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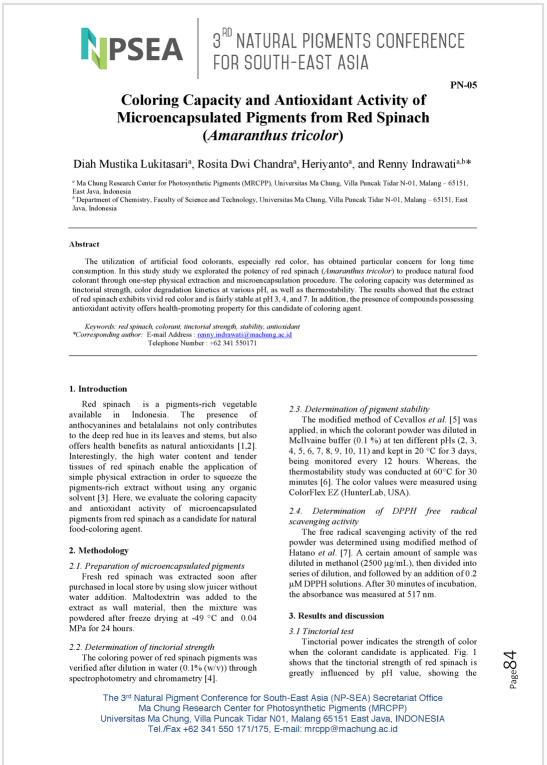

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PN-05

Coloring Capacity and Antioxidant Activity of Microencapsulated Pigments from Red Spinach (*Amaranthus tricolor*)

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Abstract

The utilization of artificial food colorants, especially red color, has obtained particular concern for long time consumption. In this study study we explorated the potency of red spinach (*Amaranthus tricolor*) to produce natural food colorant through one-step physical extraction and microencapsulation procedure. The coloring capacity was determined as tinctorial strength, color degradation kinetics at various pH, as well as thermostability. The results showed that the extract of red spinach exhibits vivid red color and is fairly stable at pH 3, 4, and 7. In addition, the presence of compounds possessing antioxidant activity offers health-promoting property for this candidate of coloring agent.

Keywords: red spinach, colorant, tinctorial strength, stability, antioxidant
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1. Introduction

Red spinach is a pigments-rich vegetable available in Indonesia. The presence of anthocyanines and betalalains not only contributes to the deep red hue in its leaves and stems, but also offers health benefits as natural antioxidants [1,2]. Interestingly, the high water content and tender tissues of red spinach enable the application of simple physical extraction in order to squeeze the pigments-rich extract without using any organic solvent [3]. Here, we evaluate the coloring capacity and antioxidant activity of microencapsulated pigments from red spinach as a candidate for natural food-coloring agent.

2. Methodology

2.1. Preparation of microencapsulated pigments

Fresh red spinach was extracted soon after purchased in local store by using slow juicer without water addition. Maltodextrin was added to the extract as wall material, then the mixture was powdered after freeze drying at -49 °C and 0.04 MPa for 24 hours.

2.2. Determination of tinctorial strength

The coloring power of red spinach pigments was vertified after dilution in water (0.1% (w/v)) through spectrophotometry and chromametry [4].

2.3. Determination of pigment stability

The modified method of Cevallos *et al.* [5] was applied, in which the colorant powder was diluted in McIlvaine buffer (0.1 %) at ten different pHs (2, 3, 4, 5, 6, 7, 8, 9, 10, 11) and kept in 20 °C for 3 days, being monitored every 12 hours. Whereas, the thermostability study was conducted at 60°C for 30 minutes [6]. The color values were measured using ColorFlex EZ (HunterLab, USA).

2.4. Determination of DPPH free radical scavenging activity

The free radical scavenging activity of the red powder was determined using modified method of Hatano *et al.* [7]. A certain amount of sample was diluted in methanol (2500 µg/mL), then divided into series of dilution, and followed by an addition of 0.2 µM DPPH solutions. After 30 minutes of incubation, the absorbance was measured at 517 nm.

3. Results and discussion

3.1 Tinctorial test

Tinctorial power indicates the strength of color when the colorant candidate is applicated. Fig. 1 shows that the tinctorial strength of red spinach is greatly influenced by pH value, showing the

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