

# Micropropagation of carnation



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Plant tissue culture refers to rapid multiplication and growing of plant cells, organs and tissues on defined solid or liquid media under controlled and aseptic environment. Plant tissue culture technology is world widely being used for the large scale multiplication of different plants. The technology of plant tissue culture commercially is primarily based on micro propagation, in which rapid proliferation is achieved from tiny stem cuttings, axillary buds, and to a limited extent from somatic embryos, cell clumps in suspension cultures and bioreactors. 1

## **MICROPROPAGATION**

Micro propagation as a technique can be defined as the growing plants from seed or small pieces of plant tissue under aseptic/sterile conditions in vitro in a controlled laboratory conditions on specially selected nutrient growth media. This technique of micro propagation is performed in a carefully controlled environment. The media that the plants are grown on contain rich source of carbohydrate, mineral salts in specific range and agar. Sometimes vitamins, amino acids, growth regulators or plant extracts may be added to encourage growth. Different kinds of media are used for different plants growth according to their specificity and need.

## **EXPLANT SOURCE**

Plant tissue cultures are initiated from tiny pieces of plants which are termed as explants, taken from any part of a plant. Practically all parts of a plant can be used and have already being used successfully as a source of explants for micro propagation. In practice, the “ explants” is removed surgically, surface sterilized for aseptic conditions and placed on a nutrient medium to initiate the mother culture that is multiplied repeatedly by subculture. 1

## **PROCESS OF MICROPROPAGATION**

The process of plant micro-propagation focuses to produce clones of any plant in large numbers. This process of micro propagation is usually carried out in the following stages:

- Stage 0: Pre-propagation step or selection and pre-treatment of suitable plants.
- Stage I: Initiation of explants – surface sterilization, establishment of mother explants.
- Stage II: Subculture for multiplication/proliferation of explants.
- Stage III: Shooting and rooting of the explants.
- Stage IV: Weaning/hardening.

These above mentioned stages are universally applicable in large-scale multiplication of plants for micro propagation. The individual plant species, varieties and clones require specific modification of the growth media, weaning and hardening conditions. 1

## **MICROPROPAGATION IN CARNATION**

The genus *Dianthus* belongs to the dicotyledonous Caryophyllaceae family. The name carnation is derived from the latin word “ Carnatio” which means fleshness. Carnation is a term used for plants in the *Dianthus caryophyllus* L. group. Carnation (*Dianthus caryophyllus* L.) is most famous for its use as a cut flower for ornamental purposes in the florist trade, but cut flowers also performs well in the garden as a bedding plant. Carnation is the member of the family Caryophyllous. Carnation has 88 genera and 1750 species. Carnations were firstly cultivated about 2000 years ago. The modern varieties of carnation were developed first in France in 1840. Carnation is <https://assignbuster.com/micropropagation-of-carnation/>

one of the most important cut flower crops grown worldwide on a commercial scale, and it ranks the top of cut-flowers. 2, 3

Due to the highly heterozygous nature, the carnation does not come true to its parent when grown from seed. Consequently, under horticultural conditions, this method of propagation is only used in selection of new varieties although annual carnations tend to be propagated by seeds. Furthermore, most cultivars of carnations are vegetatively maintained the selected characteristics. Carnations can also be propagated by tissue culture techniques. 3

The carnation flower has been used as an unconventional food plant. It is used in salad garnishing, in fruit salads and for flavoring fruits etc. It can be used as substitute for rose petals for bouquets as well as used as medicinal plants in making syrup. An essential oil is also obtained from its flowers used as perfumes in perfumery. Roughly estimated about 500 Kg of carnation flower produce 100 gm of oil. The flower heads are dried and used in cosmetic and sachats. Its flowers are considered to be alexiteric, antispasmodic, cardiogenic, diaphoretic and nervine. 4

The three kinds of carnation which are most common includes annual carnations, perpetual-flowering carnations and border carnations. 3

