International Journal of Basic and Applied Biology
p-ISSN: 2394-5820, e-ISSN: 2349-2539, Volume 3, Issue 1; January-March, 2016, pp. 80-80

http://www.krishisanskriti.org/Publication.html

Novel Variants in Rose (*Rosa × hybrida*) using *In vitro* Mutagenesis

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Abstract—*Rose (Rosa × hybrida) is one of the attractive flowers with longer stem and fragrance due to which it is top ranking cut flower in international market. Mutation breeding combined with tissue culture i.e. in vitro mutagenesis has proven more effective in rose due to controlled environment that provides ideal conditions for survival of mutated tissues or cells. Keeping these aspects in view, the present investigation was carried out to induce variability in rose cv. Happiness under in vitro conditions using gamma (γ) rays. Single node cuttings were excised from the field grown plants and were irradiated with different doses of γ rays (0, 10, 20, 30, 40, 50, 60, 70 and 80 Gy) using a ^{60}Co source. The γ-irradiated explants were then pre-treated, surface sterilized and cultured aseptically on Murashige and Skoog basal medium supplemented with 2.5 mg 6-benzylaminopurine (BAP) plus 5.0 mg kinetin plus 0.1 mg α-naphthaleneacetic acid (NAA) plus 0.5 mg gibberellic acid (GA_3) plus 40 mg adenine sulphate plus 0.8% (w/v) agar-agar to induce sprouting and shoot proliferation. Explants treated at higher dose of γ-rays (70 and 80 Gy) showed deleterious effects of ionising radiation. The 30 Gy treatment was found to be the LD_{50} dose. It was observed that few explants treated with γ-rays were sprouted, showed slow growth and failed to survive after the first sub culture. The explants irradiated with 50 Gy γ-rays exhibited minimum explant survival, bud sprouting, number of shoots/explants, shoot length, number of roots per shoot and root length while maximum days to bud sprouting, contamination free culture and more days to root initiation. In vitro raised, irradiated and non irradiated (control) plants were transferred to earthen pots one month after acclimatization under laboratory conditions and examined for morphological traits of the plants. Variation was observed between mutated and control populations. Two variants with altered flower colour or with small stripes compare to original flower colour were isolated. These variants were multiplied through micropropagation and are under evaluation for their stability. This investigation developed a protocol for in vitro mutagenesis that could be used to induce more novel colour variants/mutants in rose.*