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Evaluation of Yield Performance, Cookability, Nutrient Composition and Sensory Properties of Lima Bean (*Phaseolus lunatus*) Accessions

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Abstract: *Lima bean (Phaseolus lunatus), an underutilized legume in Nigeria has potential for improving food and nutrition security. Ten (10) lima bean accessions were evaluated for yield performance, cooking ability, sensory acceptability, nutrient and antinutrients content. The Lima bean accessions evaluated displayed significant variation in agronomic, nutritional, and processing quality traits. While some accessions combined high yield and reduced cooking time, they exhibited relatively lower nutrient concentrations. Some other accessions were characterized by higher nutrient density and reduced levels of anti-nutritional factors but required longer cooking times. Functional performance also differed among accessions, with certain varieties suitable primarily for cooked bean preparations, whereas others demonstrated broader applicability for both cooked beans and processed products such as moin-moin. These findings underscore the inherent trade-offs among yield, nutritional quality, and processing efficiency and highlight opportunities for targeted selection and breeding of Lima bean accessions to meet diverse nutritional and end-use requirements.*
Key words: Lima bean accessions (LBAC), yield, cookability, nutrients content, acceptability

INTRODUCTION

Food security, as regards to nutrition, is a global challenge due to overpopulation and under-availability of nutritious foods, which is made worse by dependence on just a few legumes, despite the availability of several species which are underutilized and less exploited (Agbeleye *et al.*, 2019; Adebo, 2023). This challenge necessitates the study and exploration of resilient and nutrient-dense indigenous crops such as Lima beans.

Lima beans (*Phaseolus lunatus* L), belongs to the family Fabaceae, and are usually cultivated for their edible seeds. Lima beans are referred to as: haba beans, sugar beans, butter beans, Guffin beans, civet beans, Hibbert beans, Pallar beans, Sieva beans, Madagascar beans, and Burma beans in America. It is known as Maharage in East Africa, Haricot de lima in South Africa, Kokondo in West Africa and Awuje in Nigeria (Yellavila et al. 2015).

This crop thrives in tropical and subtropical climates, and can grow on a wide range of soil types. It is an underutilized legume largely due to its hard seed coat which causes drudgery in its processing (Palupi *et al.*, 2021; Palupi *et al.*, 2022). Lima bean like all other legumes are food resources that offer various optimum nutritional and health benefits (Yellavila et al. 2015). It is a nutritious legume containing about 23% protein and 6% fibre (Farinde *et al*., 2018). It is also is an excellent source of essential vitamins, dietary fibre, complex carbohydrates, and minerals such as iron, magnesium, potassium and phosphorus (Seidu *et al.*, 2018; El-Gohery, 2021). Lima beans can be cooked, steamed, fermented, processed into flour and snacks, and used in a variety of soups and stews (Farinde, 2019; Maliza *et al.*, 2023; Obisesan *et al.*, 2025). Lima beans contain anti-nutrients such as phytin, tannins and trypsin inhibitors which interfere with nutrient uptake and absorption; these antinutrients could be reduced or removed by processing such as soaking, cooking and fermentation (Ugwu and Nwokolo, 2015; Farinde *et al.*, 2018; Farinde *et al.*, 2020).

Despite the proven nutritional profile of Lima beans, farmers are concerned that this crop may go into extinction in local farming systems due to low crop yield, lack of improved varieties, low market demand and viability, and lack of institutional support for research (Ezeagu & Ibegbu; 2010; Obiakor-Okeke, 2014; Kyeremateng *et al.*,2018). Institute of Agricultural Research and Training, Ibadan, Nigeria thus developed some lima bean accession lines in order to increase crop yield, market viability and availability of the beans. This study therefore evaluated the said lines for yield performance, cookability, sensory acceptability, nutrients and antinutrients content.

THEORETICAL UNDERPINING

This research is guided by food utilization and processing quality theory, which emphasizes that food value extends beyond yield and nutrient content to include functional performance, sensory acceptability, and suitability for diverse end uses. According to this framework, legumes with different physicochemical and functional properties are better suited for specific culinary or processing applications, such as whole cooked beans or processed products like moin-moin. The theoretical foundations support the premise that optimizing underutilized crops for food and nutrition security requires a multidimensional evaluation approach. The observed variation among Lima bean accessions validates the importance of targeted selection and breeding strategies that will balance agronomic productivity, nutritional quality, and processing efficiency to meet diverse consumer and food system needs.

