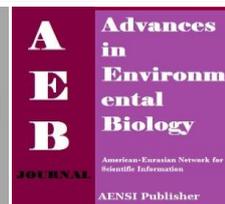




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Some Quality Aspects and Proximate Composition of Some Legumes in Sudan

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ABSTRACT

Legumes (pulses) are grown agriculturally, primarily for their edible seed in Sudan. This study was carried out to determined the quality aspect (100 seed weight, hydration coefficient and non soaker percentage) and proximate compositions (moisture, ash and protein contents) of some widely used legumes (fababean *Vicia faba*, kidney bean *Phaseolus vulgaris*, chick pea *Cicer arientinum*, lablab bean *Dolichos lablab*, cow pea *Cajanus cajan*) in the laboratory. The results showed that the 100 seed weight for super faba bean, English faba bean, kidney bean, chick pea, lablab bean and cow pea was 131.94, 62.85, 39.02, 16.12, 27.86 and 8.96%, respectively. Hydration coefficient of super faba bean, English faba bean, kidney bean, chick pea, lablab bean and cow pea was 286.29, 121.18, 37.63, 23.79, 61.29 and 14.48%, respectively. Non soakers percentage super faba bean, English faba bean, kidney bean, chick pea, lablab bean and cow pea was 1.0, 2.67, 47.33, 1.33, 0.33 and 24.67%, respectively. The statistical analysis of the results showed a significantly differences ($p \leq 0.01$) in 100 seed weight, non soakers percentage and hydration coefficient for the tested legumes. Proximate analysis showed that moisture content of super faba bean, English faba bean, kidney bean, chick pea, lablab bean and cow pea was 5.00, 5.00, 3.9, 3.4, 4.50 and 4.27%, respectively. Ash content of super faba bean, English faba bean, kidney bean, chick pea, lablab bean and cow pea was 3.93, 2.60, 3.60, 2.23, 2.70 and 2.83%, respectively. Crude protein percentage of the same legume was 29.70, 20.33, 21.17, 19.92, 22.27 and 19.50%, respectively. The differences between protein content of the above mentioned legumes were significant ($P \leq 0.01$). From the study findings, it is clear that super *Faba bean* seeds had the highest achieve in terms of quality attributes.

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INTRODUCTION

A legume is a plant in the family Fabaceae or Leguminosae, or the fruit or seed of such a plant. Legumes are grown agriculturally, primarily for their food grain seed (e.g. beans and lentils, or generally pulse), for livestock forage and silage, and as soil-enhancing green manure. Legumes are notable in that most of them have symbiotic nitrogen-fixing bacteria in structures called root nodules. Well-known legumes include alfalfa, clover, peas, beans, lentils, lupins, mesquite, carob, soybeans, peanuts and the woody climbing vine wisteria. Grain legumes are cultivated for their seeds, and are also called pulses. The seeds are used for human and animal consumption or for the production of oils for industrial uses. Grain legumes include beans, lentils, lupins, peas, and peanuts [1].

Legumes are plants that bare their fruit in pods, which are casings with two halves, or hinges. Legumes are a very healthy food because it is low in fat and high in protein. Legumes are also very high in fiber and other nutrients. Legumes are rich in some minerals such as Ca, Mg, Fe, Mg, P, K, Z, as well as some vitamins as folate, riboflavin, thiamin and B6 [2].

According to the nutritionists, edible legumes, an excellent source of dietary proteins and oils, can play an important role in fulfilling requirements of rapidly increasing population. The pulses contain 20-24% proteins [3] and can provide a balanced diet when eaten in combination with wheat, rice and other cereals [4]. Protein content in legume grains range from 17 to 40 %, contrasting with 7 – 13 % of cereals [5], and being equal to the protein contents of meats (18 – 25 %) [6].

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Legumes are among the best protein sources in the plant kingdom. The low concentrations of the amino acid methionine in legumes may be compensated for simply by eating more of them. Since legumes are relatively cheap compared to meat, eating more legumes may be an alternative to meat for some.

Legumes have a very specific place from the nutritive point of view and play an important role in nourishment of world population. Pea is highly consumed in Asian countries, common bean in Latin American and African countries, chick pea in India and lentil in countries of the Middle East [7].

In Sudan many types of legume are used for human food and animal feed such as faba bean, kidney bean, chick pea, lablab bean, cow pea. Utilization of legumes in food formulations as a source of protein is increasing as they provide balanced amino acids profile. Therefore, the objectives of the study were to estimate some proximate composition of some legumes and define some quality aspects..

MATERIALS AND METHODS

Seeds of five legumes namely faba bean, kidney bean, chick pea, lablab bean, cow pea were analyzed in the laboratory. Tests of some quality aspects (100-seed weight, non-soaker percentage and hydration coefficient) were determined according to the methods described by Ali *et al.* [8] and Elsayed [9]. From each sample 100 seeds were counted randomly in triplicate and weight was recorded. All samples were soaked overnight (16 hours) at room temperature. The percentage of non-soaker for each sample was calculated after sorting and weighing of non-soaker seeds. The hydration coefficient was calculated as follows:

$$\text{Hydration coefficient (\%)} = \frac{\text{weight of soaked seeds}}{\text{initial weight}} \times 100$$

The proximate composition (moisture content, Ash content and Protein content) was carried out according to AOAC [10].

