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# Gamma-aminobutyric acid (GABA) Content in Leb nok Phattalung of Germinated Brown Rice

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The objective of this study was to investigate the increase in Gamma Aminobutyric Acid (GABA) content in germinated brown rice Leb nok Phatthalung under different germination durations. soaking the rice in deionized water and 3 level of steeping time 24, 48, and 72 hours. The samples were then dried, finely ground, and analyzed for absorbance at 630 nm using a UV spectrophotometer. The results is showed that increasing the soaking duration led to a progressive increase in GABA content with 1.33±0.05 (0 hour), 2.08±0.10 (24hours), 3.05±0.03 (48 hours) and 3.21±0.09 (72 hours) mg/100g fresh weight. The ability of Leb nok Phatthalung germinated brown rice to enhance GABA content highlights the potential of this rice variety as a functional food ingredient, promoting health benefits and adding nutritional value. This research supports the development of agricultural and industrial products that utilize rice as a health-enhancing food source.

## Introduction

Rice is an important cereal crop in Thailand, serving as a major food source of carbohydrates and a key economic crop. White rice, which has been heavily milled, loses much of its nutritional value. In contrast, brown rice, which is not milled, retains essential nutrients such as fiber, iron, calcium, vitamins, and GABA (Gamma-Aminobutyric Acid), which helps relax the brain. Germinated brown rice (GBR) is produced by soaking brown rice in a solution under controlled conditions, increasing the GABA content. The Leab Nok Phatthalung rice variety, a native rice of Thailand, is known for its high nutritional value and is gaining popularity in Asian countries. It has small slender grains with a unique "bird's claw" shape, high in fiber and antioxidants, and is valued for its aroma, chewy texture, and health benefits.

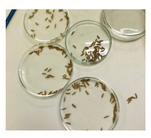
## Objective

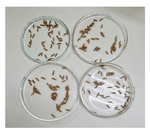
1.To study the increase in GABA content in various germinated Leb nok Phattalung.
2.To study the effect of different durations on the increase of GABA content in germinated Leb nok Phattalung rice.

## Methodology

### Rice Samples –

Select perfect seeds and wash the rice → Divide the rice and soak it to 24 , 48 ,72 hr. → Apply heat bake the rice at a temperature of 50°C ,4 hours.





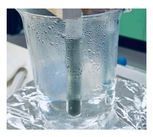
### Standard GABA —

Prepare a standard GABA in 0,0.04,0.08,0.12,0.16,0.2,0.24 mg/ml

→ add borate buffer, phenol, NaOCl, and shake for 1 minutes

↓

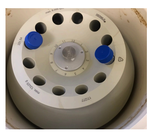
on ice 5 minutes and boil 100°C 10 minutes Take at room temperature for 20 minutes

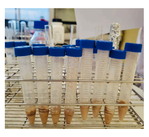


← add ethanol and measure the absorbance at 630 nm

### Extraction of GABA —

grind rice soaked into a fine powder. → Take 1g Add alcohol, shake for 1 hour and centrifuge 2500rpm, → take supernatant 1ml and then centrifuge at 3000 per 15 minutes.

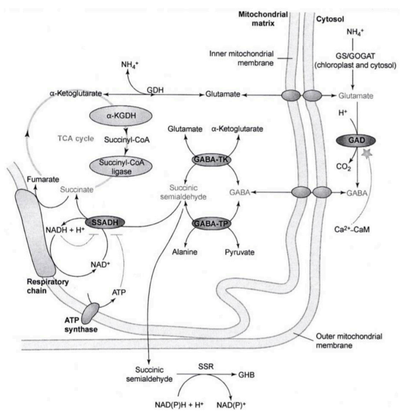




↓

Take supernatant and add D.I. water , borate buffer, phenol, NaOCl → Shake for 1 minute, then place on ice for 5 minutes. Boil 90°C for 10 minutes, Take in room temperature for 20 minutes. → add alcohol Measure the absorbance at 630 nm and then compare it with the standard curve.

## Conclusion




ที่มา : กรกฎ เพ็ชร์หัสณะโยธิน และคณะ (2561)

This study demonstrated that Leb Nok Phatthalung germinated brown rice shows strong potential as a health-promoting functional product with added nutritional value. Moreover, extending the soaking duration of brown rice led to a progressive increase in GABA content, confirming the importance of germination conditions in enhancing bioactive compounds.

