

**PRODUKSI PENGEMBANGAN PROTEIN ANTOKSIDAN GENERASI
BARU DARI *Gnetum gnemon* PROTEIN SEBAGAI BAHAN
NUTRACEUTICAL KOMERSIAL**

Tri Agus Siswoyo¹, Didik Pudji Restanto¹ dan Tri Handoyo¹

Sumber Dana : DP2M-Dikti- Stranas 2013

Dept of Agronomy, Faculty of Agriculture,
University of Jember. Jln Kalimantan III/23 Jember 68121
E-mail: triagus.faperta@unej.ac.id

ABSTRAK

*Penggunaan senyawa alami biofungsional protein sebagai nutraceutical sebagai sumber obat alami merupakan suatu pilihan untuk mempertahankan atau meningkatkan sistem fisiologis pada tubuh, terutama untuk pencegahan atau pengobatan terhadap suatu penyakit. Kandungan protein yang tinggi (9-10%) pada biji *Gnetum gnemon* (melinjo) sangat berpotensi untuk dapat dikembangkan sebagai bahan dasar nutraceutical komersial yang berbasis protein. Teknik modifikasi protein secara enzimatis untuk menghasilkan protein potensial generasi baru dapat dilakukan dengan menggunakan beberapa jenis peptidase. Dari hasil penelitian telah ditemukan jenis alcalase dapat meningkatkan aktivitas antioksidan lebih tinggi dari normal sampai 20-30 kali pada kondisi optimal 0.2% (E/S) pada suhu hidrolisis 50°C pada pH 8 selama 5-6 jam. Dari hasil penelitian yang diperoleh dapat dikatakan bahwa protein biji melinjo sangat berpotensi sebagai sumber atau bahan komersial Nutraceutical Food Supplement protein antioksidan. Untuk lebih lanjutnya diperlukan suatu teknologi dalam produksi up skala protein tersebut guna memenuhi kebutuhan industri.*

*Kata kunci : Antihipertensi, Protein, Nutraceutical, *Gnetum gnemon**

Production of New Generation of Protein Antioxidant from *Gnetum gnemon* Seed (Gg-AOP) as Nutraceutical Resource

Tri Agus Siswoyo¹, Didik Pudji Restanto¹ dan Tri Handoyo¹

Sumber Dana : DP2M-Dikti- Stranas 2013

¹Dept of Agronomy, Faculty of Agriculture,
University of Jember. Jln Kalimantan III/23 Jember 68121
E-mail: triagus.faperta@unej.ac.id

EXECUTIVE SUMMARY

Reactive oxygen species (ROS) have effects on many substances in the human body, such as fatty acids, proteins and DNA. Generation of reactive oxygen species or free radicals such as superoxide, hydroxyl radical and hydrogen peroxide during metabolism and other activities beyond the antioxidant capacity of a biological system gives rise to oxidative stress. Oxidative stress plays a role in heart diseases, malaria, neurodegenerative diseases, AIDS, cancer and in the aging process. All organisms have antioxidant systems that are able to control and counter the onslaught of free radical mediated oxidative damage. Therefore, dietary sources have been recognized as safer and effective antioxidants in the context of their efficiency and non-toxicity. The intake of fruits and vegetables containing high amounts of antioxidative nutraceuticals has been associated with the balance of the free radicals or antioxidants status, which helps to minimize the oxidative stress in the body and to reduce the risks of diseases. Recently, the use of natural product has attracted particular interest.

As an archaic living fossil of the *Gnetum gnemon*, L (Gnataceae) is one of the oldest species of tree, with great anti-adversity ability, which has existed on the earth for two hundred million years. *Gnetum gnemon* (melinjo), L (Gnataceae) is cultivated in Indonesia, Malaysia and other south-east Asian islands for its seeds and is used as food in Indonesia. This tree may be considered as a suitable source of functional food, nutraceutical food supplement and their high bioavailability. The characters potency of *Gnetum gnemon* (melinjo) seed component such as starch, lipid, protein and phenolics/flavonoids as a nutraceutical sources for food supplement were very limited. In line with this, the main our research is to studies of

potency and development of functional components from melinjo seed (*Gnetum gnemon*) as nutraceutical food supplement.

Extraction and Isolation, Twenty five grams of sample seed were ground in a food processor and the resulting meal was extracted with 50 mL of an ice-cold extraction distilled water for 2-4 hours at 4°C. Protein isolated was hydrolysed with trypsin, pepsin and alcalase on their optimal hydrolysis condition. The degree of hydrolysis was determined using trinitrobenzenesulphonic acid (TNBS) reaction (Alder-Nissen, 1979). ABTS radical scavenging activities of Gg-AOP fractions were determined as described by siswoyo *et al.* with slight modification.

Scavenging radical activities of melinjo (*Gnetum gnemon*) protein isolate (Gg-PI) hydrolysates prepared by three enzymes (alcalase, trypsin and pepsin). The antioxidant activities and protective effect against oxidative DNA damage of Gg-PI hydrolysates were investigated. Alcalase hydrolysates exhibited the highest hydroxyl radical-scavenging activity (IC_{50} 1.74 mg mL⁻¹) ($P < 0.05$). Compared with other two hydrolysates, the hydrolysates obtained by alcalase had the most abundant <3-kDa fractions. In addition, below 3-kDa fractions of alcalase hydrolysates showed the highest antioxidant activities and protective effects against DNA damage through both scavenging hydroxyl radicals, which was probably because of the increase in several antioxidant amino acids, such as His, Met, Cys, Tyr and Phe, as well as the hydrophobic amino acids. The results suggested that enzymatic hydrolysis could be used as an effective technique to produce high value-added peptides products from *Gnetum gnemon* seed.

Keywords: Antioxidant, Protein, Gnetum gnemon, Nutraceutical, Production

References ;

1. Alder-Nissen J, Enzymic Hydrolysis of Food Proteins. Elsevier Applied Science, New York, NY, pp.122–124 (1986).
2. Siswoyo, T.A., Eka M., Lee K.O. and Hosokawa K. (2011) Isolation and Characterization of Antioxidant Protein Fractions From Melinjo (*Gnetum gnemon*) Seed. J. Agricultural and Food chemistry. 59, 5648-5656