EFFECT OF MALTING PERIODS ON THE CHEMICAL AND ANTINUTRIENT CONTENTS OF MUNG BEAN *(Vigna radiata) ORARUDI* FLOUR

Presented by

E.U. Onwurafor, J.C. Onweluzo, I.L. Umunnakwe

Department of Food Science and Technology, University of Nigeria, Nsukka

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BACKGROUND

- **High prevalence of both macro and micro nutrient deficiencies especially in the developing regions**
- **Dire consequences of such deficiencies both to the individual and to the Society exist**
- **Unsustainability of some of the present efforts to curb the problem.**
- **A need for locally available, low cost interventions that will be more sustainable**
- **Underutilized/Neglected locally available crops present a rich array of untapped resources/solution**

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BACKGROUND

- Legumes occupy an important place in the diets of the populations in the developing countries

Legumes are rich sources of protein, calories, minerals and vitamins

- Several bioactive compounds in legumes has some health benefits.
- legumes also serve as low cost supplement for animal protein among low income groups in developing countries

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Background cont'd

WHY MUNG BEAN ??

Figure 1. Mung bean seeds

Figure 2. Mung bean seeds

Background cont'd

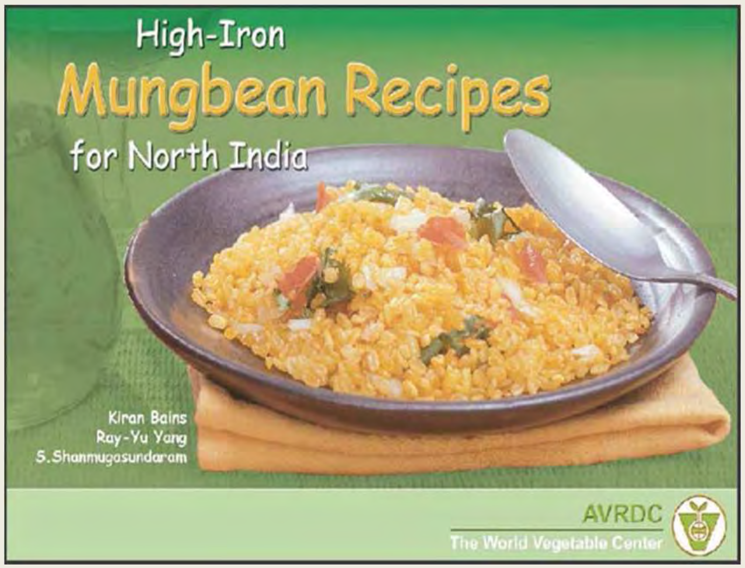

Figure 3

1.Mung has low profile of uses in Nigeria

2.Value added product potentials from mung beans in some regions exist

-Mung beans has been used in some regions like Asia, Indian etc in processing of some value-added products example-Dhal, transparent noddle among etc.

