**South African Avocado Growers' Association Yearbook 1997. 20:35**

# *Towards the Development of a Method for the Clonal Propagation of Avocado Rootstocks*

**K Hannweg**
*ARC-Institute for Tropical and Subtropical Crops, Private Bag XI1208, Nelspruit 1200*

Tissue culture or *in vitro* propagation techniques provide an alternative method for the clonal propagation of plants compared with conventional methods. The major difference between conventional propagation and *in vitro* propagation is that the plants are produced under sterile conditions on an artificial medium. Sucrose is normally provided in the nutrient medium as a source of carbohydrates. This means that the plantlets do not depend on photosynthesis and hence are not affected by adverse climatic conditions such as low/high light or extremes in temperature. As a result, growth is not restricted and far higher growth rates can be achieved in tissue culture than is normally obtained using traditional methods. The major disadvantage of *in vitro* propagation is the fact that contaminants such as bacteria and fungi often out-compete the plantlets for the carbohydrate in the medium hence the need for a sterile growth environment.

Tissue culture provides several advantages over conventional propagation. The first, as mentioned briefly above, is the rapid multiplication potential which can be achieved when conditions are optimised. Far larger numbers of plants can be produced in a given time because of the high multiplication rates which can be achieved compared to conventional methods. An important consequence of this is that new and important selections can be released faster than by conventional methods. Furthermore, plants can be produced throughout the year so that they are available during the planting season, thus not dependent on seasonality. A further advantage is that micro-propagation requires only small amounts of starting material, thus it becomes an invaluable technique when material is limited for example when a new selection developed by breeders, looks promising. A further, and perhaps more important advantage, is that plant vigour can be induced *in vitro.* This reactivation of the plant's physiology essentially returns the plant to a juvenile state of growth. Rejuvenation of plant tissue is characterised by increased growth rates, increased rooting ability, potential yield increases and, in general, a change in the plant's morphology (a return to the juvenile growth form). There are several examples of crops (work previously carried out by researchers at the ITSC) whereby rejuvenation has proved to be invaluable *i.e. Eucalyptus* (Vos and Olivier in conjunction with HL and H. pers. comm.), coffee (Vos, pers. comm.) and bananas (Robinson, pers. comm.).

Developing a protocol for clonal rootstock multiplication involves a number of steps tissue culture being used as a tool for plant manipulation and production. These include initiation, multiplication, rooting (either *in vitro* or *ex vitro),* planting out and hardening-off, production of micro-cuttings and eventually, release of the selection of interest. Initiation requires the sterilisation of the plant material to be multiplied up and the

subsequent culture of the tissue on induction medium. Young nodal tissue which is clean and disease-free is used for initiation of avocado shoots. These shoots, once approximately 1,5 cm in length, are transferred to a multiplication medium, multiplied up and then finally rooted. Currently, almost 50 different rooting treatments (both *in vitro* and *ex vitro)* are under investigation and, in addition, various hardening-off trials are also being investigated. Once plantlets are established, they will be maintained in the juvenile state and micro cuttings (having the same juvenile characteristics as the mother plants) from these plants will be used to multiply up a particular rootstock selection with a view to the release of new selections.

In conclusion, current research efforts are therefore being directed towards the eventual intensive production of juvenile cuttings from rejuvenated tissue culture plants which have the potential to far exceed production compared to conventional cuttings. The easy formation of mother microplants and their independence from seasonal constraints permits the creation of an intensive micro cutting production system. These micro cuttings should out-perform conventional cuttings with regard to increased growth rates and increased rooting potential.

## REFERENCES

OLIVIER, J.J. ARC-ITSC, Private Bag X11208, Nelspruit 1200.
ROBINSON, J. (1995) ARC-ITSC, Private Bag X11028, Nelspruit 1200.
VOS, J.E. ARC-ITSC, Private Bag X11208, Nelspruit 1200.