



<http://www.cintdis.org>

Regd. Office: 9 Old Calcutta Road, Talpukur, Kolkata 700123

Field Res. Station: Village Kerandiguda, District Rayagada, Odisha 765019

Laboratory: 186 A, Kalikapur Canal Road, Kolkata 700099

Tel: (+91-33) 4065 5396

Email: cintdis@hotmail.com

To

Friends of

- (1) Kerala Jaiva Karshaka Samithi
- (2) Paithragam
- (3) Organic Farming Association of India,
- (4) Thanal
Kerala

May 30, 2017

Dear Friends,

I am pleased to attach herewith a report of analyses of nutraceutical properties of the food samples you sent us.

The report has been delayed owing to some unforeseen snags in certain apparatuses. In any case, we have completed all the analyses to our satisfaction.

For each test, we took three replications of each sample. The standard curves for protein, carbohydrates, lipids and antioxidant activities were fitted for the maximum accuracy at $p = 99\%$ confidence level.

We hereby attach the Methods adopted, and the final Results of our biochemical analyses.

Please feel free to contact us in need of clarification.

Regards,

(Dr. D. Deb)
Chair

Chair
Dr. Debal Deb
Secretary
Avik Saha
Treasurer
Dr. Mita Dutta
Member
Tathagata Banerjee
Debdulal Bhattacharjee

Advisors:
Martyn Brown
(Kolkata)
Prof. Anil K. Gupta
(Ahmedabad)
Dr. Roberto Imperiali
(Rome, Italy)
Dr. Anuradha Joshi
(Brighton, UK)
Prof. Marius Kloft
(Berlin, Germany)
Prof. Jörg Lässig
(Görlitz, Germany)
Prof. Richard Norgaard
(Berkeley, USA)
Vyron Perelis
(Athens, Greece)
Prof. T. Pradeep
(Chennai, India)
David Rowe
(Kolkata)



<http://www.cintdis.org>

Regd. Office: 9 Old Calcutta Road, Talpukur, Kolkata 700123

Field Res. Station: Village Kerandiguda, District Rayagada, Odisha 765019

Laboratory: 186 A, Kalikapur Canal Road, Kolkata 700099

Tel: (+91-33) 4065 5396

Email: cintdis@hotmail.com

BIOCHEMICAL TEST RESULTS :

Neutraceutical Properties of Decorticated Grains of Rice Samples

Rice Variety	RAKTHA-SALI	KAVUNGIN POOTHALA	MULLAN KAZHAMA	KARUTHA NAVARA	THAVALA KANNAN
Starch (%)	6.97	7.95	11.06	8.28	10.96
Soluble Sugars (%)	2.56	2.72	2.99	3.85	3.66
Total Carbo-hydrate (%)	9.53	10.67	14.05	12.12	14.63
Soluble Protein (%)	3.26	4.15	4.13	2.31	4.51
Vitamin B1 (mg/g)	0	1.231	0	1.086	0
Vitamin B2 (mg/g)	0.005	0.644	0.017	0.205	0
Vitamin B3 (mg/g)	0.544	0.149	0.059	0.366	0.56
Vitamin B5 (mg/g)	11.96	0	0	0	0.695
Vitamin B6 (mg/g)	0	0	0.386	0	0
Vitamin B7 (mg/g)	0	0	0	0	0
Vitamin B12 (mg/g)	0	0	0	0	0
Antioxidant Activity					
IC50 (mg/ml)	3.251	22.33	18.38	8.69	75.34
Total lipid (mg/g)	18.66	18.00	29.33	21.33	18.66
Cr (mg/kg)	1.87	1.83	1.89	1.85	1.91
Mn (mg/kg)	29.58	43.48	49.84	32.73	25.97
Ni (mg/kg)	1.80	1.79	1.77	1.98	1.55
Cu (mg/kg)	9.08	8.86	9.17	13.21	8.98
Co (mg/kg)	0.09	0.15	0.09	0.08	0.09
Zn (mg/kg)	77.25	74.67	68.27	83.21	69.28
As (mg/kg)	0.14	0.02	0.04	0.12	0.14
Al (mg/kg)	10.67	6.49	18.05	8.73	13.35
Fe (mg/kg)	27.20	14.78	38.26	24.98	30.96
Ag (mg/kg)	0.09	0.0	0.0	0.0	0.0
Cd (mg/kg)	0.07	0.01	0.02	0.02	0.06
Omega 3 Fatty Acid					

