**Study on the Effect of Gamma Irradiation on Turmeric (*Curcuma longa* L.) Callus Cultures as an Approach for Inducing Mutagenesis.**

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Turmeric (*Curcuma longa* L.) is a perennial rhizomatous herb, which propagated vegetatively; therefore, genetic variation among the local germplasm is narrowed to open up breeding opportunities. Mutagenesis is used for achieving genetic variations in such limitations. Gamma irradiation has been widely tested in agriculture for crop improvement. This study focused to identify the effect of gamma irradiation-induced mutagenesis on turmeric callus cultures. Shoots with developed callus which were cultured in hormone-free MS medium exposed to gamma radiation from Co-60 (dose rate 5.1kGy/h) at 0, 40, 50, 60, 70 and 80 Gy and samples were maintained under *in vitro* conditions and net house conditions. The molecular variation caused by gamma irradiation was analyzed by two Simple Sequence Repeats (SSR) DNA marker panels*.* DNA was extracted by following a modified CTAB Extraction procedure. Under the lab experiment, all the plants were shown a 100% survival percentage where the number of shoots and the number of leaves were shown no significant difference (P>0.05). Under the net house experiment, plant survival, the total number of leaves (60Gy & 70Gy showed a significant difference compared to 0Gy), leaf area (all the dosages showed significant difference compared to 0Gy) showed a significant difference (P<0.05) and the number of shoots, MDA content showed no significant difference (P>0.05) but as percentage vice, it showed an increase in MDA content compared to 0 Gy, (40Gy, 50.14%, 50Gy, 49.79%, 60Gy, 37.38%, 70Gy, 58.87%, 80Gy, 74.94%). Chimeras in the leaf were observed at 50Gy whereas lobular development was at 70Gy. According to this study, slight morphological changes were observed at and above 50Gy hence; 50Gy is the minimum effective dosage of gamma radiation that need to initiate an effect from irradiation. Further research with a bulk population is needed to be carried out on the effective and lethal dosages of mutagenesis. This will open a new era for the *C. longa* L. crop improvement programs in Sri Lanka.

**Keywords***: crop improvement, gamma irradiation, lipid peroxidation, mutation, SSR markers*