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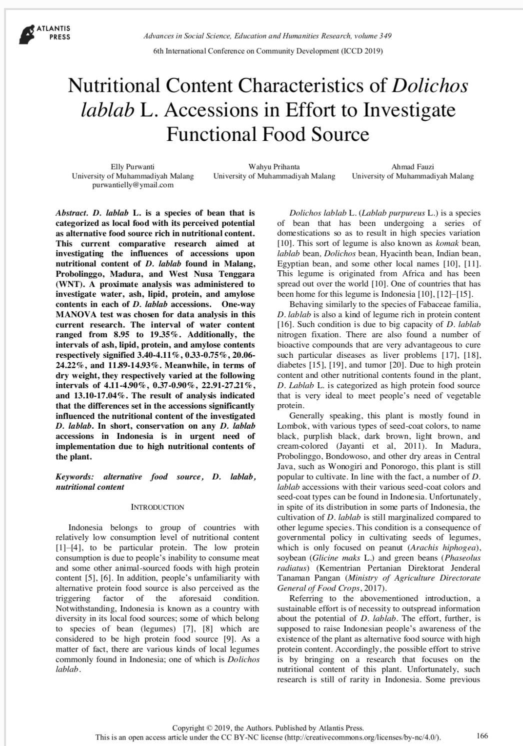

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Nutritional Content Characteristics of *Dolichos lablab* L. Accessions in Effort to Investigate Functional Food Source

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***Abstract*. *D. lablab* L. is a species of bean that is categorized as local food with its perceived potential as alternative food source rich in nutritional content. This current comparative research aimed at investigating the influences of accessions upon nutritional content of *D. lablab* found in Malang, Probolinggo, Madura, and West Nusa Tenggara (WNT). A proximate analysis was administered to investigate water, ash, lipid, protein, and amylose contents in each of *D. lablab* accessions. One-way MANOVA test was chosen for data analysis in this current research. The interval of water content ranged from 8.95 to 19.35%. Additionally, the intervals of ash, lipid, protein, and amylose contents respectively signified 3.40-4.11%, 0.33-0.75%, 20.06-24.22%, and 11.89-14.93%. Meanwhile, in terms of dry weight, they respectively varied at the following intervals of 4.11-4.90%, 0.37-0.90%, 22.91-27.21%, and 13.10-17.04%. The result of analysis indicated that the differences set in the accessions significantly influenced the nutritional content of the investigated *D. lablab*. In short, conservation on any *D. lablab* accessions in Indonesia is in urgent need of implementation due to high nutritional contents of the plant.**

Keywords: alternative food source, D. lablab, nutritional content

INTRODUCTION

Indonesia belongs to group of countries with relatively low consumption level of nutritional content [1]–[4], to be particular protein. The low protein consumption is due to people's inability to consume meat and some other animal-sourced foods with high protein content [5], [6]. In addition, people's unfamiliarity with alternative protein food source is also perceived as the triggering factor of the aforesaid condition. Notwithstanding, Indonesia is known as a country with diversity in its local food sources; some of which belong to species of bean (legumes) [7], [8] which are considered to be high protein food source [9]. As a matter of fact, there are various kinds of local legumes commonly found in Indonesia; one of which is *Dolichos lablab*.

Dolichos lablab L. (*Lablab purpureus* L.) is a species of bean that has been undergoing a series of domestications so as to result in high species variation [10]. This sort of legume is also known as *komak* bean, *lablab* bean, *Dolichos* bean, Hyacinth bean, Indian bean, Egyptian bean, and some other local names [10], [11]. This legume is originated from Africa and has been spread out over the world [10]. One of countries that has been home for this legume is Indonesia [10], [12]–[15].

Behaving similarly to the species of Fabaceae familia, *D. lablab* is also a kind of legume rich in protein content [16]. Such condition is due to big capacity of *D. lablab* nitrogen fixation. There are also found a number of bioactive compounds that are very advantageous to cure such particular diseases as liver problems [17], [18], diabetes [15], [19], and tumor [20]. Due to high protein content and other nutritional contents found in the plant, *D. Lablab* L. is categorized as high protein food source that is very ideal to meet people's need of vegetable protein.

