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Mutation in Gladiolus

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Introduction of Gladiolus

Gladiolus is a glamorous flower and known for its perfection and is known as Queen of the bulbous plants due to its magnificent spikes containing a massive form of florets, elegant florets of different shade, attractive shapes, varying in size, and marvelous vase life. It is a very important ornamental commercial flower cultivated in various parts around the world and most diverse in South Africa, where they originated. Botanically gladiolus belongs to the family Iridaceae and propagated through underground corms which consist of 4-6 dry scales or husks. Gladiolus is a delicate herbaceous plant with perennial nature and the corms have filliform roots which later on help to produce cormels. Leaves are blade molded bunched at the stem base. Singh, 2006 found that there are around 260 species in Genus Gladiolus. Anonymous, 2002 reported that few species of gladiolus contributed to the improvement of advanced gladiolus.

Lewis et al. 1972 and Delpierre and Du plessis, 1974 reported that Gladiolus species have 2 fundamental distribution centers: one in the Mediterranean basin and the other in southern and central Africa. Raghava, 2000 studied that the majority of the species are restricted to the tropical regions of South Africa, particularly the Cape of Good Hope and Mediterranean region.

Mutation in Gladiolus

Pliny the Elder (A.D. 23-79) gave the plant the name Gladiolus to reflect the sword-like form of the leaf. Gladiolus is derived from the Latin word "Gladius," which means "sword." Gladioli are said to have been invented in ancient Greece. According to a record kept by Lyte's Nieeve Herball. In France it was 1st introduced, then quickly spread to North America, Holland, Germany, and England. There is no proof that any Gladiolus spp. from

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multidisciplinary e-Newsletter

South Africa was ever established in Europe before the 1700s. *Gladiolus aethiopion*, a pale scarlet-red flowering plant from the Cape, was depicted by Cornutus. South African species were introduced to Europe in the seventeenth century. *Gladiolus tristis*, firmly identified with *Gladiolus grandis*, was 1st introduced in 1745 to the United Kingdom from the Cape district and to the Mediterranean locale Walat *G. illyricus*is originated. *Gladiolus grandis*, a South African species, was naturalized in Spain in 1749.

Breeders have adopted mutation breeding as a standard practice (Mahawar et al. 2011). Commercial exploitants of mutants, isolation of mutants, mutation spectrum and frequency, detection of mutation, suitable dose, strategies of exposure to gamma irradiation, selection of material, and radio-sensitivity have all been the subject of extensive writing for the successful use of classical induced mutagenesis. Colchicine therapy, recurrent irradiation, ion beam technology, combined treatment split dosage, space breading, and other unique treatment techniques have been wisely chosen for the effective advancement of novel cultivars (Datta, 2012). Induced mutation in ornamental crops is primarily used to develop new and original cultivars for the floriculture industry. The ability to modify one or a few features of outstanding varieties without changing the surplus and frequently unique part of the genotype is the primary benefit of mutation induction in vegetatively propagated crops. Gamma rays have shown to be the most successful method of induced mutation, resulting in the creation of one of the many new decorative varieties.

Maluszynski et al. 2000 reported that over 2,252 mutant cultivars have been authoritatively issued in recent years, with 75% of these being found in food crops and 25 percent in aesthetic and ornamental plants. After 1985, Sixty percent of varieties released were mutant. The mutants 26.8% were released from China followed by India, Russia and the USSR, the Netherlands, United States, and Japan. Most of them were released as a variety & others were utilized as a parent to induce new variety. Maluszynski *et al.* 1995 reported that 1,585 (70%) out of 2,252 mutant varieties were released as direct mutants. Considering the impact of mutation in ornamental plants is profoundly observable, in their blossom size, shape and colour. Consequently, for breeding Ornamental plants mutation breeding strategies have become a major instrument.

Gladiolus improvement through breeding began in England around the beginning of the 18th century. The plant breeding program set the main goal to form variability and to choose the leading recombinants possessing desirable features. Because variations occurred in phenotypic features like Cholophyll variation in leaves, shade of bloom, shape or size can be easily recognized. Mutation breeding has been successful in ornamental plants. Artificial mutations are used exclusively in mutation breeding. Induced Mutation could be one of the methods for creating hereditary variability.

Gamma rays have been used to create over 70% of the world's mutant types (Datta, 2009). Jain, 2006 reported that, In combination with biotechnology, mutation-assisted breeding can be used to improve the genetics of ornamentals and increase the economic benefits in agricultural nations. Broertjes and Van Harten, 1988 reported that many mutants were discovered in ornamental plants before in-vitro procedures by irradiating dormant plants, detached leaves, and stem cuttings. Mutagenesis is a powerful tool for creating variation because it can change even the genes that are common to all types of a species, resulting in no segregation within the species. Through crossing and selection in another superior genotype, good induced alterations can be picked and also be incorporated. Physical mutagens are often used because of their precise dissymmetry and high penetration. Genetic background difference worked as a mutagen uniquely. Gusafsson, 1944 and 1965 reported that Even minor genetic alterations, like as a single gene difference, can cause considerable changes in sensitivity percentage, affecting both the complete rate and the range of recoverable mutations. Various studies have surfaced describing changes in ornamental plant flower characteristics as a result of mutagenesis treatment.

