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Micropropagation of Philodendron Ring of Fire Var. by Meristem Culture and *Philodendron Billieteae* by Somatic Embryogenesis

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Introduction

Ornamental plants have accompanied the history of human civilization, have always been a symbol of expression of well-being and used for improving landscape beauty Mariani et al. [1]. Philodendron is an ornamental foliage plant for indoor use due to its function to absorb pollution. Philodendron ring of fire var. is a tropical plant. However, they could grow in mild temperatures. *Philodendron billieteae* is originated from Brazil, Costarica, France. It is included into the unique plant because of the giant size of leaf. Chen et al. [2] performed the micropropagation of Philodendron via direct shoot regeneration. They used Kinetin, Benzyl Adenine and Thidiazuron as plant growth regulators. Result shows that Benzyl Adenine is the most suitable hormone for multiplication of the Philodendron. Therefore, we used Benzyl Adenine for this study. Pawar et al. [3] indicated that the use of glutamine was better than that of without glutamine. Hence, we used glutamine in this research.

Material and Method

Material

The material in this study is Philodendron ring of fire var. and *Philodendron billieteae* sterile leaf provided by Mr. Ahmad Syahrian Siregar from Research Center of Citrus Plant and Subtropical Fruit, Raya Tlekung Street No. 1, Junrejo, Batu, East Java 65301, Indonesia.

Meristem culture

Firstly, the explant (shoot) was surface sterilized by 96% alcohol for 30 second and 20% chlorox for 3 minutes. Then, the explants were washed by sterile water 4 times. 2. The scale of the shoot was opened under stereomicroscopy until 0.2-0.5 mm and the shoot mersitem was obtained. 3. The shoot meristem was cultured on initiation media MS containing 1g active charcoal for 2 weeks. Thereafter, the shoot was subcultured on MS media supplemented with 0.5 mg/l BAP and 0.025 mg/l NAA. For development of leaf, clump of leaf was subcultured onto M2 medium, which is Murashige and Skoog (MS) medium supplemented with 1 ppm of Benzyl Adenine, 10 ppm of glutamine, 10 ppm of Arginine and 5 ppm adenine sulphate. For development of plantlet, the leaf was subcultured onto MS medium without hormone.

Somatic embryogenesis

Sterile leaf explant was cultured on embryogenic callus medium. It consists of M9 macronutrient, M9 micronutrient, B5 vitamin, 2 ppm NAA, 2 ppm BAP, 1.5 g/l glutamine, 0.1g/l casein hydrolysate, 1g/l MES buffer, 3 % sucrose and 0.8 % agar. Then, the embryogenic callus was subcultured onto somatic embryogenesis medium. It is an M9 medium supplemented with 1.5 g/l glutamine, 5 ppm NAA and 1 ppm BAP. Thereafter, the globular and heart somatic embryos were transferred onto M9 medium supplemented with 1.5g/l glutamine, 0.5 ppm NAA and 1 ppm BAP.

Result and Discussion

Meristem culture

In this study, we used one shoot of Philodendron ring of fire var. derived from meristem culture. For medium, we utilized glutamine, arginine, adenine sulphate and Benzyl adenine. Figure 1 shows roundish form that full of leaves. This form developed within 2 months of culture on M2 medium, which is Murashige and Skoog (MS) medium supplemented with 1 ppm of Benzyl Adenine, 10 ppm of glutamine, 10 ppm of Arginine and 5 ppm adenine sulphate. Glutamine, arginine, and adenine sulphate are reduced nitrogen. Therefore, they have a good effect in the development of leaves. After 2 months on M2 medium, the leaves of Philodendron ring of fire var. speeded as shown in figure 2. The leaves are good and thick. Thereafter, after being transferred to MS medium without hormones, the leaves became variegated and aerial root developed. This is a plantlet of Philodendron ring of fire var. (Figure 3). The aerial root could develop on medium without hormone because the shoot derived from meristem culture. This is the first study of meristem culture in Philodendron ring of fire var.

