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Improvement of major ornamental crops through mutation breeding

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The improvement in ornamental crops can be achieved by mutation induction through physical and chemical mutagens at different concentration by using various plant materials, even through the most of the mutations are deleterious and lethal. The gamma irradiations at 1 K rads to 7.5 K rads proved best according to crop response. As the doses of mutagens increase, the quality parameters of plant decrease. So, it has been suggested to use mutagens at lower concentrations (Rose- 5 to 7.5 K rads, Chrysanthemum- 1.5 to 2 K rads, Gladiolus- 1 to 5 K rads, Tuberose- 0.5 to 1 K rads, Orchid and Carnation- 5 to 10 G rays under *in vitro*) to obtain useful mutants. Further, different cultivars also differed in their response to resist mutations. The changes in flower colour and forms due to mutation can be easily detected from its phenotypic expression as well as from cytological studies. A overall review of research work indicated that mutation breeding is one of the most powerful methods for developing new varieties which is very successful in ornamental crops.

Improvement in flower crops is very important to generate the interest by evolving new forms, new colours and their large scale production. New varieties can be developed through sexual breeding which provides thrilling results but is time consuming while mutation breeding takes about three times less time and even produce an unusual type.

Induced mutation breeding holds promise for effective improvement and it has led to a great burst of flower colour, form, pattern and other variations in different ornamentals.

In general mutation refers to sudden heritable change in the phenotype of an individual. In molecular term, mutation is the permanent and relatively rare change in the number or sequence of nucleotides.

Mutation breeding refers to the genetic improvement of crop plants for various economic characters through the use of induced mutations. Mutations are induced by mutagens. Generally mutagens are classified in two ways *i.e.* physical mutagens and chemical mutagens. Different types of radiations like gamma rays, X-rays, alpha particles, beta particles, ultra violet rays and fast and thermal neutrons are considered into physical mutagens while chemical mutagens include ethyl methane sulphonate, methyl methane Sulphonate, ethyl ethane sulphonate, ethylene amines, 5-Bromo Uracile, 2-Amino purine, acriflavin, proflavin, nitrous acid, hydroxylamine, sodium azide, etc. Mostly physical mutagens are used for development of new varieties in ornamental crops and among all physical mutagens, gamma radiations are more preferable due to its properties like sparsely ionizing, deeply penetrating and it is non-particulate Kaicker and Vishnuswarup (1992), Shobha *et al*. (2001), Arnold (1998), Dilta (2003), Banerji and Datta (2002), Dhaduk (1992), Misra and Mahesh (1993), Misra and Bajpai (1983), Abraham and Desai (1976), and Gupta *et al*. (1984). The treatment of mutations is applied on seed, seedlings, cuttings, any plant part and also on i*n vitro* plantlets. Under *in vitro* condition Shobhana and Rajeevan (2003), Sooch *et al*. (1999) and Singh *et al*. (1999) were obtained good results with gamma rays at low concentrations.

Mutations occur in cells in two ways. Firstly, by alteration in nuclear DNA which is also known as point mutation and it cause addition, deletion, transition and transversion in nucleolus of cell. Thus it changes the structure of nuclear DNA and mutations occurred. In second way, the mutagen makes the change in cytoplasmic DNA that is also called as cytoplasmic mutation. The best example of cytoplasmic mutations is 'Male sterility' induced in some ornamentals crops.

Mutation is cheap and rapid method of developing new varieties as compared to hybridization methods. It is more effective for the improvement of oligogenic characters than polygenic traits. It is the simple, quick and best way when a new character is to be induced in vegetatively propagated crops. An induced mutation takes lesser time for release of new variety. Mutations provide new variety is identical to parent variety except for the character improved.

While under limitations of mutations, most of the mutations are deleterious and undesirable. Also, identification of micro-mutations is usually very difficult

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