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Selection of Radiation-Induced Kenaf Mutant with Excess Moisture Tolerance in Paddy Field

In-Sok Lee[1]*, Chan-Ho Kang[1], Yu-Rim Choi[1], Ju Kim[1]

[1]Jeollabukdo Agricultural Research and Extension Services, Iksan, 54968, Korea

[Introduction]

Kenaf(*Hibiscus cannabinus* L. 2n=36) is a non-food herbaceous plant of the Malvaceae family, which has recently received a lot of attention due to its high above-ground biomass yield. In Korea, the surplus rice has been becoming a social problem since a long time ago. Thus, an alternate crop should be developed to keep the balance of supply and demand of rice. The main objective of this study was to generate new kenaf line with high biomass in paddy field through mutation breeding. Also, it aimed to describe genotype in regards to their morphological traits in comparison to the Control varieties, Jangdae.

[Materials and Methods]

The kenaf seed variety used for the Control was 'Hongma 300', being originally from China.

Approximately 100g of kenaf seeds were irradiated with 250 Gy from ^{60}Co sources located in Korea Atomic Energy Research Institute (KAERI). Each of the 500 plants (1st generation, M_1) were planted in 2017, grown to maturity in an upland field, and assigned numbers at harvest time. In 2018, the 250 plants of 2nd generation (M_2) were planted and the mutants showing normal seed fertility were investigated on an individual plant basis. An acceleration of generation was processed from Oct. 2019 to Apr. 2020, and from Oct. 2020 to Apr. 2022. After planting in paddy field and upland on 1st May, various characteristics including flowering date were recorded, compared to the Control plants, Jangdae.

[Results and Discussions]

The one purpose of breeding new kenaf is developing new varieties that are higher yielding in paddy field of an excess moisture condition. The elite mutant with superior performances was selected through mutation breeding. Seeds of the original resource named Hongma 300 (Control) were irradiated with 250 Gy gamma-ray. The agronomic performances of the elite mutant line (JBK3183) were investigated at M10 generation in comparison with the Control. The leaf shape of the Control and the JBK3183 mutant was the same as a palmate. There was a big difference on flowering time between plants grown in upland and plants grown in paddy field. Both genotypes was flowered in July in upland condition, however, in September in paddy field condition. Some differences at stem color were observed as green at the Control and pale red at the JBK3183 in both cultivation conditions. The leaf size and width the JBK3183 was higher and larger than those of the Control. The stem diameter is directly correlated with the biomass yield. In upland condition, the stem diameter of JBK3183 was 13.6cm that is statistically higher ($p \leq 0.05$) than 11.2cm of the Control. Also, the mutant had a much higher ($p \leq 0.05$) score compared to the Control in paddy field condition. It demonstrated differentiation between the Control and mutant. Based on the results, the JBK3183 would be useful as a resource to be cultivated in paddy field.

*Corresponding author: E-mail. bioplant325@korea.kr Tel. +82-63-290-6038