential for coconut plantations worldwide.

Besides the potential to provide the world with enough high-quality planting materials this methodology can also be applied for the safe and long term conservation of coconut germplasm; this though growing in vitro cultures or though cryopreservation in liquid nitrogen.

The technology was published in 2021 in the International journal "Scientific reports" (see https://www.nature.com/articles/s41598-021-97718-1) and is meanwhile successfully applied in at least four laboratories showing the that it is efficient, user-friendly and can be applied in all tissue culture laboratories. Moreover, compared to the technology using somatic embryogenesis, the present protocol does not involve a callus phase. Plants are thus believed to be genetically more stable.