## **Kingdom**

Plantae

## **Division**

Magnoliophyta

**Class**

Magnoliopsida

**Order**

Caryophyllales

**Family**

Caryophyllaceae

**Genus**

Dianthus

Since 1950, s researchers have found technique to rid the carnation from internal infection, called Plant Tissue Culture Technique, which refers to growing plant cells, tissues and organ in an artificially prepared nutrient medium static or liquid, under aseptic conditions. By using this technique, better quality and disease resistant plants can be obtained. This technique is based upon the concept of totipotency which means single cell can give rise to whole plant by cell division. 2

The potential advantages of this technique involves the evaluation of large number of genotypes by using very small space in the laboratory and reduction of time between two successive generations by controlling the environmental and nutritional conditions along with reduction of differences in morphology and stages of development. In recent years this technique has gained greater momentum on commercial application in the field of plant biotechnology and floriculture. The most successful and most widely used discipline of plant tissue culture technique is micropopagation which refers

to the propagation of plants by using meristem tip culture which is the transfer of apical buds and surrounding leaf primordia to sterile culture conditions with the realization of foreseen advantages and unprecedented applications this technique has received great attention all over the world including Pakistan and India. 2

## **MATERIAL AND METHODS**

For micropropagation of Carnation, explants of about 1.0 mm size are used. Explants may be obtained from normally pot grown plants. The explants are firstly to be washed comprehensively with tap water and then with routinely used normal house hold detergent to remove all the traces of dust particles. The explants is then immersed in about 7.5% aqueous solution of Sodium hypochlorite for 15 minutes and then to be thoroughly rinsed. Sodium hypochlorite solution is decanted and apical shoots are to be rinsed three times with autoclaved distilled water to remove all the traces of sterilent. Inoculation is always carried out in laminar air flow cabinet. It is cleaned by scrubbing with 70% ethanol solution and is irradiated with UV irradiations for 25 minutes before use. MS medium (Murashiage & Skoog's, 1962) supplemented with different concentrations of auxin and cytokinin along with 3% sucrose are used. pH of the medium is to be adjusted to  $5.71 \pm 0.5$ . Agar medium is used for solidification of media. The media is autoclaved at 121 °C for 15 minutes at 15 lbs/In 2 pressure. For shoot induction and proliferation, MS media containing different concentration and combinations of auxins and cytokinins are used. For rooting MS media is to be supplemented with different concentration of NAA or IBA. About ten (10) explants are cultured in a single test tube. All the cultures are maintained under light intensity of

2500- 3000 lux having temperature of  $27 \pm 1.0^{\circ}\text{C}$  and photoperiod is 16 hour with 8 hours dark period in every 24 hour cycle. Sub-culturing is to be carried out after every 4 week interval. 2

## **MICROPROPAGATION OF CARNATION IN BALOCHISTAN**

Plant Tissue culture technology is an established method of micropropagation worldwide. This technology is particularly very useful for afforestation, as we know many trees take long duration time to grow and many of the conventional methods of propagation such as through normal conventional cuttings, growing seeds, and grafting are often slow and difficult to establish. Tissue culture has been found its best commercial application in propagation of clonal plants at very rapid rate compared to conventional methods. In many cases it has been increased to million fold. Thus, it may immensely help in introducing newly created cultivars in trade.

Majority of commercial carnation cultivar import carnations which could be prepared in our own environment of Balochistan. The technique of micropropagation in carnation is efficient, cost effective and easy to follow which not only will fulfill domestic and commercial need of Balochistan but we will also be able to export carnation to other provinces as well as to foreign countries. Secondly it can be started and manufactured on smaller industrial based units. Aside from producing disease-free plants, micropropagation of carnation can also grow plant materials other than in their usual place on farms and similar land areas. Since cultured plant tissues are developed from sterile environments, it's also possible to grow them in a laboratory setup. The conditions in the laboratory can be

controlled to fit the needs of the plant materials. These conditions may be maintained all year-round, without having to worry about climate and weather changes which always have negative effect on growth of carnation. Micro propagation of carnation will enable us to have cut flowers all round the year in any season and beyond our need and that too in harsh and unfavorable conditions of Balochistan.