

Gamma Irradiation on Growth and Development of *Amorphophallus muelleri* Blume.

Edi Santosa^{1*}, Sigit Pramono¹, Yoko Mine², and Nobuo Sugiyama²

¹Department of Agronomy and Horticulture, Bogor Agricultural University
Jl. Meranti, Kampus IPB Darmaga, Bogor 16168, Indonesia

²Faculty of Agriculture, Tokyo University of Agriculture, Funako, Atsugi, Kanagawa 243-0034, Japan

Received 20 August 2013/Accepted 17 December 2014

ABSTRACT

*Iles-iles (Amorphophallus muelleri Blume) produces apomictic seeds lead to low genetic variation. In order to induce genetic variation, germinated seeds were exposed to Gamma irradiation (Co-60) at doses of 10 to 100 Gy. Seed irradiation was conducted at Center for the Application of Isotop and Irradiation Techology -National Nuclear Energy Agency (CAIRT), Indonesia. Morphological and yield of M1 generation were observed. Results showed that irradiation at a dose of 10 Gy close to LD₅₀ with survival rate 56%. Gamma irradiation at a dose of 10 Gy delayed seeds germination. Germination rates gradually increased and reached maximum at 4 weeks after planting (WAP) for control plants, while 14 WAP of irradiated plants. At 16 WAP, germination rate of 10 Gy irradiated plants was 56% while 84% for thoses of control plants. Chimera were presented as indicated by short petiole, variegated and abnornal shape of leaflets. Some irradiated plants entered dormancy at 8-10 weeks longer than control ones. Prolong vegetative periode lead plants to have larger corms production. This study revealed the possibility to induce variation of *A. muelleri* by using gamma irradiation.*

Keywords: Amorphophallus muelleri, gamma irradiation (Co-60), morphological variation, mutation breeding

ABSTRAK

Iles-iles (Amorphophallus muelleri Blume) menghasilkan biji apomiksis yang menyebabkan keragaman genetik tanaman rendah. Dalam upaya meningkatkan keragaman genetik, maka digunakan iradiasi sinar gamma (Co-60) dengan rentang dari 10-100 Gy. Iradiasi benih dilakukan pada Pusat Aplikasi Teknologi Isotop dan Radiasi-BATAN, Indonesia. Tanaman M1 hasil iradiasi diamati pertumbuhan hingga panen. Hasil penelitian menunjukkan bahwa dosis iradiasi 10 Gy hampir mendekati LD₅₀ karena survival rate 56%. Iradiasi sinar gamma menyebabkan benih lambat berkecambah. Pertumbuhan tunas pada tanaman kontrol telah maksimal pada 4 MST, sedangkan pada tanaman iradiasi pada 14 MST. Pada minggu ke 16 setelah tanam, persentase tanaman tumbuh dari perlakuan 10 Gy adalah 56%, sedangkan pada kontrol mencapai 84%. Kimera muncul pada tanaman hasil iradiasi, utamanya berupa petiol yang memendek, varigata dan bentuk leaflet abnormal. Beberapa tanaman hasil iradiasi memasuki masa dorman 8-10 minggu, yang lebih lambat dibandingkan dengan kontrol. Lambatnya tanaman iradiasi memasuki dorman diduga menjadi penyebab meningkatnya bobot umbi pada tanaman tersebut. Penelitian ini menunjukkan adanya peluang penggunaan iradiasi sinar gamma untuk meningkatkan variasi pada tanaman iles-iles.

Kata kunci: Amorphophallus muelleri, iradiasi gamma (Co-60), keragaman morfologi, pemuliaan mutasi

INTRODUCTION

Amorphophallus muelleri Blume (synonym *Amorphophallus oncophyllus*), locally called *iles-iles* or *porang* is a new promising carbohydrate source in many Asian countries. Corm of *A. muelleri* contains large amount of glucomannan. Clinical study indicates that glucomannan is responsible for lowering lipids and glycemia (Sood *et al.*, 2008). Glucomannan flour is used as food to relieve conspitation and a raw material for many industries (Sugiyama and Santosa, 2008). In tropical climates, *A.*

muelleri cultivation is preferable than *A. konjac* cultivation because *A. muelleri* is more tolerant to soil-borne diseases, viruses and shading, thus *A. muelleri* grow well in agroforests (Santosa *et al.*, 2003; Sugiyama and Santosa, 2008).

Apomictic seeds and vegetative aerial bulbils are main propagation materials in *A. muelleri*, lead to low genetic variation (Sugiyama and Santosa, 2008). *A. muelleri* requires three years from seedlings to harvest of marketable corm size, ca. 1.5 kg or more (Sugiyama and Santosa, 2008). In spite of the high value of the crop in Indonesia, little research has been done to improve this species. Current productivity is considered low as compared with its potential yields ca. 3.5-4.0 kg plant⁻¹. Mine *et al.* (2010) stated that intraspecific competition on *A. muelleri*

* Corresponding author. e-mail: edisang@gmail.com