Short Communication

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Effects of UV Radiations on Morphological Characters in *In vitro* Regenerated *Polianthes tuberosa*

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The tuberose (*Polianthes tuberosa*) is a perennial plant of the agave family Agavaceae, extract from the flowers of which is used as a middle note in perfumery. The common name derives from the Latin tuberosa, meaning swollen or tuberous in reference to its root system. It consists of about 12 species. Polianthes means "many flowers" in Greek language. The tuberose is a night-blooming plant thought to be native to Mexico along with every other species of Polianthes. It is a prominent plant in Indian culture and mythology. The flowers are used in wedding ceremonies, garlands, decoration and various traditional rituals.

P. tuberosa suckers were collected from Lokmangal Agricultural Biotechnology College, Wadala Campus. Physical mutagens like UV (Ultra Violet) rays were obtained from the Lokmangal Tissue Culture Laboratory, Lokmangal Agricultural Biotechnology College, Wadala, Maharashtra. Different media compositions have been utilized for *in vitro* initiation, multiplication and rooting of the *P. tuberosa* (PTI: *P. tuberosa* initiation medium, PTM: *P. tuberosa* multiplication medium and PTR: *P. tuberosa* rooting medium) (Table 1). *Polianthes tuberosa* suckers were obtained by uprooting and then cutting it out from the plant. Explants were washed with 5% savlon as a surfactant for 30 minutes and rinsed with distilled water for three times. Then the explants were disinfected with sodium hypochloride for 10 minutes and rinsed thrice with distilled water. Again the explants were disinfected with mercuric chloride for 10 minutes and rinsed thrice with distilled water. Finally the explants i e suckers were cut into appropriate size (1-3cm) and inoculated on initiation medium (PTI) under aseptic condition and maintained under appropriate conditions of light and humidity. After 10 days well grown shoots were sub cultured on multiplication medium (PTM1 and PTM2) for multiplication and maintained under appropriate conditions of light and humidity. Some of the well developed shoots were used for UV treatment. These shoots were exposed to UV light in laminar air flow for different time interval (5, 10, 15, 20 and 25 minutes). Treated shoots were transferred to PTM1 for multiplication and maintained under proper light conditions. PTM1 is continued for further multiplication as it shows faster multiplication as compared to PTM2. After 15 days, the well grown shoots were transferred to rooting medium (PTR) and maintained under dark conditions for root development.

Table 1 Different media compositions used in the experiment with *Polianthes tuberosa*

Components	PTI 1	PTM 1	PTM2	PTR1
Macroelements (g/l)				
NH_4NO_3	0.16	0.16	0.16	0.825
$CaCl_2,4H_2O$	0.44	0.44	0.44	0.22
$MgSO_4,7H_2O$	0.37	0.37	0.37	0.185
KH_2PO_4	0.17	0.17	0.17	0.085
KNO_3	1.9	1.9	1.9	0.95
Fe EDTA	0.04	0.04	0.04	0.06
Microelements (mg/l)				
KI	0.83	0.83	0.83	0.83
H_3BO_3	6.2	6.2	6.2	6.2
$MnSO_4,2H_2O$	22.3	22.3	22.3	16.88
$ZnSO_4,2H_2O$	8.6	8.6	8.6	8.6
$Na_2MO_4,4H_2O$	0.25	0.25	0.25	0.25
$CuSO_4,5H_2O$	0.025	0.025	0.025	0.025
$CoCl_2,6H_2O$	0.025	0.025	0.025	0.025
Vitamins (mg/l)				
Nicotinic acid	0.5	0.5	0.5	0.25
Pyridoxine HCl	0.5	0.5	0.5	0.25
Thiamine HCl	0.5	0.5	0.5	0.25
Pyruvate Na	-	-	-	-
Aminoacids (mg/l)				
Glutamine				-
Glycine	2	2	2	1
L-asparagine	-	-	-	
Myo-Inositol	100	100	100	100
Growth regulators (mg/l)				
2,4-D			2	1
NAA	-	-	-	-
Kinetin		0.5	0.5	
BAP	0.5	0.5	0.5	-
IBA	-	-	-	0.5
IAA	-	0.8	0.4	-
Sucrose (g/l)	30	30	30	30
Phytagel (gm/l)	2.5	2.5	2.5	2.5
*p*H	5.8	5.8	5.8	5.8

Primary hardening is carried out by transferring the control and treated plants to trays containing coco peat and

soil in greenhouse. And for secondary hardening well grown plants were transferred into black coloured polythene bags containing soil.

