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| Abb. | Full Form |
|---|---|
| $^{\circ}C$ | Degree Celsius |
| µg | Microgram |
| µM | Micromolar |
| AFLP | Amplified Fragment Length Polymorphism |
| APX | Ascorbate peroxidase |
| BAP | Benzylaminopurine |
| BBTVD | Banana Bunchy Top Virus Disease |
| CAT | Chloramphenicol acetyltransferase |
| DES | Dietethyelsulphate |
| DNA | Deoxyribo nucleic acid |
| DW | Dray Weight |
| et al | Et alii |
| FW | Fresh weight |
| $gl^{-1}$ | Gram per liter |
| ISSR | Inter simple sequence repeat |
| K | Potassium |
| $KD_a$ | Kilodaltons |
| LSD | Least significance difference |
| min | Minute |
| MS | Murashige and Skoog medium(1962) |
| MW | Molecular weight |
| Na | Sodium |
| Na/K | Sodium and Potassium Ratio |
| NAA | Napthalene acetic acid |
| NaCl | Sodium chloride |
| $NaN_3$ | Sodium azide |
| P | Proline |
| $P \leq 0.05$ | Probability level at 5% |
| PCR | Polymerase chain reaction |
| PEG | Polyethylenegelycol |
| POX | Peroxidases |
| ppm | Parts per million |
| RAPD | Random Amplification Polymorphisms DNA |
| RWC | Relative Water Content |
| S.E | Standard error |
| SDS-PAGE | Sodium dodecyl sulfat –poly acylamide gel electrophoresis |
| SOD | Superoxide dismutase |
| TDZ | Thidiazouron ,N-phenyl-N-1,2,3-thidiazol-5-ylurea |

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**Title of Thesis:** Effet of some Chemical Mutagens on the Improving of Micropropagated Banana Plants to Tolerance Water and Salinity Stresses

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## ABSTRACT

This study was carried out at the Tissue Culture Laboratory of the Horticulture Res. Inst. (HRI), Agricultural Research Center (ARC) and the Plant Biotechnology Dept., National Research Center (NRC) during the periods from 2012 till 2015. The aim of this study was to induce a tolerance mutant in banana plants for salt and drought stresses by using different chemical mutagenesis diethyl sulphate (DES) and sodium azide ($NaN_3$) and concentrations (100 µM for DES and 2 µM for $NaN_3$ expressed as low, 200 µM for DES and 4 µM for $NaN_3$ expressed as medium and 400 µM for DES and 8 µM for $NaN_3$ expressed as high) as well as soaking durations (10, 20 and 30 min) to increase its ability to tolerate salinity (500, 1000 and 1500 ppm) and drought stresses (PEG at 8, 16 and 32 $gl^{-1}$). Salinity and drought experiments were carried out during rooting stage and evaluated until the end of acclimatization stage. During multiplication stage, the results showed that $NaN_3$ was more effective in increasing number of shoots/plantlet but DES increased number of leaves and shoot length. High concentration for 30 min increased number of shoots and leaves to the highest values. Interaction between mutagen and concentrations plus duration revealed that DES concentrations produced the highest values except for number of shoots/plantlet which was more effective by using $NaN_3$ at 8 µM for 30 min. There were a great variance regarding the effect of mutagens, concentrations plus duration and studied stress (salinity and drought), individually and double interaction between these three factors during rooting and acclimatization stages. Treble interaction investigated that, DES at 100, 200 and 400 µM (to some extent) for different durations (10 to 30 min) could be used to reduce the negative effects of salinity (up to 1500 ppm) and drought (up to 32 g/l) during both rooting and acclimatization stages, with little exceptions toward $NaN_3$. In the same line all mutagens caused a great variation in terms of K, Na and proline accumulation in the plant tissues.Also, Inter simple sequence repeat Polymerase chain reaction (ISSR-PCR) test showed a genetic variation occurred in the salinity and drought stressed plants and also a clear variation of protein were seen between treated banana with different mutagens under salinity and drought stress on the polyacrylamide gels from presence or absence bands to varied intensity of expression. These results showed that there were genetic variations in the stressed plants as a result to use DES mutagen. Such previous treatments reduced the harmful effects of either salinity or drought stresses and these treatments could be used during production of banana plants by micro-propagation technique.

**Key words:** Banana Grand Nain cv., diethyl sulphate, DES, Sodium azide, $NaN_3$, mutagens, salinity, drought, SDS-PAGE, ISSR