

5. Title: Amino acid composition of glutinous rice and ordinary rice from Ubol Province.

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OBJECTIVES

To compare the amino acid composition of the glutinous rice consumed by villagers with the ordinary rice from Bangkok. It is possible that high oxalic acid production might come from glutinous rice consumed by village infants.

DESCRIPTION

Five samples of glutinous rice (home-pound) obtained from five village in Ubol Province and one sample of ordinary rice (milled) from Bangkok were analyzed. Two and one-half grams of finely ground samples were hydrolyzed by 50 ml. of 20% hydrochloric acid and incubated in an autoclave for 6 hours at 15 pounds. Then the specimen was evaporated on a steam bath until dry and repeated twice after adding distilled water (1). Distilled water was again added to the hydrolysate, decolorized with activated charcoal and centrifuged. The clear supernatant liquid was analyzed for 18 amino acids by using on Amino Acid Autoanalyzer (ion exchange chromatography technic). The data are presented as norleucine units.

The Nutrition Division, Ministry of Health kindly performed nitrogen determination by using standard Kjeldahl Technic.

Rice samples were also sent to the Wisconsin Alumni Research Foundation Laboratories, Madison, Wisconsin, U.S.A. for complete chemical analysis. The analyses included moisture, fat, protein, carbohydrate minerals and vitamins.

PROGRESS

The chemical compositions are shown in Table 1. It is of interest to note that ash content of the ordinary rice is very high as compared to the glutinous rice and the previous report by ICNND in 1960. However, in this study, only one sample for each category of rice was available for analysis.

The amino acid content of rice is shown in Table 2. It is of special interest to note that the glycine content of glutinous rice is higher than the Thai and U.S. ordinary rice. Since glycine is a source of glyoxylate, the possible role of glutinous rice in oxalic production in village infants in Ubol Province required further study.

Table 1
Composition of Ordinary Rice and Glutinous Rice
From Ubol City, Thailand

Composition	Ordinary Rice	Glutinous Rice		
		H.P.	M.P.	M.P. ¹
Water Moisture (%)	11.4	11.0	11.0	12.3
Fat (%)	0.6	0.6	0.6	0.7
Protein (%)	7.7	7.2	6.7	7.2
Carbohydrate (%)	78.3	80.5	80.6	79.1
Ash (%)	1.8	0.4	0.5	0.3
Fiber (%)	0.2	0.3	0.6	0.4
<u>Minerals</u>				
Ca (%)	.025	.025	.025	.025
(mg/100 gm)	6.8	7.3	5.7	6.3
P (%)	.078	.10	.10	.078
K (%)	.14	.19	.19	.19
Na (%)	.005	.005	.005	.005
Mg (%)	.014	.019	.021	.014
Al (PPM)	5.0	5.0	5.0	5.0
Ba (PPM)	1.0	1.0	1.0	1.0
Fe (PPM)	2.5	3.7	3.7	3.1
(mg/100 gm)	1.01	1.12	1.39	0.57
Sr (PPM)	.50	.50	.50	.50
B (PPM)	.50	1.2	.50	.50
Cu (PPM)	2.3	4.4	3.3	2.3
Zn (PPM)	20	23	20	23
Mn (PPM)	9.0	9.0	13.0	9.0
Cr (PPM)	1.5	1.5	1.5	1.5
<u>Vitamins</u>				
B-1 (mg/100 gm)	0.077	0.070	0.112	0.112
B-2 (mcg/gm)	0.208	0.238	0.270	0.220
B-6 (mcg/gm)	0.213	0.220	0.222	0.233
C (mg/100 gm)	0.44	0.54	0.64	0.44
B-carotene (mg/100 gm)	—	—	—	—
Pantothenic Acid (mcg/gm)	7.33	10.4	9.45	7.93
Niacin (mcg/gm)	20.1	29.1	31.9	18.4
Folic acid (mcg/gm)	0.176	0.250	0.202	0.172
B-12 (mg/gm)	0.2	0.2	0.2	0.2

H.P. = Home Pound rice M.P. = Mill pound rice M.P.¹ = Mill pound rice (Large mill)

Table 2
Amino Acid Content of Rice
Gm/16 Gm N₂

Amino Acids	U.S.A. J. Agr. Food Chem		Thailand			
	Uncooked Rice	Cooked Rice	Uncooked Glutinous Rice		Uncooked Rice	Differences
			Ranges	Average		
Aspartic Acid	9.5	10.1	6.0 — 7.1	6.5	5.7	0.8
Threonine	2.5	2.8	1.3 — 1.6	1.4	0.6	0.8
Serine	3.9	3.7	2.5 — 3.5	3.1	1.9	1.1
Glutamic Acid	14.2	14.6	14.2 — 19.7	16.9	11.7	5.2
Proline	3.2	3.5	0.2 — 0.4	0.3	0.2	0.1
Glycine	3.8	4.2	4.7 — 6.0	5.2	4.1	1.1
Alanine	5.2	5.2	3.7 — 5.4	4.6	3.7	0.9
Valine	4.3	4.4	3.2 — 4.5	3.8	3.2	0.6
Cystine	1.5	1.2	0.7 — 1.0	0.9	0.6	0.3
Methionine	2.1	2.3	0.9 — 1.5	1.2	1.0	0.2
Isoleucine	3.7	3.7	2.2 — 3.1	2.6	2.2	0.4
Leucine	6.9	6.7	7.3 — 10.9	9.0	7.1	1.9
Tyrosine	2.4	2.1	1.2 — 2.0	1.6	1.4	0.2
Phenylalanine	4.3	4.6	3.0 — 3.9	3.5	3.5	0.0
Ammonia	2.7	2.2	0.3 — 0.5	0.4	0.3	0.1
Lysine	3.5	3.4	2.9 — 4.3	3.5	3.2	0.3
Histidine	2.1	1.9	2.2 — 2.6	2.3	2.0	0.3
Arginine	9.6	8.7	5.3 — 7.4	6.6	5.8	0.8