(Dr. D. Deb)



<http://www.cintdis.org>

Regd. Office: 9 Old Calcutta Road, Talpukur, Kolkata 700123

Field Res. Station: Village Kerandiguda, District Rayagada, Odisha 765019

Laboratory: 186 A, Kalikapur Canal Road, Kolkata 700099

Tel: (+91-33) 4065 5396

Email: cintdis@hotmail.com

METHODS EMPLOYED

A. Soluble protein Estimation:

Soluble protein was extracted from the sample using 0.25 M Sodium Phosphate buffer ($pH = 8$) with 2% NaCl. Protein concentration was measured by UV-Visible spectrophotometer following Bradford method.

Reference:

- Croy RR, Gatehouse JA, Tyler M, Boulter D. *Biochemical Journal* 191(2): 509-516 (1980).

B. Soluble Sugar Estimation:

Soluble sugar was extracted from the sample using hot 80% Ethanol. The soluble sugar content was estimated using UV-Visible Spectrophotometer by Anthrone method.

References:

- Chow PS, Landhausser SM. *Tree Physiol.* 2004; 24 : 1129
- http://sydney.edu.au/science/biology/warren/docs/spec_starch_sugars.pdf Last accessed on: 05.03.2017.

C. Starch Estimation:

Starch was extracted from the sample using 1.1% HCl. Concentration of starch content was estimated using UV-Visible Spectrophotometer by Anthrone method.

References:

- Chow PS, Landhausser SM. *Tree Physiol.* 2004: 24. (1129)
- http://sydney.edu.au/science/biology/warren/docs/spec_starch_sugars.pdf Last accessed on: 05.03.2017.

METHODS EMPLOYED, contd...

D. Lipid Estimation:

Total lipid was extracted following the method of Brigh & Dyer. 1959. Chloroform phase was transesterified & quantified by using Gas Chromatography-Mass Spectrometry, at Botany Department of the University of Calcutta.

Reference:

- Bligh, E.G. and Dyer, W.J. *Can. J. Biochem. Physiol.* 37: 911-917 (1959).

E. Anti-oxidant Activity Assay:

Powdered samples were soaked in methanoic water. Antioxidant capacity was measured with DPPH (2,2-diphenyl-1-picrylhydrazyl) and estimated spectrophotometrically.

Reference:

- Brand-Williams W, Cuvelier ME, Berset C. *Lebensm. Wiss. Tech.* 28:25-30 (1995).

F. Vitamin B Estimation:

Acid digestion was performed followed by an enzymatic digestion to extract B vitamins from the samples. All seven B vitamins (B1, B2, B3, B5, B6, B7 and B12) were quantified using High Performance Liquid Chromatography, collaboratively at Chemistry Department, IIT-Madras.

Reference:

- *ASEAN Manual of Food Analysis*. Regional Centre of ASEAN Network of Food Data System: Institute of Nutrition, Mahidol University, Thailand (2011).

G. Heavy Metal Profiling:

Ground samples were dissolved in nitric acid (HNO₃) and Hydrogen peroxide (H₂O₂) & digested using microwave digester. Metal ions were analyzed using Inductively Coupled Plasma Mass Spectrometry, collaboratively at Chemistry Department, IIT-Madras.

Reference:

- Deb, D, S. Sengupta and T. Pradeep. *Current Science* 109: 407-409 (2015).