Background cont'd

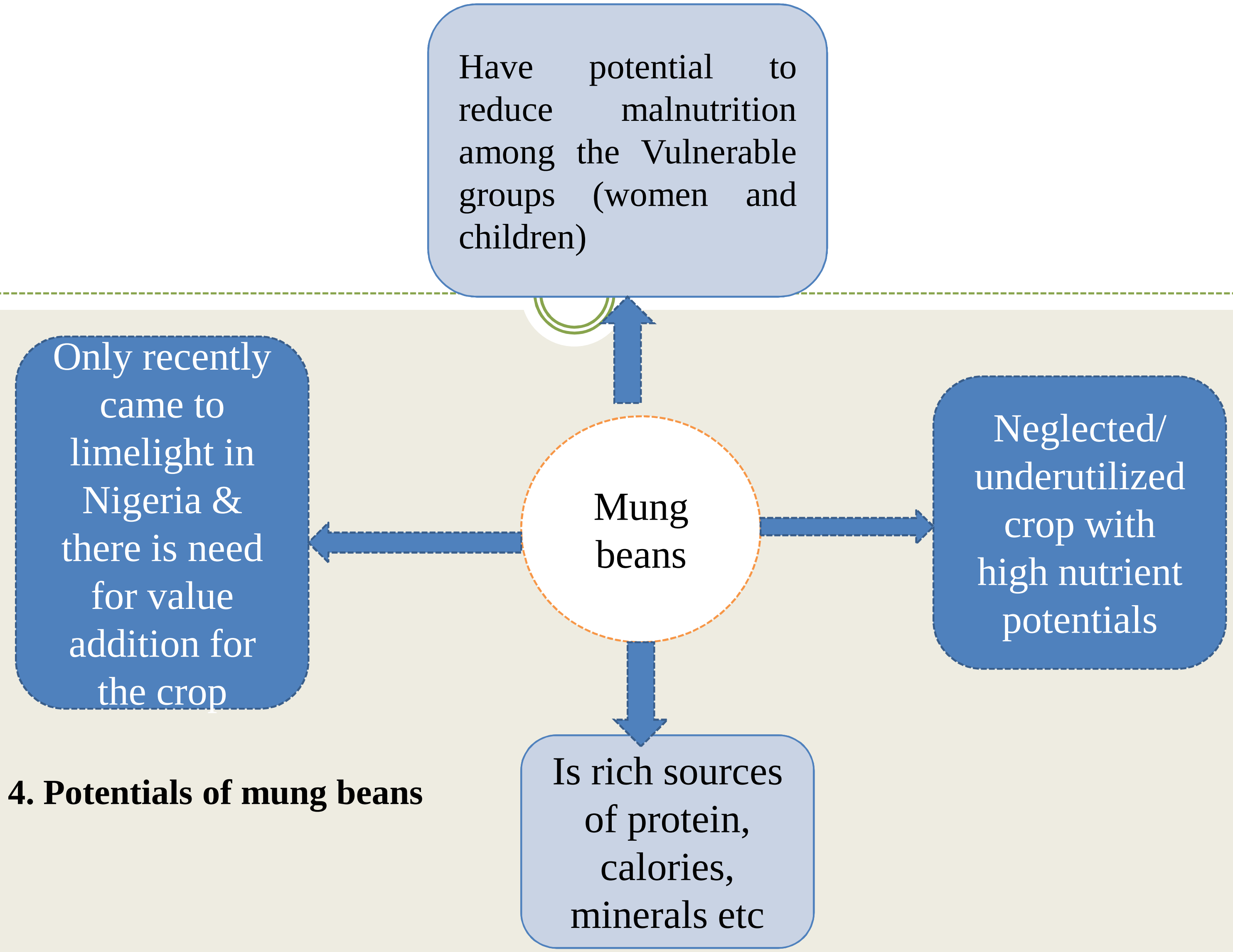

Figure 4. Potentials of mung beans

Background cont'd

- **Possible limitations in the utilization of mung beans*(ordrudi)* in product development includes:**
- **High Antinuritional factors**
- **High Viscosity of the Gruel from the flour**
- **Low Bioavailability of Nutrients**

- **Malting has been identified as simple traditional food processing technique for improving nutrient contents of plant foods and could**
- **Improve the functional properties of foods**
- **Promote the development of hydrolytic enzyme- amylases, proteases etc**
- **Improve the digestibility of proteins**
- **Improve bioavailability of nutrients among others.**
- **Flours from legumes malted for different periods may perform differently in product development**

Objective of the Study

1.To determine the effect of malting periods on:

- **Chemical composition of *Vigna radiata* flour/malt**
- **Antinutrient contents of *Vigna radiata* flour/malt**

2. To determine the optimal malting period for mung bean(*Vigna radiata*).

Materials and Methods

whole mungbean seeds (*orarudi*)

↓

cleaning (winnowing and hand sorting)

↓

steeping for 3 h

↓

air-resting for 90 min

↓

re-steeping for 3 h

↓

draining

↓

Materials and methods cont’d

Draining

↓

sprouting(24,48, 72 & 96)

0h	24h	48h	72h	96h
oven drying	oven drying	ovendrying	ovendrying	oven drying
↓	↓	↓	↓	↓
Dehulling	Dehulling	Dehulling	Dehulling	Dehulling
↓	↓	↓	↓	↓
Milling	Milling	Milling	Milling	Milling
↓	↓	↓	↓	↓
Sieving	Sieving	Sieving	Sieving	Sieving

Figure 6. Processing of mungbean malt.