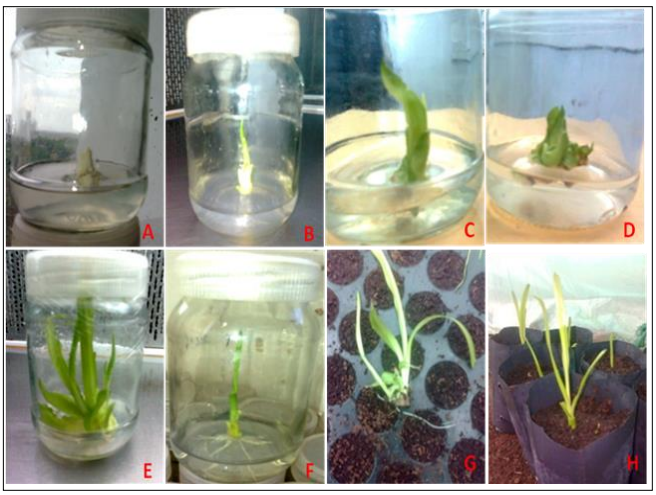

Fig 1 A: Explant inoculation on PTI medium, B: 10 days old culture, C: fast growth of 10 days old culture sub cultured on PTM1, D: slow growth of 10 days old culture sub cultured on PTM2, E: Shoot multiplication on PTM1 (some of the shoots were treated with UV light while others remain untreated as control), F: Root development in PTR medium, G: Primary hardening in plastic trays containing coco peat and soil, H: Secondary hardening in polythene bags containing soil

The sensitivity of *Polianthes tuberosa* to ultra violet radiations was evaluated by comparing the survival rate (%) between irradiated and non-irradiated plantlets. No significant differences were observed among the control (untreated plant) and treated plants with different doses of irradiation. Further different UV radiations treatments showed the slight differences in the morphological characters as compared to the control. But the marked differences in the morphological characters were observed with a UV radiation dose of 25 minutes (Table 2). All these differences in the morphological characters might be due to mutation. These results and those available in the literature, clearly show that mutation by using physical mutagens has successfully produced quite a large number of new and promising varieties in different seeds and ornamental plants, and is considered to be a most successful tool for breeding ornamental plants (Micke 1991, Datta 1992, Maluszyski *et al*. 1995, Datta 1997). The main advantage of mutation induction in vegetatively propagated crops is the ability to change one or a few characters of otherwise outstanding cultivars without altering the remaining and often unique part (features) of the genotype (Broertjes and Van Harten 1998). Mutation breeding has been more successful in ornamental plants because changes in any phenotypic characteristics like color, shape or size of flower and chlorophyll variegation in leaves can be easily detected.

Table 2 Effect of UV radiations on the morphological characters of treated and untreated plants of *Polianthes tuberosa*

Morphological characters	Control	U.V. radiation treatment (25 min.)
Plant Height (cm)	18	23
No. of leaves	13	9
Leaf Length (cm)	12	16
Leaf Width (cm)	1.1	1.3
Leaves colour	Dark green	Pale green

The tuberose oil, one of the most expensive flower oil shows a promising prospective for novel discoveries in the commercial and perfumery industries. This intensely fragrant Mexican flower has found international fame in perfumes such as White shoulders and Chloe. *In vitro* mutagenesis through UV radiation can be employed to create economically superior mutants. Gamma irradiations are often applied on plants for developing varieties which are agriculturally and economically important and comprise high productivity and efficiency potential (Jain *et al.* 1998).

In the future prospects, the *in vitro* propagation of *Polianthes tuberosa* as well as the use of UV radiation as elicitor could enable the mass extraction of economically valuable terpenes which possesses important flavor and aroma properties. Further investigation on the combined effects of UV, gamma irradiation and CO_2 enrichment (to compensate detrimental effects of gamma on photosynthetic apparatus) on *Polianthes tuberosa* could be conducted to facilitate the creation of a mutant with superior physiological, agronomical and biochemical qualities for commercial use.

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