MATERIALS AND METHOD

Experimental site and source of Experimental Materials

Ten (10) lima bean landraces were collected during a survey conducted across four Nigerian states—Osun, Ondo, Ekiti, and Oyo. Subsequently, a field trial was established for seed multiplication of the collected landraces during the early 2023 planting season at the Institute of Agricultural Research and Training (IAR&T) farm in Ibadan (latitude 07°22'N, longitude 03°50'E). The site lies within the derived savannah/transition agro-ecological zone of Southwest Nigeria, at an altitude of 122 meters above sea level, with an average annual rainfall of 1220 mm and a mean temperature of 26°C. The experimental field was ploughed and harrowed before plot establishment, and the experiment was laid out using a randomized complete block design (RCBD) with three replicates (r = 3). Each plot measured 5 m × 4 m (20 m^2) and was separated by a 1.5 m alley. Plant stands were spaced at 1 m × 1 m intervals. Stalking was done one week after seed emergence. Insect pests were controlled with the applications of Lambda cyhalothrin (Karate; 2ml/litre) once at flowering and twice at podding. Weeding was manually carried out as and when necessary, throughout the experimental period. Data on pod length, number of seed/pod and days to 50% flowering were collected fortnightly. Lima beans were harvested, threshed and were processed into cooked beans using the method of Farinde (2019). Lima beans (1kg each) were soaked overnight, drained and cooked using three types of fuel sources (Firewood, charcoal and gas). The cooking time for each accession was recorded and compared with control. Moinmoin was also processed from the beans (Farinde, 2019). Freshly prepared cooked lima beans and moinmoin samples were coded and presented to twenty semi-trained panel of judges (Staff and students of Institute of Agricultural Research and Training Ibadan, Nigeria). The judges were provided with water for mouth rinsing after each tasting. The judges were asked to score the samples for colour, appearance, flavor, taste and overall acceptability using 5-point hedonic scale where 1 represent dislike and 5 represents like very much. The raw lima beans seeds were evaluated for nutrients and anti-nutrients content using AOAC, 2005 method. Data obtained were subjected to general linear model (GLM) and mean of significantly different source(s) were separated using Duncan Multiple Range Test. Significant was accepted at 5% level.

RESULTS AND DISCUSSION

Mean 50% flowering, pod length and number of seed/pod

The accessions showed substantial variances in growth and yield parameters in the study. The number of days to 50% flowering ranged between 80.40 and 90.22. LBAC9 (80.23 days) and LBAC1 (80.5 days) were the first accessions to reach 50% flowering, closely followed by LBAC2 (81.5 days) and LBAC10 (83.24 days). While, LBAC5 took the longest days (90.22 days) to reach 50% flowering (Table 1). LBAC1 (6.78) and LBAC9 (6.61) produced the longest pods, and were not significantly different from each other. These were followed by LBAC4 (6.26 cm) and LBAC10 (6.20 cm), which also recorded relatively long pods. In contrast, LBAC8 exhibited the shortest pod length (4.38 cm) among all the accessions evaluated (Table 1). This might have contributed to low yield obtained since pod length correlates with seed yield because it provides a larger physical volume for ovule development and subsequent seed filling (Akande and Balogun 2007). A similar trend was observed in the number of seeds per pod, where LBAC1 and LBAC9 had the highest seed number, with substantially more seeds than the other accessions. LBAC3 and LBAC8 exhibited the lowest number of seeds (2.80 and 2.90), indicating lower seed production compared to the other accessions.

Table 1: Mean of Growth and Yield Performance of Lima Bean Accessions

Accession	Pod length (cm)	Number of seed/pod	Days to 50% flowering
LBAC1	6.78a	4.45a	80.50g
LBAC2	5.14e	3.54d	81.50f
LBAC3	5.07e	2.80e	89.50b
LBAC4	6.26b	4.26abc	87.34c
LBAC5	5.36d	3.75cd	90.22a
LBAC6	5.49d	4.00bcd	89.53b
LBAC7	5.68c	4.20abc	89.50b
LBAC8	4.38f	2.90e	86.70d
LBAC9	6.61a	4.40ab	80.23h
LBAC10	6.20b	4.26abc	83.24e
SE ±	0.10	0.11	1.01

Means along the same column with different alphabet are significantly different ($p \leq 0.05$) from each other.

Key: LBAC1: Erin Ijesha, LBAC2: LB52; LBAC3: Pepelupe red; LBAC4: LB 51B; LBAC5: Tede Oyo 1; LBAC6: LB50; LBAC7: Erin Ijesha 2; LBAC8: LB51A; LBAC9: Tede Oyo3; LBAC10: Tede Oyo 2.