The higher GABA collection found in Phatthalung Leb Nok rice may be a result of the rice's unique biochemical and genetic background. This rice variety likely possesses a more active glutamate decarboxylase (GAD) enzyme and related cofactors, which enhance the conversion of glutamate to GABA during germination. The antioxidant compounds present in this rice variety may also protect the enzyme from oxidative damage, resulting in higher GABA yields than other varieties.

## Result and Discussion

The standard of GABA was prepared which different concentration.
The equation of a straight line is y=0.63x+0.0024 with 0.9943 R square

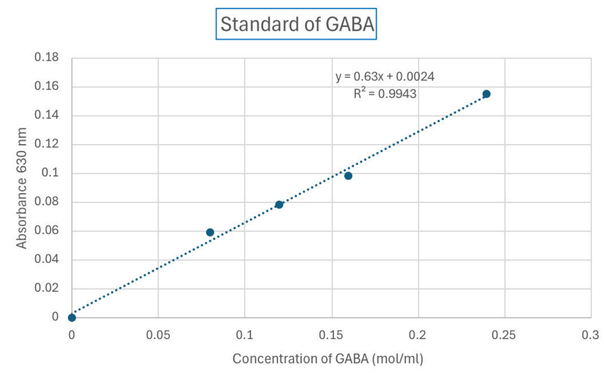



Figure 1 : The results of measuring the standard of absorbance.

| Socking Brown rice Leb nok (h) | GABA Content (mg/100 g FW) |
|---|---|
| 0 | 1.33±0.05 |
| 24 | 2.08±0.10 |
| 48 | 3.05±0.03 |
| 72 | 3.21±0.09 |

The result of GABA in leb nok phattalung rice can be showed that increasing the soaking duration led to a progressive increase in GABA contentwith 1.33±0.05 (0 hour), 2.08±0.10 (24hours), 3.05±0.03 (48 hours) and 3.21±0.09 (72 hours) mg/100g fresh weight.

Table 1 : The results of GABA in leb nok phattalung

The study found that soaking time affected GABA content in germinated Hang rice (Leb Phatthalung). Soaking for 24, 48, and 72 hours increased GABA from 1.33 to 3.21 mg/100 g, peaking at 72 hours. This aligns with Thida Amon (2022), who found that soaking for 24 hours raised GABA levels by 1.5–3.5 times compared to raw rice. Similarly, D. Karladee and S. Suriyong (2012) reported a GABA peak of 17.87 mg per 100 g at 24 hours, decreasing thereafter.

While soaking time significantly influenced GABA accumulation, this study's trend differed from Karladee and Suriyong (2012), where 24 hours showed the highest GABA level. Here, the maximum was at 72 hours with 3.21 mg per 100 g.

| Socking Brown rice | This study (Leb nok) | Tida Amon et al (Khao Dawk Mali 105) | D. Karladee & S. Suriyong (Average of 21 rice varieties) |
|---|---|---|---|
| 0 hr. | 1.33 mg/100 g | 6.9 mg/100 g | 3.06 mg/100 g |
| 24 hr. | 2.08 mg/100 g | 11.0 ± 0.2 mg/100 g | 17.87 mg/100 g |
| 48 hr. | 3.05 mg/100 g | 15.2 ± 0.3 mg/100 g | 1.36 mg/100 g |

The progressive increase in GABA observed with longer soaking times may be attributed to enhanced enzymatic activity during germination. Enzymes such as glutamate decarboxylase (GAD) are activated under soaking and sprouting conditions, converting glutamate into GABA. Extended soaking promotes metabolic changes in rice grains, stimulating amino acid metabolism and stress-related biochemical pathways that favor GABA accumulation.

Differences between this study and previous reports (e.g., Karladee & Suriyong, 2012) could be due to variations in rice variety, environmental conditions, and soaking protocols. Leb nok Phatthalung may possess a unique genetic background influencing its GABA biosynthetic capacity, which explains why maximum accumulation occurred at 72 hours rather than 24 hours as in other studies.

Other factors that may have contributed to the inconsistency of the experimental results is Rice selected for germination should be 2-3 months old after harvest to ensure accurate and reliable research results and The tetrazolium method should be used to ensure that every rice seed is viable

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