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Improvement of citrus crop through tissue culture

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DESCRIPTION

Biotechnology has been introduced in agricultural practice at a rapid pace and the methods of tissue culture allow the propagation of genetically homogeneous and disease free plant material. Tissue culture is an *in vitro* technique of culturing cell, tissue, organ or any part of the mother plant under artificial nutritional and controlled environmental conditions for the production of new clones (Bonner J, 1936). The resultant clones are the true-to-type of the selected genotype and phenotype. The commercial production of plants through micropropagation or multiplication techniques has several advantages to overcome the traditional methods of propagation through seed, cutting, grafting and air-layering (Mooney DJ, et al, 1999). It has promoted a rapid propagation process that can lead to the production of virus free plants. Plant tissue culture technique has been widely used for rapid plant propagation, disease elimination, improvement of plants and production of *in vitro* secondary metabolites. The excised piece of organ or explant can produce number of plants in a continuous process, relatively in short period and space under controlled conditions. It reduces the possibilities of dependence on season and weather conditions all through the year. In addition the endangered, threatened and rare plant species have been successfully regenerated and conserved by in vitro technology (Rous P, et al 1916). It is due to high coefficient of multiplication from small space and demands for a number of initial plants, that the technology has become extremely popular in the present time. Plant tissue culture technology is considered as most efficient technique for crop improvement programme and for production of soma clonal and gametoclonal variants. The micropropagation application has lot of potential to regenerate plants of superior quality (Steinhardt E, et al, 1913).

It emphasizes application in isolation of useful variants, high yielding genotypes with better stress tolerance capacities and disease resistance. Certain types from callus derived cultures can give rise to clones which contain inheritable characteristic features from parent plants due to the possibility of occurrence of variability leading to development of improved varieties of plants (Vasil IK, 2008).

CONCLUSION

In *vitro* mutation for crop Improvement, the plant breeder has several options in *in vitro* techniques such as micropropagation, protoplast culture, another culture, and embryo rescue, shoot tip and somatic embryogenesis Steinhardt E, Israeli C,. *In vitro* techniques improve the efficiency in obtaining variation, selection and multiplication of desired genotypes. The frequency of tissue culture derived variation or somaclonal variation is low in cereals and fruits. It is always desirable to increase the genetic variability by combining mutagenesis and tissue culture for breeders in crop improvement programme. Few more benefits of *in vitro* mutagenesis include the mutagenic treatment which can be given to large number of cells or protoplast or somatic embryos and rapid multiplication of mutant plant material can be achieved. The *in vitro* selection of mutation requires less space for shoot multiplication under the controlled conditions. The mutation technology has benefitted greatly in genetic improvement of seed and vegetative propagated crops. The chemical and physical mutagens are widely used to induce *in vitro* mutations. Among them, gamma rays, Ethyl Methane Sulphonate (EMS) and Sodium Azide (SA) are widely used for mutation induction. *In vitro* mutation technique

along with plant tissue culture technology provided powerful methodology for improvement of clonally propagated plants. It can induce the desired trait among the *in vitro* grown population and ensure rapid multiplication of the selected mutants under controlled disease free conditions. The International Atomic Energy Agency (IAEA) mutant database has shown over 3000 mutant varieties of plants officially released throughout the world in cereals, ornamentals, fruits, vegetables and oil crop plants.

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