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EFFECT OF GAMMA IRRADIATION OF LOCAL BRACHIARIA RUZIZIENSIS (GERMAIN & EVRARD) SEEDS ON AGRONOMIC PERFORMANCE AND YIELD

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A B S T R A C T

Appropriate methods of mutation induction are of high importance in pastures for increased genetic variability and improved performance. The objective of this research was to improve the agronomic and nutritive performance of mutant lines (M7) through induced mutagenesis to seeds of a local landrace *Brachiaria ruziziensis.* The seeds were irradiated with 0, 10, 20, 30 and 40Gy doses of gamma radiation from Cobalt 60 (^{60}Co). Treatments were; KE 0Gy, KE 10Gy, KE 20Gy, KE 30Gy and KE 40Gy resulting into M1 seeds. The M1 seeds were planted in the greenhouse in germination pots for one month and the seedlings transplanted to the field. Seeds of M6 plants (M7 seeds) were used to establish field experiment in a completely randomized block design, with three replications. Parameters measured included; tillering, leaf-stem ratio, dry matter weight, and seed weight. Data collected was analyzed using the SAS package. Mutant lines exhibited better agronomic performance compared to the wild type. Performance increased with increased gamma-ray exposure with 40Gy treatment outperforming all other treatments whereas the control performed dismally. There was a significant difference ($P<0.05$) in the dry matter with 40Gy treatment having the highest values of dry matter yields, whereas control had the lowest values. Application of nuclear technology to other grasses would lead to increased biomass and improved nutrition for increased animal productivity leading to food and nutrition security.

Keywords: Gamma rays, agronomic performance, *Brachiaria* grass, Mutant lines.

INTRODUCTION

Population growth in sub-Saharan Africa (SSA) is among the fastest in the world, with a population of over one billion in 2017 (World Bank, 2018). However, growth in the production of livestock products is not keeping pace with the growth in the human population and sub-Saharan Africa has the lowest per capita consumption levels of livestock products in the world (Cardoso, 2012). In addition to the requirements of the increasing population, demand for dairy products is also increasing with rising per capita income, urbanization and westernization of diets (Knips, 2006). To meet the market demand for milk, cattle productivity in these areas needs to be increased through improved pasture and forage productivity. However, the main challenge facing cattle productivity in SSA is the lack of enough feed for the livestock emanating from poor crop performance. Therefore, there is a need to improve the local pasture and forage landraces to meet this demand.

Exploitation of natural or induced genetic diversity is an established strategy for the improvement of major food crops, and the use of mutagenesis to create novel variation is particularly valuable in crops. Mutation induction is an effective method for increasing the diversity of plants and their performance (Sutapa and Kasmawan, 2016). Mutations can be induced using physical or chemical mutagens. Physical mutagenesis includes irradiation with non-ionizing gamma rays, alpha and beta rays, fast and slow neutrons (Tadele, 2016; Oladosu *et al.*, 2015). Gamma rays are vital in developing mutant crop varieties and increasing genetic variability (Jan *et al.*, 2012; Ali *et al.*, 2016). Uses of

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