Since mutation occurs in small sections of the meristem, only a fraction of the plant is affected. To obtain a stable mutant phenotype, one or more clonal or sexual generations must be paired with determinations (Selection). Because both recessive and dominant mutations are used in mutation breeding of sexually reproducing crops, there are many chances for polygenic trait mutation breeding (Mahawer et al. 2011). Because of their size and constrained measure, Datta (1989) stated that after the irradiation of rosebud wood, mutant areas ranged from restricted streaks on single petals to entire blossoms and in many cases,

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such mutations are hard to isolate by conventional methods, for example, repeated cutting back of plants. Nikaido and Onozawa, 1989 and Malaure et al. 1991 reported that by regeneration of adventitious shoots in In-vitro culture of explants secured from various regions of petal tissue and was used to isolate strong mutants.

The importance of post-harvest maintenance of blooms cannot be overstated. Approximately half of the losses, or 50%, occur during transportation, lowering the quality of cut spikes and resulting in lower fetch returns for farmers. To keep a strategic distance from these situations, several chemical preservatives for extending cut spikes post-harvest life are recommended. The gladiolus flower spike can be carried across large distances and has a longer vase life. After the primary floret has turned colour, spikes are harvested. Spikes are taken when the basal floret has completely opened for local markets. The increasing value of cut blossom production requires achieving a high keeping quality of harvested cut blossoms. It is now more necessary than ever to coordinate research aimed at extending the life of cut blossoms in order to boost the trade of
flowers, especially cut flowers. To ensure that the blooms reach their destination, the buyers transport them from the field in perfect shape and at amazing pricing.

There are two sets of components which are capable of keeping quality of cut blossoms. To begin, there is an internal component that involves a balance between water loss and water absorption, stem plugging, the synthesis of harmful compounds such as ethylene, and respiration rate, and an exterior component that comprises microbial attack on cut ends and environmental circumstances. Silver nitrate, sucrose, and other compounds are commonly used to prolong senescence in gladiolus. Additives help with solution uptake, microbial growth control, ethylene formation prevention, and energy production (Singh et al. 2000). Pal *et al.* 2003 reported that Additives have antimicrobial nature which prevents retention, increasing solution uptake, and Xylem blockage.

The quality of blooms after harvest is also altered by varying electron beam irradiation and gamma doses. Biocide and Sucrose are commonly used in gladiolus cut spikes to extend post-harvest life because biocide kills microorganisms and Sucrose gives energy. The vase life of cut flowers is controlled by numerous chemicals and Sucrose added to the solution, as well as the genotype of the crop (Awasthi *et al*. 2013).

REFERENCES

Anonymous. (2002). Gladiolus. Technical bulletin no. 14, Division of Floriculture and Landscaping, IARI, New Delhi. 100p.

Awasthi, A. K, Karhana. P. K. and Pandey. K. K. (2013). The application of preservatives on quality of Gladiolus (*Gladiolus grandiflorus*) cut spike. *International Journal of Plant, Animal & Environmental Science*. 71(4): 152-157.

Broertjes, C. and Van harten. A. M. (1988). Applied mutation breeding for vegetatively propagated crops. Elsevier, Amsterdam.

Datta, S. K. (1989). Improvement of ornamental plants through induced mutations. *In*: S.A. Farook and I.A. Khan (eds.). Recent Advances in Genetics and Cytogenetics. pp. 215-228.

Datta, S. K. (2009). Rose of classical mutagenesis for development of new ornamental varieties. *ProcInt Joint* FAO/ IAEA *Symm*. *International Atomic Energy Agency Vienna, Austria*. 303-402.

Datta, S. K. (2012). Success story of induced mutagenesis for development of new ornamental varieties, *Bioremediation, Biodiversity and Bioavailability*. 15-26.

Delpierre, G. R. and Du Plesis. N. M. (1974). Winter growing gladioli of South Africa. Tafelberg. Smith Family Bookstore.

Gustafsson, A. (1944). The X-ray resistance in dormant seeds in some agriculture plants. *Heriditas*. 30: 165-178.

Gustafsson, A. (1965). Characteristics and rates of high production mutants in diploid barley. The use of induced mutation in Plant breeding. Rep. FAO (IAEA Tech. Meeting, Rome, 1964). Pergamon Press, Oxford. pp. 323-337.

Jain, S. M. (2006). Major mutation assisted plant breeding programs supported by the FAO and IAEA. Plant Cell Tissue Organ Culture. 82: 113-23.

Lewis, G. J. Obermeyer. A. A. and Barnard. T. T. (1972). A revision of the South African species of *Gladiolus*. *Jl S. Afr. Bot. Suppl.* 10: 1-316.

Malaure, R. S. Barday. G. Power. J .B. and Davey. J. B. (1991). The production of novel plants from florets of *Chrysanthemum morifolium*using tissue culture 2. Securing natural mutations (sports). *J. Plant Physiol*. 139: 14-18.

Maluszynski, M. Ahloowalia. B. S. and Sigurbjornsson. B. (1995). Application of in vivo and *invitro* mutation techniques for crop improvement. *Euphytica*. 85: 303-315.

Maluszynski, M. Nichterlein. K. Van Zanten. L. and Ahloowalia. B. S. (2000). Officially released mutant varieties- the FAO/IAEA Database.

Nikaido, T. and Onozawa. Y. (1989). Establishment of a non chimeric flower colour mutation through *in vitro* culture of florets from a sport in chrysanthemum with special reference to the genetic background of the mutation line obtained. Scientific Reports of the Faculty of Agriculture, Ibaraki University. 37: 63-69.

Pal, R. K. Lahji. F. and Roy. S. K. (2003). Influence of storage environment, 8-HQC and sucrose on post-harvest quality of First Red cut rose. *J. Orna. Hort*. 6(2): 130-133.

Singh, K. Singh. P. Arora. J. S. and Mann. R. P. S. (2000). Studies on post harvest management of gladiolus. *Journal of Ornamental Horticulture*. 3(2): 107-110.