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Abstract

The objective of this research was to examine the phenolic compounds present of the native varieties of twenty rice varieties (Khaw-ta-haeng, Hom-mali, Luang-plang-hla, Kan-na, Luang-hom, Luang-teay, Kaw-mali, Luan-num-kam, Ta-chung, Kaw-ta-hang-hak, Luang-pra-tiw, Ko-klo 27, Kaw-hlang, Luang-klay-la, Kaw-oo-kas, Sam-Rung, Kaw-nga-chang, Luang-pra-kim, Sad-tee-boa and Luang-hol) in Pathum Thani Province. Results showed that Kaw-oo-kas had the highest phenolic compound content (2.90 µg gallic acid/1mL sample) and Hom-mali had higher antioxidant activity (33.06 µg Trolox/1mL sample) than that other rice. The phenolic content of Ta-chung had the lowest (2.43 µg gallic acid /1 mL sample) while, Kaw-oo-kas had the lowest antioxidant capacity (14.55 µg Trolox/1mL sample). However, Hom-mali had the high phenolic content (2.84 µg gallic acid /1 mL sample) and antioxidant a capacity (33.06 µg Trolox/1mL sample).

Keywords: Native varieties of rice, phenolic compound, antioxidant activity.

1. Introduction

Rice, has an important role in the relation between the diet and health. Several compounds with antioxidant activity have been identified in rice, including phenolic compounds, tocopherols, and γ-oryzauol [1]. The phenolic compounds are mainly associated with the pericarp in rice. Besides, grains with darker pericarp color, such as red and black rice, contain higher amounts of polyphenols [2][3]. The total phenolics in the grain has been positively associated with the antioxidant activity [4][5][6], such as reduction of oxidative stress [7] and in the prevention of the complications of diabetes [8][9]. The aim of the research was to examine the phenolic compounds present of the native varieties of rice in Pathum Thani Province their antioxidant activity and their potential beneficial effects on health.

3. Experimental methods

3.1 Preparation of Paddy

Rice, twenty varieties of Khaw-ta-haeng, Hom-mali, Luang-plang-hla, Kan-na, Luang-hom, Luang-teay, Kaw-mali, Luan-num-kam, Ta-chung, Kaw-ta-hang-hak, Luang-pra-tiw, Ko-klo 27, Kaw-hlang, Luang-klay-la, Kaw-oo-kas, Sam-Rung, Kaw-nga-chang, Luang-pra-kim, Sad-tee-boa and Luang-holfrom Pathum Thani Rice Research, Thailand were used. Rice grains were ground by the mortar and pestle and analyzed according to the technique described above.

3.2 Extract

Three gram of each sample were extracted with 30 ml of 80% ethanol for 24 h at room temperature. The procedure was repeated twice. The ethanolic extracts were centrifuged at 4000 g for 15 min and the supernatants were pooled and stored at 4°C.

3.3 Total phenolic compounds

The Folin-Ciocalteu colorimetric method was used to measure the total phenolic content [10]. Briefly, 200 ul of the extractions were oxidized with 1 ml of 0.5 N Folin-Ciocalteu reagent and then the reaction was neutralized with 1 ml of the saturated sodium carbonate (75 g/L). The absorbance of the resulting blue color was measured at 760 nm with a spectrophotometer after incubation for 2 h at room temperature. Quantification was done on the basis of the standard curve of gallic acid. Results were expressed

as milligram of gallic acid equivalent (mg GAE) per 100 g of dry weight.

3.4 The total antioxidant capacity

The total antioxidant capacity was determined by a colorimetric method by spectrophotometer with a little modification [1]. First, 3 ml of 0.1 mM DPPH solution was added to 1 ml of extracts and mixed thoroughly. The mixture incubated for 30 min at room temperature and tested the absorbance at 517 nm. Results were expressed in terms of Trolox equivalent antioxidant capacity (TEAC, µM Trolox equivalents per 1mL dry weight).

