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Research progress of mutation breeding in high plant induced by heavy ion beam at IMP

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Abstract

It is well known that heavy ion irradiation is characterized by a high linear energy transfer and relative biological effectiveness, which is expected to increase mutation frequency and mutation spectrum. So far a variety of mutants induced by heavy ion beam such as high yield mutant in wheat, leaf color mutant in wandering Jew and an early-maturity mutant of sweet sorghum, have been reported at the Institute of Modern Physics (IMP), affiliated with the Chinese Academy of Sciences, which is an institute making important contributions to basic research as well as the applications of heavy-ion physics and nuclear techniques. Aiming at the scientific front and strategy demand on modern agriculture, the researchers of IMP has been carrying out mutagenic improvement on high plant since in the middle of 1990s. Long Fu No. 2, the new variety of spring wheat, was successfully bred by heavy ion beam mutation breeding techniques at IMP, which has extended the planting filed of 5.5×10^5 ha during the past several years with excellent agronomic characteristics. White-flowered wandering Jew is a perennial evergreen herb. However, the mutant induced by carbon ion irradiation has been seasonally exhibited green or pink-variegated leaf and maintained by vegetative propagation since 2007. Sweet sorghum is a potential useful energy crop characterized by a high photosynthetic efficiency and a high biomass- and sugar- yielding crop. After irradiation by heavy ion beam, an early-maturity mutant was acquired and the growth period had stably shortened for around 20 days in sweet sorghum, which is expected to solve the difficult problem of earlier frost during industrialization plant for bio-ethanol production using sweet sorghum as feedstock in the northwest region of China. To date, IMP has established industrial chain based on circular economic to develop yeast products and good fodder for sweet sorghum. In addition, a large number of mutants were isolated by heavy ion beam irradiation from maize, cotton, castor, violet and pelargonium, respectively. In the future, our research will be further focused on mutagenic mechanism of heavy ion beam on high plant at the molecular level.

Biography

Xicun Dong has completed his PhD at the age of 35 years from Chinese Academy of Sciences University. He is the director of plant breeding group. He has published more than 40 papers in journals.