

A review on gamma greenhouse as a chronic gamma irradiation facility for plant breeding and improvement program

ABSTRACT

The research on radiation induced mutation has been conducted as one of the promising method of plant breeding in Malaysia since 1980s. Nuclear Malaysia is leading research institute in Malaysia conducting plant mutation breeding research. Gamma Greenhouse facility located in Nuclear Malaysia is one of the irradiation facilities to serve as a chronic irradiation facility for inducing mutation in various organisms including plants, fungi and microbes. Chronic irradiation refers to the exposure of materials at a lower dose rate over a long period of time. Previous studies have shown that this type of irradiation can minimize radiation damages to living materials and produces a wider mutation spectrum, therefore is very useful for trait improvements in irradiated organisms. Experiments on induce mutation using Gamma Greenhouse facility for crop improvement program have been conducted since its first operation in 2009. Various plant species including ornamental and herbal plants, food crops and industrial crops have been irradiated to improve their traits such as higher yield and biomass, pest and disease tolerance, higher bioactive compounds, longer bloom time and many others. Most of these crop improvement programs were done through collaborations with other agencies in Malaysia such as universities, research institutes and government departments. A number of publications on crop improvement using Gamma Greenhouse have been published in local and international journals as well as seminar presentations at national and international levels. The outputs from induced mutation via chronic radiation using Gamma Greenhouse could be of great interest for plant breeders dealing with improvement and development of new cultivars. This paper discusses the activities and achievement in plant breeding and improvement using Gamma Greenhouse Facility in Malaysia.

Keyword: Chronic gamma irradiation; Mutation breeding; Mutation spectrum; Plant breeding and improvement; Gamma greenhouse facility