Generally speaking, this plant is mostly found in Lombok, with various types of seed-coat colors, to name black, purplish black, dark brown, light brown, and cream-colored (Jayanti et al, 2011). In Madura, Probolinggo, Bondowoso, and other dry areas in Central Java, such as Wonogiri and Ponorogo, this plant is still popular to cultivate. In line with the fact, a number of *D. lablab* accessions with their various seed-coat colors and seed-coat types can be found in Indonesia. Unfortunately, in spite of its distribution in some parts of Indonesia, the cultivation of *D. lablab* is still marginalized compared to other legume species. This condition is a consequence of governmental policy in cultivating seeds of legumes, which is only focused on peanut (*Arachis hiphogea*), soybean (*Glicine maks* L.) and green beans (*Phaseolus radiatus*) (Kementrian Pertanian Direktorat Jenderal Tanaman Pangan (*Ministry of Agriculture Directorate General of Food Crops*, 2017).

Referring to the abovementioned introduction, a sustainable effort is of necessity to outspread information about the potential of *D. lablab*. The effort, further, is supposed to raise Indonesian people's awareness of the existence of the plant as alternative food source with high protein content. Accordingly, the possible effort to strive is by bringing on a research that focuses on the nutritional content of this plant. Unfortunately, such research is still of rarity in Indonesia. Some previous

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Referring to the abovementioned introduction, a sustainable effort is of necessity to outspread information about the potential of *D. lablab*. The effort, further, is supposed to raise Indonesian people's awareness of the existence of the plant as alternative food source with high protein content. Accordingly, the possible effort to strive is by bringing on a research that focuses on the nutritional content of this plant. Unfortunately, such research is still of rarity in Indonesia. Some previous studies conducted only focused on discussing the morphological and molecular diversities [14] and anatomy [12] of *D. lablab*. Meanwhile, another study discussing the nutritional content of *D. lablab* only included accession from Lombok with a limited parameter on the protein content [13]. For that reason, this research was brought on with the purpose of investigating the differences of water, ash, lipid, protein, and amylose contents of various accessions of *D. lablab* found in several parts of Indonesia.

METHOD

This comparative research involved *D. lablab* L. population gained from Malang, Madura, West Nusa Tenggara (WNT), and Probolinggo. The selected accessions of *D. lablab* L. were those of which morphological seeds had been found and identified in our previous research. For each of the population, two samples were taken for nutritional content analysis. Further, the research highlighted the analysis on several proximate parameters, namely water, ash, lipid, protein, and amylose. All contents other than water were investigated not only based on gross weight of the samples, but also their dry weight. The procedure of analysis on water, ash, and lipid was on the basis of SNI [22], protein based on AOAC [23], and amylose based on IRRI [24]. Those proximate analyses were administered in Balai Penelitian Tanaman Aneka Kacang dan Umbi, Malang.

After all data of the proximate analyses had been completed, data analysis was administered. Data analysis method applied for this study was One-Way Multivariate Analysis of Variance (MANOVA). Both of multivariate and univariate analyses were administered during data analysis process in which the accessions of *D. lablab* were positioned as independent variable; while the nutritional contents were investigated as dependent one. Further testing was administered only if significant influence was found by univariate analysis. Moreover, the posthoc testing selected to help data analysis constituted Least Significant Difference (LSD) testing with the significance of 0.05.

RESULT

D. lablab constitutes one of local food sources potential to meet the need of alternative food source with high nutritional contents and found in some parts of Indonesia. In this current research, there were 12 accessions of *D. lablab* spread out over Probolinggo, Madura, Malang, and WNT – their nutritional contents were analyzed. The results of MANOVA testing, to investigate if there were chemical differences occurring from those several accessions, were presented in Table 1. Referring to Table 1, it was identifiable that the difference found on those accessions resulted in different chemical contents found in the seeds [F (99, 39) = 67.161, $p < .001$; Wilk's $\Lambda = 0.0001$, partial $\eta p2 = .982$]. This indicated that there was difference of chemical contents on the seeds of several *D. lablab* accessions originated from some parts of Indonesia.