Malted samples

Analyses

The following analyses were carried out on the samples :

- Proximate composition (AACC, 2000) .Carbohydrate content was determined by difference.
- Tannins(Buns,1971)
- Phytate (Latta and Eskin, 1980)
- Oxalate (Fasset *et al*., 1973)
- pH determination: This was carried out using the method described by Onwuka (2005)
- Titratable acidity determination: This was carried out by using the method described by Pearson (1976)

- **Minerals(Calcium, Iron, zinc, copper, magnesium, phosphorous, sodium and potassium contents(AACC, 2000) using Inductively Coupled Plasma Atomic Emission Spectrometry(ICP-AES)- (Model Perkins-Elmer Optima 5300UV)**
- **Vitamin A and B1 (Arroyave *et al*.,1982 and AOAC,2010)**
- **The result was analysed using ANOVA and Duncan's multiple range test was used to separate the means. Significance was accepted at p<0.05 levels.**

Table 1: Proximate composition (%/100g) of mung bean (*Orarudi*) malted for different periods

Malting period/h	Moisture	Protein	Crude Fat	Crude fibre	Ash	Carbohydrates
0	$6.58^{e}\pm0.14$	$30.77^{e}\pm0.04$	$4.61^{a}\pm0.01$	$3.11^{e}\pm0.04$	$1.95^{d}\pm0.00$	$52.94^{a}\pm0.00$
24	$9.19^{d}\pm0.02$	$32.54^{c}\pm0.04$	$1.36^{b}\pm0.01$	$3.44^{c}\pm0.05$	$2.75^{e}\pm0.26$	$50.72^{b}\pm0.27$
48	$9.79^{c}\pm0.13$	$33.50^{b}\pm0.12$	$1.16^{d}\pm0.01$	$3.57^{b}\pm0.02$	$3.29^{c}\pm0.14$	$48.69^{d}\pm0.14$
72	$10.10^{b}\pm0.14$	$34.47^{a}\pm0.06$	$1.22^{c}\pm0.02$	$3.63^{a}\pm0.24$	$4.33^{a}\pm0.00$	$46.25^{e}\pm0.00$
96	$11.45^{a}\pm0.12$	$31.47^{d}\pm0.01$	$0.52^{e}\pm0.00$	$3.49^{c}\pm0.05$	$4.14^{b}\pm0.03$	$48.93^{c}\pm0.19$

Values are the means ±SEM of triplicate samples. Means carrying different superscripts in the same row were significantly different $(p<0.05)$

Proximate composition continued

- **Mung bean contain high levels of protein, ash and carbohydrate**
- **Malting of mung bean significantly($p<0.05$) increased the protein, ash and crude fibre contents**
- **Fat and carbohydrate content decreased as malting period was increased**

