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The Potential of Phase Reversal in Avocado Using *in Vitro* Propagation

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The continuing need for the avocado industry to provide a consistent and high quality product (fruit) is of great importance. One possible way to assure the deliverance of these standards to the market is through the use of tissue culture *(in vitro* propagation). With new developments and recent success in the tissue culturing of the avocado (1); the ability to use tissue culture to provide a homogeneous product of exceptional quality has never been closer. Yet the success of tissue culturing the avocado has been limited to using juvenile tissue for the explant such as the embryonic axes from mature avocado seeds[1]. The use of embryonic axes to clone the parent traits of a particular specimen leaves a cushion for genetic variances, making the use of embryo tissue not favorable for the purpose of *in vitro* (clonal) propagation if the objective is to clone specific parental traits. In some plants, the tissue culturing of mature plant tissue provides a direct means in preserving desired traits for *in vitro* propagation, yet this approach is not very successful in many woody perennials including the avocado. A possible solution may now be at hand: the application of phase reversal.

When a plant changes from a juvenile state to a mature state, this could be defined *as* the phenomenon called "phase change," where juvenility is usually characterized by vigorous vegetative growth and the ability to regenerate organ tissue, while the latter is noted for the competence to flower or the presence of sexual organs. Other characteristics also distinguish between juvenile and mature state such as pigmentation (2), leaf morphology (3), growth rate, and even thorniness in some plants. In most instances, phase change is a permanent feature among plants, with a few exceptions.

Phase reversal is the ability to induce a reverse phase change in plants (from adult to juvenile). Phase reversal has successfully been accomplished through tissue culture in numerous woody perennials such as eucalyptus, where shoots as old as 20 years were used (4).

Phase reversal can be achieved through specific grafting and hormonal treatments customized to a particular plant. The grafting of adult shoots onto juvenile rootstocks with hormonal treatments has been proven to be an effective phase reversal technique, producing juvenile characteristics in the otherwise adult shoots (5).

The ability to install juvenile traits into an adult shoot gives way to a possibly effective way to tissue culture avocado, since the ability to tissue culture avocado with juvenile tissue has already been established.

If phase reversal is possible through the tissue culturing of avocado, this can give way to a whole new approach on crop production. It could give a firm control on how the finished product will turn out: texture, taste, size, and other qualities could be controlled and modified to a large extent.

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