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Oil palm *DREB1* regulates drought- and cold-responsive genes and induces parthenocarpic fruit development in transgenic tomato

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Statement of the Problem: Drought stress becomes a major problem for the oil palm plantation. It decreases fresh fruit bunch and oil production due to severe vegetative damages. The vegetative damage like accumulation of unopen spear leaves and broken green leaves diminish photosynthetic activity and induce accumulation of reactive oxygen species (ROS). ROS together with abscisic acid and Ca^{2+} induce expression of many stress responsive genes (*SRGs*). The activation of SRGs relies on the transcription factor (TF) activities. Dehydration-responsive element binding 1 (DREB1) is among TFs involved in controlling expression of SRGs under drought. But, the DREB1 TFs are extensively studied in model plant *Arabidopsis thaliana*, which sometimes give limitation to be compared with oil palm. Thus, the aim of this study is to characterize oil palm drought inducible *DREB1*, which also involved in cold-signaling pathway and developing parthenocarpic transgenic tomato fruit.

Methodology & Theoretical Orientation: The oil palm seedlings were exposed to different severity levels of drought stress. The expression of *DREB1* and other SRGs was profiled using qPCR. The intronless *DREB1* was isolated from oil palm genomic DNA and further cloned into an expression vector. Further characterization of *DREB1* was carried out in the transgenic lowland tomato.

Findings: Differential expression of *DREB1* and SRGs was observed under different severity of drought. Ectopic expression of *DREB1* in lowland tomato showed that it also involved in cold stress and formation of parthenocarpic fruit.

Conclusion & Significance: Oil palm *DREB1* involved in adaptation to drought and cold stress by regulating expression of many SRGs. The TF is also responsible for fruit and seed development. This data can be used as potential targets for the enhancement of stress tolerance in oil palm, and the development of parthenocarpic fruits can benefit palm oil production, through genetic engineering and breeding programs.

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