Cooking time for Lima beans accessions and the control

Table 2 shows the cooking times for the different Lima beans accessions and the control (Oloyin) using charcoal, firewood and gas as different fuel sources for cooking. Cooking with charcoal recorded the shortest cooking times, while cooking with gas had the longest cooking times. This may be due to the fact that charcoal as a solid biomass can reach a higher peak temperature and with more consistency than gas and firewood (Lubwana et al. 2021). According to the study of Lubwana et al. (2021) on slow pyrolysis of charcoal burning compared with firewood, charcoal has higher energy content per kilogramme (30MJ/kg) compared with that of firewood (18MJ/kg), and can reach higher consistent temperature which may influence post cooling behaviour on them. This high temperature is essential in breaking down the complex cellular structure of Lima beans (Johnson, 2009; Ku *et al.*, 1976). This implies that charcoal is the most effective cooking fuel in achieving a short cooking time for Lima beans.

Using gas as a fuel source, sample BZ (Oloyin-Control) had the shortest cooking time while sample LBAC 8 (LB51 A) had the longest cooking time. With firewood, sample BZ (Oloyin-Control) had the shortest cooking time while sample LBAC 8 (LB51 A) had the longest cooking time. Using charcoal, sample BZ (Oloyin-Control) had the shortest cooking time while sample LBAC 9 (Tede Oyo 3) had the longest cooking time. Lima beans have a larger seed size, weight, harder seed coat compared to Oloyin beans, which reduces the rate of water absorption and penetration into the cotyledon, thereby prolonging the cooking process. The morphological and chemical structure of Oloyin beans allows its cell walls to disintegrate faster during cooking, thereby reducing its cooking time (Srisuma *et al.*, 1989; Uebersax *et al.*, 1991, Farinde *et al.*, 2017).

Table 2: Cooking Time for the Lima Bean Accessions

Sample	Charcoal cooking (mins)	Firewood cooking (mins)	Gas cooking (mins)
LBAC 1	98	116	108
LBAC 2	100	102	85
LBAC 3	100	110	160
LBAC 4	99	120	122
LBAC 5	95	154	94
LBAC 6	80	94	85
LBAC 7	84	118	90
LBAC 8	120	166	164
LBAC 9	151	105	122
LBAC 10	100	131	136
BZ	75	90	80

Key:

LBAC1: Erin Ijesha, LBAC2: LB52; LBAC3: Pepelupe red; LBAC4: LB 51B; LBAC5: Tede Oyo 1; LBAC6: LB50; LBAC7: Erin Ijesha 2; LBAC8: LB51A; LBAC9: Tede Oyo3; LBAC10: Tede Oyo 2. BZ: Oloyin (Control

Nutrients and Anti-nutrients Content of Raw Lima beans Accessions

The results of the nutrients and anti-nutrients content of the different lima beans accessions are presented in Table 3. Lima beans are generally high in protein according to Farinde *et al*., 2018. The protein values of the lima bean accessions ranged from 16.40 – 20.32%. The results showed that the protein content was highest in sample LBAC 9 and lowest in LBAC 6. The variations in protein content across all accessions might be due to genetic factors of the accessions, environmental influences and geographical origin (Eboibi *et al.*, 2018; Ezeagu and Ibegbu, 2010; Seidu *et al*., 2018).

Lima beans contain crude fibre which help in digestion, and the reduction of cholesterol (Farinde *et al.*, 2017). The crude fibre content in this study ranged from 8.39 – 13.43%, with sample LBAC 6 recording the lowest value and LBAC 2 recording the highest value. However, these values are different from findings in other investigations by Fasoyiro *et al.,* 2006; Yellavila *et al.,* 2015; Farinde *et al.,* 2018; Dankat and Owolabi, 2021. The crude fibre contents of all the accessions are far higher than the crude fibre of 6.5% in the raw lima bean accessions reported by Yellavila et al., 2015. There was no significant difference ($p<0.05$) in the crude fibre contents of samples LBAC2 and LBAC4.

The phosphorus content of the samples in this investigation ranged from 0.26 – 0.37%, which is lower than findings made by Ezeagu and Ibegbu, 2010, and Farinde *et al.*,2018. Phosphorus is important for skeletal health, building and protection of bones and teeth, as part of DNA and RNA, helps convert food into energy and cellular function. Sample LBAC 9 recorded the highest phosphorus content, while sample LBAC 10 recorded the least values.

