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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 radiated 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, ionizingradiation

INTRODUCTION

The Jamaica (*Hibiscus sabdariffa* L.) is a cropplant belonging to th 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 livestok and as industrial crop because of their stems a fiber is extracted very resistant to salinity, their seeds of anoilextractedwithantimicrobialproperties[1].Regarding thebreedingis a technique as old as agriculture itself, since man has had the need to enhance the potential and attributes of their crops [2], and to achieve this you have different techniques among which may be mentioned muta génesis, which is based on accelerating the process of molecular mutation using chemical or physical, such as ionizing radiation emitted by some radio active isotopes such as ^{60}Comutagens [3].So under this trend, the gamma radiation is a type of ionizingradiation as a very short wave length of 10^{-11} m, which would transfer enormous power of penetration, which is used to induce changes at the molecular level in the DNA ,causing mutations at the molecular level, which will lead to spontaneous and permanent changes, manifested in the phenotype of the individuals under study [6].Therefore to start a breeding program using muta génesis radion ducida is necessary to know the curve of radiosensitivity of the species under study, as such trials are needed to determine the LD_{50} in which 50% of individuals under study die as a result of the radiation, and thus establish the ranges of radiation to be applied to the species in question. The aim of this study was: irradiating seeds of Jamaica (*Hibiscus sabdariffa* L.) with^{60}Co gamma irradiation to determine radiosensitivity curve and the LD_{50}. The hypothesis was: ^{60}Co gamma radiation affect seed germination under different doses Jamaica.

MATERIALS AND METHODS

This study was carried out in the facilities of the Technological University of Tehuacan 18º24'51" located north l atitude, 97º 20'00" west longitude and 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 16º 21'; 98° 02' west and 28 meters of altitude. Whose characteristics are: medium sized 0.50 to 1.50 m in height and red calículos. Seed irradiation was performed at th eNational Institutefor Nuclear Research (ININ) located in La Marquesa Mexico.The radiation source was^{60}Co gamma rays through Transelektro. Radiation doses were 0, 5, 10, 15, 20, 25, 30, 35, 40, 45 and 50 Gy. Their radiated 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 ^{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 60Co radiation applied to the seeds of Jamaica, germination percentage decreased by 0.37% which is tool ow to be considered in determining the LD_{50}.So under this trend, the maximum radiation dose able to reduce by 28% germination, indicating that in order to determine the LD50, 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.

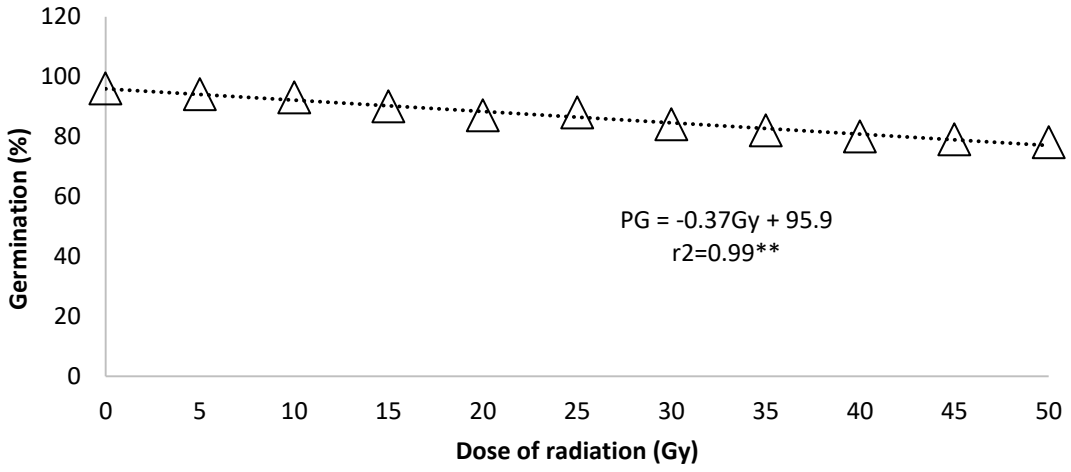

Fig 1: Curve radiosensitivity seed Jamaica (*Hibiscus sabdariffa* L.), under ^{60}Co gamma radiation. Technological University of Tehuacan. 2015.

CONCLUSION

According to the results of their radiation of the material under study, it can be concluded the following:

- The curve of radiosensitivity in Jamaica at the doses tested, at a decreasing linear model was adjusted.
- The maximum radiation dose, only managed to reduce seed germination in Jamaica by 28%.
- The model fit was excellent, which shows that this previous study was well done.

RECOMMENDATIONS

For a better response from germination to gamma irradiation of ^{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_{50}.

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