Production of Red Pigment from the Root of *Morinda angustifolia* Roxb. var. *scabridula* Craib. by Root Cell Culture

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ABSTRACT

Antraquinone is a group of natural red dye found in the root of *Morinda* sp. which is available in the upper north of Thailand and has been widely used on cotton dyeing. Recently, interest in natural dyes has increased and there is a need to find suitable alternative sources of natural dyes. We have studied one alternative to increase the production of anthraquinone dye by root cell culture of *Morinda angustifolia* Roxb. var. *scabridula* Craib. The major components of the red pigment extracted from the root of this plant was purified and analyzed for the chemical structure and was found to be an anthraquinone pigment morindone. Uncontaminated root cells were obtained by growing the *Morinda* seed on Murashige and Skoog agar medium(MS).The roots were cut into 2.5 mm. pieces and grown in fresh MS medium to get callus. The callus fully proliferation on a modified Gamborg's B_5 medium supplemented with 40 g/l succinic acid, 0.1 mg/l kinetin, 0.2 mg/l auxin and 20 g/l sucrose cultured in shake flask 100 rpm at 25°C for 3 months gave root cells only 0.14 g dry weight whereas the callus cultured on B_5 agar at the same condition gave 1.22 g dry cells within one month. The cultivated callus contained red and yellow pigments. Extraction of the pigment from the cultured cells and separated by Thin Layer Chromatography with the same solvent system as what had been used to separate pigment in the plant's root extract and gave two major components with R_f values comparable to the red pigment extracted from *Morinda* plant's root. The production of anthraquinone dye from root cells cultured for 5 months was 1.4 times of the cells cultured for 3 months and could produce 0.6 times of the dye from the root of 2-3 years old plant.

Key words: Red pigment, *Morinda* sp. Extraction, Root cell culture

INTRODUCTION

Plants are the origin of most natural dyes. Some common plants containing dyes include wood, weld, madder and goldenrod. Alum, bichromate of potash, copper, ferrous sulfate, stannous chloride and tannic acid are common mordants (Lemmens and Wulijirni-Soetjipto,1992). The natural red dyes including the anthraquinones, naphthoquinones and benzoquinones could be also found in varieties of plants (Koyama et al.,2001). Anthraquinones are important naturally occuring pigments that are widely distributed in nature. They are particularly prominent in fungi (Turner and Aldridge , 1983; Gill and Steglich, 1987; Gill, 1994), higher plants