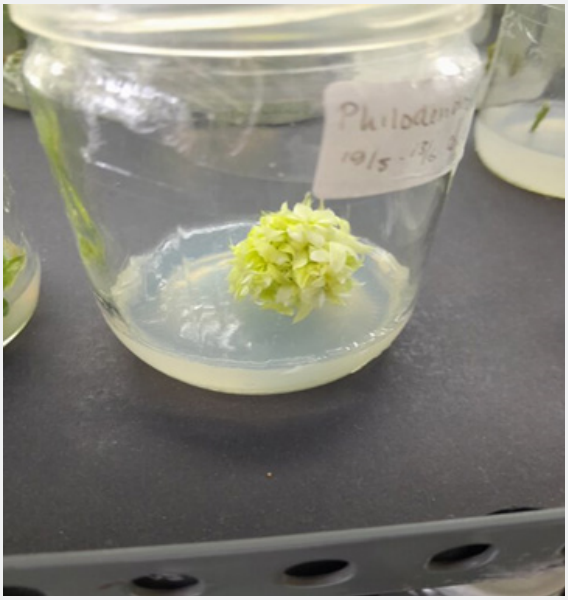

Figure 1: Roundish form that full of leaves.

Figure 2: Spreaded leaves on M2 medium.

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Figure 3: Plantlet of Philodendron ring of fire var. with aerial roots.

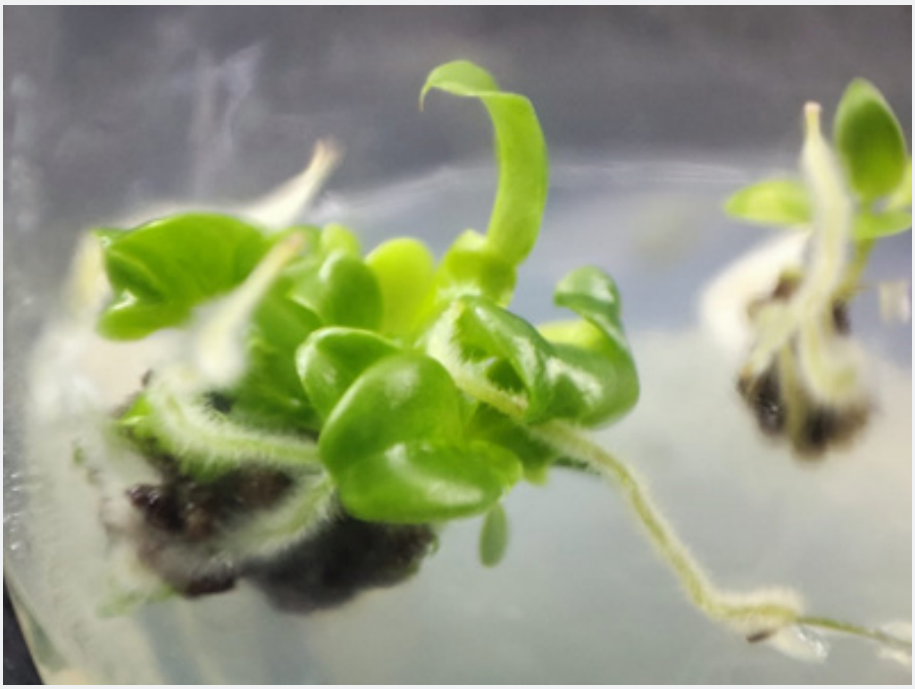

Figure 4: Plantlet of Philodendron billieteae consisting of leaf and aerial root.

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Somatic embryogenesis

Next is somatic embryogenesis of *Philodendron billieteae*. The medium, firstly embryogenic callus medium. It consists of M9 macronutrient, M9 micronutrient, B5 vitamin, 2 ppm NAA, 2 ppm BAP, 1.5g/l glutamine, 0.1g/l casein hydrolysate, 1g/l MES buffer, 3 % sucrose and 0.8 % agar. In this medium, the embryogenic callus developed from leaf explant. For developing the somatic embryo, the embryogenic callus was transferred onto somatic embryogenesis medium. It is an M9 medium supplemented with 1.5g/l glutamine, 5 ppm NAA and 1 ppm BAP. In this medium, globular and heart somatic embryos were developed. Then, when they were subcultured onto M9 medium supplemented with 1.5g/l glutamine, 0.5 ppm NAA and 1 ppm BAP, a plantlet of *Philodendron billieteae* developed, as shown in figure 4 consisting of leaf and aerial root. To our knowledge, this somatic embryogenesis of *Philodendron billieteae* was a first study as well.

Conclusion

Based on the observation above, we concluded as follows:

The philodendron ring of fire var. could be regenerated by meristem culture method.

Philodendron billieteae could undergo somatic embryogenesis method.

Acknowledgement

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