PB-26

Development of a Kenaf Mutant with Superior Biomass Using Gamma-Ray Irradiation

In-Sok Lee[1]*, Chan-Ho Kang[1], Jin-Jae Lee[1]

[1]Jeollabukdo Agricultural Research Extension Service, Iksan 54968, Korea

[Introduction]

Kenaf (Hibiscus cannabinus L.) is a fiber crop belonging to the family of Malvaceae and native to India and Africa. The 'green tag' is further associated with kenaf because of its promising growth, and scavenges extensive amounts of carbon dioxide (CO2) from the atmosphere. Because of that characteristics, kenaf would be the world's next golden crop. In this paper, we describe the selection and characterization of a kenaf mutant with high biomass productivity and satisfactory seed amount.

[Materials and Methods]

In 2017, the seeds (500g) were irradiated with 300Gy of gamma-ray, which were assigned as M1 lines. After treating a short day from July to September, M2 seeds were established in the same year. The seeds of previous year were planted, harvested M3 lines, and since then assigned numbers for 121 lines in 2018. 20 seedlings per each pedigree of M3 generation were grown to maturity in an upland field in 2019, and seeds of M4 lines were gained on individual plants. After rapid generation advance for M4 lines from December of 2019 to April of 2020, and produced M5 generations. In May 2020, M5 lines were sown and characteristics were investigated. All lines were used to record data on days to 1st flowering, plant height, stem diameter and branch number. The record data was average of 10 repetitions.

[Results and Discussions]

The traits of interest in kenaf are high biomass of aerial part, and ample seed yield in Korea. So, we conducted this project to select an elite mutant with these traits of interest using gamma-ray. The several agronomic performances of a mutant (JBM501-1) were investigated at M5 generation in comparison with the Control (Hongma). Significant differences were observed between the Control and JBM501-1. Two plants had a big difference for stem color that was a light red in Hongma and green in JBM501-1. The number of flowering days for JBM501-1 was August 12 being in contrast to October 1st of Hongma. The plant height of JBM501-1 in upland and reclaimed land was statistical similar with the Control. As to stem diameter, JBM501-1 in upland showed 46.2 cm being the same with the Control of 46.3 cm, and their score was decreased up to 25.3% in the Control and 24.4% in mutant in reclaimed land. As compared branch number, 22 of Hongma in upland were reduced up to 11 in reclaimed land and JBM501-1 were diminished from 22.3 in upland to 8.3 in reclaimed land. The stem dry weight was founded to be no significant difference to both of them in upland, however mutant showed a 15% increase compared to the Control. The same aspect for two genotypes was revealed in result gained from reclaimed land. For seed weight, Hongma didn't set seeds owing to late flowering. On the other hand, JBM501-1 bore 13.8g/plant of seed in upland and 14.3g/plant of seed in reclaimed land. On the basis of these results, we concluded that JBM501-1 has the potential to be an important genetic resource with the ability to satisfy high biomass and seed productivity in Korea.

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