The potassium contents of the lima bean accessions were found to be within the range of 0.80% in LBAC5 – 1.11% in LBAC9. Samples LBAC9, LBAC7 and LBAC1 were significantly high in potassium. There was no significant difference ($p<0.05$) in the potassium contents of LBAC2, LBAC4, LBAC8 and LBAC10. Potassium is important in regulating pH, maintaining cellular water balance, and enhances protein and carbohydrate metabolism (Oribon et al., 2007). Bamigboye and Adepoju, (2015) reported the importance of potassium in consumers diet as blood pressure regulator.

Sample LBAC6 was significantly low in iron ($p<0.05$) while samples LBAC1 and LBAC7 significantly high in iron ($p<0.05$) compared with the other lima bean accessions in this study. The iron content ranged from 58.34 – 91.67mg/kg, which is significantly higher than the iron content of 2.45 to 2.67mg100/ 100g in raw lima bean accessions reported by Yellavila et al., (2015) and 8.7mg/100g reported by Farinde et al., (2018). There was no significant difference ($p<0.05$) in the iron contents of samples LBAC2, LBAC4 and LBAC6, there was also no significant difference ($p<0.05$) in the iron contents of samples LBAC3, LBAC8 and LBAC9. Iron is an integral part of many proteins and enzymes and it helps in energy metabolism, it improves cognitive function, regulates the immune system and prevents anemia.

Anti-nutrients are compounds that interfere with the absorption and utilization of essential nutrients. They can be reduced in food by soaking, germination, boiling, cooking, roasting, autoclaving and fermentation (Oboh et al., 2000; Fasoyiro et al., 2009; Adeniran et al., 2014; Farinde et al., 2017; Farinde et al., 2018; Farinde, 2019; Farinde et al., 2014; Owolabi *et al*., 2020). The cyanide content of the lima bean accessions in this study ranged from 40-87mg/kg, with samples LBAC 1 and LBAC 2 recording the highest values and sample LBAC 4 recording the least amount of cyanide (Table 3).

Table 3: Nutrients and Anti-nutrients Contents in the Raw Lima Bean Accessions

Sample	Protein %	Crude Fibre (%)	Phosphorous (%)	Potassium (%)	Iron (mg/kg)	Cyanide (mg/kg)	Trypsin Inhibitor (TIU/g)
LBAC 1	19.90^{b}	8.89^{def}	0.34^{b}	1.03^{bc}	91.67^{a}	87^{a}	0.18^{i}
LBAC 2	17.31^{f}	13.43^{a}	0.31^{cde}	0.93^{c}	63.30^{d}	87^{a}	0.41^{c}
LBAC 3	16.41^{h}	11.39^{bc}	0.29^{ef}	0.88^{d}	70.00^{c}	65^{e}	0.41^{c}
LBAC 4	17.72^{e}	13.11^{a}	0.30^{cde}	0.92^{c}	61.67^{d}	40^{i}	0.42^{c}
LBAC 5	18.60^{c}	12.67^{ab}	0.29^{ef}	0.80^{cd}	81.67^{b}	60^{f}	0.35^{f}
LBAC 6	16.40^{h}	8.39^{f}	0.29^{ef}	0.88^{d}	58.34^{d}	41^{i}	0.32^{h}
LBAC 7	17.97^{d}	8.80d^{ef}	0.35^{ab}	1.06^{b}	91.67^{a}	84^{b}	0.36^{f}
LBAC 8	19.91^{b}	10.35^{dc}	0.31^{cd}	0.94^{c}	71.67^{c}	59^{f}	0.40^{de}
LBAC 9	20.32^{a}	8.87^{def}	0.37^{a}	1.11^{a}	71.67^{c}	69^{d}	0.39^{e}
LBAC 10	16.85^{g}	11.11^{bc}	0.26^{h}	0.97^{c}	80.00^{b}	59^{f}	0.31^{h}

Means with the same superscript within a column are not significantly different at 5% level

Key:

LBAC1: Erin Ijesha, LBAC2: LB52; LBAC3: Pepelupe red; LBAC4: LB 51B; LBAC5: Tede Oyo 1; LBAC6: LB50; LBAC7: Erin Ijesha 2; LBAC8: LB51A; LBAC9: Tede Oyo3; LBAC10: Tede Oyo 2.