Table 1. The results of MANOVA testing on the influences of accessions upon chemical content of *D. lablab*

Value	F	Sig.
0.0001	67.161	<0.001

In order to identify which proximate parameters were influenced by accession difference, univariate testing was administered. The summary of univariate testing results was presented in Table 2. Alluding to Table 2, it was shown that accession difference could generate significant influence upon water, ash, lipid, protein, and amylose contents ($p < .001$). Additionally, the results have shown that the factor of accessions entirely influenced the proximate parameters measured in this research. For that reason, posthoc testing was administered on the whole proximate data gained.

Table 2. The results of univariate testing on the influences of accessions upon nutritional content of *D. lablab* seeds

Dependent Variable		F	Sig.
Water		153.971	<0.001
Wet	Ash	352.446	<0.001
	Lipid	10.972	<0.001
	Protein	10.033	<0.001
	Amylose	184.833	<0.001
Dry	Ash	318.986	<0.001
	Lipid	13.610	<0.001
	Protein	5.923	<0.001
	Amylose	198.992	<0.001

The results of posthoc testing on the seeds in terms of wet and dry mass contents were respectively displayed in Table 3 and 4. In respect to Table 3, the water content in the accession of Probolinggo-1 was significantly higher than other accessions. Next, Table 3 indicates that the accessions of WNT-5, Probolinggo-2; Madura-1 and WNT-4; and Probolinggo-1 and Madura-1 were categorized as a group of accessions with the highest level of ash, lipid, protein, and amylose contents. On the other hand, based on Table 4 with the highlight in the dry weight seeds, the accessions of Probolinggo-2; Malang, Madura-2, Madura-3, Probolinggo-1, and Probolinggo-2; Madura-3; and Probolinggo-1 contained the highest level of ash, lipid, protein, and amylose contents.

The water content gained from numerous seeds of *D. lablab* in this research ranged from 8.95% to 19.35%. This water content range was not significantly different from that of 25 genotypes of *D. lablab* owned by Department of Agricultural Botany, India [25] and *D. lablab* gathered from local markets in India [26]. In general, water content is not the most essential nutrition legume is supposed to contain. Nevertheless, information related to water content is deemed as pivotal insight due to its close connection with storage stability of seeds.

[27], [28]. In addition, water content also contributes to influencing seed germination and development [29].

Table 3. The results of LSD testing on the influences of accessions upon wet mass contents in *D. lablab* seeds (%)

Accessions	Water	Ash	Lipid	Protein	Amylose
Madura-1	8.95 ± 0.127^{b}	4.00 ± 0.021^{f}	0.44 ± 0.078^{b}	24.16 ± 0.007^{f}	14.93 ± 0.035^{g}
Madura-2	11.39 ± 0.049^{cd}	3.85 ± 0.014^{d}	0.61 ± 0.007^{de}	20.30 ± 0.481^{a}	12.95 ± 0.071^{b}
Madura-3	12.26 ± 0.000^{ef}	4.04 ± 0.014^{g}	0.65 ± 0.007^{e}	23.88 ± 0.742^{ef}	13.39 ± 0.057^{cd}
Malang	11.59 ± 0.509^{de}	3.72 ± 0.028^{c}	0.54 ± 0.014^{cd}	$22.92 \pm 0.346d^{ef}$	13.60 ± 0.007^{de}
WNT-1	9.97 ± 0.049^{a}	3.96 ± 0.007^{e}	0.33 ± 0.042^{a}	22.49 ± 0.559^{cde}	12.79 ± 0.156^{b}
WNT-2	11.21 ± 0.290^{cd}	3.65 ± 0.007^{b}	0.43 ± 0.028^{ab}	21.01 ± 0.163^{ab}	14.19 ± 0.092^{f}
WNT-3	11.82 ± 0.643^{de}	4.05 ± 0.007^{g}	$0.52 \pm 0.028b^{cd}$	22.04 ± 0.403^{bcd}	12.07 ± 0.099^{a}
WNT-4	9.08 ± 0.658^{b}	4.06 ± 0.000^{gh}	0.52 ± 0.067^{bcd}	24.22 ± 1.336^{f}	11.89 ± 0.014^{a}
WNT-5	10.82 ± 0.035^{c}	4.11 ± 0.028^{i}	0.52 ± 0.08^{bcd}	23.77 ± 0.919^{ef}	13.27 ± 0.212^{c}
Probolinggo-1	19.35 ± 0.396^{h}	3.40 ± 0.007^{a}	0.61 ± 0.042^{de}	20.06 ± 0.184^{a}	14.86 ± 0.014^{g}
Probolinggo-2	16.27 ± 0.071^{g}	4.10 ± 0.021^{hi}	0.75 ± 0.071^{f}	21.37 ± 0.933^{abc}	12.94 ± 0.035^{b}
Probolinggo-3	12.68 ± 0.064^{f}	4.04 ± 0.014^{g}	0.48 ± 0.000^{bc}	21.51 ± 0.608^{abcd}	13.69 ± 0.141^{e}

