Radiosensitivity with rays gamma of $^{60}$Co at seeds of Jamaica (*Hibiscus sabdariffa* L.) to determine LD$_{50}$

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**Abstract:** The main objective of this study was to determine radiosensitivity curve in seeds Jamaica (*Hibiscus sabdariffa* L.), subjected to 0, 5, 10, 15, 20, 25, 30, 35, 40, 45 and 50 Gy, the which they were irradiated at the National Institute for Nuclear Research (ININ). Their irradiated seeds were sown in polystyrene trays to determine the percentage of germination, which was used to perform a simple linear regression between germination and the radiation dose and to determine the lethal dose (LD$_{50}$). The results indicate that the model had a highly significant icor$^2=0.99$ ** adjustment so germination high dose 50 Gy, only decreased by 28% germination. From this study it can be concluded that in determining the LD$_{50}$ you have to expand the range of radiation may between 500 or 1000 Gy.

**Keywords:** mutation, DNA, improvement, ionizing radiation

**INTRODUCTION**

The Jamaica (*Hibiscus sabdariffa* L.) is a cropland belonging to the family of Malvaceae, whose origin is located on the African continent specifically as currently includes Sudan, although Vavilov mentioned the ancestors of this plant at the center Abyssinian [5]. The uses of which has undergone this crop are medicinal as is considered diuretic, feed of livestock and as industrial crop because of their resistant to salinity, their uses of which has undergone this crop are medicinal as is considered diuretic, feed of livestock and as industrial crop because of their resistant to salinity, their uses of which has undergone this crop are medicinal as is considered diuretic, feed of livestock and as industrial crop because of their resistant to salinity. The Jamaica (*Hibiscus sabdariffa* L.), subjected to 0, 5, 10, 15, 20, 25, 30, 35, 40, 45 and 50 Gy, which were irradiated at the National Institute for Nuclear Research (ININ). Their irradiated seeds were sown in polystyrene trays to determine the percentage of germination, which was used to perform a simple linear regression between germination and the radiation dose and to determine the lethal dose (LD$_{50}$). The results indicate that the model had a highly significant icor$^2=0.99$ ** adjustment so germination high dose 50 Gy, only decreased by 28% germination. From this study it can be concluded that in determining the LD$_{50}$ you have to expand the range of radiation may between 500 or 1000 Gy.

**MATERIALS AND METHODS**

This study was carried out in the facilities of the Technological University of Tehuacan 18°24'51" located north latitude, 97° 20'00" west longitude and 1409 meters of altitude. The genetic material consists of botanical seed of Jamaica (*Hibiscus sabdariffa* L.), which were collected from an accession on the coast of Oaxaca, Mexico Pinotepa Nacional in alocation north of 16° 21'; 98° 02' west and 28 meters of altitude. Whose characteristics are: medium sized 0.50 to 1.50 m in height and red calliculos. Seed irradiation was performed at th eNational Institute for Nuclear Research (ININ) located in La Marquesa Mexico. The radiation source was$^{60}$Co gamma rays through Transelktro. Radiation doses were 0, 5, 10, 15, 20, 25, 30, 35, 40, 45 and 50 Gy. Their irradiated seeds were sown in trays of polystyrene white cavities 200 and...
using as peatmoss substrate. To determine the percentage of germination the following equation is used PG = SG / SS x100 where; PG, is the percentage of germination; SG, sedes germinated; SS, seeds sown. To determine radiosensitivity curve, germination data for each of the applied doses were used, and performing a linear regression by the method of least squares.

RESULTS AND DISCUSSION

In Figure 1, the data of germination of seeds Jamaica under\textsuperscript{60}Co irradiation, it can be seen that the radiosensitivity curve was adjusted to a decreasing linear model and proved to be highly significant, according to the model presented by variables germination percentage and radiation were found to be closely correlated negatively, and by increasing the radiation dose germination tends to decrease. Thus the slope -0.37 dela curve indicates that for every gray

\textbf{CONCLUSION}

According to the results of their radiation of the material under study, it can be seen that the radiosensitivity curve is adjusted to a decreasing linear model and proved to be highly significant, according to the model presented by variables germination percentage and radiation were found to be closely correlated negatively, and by increasing the radiation dose germination tends to decrease. Thus the slope -0.37 dela curve indicates that for every gray 60Co radiation applied to the seeds of Jamaica, germination percentage decreased by 0.37% which is to be considered in determining the LD\textsubscript{50}. So under this trend, the maximum radiation dose able to reduce by 28% germination, indicating that in order to determine the LD\textsubscript{50}, germination at high doses should have a germination of 0%, this suggests that it is necessary to jamica further trials perhaps increasing radiation dose up to 500 or 1000 Gy as shown by studies of [4], who work with soybean cultivar Cubasoy-23 report that for response decreased seed germination must radiate over a range of 50 to 480 Gy[7]. Mention that dose of 150 Gy retard germination Vignaunguiculata (L.) Walp. Lie that the application of gamma rays at doses of 600, 800 and 1000 Gy, are lethal and useful for dosimetry studies on the species in question.

\begin{center}
\begin{figure}
\centering
\includegraphics[width=\textwidth]{fig1.png}
\caption{Curve radiosensitivity seed Jamaica (\textit{Hibiscus sabdariffa} L.), under\textsuperscript{60}Co gamma radiation. Technological University of Tehuacan. 2015.}
\end{figure}
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RECOMMENDATIONS

For a better response from germination to gamma irradiation of \textsuperscript{60}Co in seeds of Jamaica, it is recommended to increase the range of irradiation may be even 500 or 1000 Gy for dosimetry studies, and thus it may provide a more complete way radiosensitivity curve and to determine the LD\textsubscript{50}.

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