The cyanide values are similar to the value of 76.70 mg/kg recorded in the raw lima beans in a study by Farinde et al., (2018) on nutritional and antinutrients contents of raw and processed lima beans. The values of cyanide content observed in this study are far below the permissible level/safe dose of 50 - 200mg/kg as reported by Farinde et al., (2018). All the lima bean accessions evaluated were significantly different ($p<0.05$) in their cyanide content. Cyanide is an effective cytochrome oxidase inhibitor; it interferes with aerobic respiratory system. Acute hydrogen cyanide poisoning could cause difficulties in breathing which can result into death.

Trypsin inhibitor ranged from 0.18-0.42 TIU/g, with sample LBAC 4 recording the highest amount and sample LBAC 1 recording the least amount (Table 4). The trypsin indicator values recorded in this study were found to be lower than those recorded by Adeyeye and Ayejuyo, (2018), and Ikeogu and Enibe, (2018). There was no significant difference in the Trypsin inhibitor contents of samples LBAC2, LBAC3 and LBAC4. Trypsin inhibitor are found widely distributed among plants, especially in seeds, grains and legumes. They interfere with protein digestion by inhibiting digestive enzymes (Adebowale et al., 2005).

Sensory Evaluation of Lima Beans Accessions (Cooked samples)

The result of the sensory evaluation of cooked Lima beans samples using parameters such as colour, taste, texture, appearance and aroma/flavour are shown in Table 4. Sample BZ (Oloyin-Control) recorded the highest values for overall acceptability; with sample LBAC 4 being the most accepted Lima beans accession and sample LBAC 6 being the least. Samples LBAC1, LBAC2

Table 4: Sensory evaluation of Lima beans Accession (Cooked Samples)

Sample	Colour	Appearance	Aroma/Flavour	Texture	Taste	Overall_Acceptability
LBAC 1	3.6 b	3.4 b	3.0 bc	3.3b	2.7cd	3.0 bc
LBAC 2	3.6 b	3.5 b	3.1 bc	3.2bc	2.4 d	2.9 bc
LBAC 3	2.5 d	2.4 d	3.0bc	2.9bc	3.2bc	2.9bc
LBAC 4	3.5 b	3.5b	3.4 b	3.2 bc	3.6bc	3.4 b
LBAC 5	2.8 cd	2.7 cd	2.7 c	2.7 c	2.9 cd	2.8 c
LBAC 6	2.9 cd	3.1bc	2.9 bc	2.9 bc	2.9 cd	2.7 c
LBAC 7	3.5 b	3.3 b	3.1 bc	3.0bc	2.3d	2.8c
LBAC 8	3.6 b	3.7 b	3.0 bc	3.1bc	2.6 cd	3.0bc
LBAC 9	3.3 bc	3.3 b	3.1 bc	3.2bc	3.1 bc	3.1bc
LBAC 10	3.3 bc	3.2 bc	3.4 b	3.0bc	3.1 bc	3.2 bc
BZ	4.3 a	4.5 a	4.4 a	4.5a	4.7 a	4.5a

Means with the same superscript within a column are not significantly different at 5% level

Key: LBAC1: Erin Ijesha, LBAC2: LB52; LBAC3: Pepelupe red; LBAC4: LB 51B; LBAC5: Tede Oyo 1; LBAC6: LB50; LBAC7: Erin Ijesha 2; LBAC8: LB51A; LBAC9: Tede Oyo3; LBAC10: Tede Oyo 2. BZ: Oloyin (Control)

and LBAC8 compared well with BZ (Oloyin) in terms of colour, appearance and aroma while samples LBAC1, LBAC2, LBAC4 and LBAC9 compared well with the control in terms of texture. Taste of sample LBAC 4 was the most preferred among the cooked lima beans samples. There was no significant difference ($p<0.05$) in the overall acceptability of cooked lima bean accessions LBAC1,2,3,8,9 and 10. Better overall acceptability of the control (Oloyin) beans over the Lima beans samples might probably be due to their naturally sweet, creamy, tender texture, as opposed to the mild, beany/earthy flavour of lima beans according to Farinde *et al.*, (2017); Dankat *et al.*, (2022), Adebo, (2023).