In this study, the ash content ranged from 3.40 to 4.11% (wet mass) and from 4.11 to 4.90% (dry mass). The range of the content was not dramatically different from that of *D. lablab* from India [30] and Kenya [31]. Ash content referred to inorganic residue with mineral as its primary content [32]. The higher the level of ash content, the higher the level of mineral content would be. Defining ash content is considered crucial for food source due to several reasons; one of which is that mineral content would define the physicochemical characteristic of the food source. Further, information with respect to physicochemical characteristic in legumes needs to be identified as the physicochemical property in legumes could undergo a transformation when fermentation process is being run [33].

Table 4. The results of LDS testing on the influences of accessions upon dry mass contents in *D. lablab* seeds (%)

Accessions	Ash	Lipid	Protein	Amyloses
Madura-1	4.39 ± 0.021^{d}	0.48 ± 0.085^{ab}	26.53 ± 0.014^{def}	13.10 ± 0.014^{a}
Madura-2	4.35 ± 0.021^{c}	0.69 ± 0.007^{c}	22.91 ± 0.544^{a}	13.64 ± 0.113^{b}
Madura-3	4.61 ± 0.021^{fg}	0.74 ± 0.014^{c}	27.21 ± 0.841^{f}	16.43 ± 0.042^{h}
Malang	4.20 ± 0.028^{b}	0.61 ± 0.014^{c}	25.92 ± 0.389^{cdef}	14.43 ± 0.078^{c}
WNT-1	4.40 ± 0.000^{d}	0.37 ± 0.049^{a}	24.97 ± 0.622^{bcd}	15.09 ± 0.049^{de}
WNT-2	4.11 ± 0.007^{a}	0.49 ± 0.035^{bc}	23.66 ± 0.184^{ab}	15.32 ± 0.007^{e}
WNT-3	4.59 ± 0.007^{f}	0.60 ± 0.035^{bc}	24.98 ± 0.453^{bcd}	14.52 ± 0.177^{c}
WNT-4	4.47 ± 0.007^{e}	0.57 ± 0.071^{bc}	26.64 ± 1.464^{ed}	15.98 ± 0.099^{g}
WNT-5	4.61 ± 0.028^{fg}	0.58 ± 0.099^{bc}	26.65 ± 1.032^{ef}	14.99 ± 0.240^{d}
Probolinggo-1	4.22 ± 0.007^{b}	0.76 ± 0.049^{c}	24.88 ± 0.233^{bc}	17.04 ± 0.021^{i}
Probolinggo-2	4.90 ± 0.014^{h}	0.90 ± 0.078^{c}	25.53 ± 1.110^{cde}	14.99 ± 0.042^{d}
Probolinggo-3	4.63 ± 0.021^{g}	0.55 ± 0.007^{bc}	24.64 ± 0.700^{bc}	15.62 ± 0.156^{f}