% Radical scavenging = (control - Asample / Ablank) x 100

4. Results and Discussion

The grain of Kaw-oo-kas had the phenolic content of 2.90 µg gallic acid /1 mL sample. The rice Ta-chung had the lowest phenolic content (2.43 µg gallic acid /1 mL sample). Kaw-oo-kas had the lowest antioxidant capacity (14.55 µg Trolox/1mL sample) and the Hom-mali had the highest antioxidant capacity (33.06 µg Trolox/1mL sample) (Table 1). The wider variations of phenolic content and antioxidant capacity among a total phenolic of 423 white rice, but the rice with extremely small grain was not phenolic and antioxidant capacity with few rice accessions [11][1]. The phenolic content and antioxidant capacity of brown rice are higher than the milled rice [11]. In general, the phenolic content had a strong positive correlation with the antioxidant capacity, which was in agreement with many of previous studies such as Chi et al [12], Rattanachitthawat et al [13] and Zhang et al [14]. In this research, Hom-mali had the high phenolic content (2.84 µg gallic acid /1 mL sample) and antioxidant a capacity (33.06 µg Trolox/1mL sample) which phenolic compounds may expert their antioxidant activity in different ways. They may directly scavenge some reactive species, including, hydroxyl, peroxyl and superoxide radicals, acting, as chain breaking antioxidants, such as α-tocopherol. The phenolic compounds may bind pro-oxidants while simultaneously maintaining their capacity to scavenge free radicals [15][16][17].

5. Conclusion

The different compounds with antioxidant activity, including polyphenols in rice are observed in the concentration of these compounds in the grains, mainly due to genotype and pericarp color. Kaw-oo-kas had the phenolic content and Hom-mali had the highest antioxidant capacity. However, Hom-mali had the high, both the phenolic compound and the antioxidant capacity.

6. Acknowledgment

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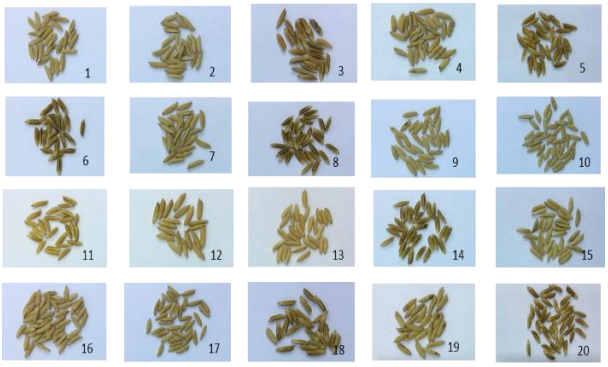

Figure 1. Characterizes of paddy in Pathum Thani Rice Province.

Table 1. Total phenolic compounds and antioxidant activity of twenty native varieties of rice in Pathum Thani Province

No.	Native varieties of rice in Pathum Thani Province	Total phenolic compounds (µg gallic acid /1 mL sample)	Antioxidant activity (µg Trolox/1mL sample)
1	Khaw-ta-haeng	2.47	30.07
2	Hom-mali	2.84	33.06
23	Luang-plang-hla	2.38	28.42
24	Kan-na	2.38	31.40
25	Luang-hom	2.46	27.31
26	Luang-teay	2.66	27.61
27	Kaw-mali	2.58	26.87
28	Luan-num-kam	2.55	25.18
29	Ta-chung	2.43	15.17
30	Kaw-ta-hang-hak	2.78	24.19
11	Luang-pra-tiw	2.76	20.96

12	Ko-klo 27	2.88	23.78
13	Kaw-hlang	2.74	21.55
14	Luang-klay-la	2.71	23.88
15	Kaw-oo-kas	2.90	14.55
16	Sam-Rung	2.69	22.70
17	Kaw-nga-chang	2.46	18.01
18	Luang-pra-kim	2.48	18.15
19	Sad-tee-boa	2.47	18.53
20	Luang-hol	2.53	19.64