Sensory Evaluation of Lima beans accessions (Moinmoin samples)

The result of the sensory evaluation of lima bean moinmoin samples are presented in Table 5. Sample BZ (Oloyin) was the most accepted, while sample LBAC8 had the least overall acceptability for moinmoin. Interestingly, sample LBAC6 which recorded the least acceptability as cooked beans compared well with the control (Oloyin) in all the sensory attributes evaluated. Sample LBAC9 was most preferred amongst the lima bean moinmoin by the panelists in terms of taste and overall acceptability. There was no significant difference ($p<0.05$) in the overall acceptability of moinmoin samples LBAC2, 4, 5and 6. Variations in the acceptability of the processed lima bean accessions samples might be due to the varying amounts of protein, fat, minerals and anti-nutrients present in the different accessions as reported by Nwosu *et al.*, 2014, Ibeogu *et al.*, 2021. All the lima bean accessions were accepted as moinmoin.

Table 5: Sensory evaluation of Lima beans Accession (Moinmoin Samples)

Sample	Colour	Appearance	Aroma/Flavour	Texture	Taste	Overall_Acceptability
LBAC 1	3.3bc	3.5cd	3.2bc	3.1cd	3.0cd	3.2cd
LBAC 2	4.1ab	4.3ab	3.1bc	3.6abcd	3.3bc	3.6bc
LBAC 3	2.0d	3.8bc	3.0c	2.7cd	3.0cd	2.8d
LBAC 4	3.9ab	2.7e	3.5ab	3.6abcd	3.7bc	3.7bc
LBAC 5	4.0ab	3.0e	3.6ab	3.9ab	3.9abc	3.9bc
LBAC 6	4.0ab	4.1abc	3.3bc	3.4abcd	3.7bc	3.8bc
LBAC 7	2.8c	3.4cde	2.6c	2.7cd	3.2bc	2.9d
LBAC 8	2.9c	4.6a	3.0c	2.5d	2.4bcd	2.7d
LBAC 9	3.9ab	4.0bc	3.7ab	3.8ab	4.0ab	4.0ab
LBAC 10	3.4bc	2.0f	3.3bc	3.2bcd	3.1bcd	3.2cd
BZ	4.7ab	3.8c	4.2ab	4.2a	4.6a	4.6a

Means with the same superscript within a column are not significantly different at 5% level

Key: LBAC1: Erin Ijesha, LBAC2: LB52; LBAC3: Pepelupe red; LBAC4: LB 51B; LBAC5: Tede Oyo 1; LBAC6: LB50; LBAC7: Erin Ijesha 2; LBAC8: LB51A; LBAC9: Tede Oyo3; LBAC10: Tede Oyo 2. BZ: Oloyin (Control)

IMPLICATION OF THE RESEARCH AND PRACTICE

Lima bean (Phaseolus lunatus), an underutilized legume in Nigeria, holds significant potential for improving food and nutrition security. In response, the Institute of Agricultural Research and Training (IAR&T), Ibadan, Nigeria, has developed several lima bean accessions to enhance farmers' access to this crop. However, successful adoption and utilization depend on key quality attributes, including crop yield, cooking characteristics, nutritional and anti-nutritional composition, and organoleptic acceptability. Systematic evaluation of these attributes has important research and practical implications, as it provides a scientific basis for selecting superior, high-quality varieties that meet the needs of farmers, consumers, and processors. Such selection will support wider adoption, improve consumer acceptance, and contribute to enhanced livelihoods and economic development.

CONCLUSIONS

Sample LBAC1 and LBAC9 had the highest yield performance compared to other accessions evaluated.

Charcoal cooking was found to be the best fuel source for cooking lima beans compared to firewood and gas.

Sample LBAC6 recorded the shortest cooking time, the least antinutrients content, accepted as moinmoin but had the least nutrients content and was poorly accepted as cooked beans.

Sample LBAC9 had the highest yield performance, highest nutrients content (protein, phosphorous and potassium), accepted as cooked beans, most preferred in taste and overall acceptability as moinmoin among the lima bean accessions. It however recorded long cooking time for all the fuel sources used.

Sample LBAC4 was found to cook fast on charcoal, contain high fibre and minerals, low in antinutrients and compared well with the control (oloyin) as cooked beans and moinmoin.

The lima bean accessions exhibited differences in the quality attributes evaluated. Some were high yielding, easy to cook but low in nutrients content. Some were high in nutrients and low in antinutrients content. Some were good as cooked beans alone while some were good for both cooked beans and moinmoin. Some were good for only moinmoin. Some were nutritious but take long to cook.

These findings underscore the inherent trade-offs among yield, nutritional quality, and processing efficiency and highlight opportunities for targeted selection and breeding of Lima bean accessions to meet diverse nutritional and end-use requirements.

FUTURE RESEARCH

Future research should look into further reduction of cooking time for accessions with high quality attributes

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