Referring to lipid content, the lowest levels of dry and gross weights respectively signified 0.33 and 0.37%; meanwhile the highest levels respectively constituted 0.75 and 0.90%. The amounts of the content were lower than *D. lablab* analyzed by Kilonzi et al. [31], but not significantly different from those of Davari and Kasture [25] as well as Hossain et al. [26]. Lipid was categorized the lowest content among nutritional components. It constituted the primary component of human's diet [34]. Beside contributing to food flavor [35], lipid also plays an important role for human's health [36]. Lack of lipid in the body would result in serious damage; conversely, excessive lipid could also generate health problems. In fact, there are some types of lipid that can trigger health problems due to excessive consumption; yet, there are also other types important to consume. For that reason, further analysis on the basis of lipid content in various accessions of *D. lablab* is necessary to perform in upcoming researches.

Furthermore, protein content of *D. lablab* signified around 20.06 to 24.22% (wet) and 22.91 to 27.21% (dry). The data indicated that protein was equipped by the highest nutritious content compared to other contents investigated. High protein content found in *D. lablab* seeds was in line with preceding researches [25], [30]. Thus, it confirmed that *D. lablab* as one protein supplier with various types of essential amino acid [9]. Accordingly, legumes are said to be able to contribute to declining the number of malnutrition problems in some developing countries [37].

The last parameter investigated was amylose content. The contents of amylose signified 11.89-14.93% (wet) and 13.10-17.04% (dry). Amylose is a macromolecule containing units of D-glucose [38]. Amylose is also categorized as polysaccharide which constitutes the main source of energy in human's diet [39]. As a consequence, the existence of food source with high amylose content can be an alternative solution for low nutrition issue in Indonesia. Indeed, consuming the plant as food source will meet the daily need of carbohydrate.

CONCLUSION

In this current research, proximate analysis was administered on 12 *D. lablab* accessions gathered from WNT, Madura, Probolinggo, and Malang. Further, whilst protein was defined as the nutrition with the highest level of content, lipid was named as the component with the lowest level of content. MANOVA testing results have indicated that the difference found in the accessions resulted in different nutritional content of *D. lablab* seeds.

REFERENCES

[1] A. Ickowitz, D. Rowland, B. Powell, and M. A. Salim, "Forests, trees, and micronutrient-rich food consumption in Indonesia," *PLoS One*, vol. 11, no. 5, pp. 1–15, 2016.

[2] E. A. A. Fatmah, "Baseline survey on nutritional and health status of underfive children at poor communities in DKI Jakarta , Tangerang , and Bogor year 2004," *Makara Kesehat*., vol. 9, no. 2, pp. 41–48, 2005.

[3] A. Diana *et al*., "Consumption of fortified infant foods reduces dietary diversity but has a positive effect on subsequent growth in infants from Sumedang district, Indonesia," *PLoS One*, vol. 12, no. 4, pp. 1–17, 2017.

[4] S. Madanijah *et al*., "Nutritional status of pre-pregnant and pregnant women residing in Bogor district, Indonesia: a cross-sectional dietary and nutrient intake study," *Br. J. Nutr*., vol. 116, no. 2016, pp. 1–10, 2016.

[5] A. Nafi, T. Susanto, and A. Subagio, "Pengembangan tepung kaya protein (TKP) dari koro komak (Lablab purpureus (L.) sweet) dan koro kratok (Phaseolus lunatus)," *Jurnal. Teknol. dan Ind. Pangan*, vol. 17, no. 3, pp. 159–165, 2006.

[6] I. Dewi, R. Nurmala, A. K. Adhi, and B. Brummer, "Price volatility analysis in Indonesian beef market," in *ICSAFS Conference Proceedings - 2nd International Conference on Sustainable Agriculture and Food Security: A Comprehensive*

Approach, 2017, vol. 2017, pp. 403–420.

[7] A. W. Ebert, "Potential of underutilized traditional vegetables and legume crops to contribute to food and nutritional security, income and more sustainable production systems," *Sustainability*, vol. 6, pp. 319–335, 2014.