Table 2: Mineral contents(mg/100g) of Vigna radiata(orarudi) malt

Constituents	0	24	48	72	96
Calcium	98.46^{d}±1.02	100.52^{c}±0.00	101.74^{bc}±0.01	122.00^{a}±0.08	102.98^{b}±0.45
Zinc	5.16^{b}±0.03	4.71^{c}±0.00	4.60^{d}±0.00	5.31^{a}±0.00	3.82^{e}±0.03
Iron	8.06^{b}±0.04	7.88^{b}±0.06	7.84^{b}±0.04	11.02^{a}±0.79	10.99^{a}±0.08
copper	0.73^{d}±0.00	0.73^{d}±0.00	0.77^{c}±0.00	0.92^{a}±0.02	0.79^{b}±0.02
Sodium	5.47^{bc}±0.17	5.26^{cd}±0.02	5.11^{d}±0.02	7.07^{a}±0.19	5.63^{b}±0.4
Potassium	1147.80^{d}±1.05	1148.89^{d}±0.00	1270.21^{c}±2.84	1376.78^{a}±6.82	1304.98^{b}±0.69
Phosphorus	261.06^{d}±1.49	262.55^{d}±0.00	274.88^{c}±0.05	312.99^{a}±0.54	288.87^{b}±2.68
Magnesium	147.03^{c}±0.51	147.54^{c}±0.00	166.42^{b}±0.56	187.31^{a}±0.45	165.15^{b}±1.60
VitaminA (µgRE/100g)	43.7^{a}±0.02	54.6^{b}±0.00	65.5^{e}±0.00	109.2^{c}±0.00	163.8d±0.00
Vitamin B1(mg/100g)	4.6^{a}±0.01	5.3^{b}±0.00	6.7^{c}±0.00	7.7^{d}±0.02	10.5^{e}±0.01

Values are the means ±SEM of triplicate samples. Means carrying different superscripts in the same row were significantly different ($p<0.05$)

Mineral content Discussion

- **Ca, Cu, K, P, and Mg increased progressively at a significant levels($p<0.05$) as malting period was increased**
- **Zinc, iron and sodium decreased for the 1st 48 h and then increased at 72h**
- **72 h malt contained the highest value of iron, zinc and sodium**
- **Vitamin A and B1 content of mung bean was low but increased with malting periods**

Table3: Antinutrient Contents Of *Vigna radiata*(*Orarudi*) Malt

Malting period/hr	Tannin	phytate	Oxalate
0	475.75^{a}±3.53	87.10^{a}±0.35	624.00^{a}±1.14
24	384.50^{b}±4.94	71.10^{b}±0.14	419.50^{b}±3.53
48	213.50^{e}±4.94	62.25^{c}±0.21	310.50^{c}±1.20
72	220.00^{d}±5.65	41.21^{d}±0.09	146.00^{d}±2.82
96	231.00^{c}±4.24	16.05^{e}±0.07	79.00^{e}±2.82

Values are the means ±SEM of triplicate samples. Means carrying different superscripts in the same row were significantly different ($p<0.05$)

Discussion

- Malting periods resulted to between
- 19.18-57.40% reduction in tannin content
- 11.48-81.57% reduction in phytates content
- 32.77-87.34% reduction in oxalate content
- Level of antinutrient reduction could account for high mineral content of the malt

Table4: pH and Titratable Acidity of (*Vigna radiata)* (orarudi) malt

Malting Periods/hr	pH	Titratable Acidity
0	6.8	0.057
24	6.5	0.069
48	6.0	0.078
72	5.7	0.100
96	5.1	0.143

Discussion contd

- **The results revealed a gradual decrease in pH from 6.8 in unmalted mungbean flour to 5.1 in mungbean malted for 96 hours.**
- **The total titratable acidity for unmalted mung bean flour was 0.057% which gradually increased to 0.143% mungbean malted for 96 hours.**

Conclusion

- **Increasing the malting periods to 72h resulted to highest increase in all the mineral, protein, ash and crude fibre contents studied**
- **Highest reduction in antinutrient occurred at the 96h malt which differed not significantly($p>0.05$) from 72h malt**
- **Malting of mung bean for 72 h should be encouraged at the community levels to increase the nutrient in content and availability.**

Recommendations

- **Researchers should focus more attention on community-oriented mung bean research that will have practical impact in the lives of the rural and urban poor in the society.**
- **Governmental and non governmental agencies should map out policies and programmes especially for the women on the use of malting to enhance nutrient content of mung bean and its nutritional/health benefits .**
- **Utilization of mung bean malt in product Development /value addition creation beyond cooking and eating need to be encouraged in Nigeria and other African countries.**

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THE END

THANK YOU FOR LISTENING