[8] N. Raes, L. G. Saw, P. C. van Welzen, and T. Yahara, "Legume diversity as indicator for botanical diversity on Sundaland, South East Asia," *South African J. Bot.*, vol. 89, pp. 265–272, 2013.

[9] Y. Maphosa and V. A. Jideani, "The role of legumes in human nutrition," in *Functional Food - Improve Health through Adequate Food*, vol. i, no. tourism, InTech, 2017, p. 13.

[10] B. L. Maass, "Domestication, origin and global dispersal of Lablab purpureus (L.) Sweet (Fabaceae): Current understanding," *Legum. Perspect.*, no. 13, pp. 5–8, 2016.

[11] M. Byregowda, G. Girish, S. Ramesh, P. Mahadevu, and C. M. Keerthi, "Descriptors of Dolichos bean (Lablab purpureus L.)," *J. Food Legum.*, vol. 28, no. 3, pp. 203–214, 2015.

[12] E. T. Jayanti, "Profil anatomi batang kacang komak (Lablab purpureus (L.) Sweet) lokal Pulau Lombok," *Biologi*, vol. 10, no. 2, pp. 151–164, 2017.

[13] E. T. Jayanti, "Uji kandungan protein kasar biji kacang komak (Lablab purpureus (L.) Sweet) lokal Pulau Lombok," *J. Ilm. Pendidik. Biol. "Bioscientist)*, vol. 5, no. 2, pp. 82–86, 2006.

[14] E. T. Jayanti, "Variasi morfologis dan genetik kacang komak (Lablab purpureus (L.) sweet) di Lombok, Nusa Tenggara Barat," Universitas Gadjah Mada, 2013.

[15] E. Wardani, P. Wahyudi, K. R. Dewi, and R. Setiawan, "Efek antihiperglikemik dan antihiperkolesterol ekstrak tempe kacang komak (Lablab purpureus (L.) Sweet) pada hamster diabetik diet tinggi kolesterol," *Pharmacy*, vol. 12, no. 2, pp. 164–175, 2015.

[16] H. M. Habib, S. W. Theuri, E. E. Kheadr, and F. E. Mohamed, "Functional, bioactive, biochemical, and physicochemical properties of the Dolichos lablab bean," *Food Funct.*, no. 1, 2016.

[17] Y. H. Kim, Y. H. Kim, and A. Im, "Dolichos lablab protects against nonalcoholic fatty liver disease in mice fed high-fat diets," *J Med Food*, vol. 20, no. 12, pp. 1–11, 2017.

[18] A. Im, Y. H. Kim, H. W. Lee, and K. H. Song, "Water extract of Dolichos lablab attenuates hepatic lipid accumulation in a cellular nonalcoholic fatty liver disease model," *J Med Food*, vol. 19, no. 5, pp. 495–503, 2016.

[19] M. Ahmed, U. K. Trisha, S. R. Shaha, A. K. Dey, and M. Rahmatullah, "An initial report on the antihyperglycemic and antinociceptive potential of lLblab purpureus beans," *World J. Pharm. Pharm. Sci.*, vol. 4, no. 10, pp. 95–105, 2015.

[20] V. Vigneshwaran and P. Thirusangu, "Immunomodulatory glc/man-directed Dolichos lablab lectin (DLL) evokes anti-tumour response in vivo by counteracting angiogenic gene expressions," *Clin. Exp. Immunol.*, vol. 189, pp. 21–35, 2017.

[21] Kementrian Pertanian Direktorat Jenderal Tanaman Pangan, *Pedoman pelaksanaan pengelolaan produksi aneka kacang dan umbi tahun 2017*. Jakarta: Kementrian Pertanian Direktorat Jenderal Tanaman Pangan, 2017.

[22] Badan Standardisasi Nasional, *Cara uji makanan dan minuman*. Indonesia, 1992.

[23] AOAC International, *Official methods of analysis*. Gaithersburg: AOAC International, 2005.

[24] IRRI-International Rice Research Institute, "Annual report for 1970," Manila, 1971.

[25] S. A. Davari and M. C. Kasture, "Wal (Lablab purpureus L.): An unexploited potential food legumes," *Int. J. Chem. Stud.*, vol. 6, no. 2, pp. 946–949, 2018.

[26] S. Hossain, R. Ahmed, S. Bhowmick, A. Al Mamun, and M. Hashimoto, "Proximate composition and fatty acid analysis of Lablab purpureus (L.) legume seed: Implicates to both protein and essential fatty acid supplementation," *Springerplus*, vol. 5, no. 1, pp. 1–10, 2016.

[27] M. Zhang, J. J. Zhuo, X. Wang, S. Wu, and X. F. Wang, "Optimizing seed water content: Relevance to storage stability and molecular mobility," *J. Integr. Plant Biol.*, vol. 52, no. 3, pp. 324–331, 2010.

[28] J. Suszka, B. P. Plitta, M. Michalak, B. Bujarska-Borkowska, T. Tylkowski, and P. Chmielarz, "Optimal seed water content and storage temperature for preservation of Populus nigra L. germplasm," *Ann. For. Sci.*, vol. 71, no. 5, pp. 543–549, 2014.

[29] A. Rezaei, B. Nasery, M. A. Hedayati, and K. Haghverdi, "Effects of seed moisture content decreasing on germination traits of Silver Fir (Abies alba Mill .)," *Kastamonu Univ. J. For. Fac.*, no. special issue, pp. 36–39, 2012.

[30] B. Sarma, A. Sarma, G. K. Handique, and A. K. Handique, "Evaluation of country bean (Dolichos lablab) land races of North East India for nutritive values and characterization through seed protein profiling," *Legum. Res.*, vol. 33, no. 3, pp. 184–189, 2010.

[31] S. M. Kilonzi, A. O. Makokha, and G. M. Kenji, "Physical characteristics, proximate composition and anti-nutritional factors in grains of lablab bean (Lablab purpureus) genotypes from Kenya," *J. Appl. Biosci.*, vol. 114, pp. 11289–11298, 2017.

[32] B. P. Ismail, "Ash content determination," in *Food Analysis Laboratory Manual*, Cham: Springer International Publishing, 2017, pp. 117–119.

[33] E. Iheke, A. Oshodi, A. Omoboye, and O. Ogunlalu, "Effect of fermentation on the physicochemical properties and nutritionally valuable minerals of Locust bean (Parkia biglobosa)," *Am. J. Food Technol.*, vol. 12, no. 6,

pp. 379–384, Jun. 2017.
[34] A. Meynier and C. Genot, "Molecular and structural organization of lipids in foods: Their fate during digestion and impact in nutrition," *OCL*, vol. 24, no. 2, p. D202, Mar. 2017.
[35] D. P. Bolhuis, L. P. Newman, and R. S. J. Keast, "Effects of salt and fat combinations on taste preference and perception," *Chem. Senses*, vol. 41, no. 3, pp. 189–195, 2016.
[36] A. G. Liu, N. A. Ford, F. B. Hu, K. M. Zelman, D. Mozaffarian, and P. M. Kris-Etherton, "A healthy approach to dietary fats: Understanding the science and taking action to reduce consumer confusion," *Nutr. J.*, vol. 16, no. 1, pp. 1–15, 2017.
[37] M. Gebrelibanos, D. Tesfaye, Y. Raghavendra, and B. Sintayeyu, "Nutritional and health implications of legumes," *Int. J. Pharm. Sci. Res. IJPSR*, vol. 4, no. 4, pp. 1269–1279, 2013.
[38] I. J. Joye, "Starch," in *Encyclopedia of Food Chemistry*, Elsevier, 2019, pp. 256–264.
[39] A. Lovegrove *et al.*, "Role of polysaccharides in food, digestion, and health," *Crit. Rev. Food Sci. Nutr.*, vol. 57, no. 2, pp. 237–253, 2017.

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