Each sample was analyzed in triplicate and the figures were averaged. The data was subjected to the analysis variance [11] and the Duncan's multiple range test.

RESULTS AND DISCUSSION

Quality aspects: Table 1 showed the results of quality aspect of some legumes

100 seed weight values of super faba bean, English faba bean, kidney bean, chick pea, lablab bean, cow pea were 131.94, 62.85, 39.02, 16.12, 27.86 and 8.96 g, respectively. The results of super and English faba beans were higher than the findings of Elsayed [9] and Elhabib [12] and that of cow pea is lesser than what obtained by Nadeem *et al.* [4]. Statistical analysis showed that there were significant ($P \leq 0.01$) differences between legumes cultivars in 100 seed weight. This could be attributed to disparity in the cultivars and size of the legume seeds

Hydration coefficients of super faba bean, English faba bean, kidney bean, chick pea, lablab bean and cow pea were 286.29, 121.18, 37.63, 23.79, 61.29 and 14.48%, respectively. Hydration coefficients of super faba bean result was higher than that of Elsayed [9] and Elhabib [12] whereas that of English faba bean was less than the mentioned range. Statistical analysis revealed that there was significant difference ($P \leq 0.01$) in the hydration coefficients of the investigated legumes. High hydration coefficient indicates that the seeds are capable of imbibing water efficiency after soaking and it is valuable quality factor for a consumer which correlates positively with cookability.

Non soaker percentages of super faba bean, English faba bean, kidney bean, chick pea, lablab bean, cow pea were 1.00, 2.67, 47.33, 1.33, 0.33 and 24.67%, respectively. Non soaker percentages of super and English faba beans were in the range of Elsayed [9]. There was significant variation ($P \leq 0.01$) in non soaker percentages for the tested legumes. Non soaker is big problem in legumes and it could be due genetic and/or environmental factors in the field

Proximate composition Table 2 illustrated proximate composition of some legumes

Moisture content of super faba bean, English faba bean, kidney bean, chick pea, lablab bean and cow pea was 5.00, 5.00, 3.9, 3.4, 4.50 and 4.27%, respectively. Moisture content results were less than that reported by Elkhidir [13]. The results of super and English faba beans were within the range of Elsayed *et al.* [14]. Moisture contents of investigated legumes in this study were less than the standards of Codex Alimentarius [15]. This might be due to different climatic conditions, marketing practices, storage and transport. There was no significant difference between moisture contents of the legume cultivars

Ash content of super faba bean, English faba bean, kidney bean, chick pea, lablab bean and cow pea was 3.93, 2.60, 3.60, 2.23, 2.70 and 2.83%, respectively. Ash content findings were in close agreement with what reported by Elkhidir [13] and Elsayed *et al.* [14] with regard to super and English faba bean. The result of chick pea was relatively consistent with the data achieved by Bojňanská *et al.* [16]. No significant variation between the studied legumes in ash content.

Crude protein content of super faba bean, English faba bean, kidney bean, chick pea, lablab bean and cow pea was 29.70, 20.33, 21.17, 19.92, 22.27 and 19.50%, respectively. Crude protein content of faba beans was in concur with what reported with Elsayed *et al.* [14]. Chick pea data was less than the findings of Bojňanská *et al.* [16] and that of cow pea was less than what reported by Nadeem *et al.* [4]. This could attributed to the differences in cultivars, soil types and fertilizers used. The differences between protein content of the above mentioned legumes were significant ($P < 0.01$). Legumes are considered as a good source of plant protein which could a proper substitute for that of animal especially for low income people.

Conclusions:

From the study findings, it was concluded that super faba bean achieved the highest level of quality aspects (100 seed weight, non soakers percentage and hydration coefficient) also acquired high percentage of protein content. This research is imperative for the application of legumes in nutritional purposes as food and feed as well as for food processing and breeding for selection of good cultivars.

Table 1: Some quality aspects of some legumes.

Legume	Parameter		
	100 seed weight (g)	Hydration coefficient (%)	Non soaker (%)
super faba bean	131.94 (± 6.47) ^a	286.29 (± 13.69) ^a	1.00 (± 1.00) ^{cdet}
English faba bean	62.85 (± 1.40) ^b	121.18 (± 3.99) ^b	2.67 (± 0.58) ^{de}
kidney bean	39.02 (± 0.99) ^c	37.63 (± 1.73) ^{de}	47.33 (± 1.53) ^a
chick pea	27.86 (± 0.08) ^d	61.29 (± 0.69) ^c	0.33 (± 0.58) ^{eth}
lablab bean	16.18 (± 0.05) ^e	23.79 (± 17.65) ^{de}	1.33 (± 0.58) ^{cdeth}
cow pea	8.96 (± 0.27) ^f	14.48 (± 1.60) ^e	24.67 (± 8.08) ^b

Values are means \pm SD (between brackets)

Means not sharing common letters in column are significantly different at $p \leq 0.01$

Table 2: Some proximate composition of some legumes.

Legume	Parameter		
	Moisture content (g)	Ash content (%)	Protein content (%)
super faba bean	5.00 (± 1.02)	3.93 (± 0.87)	29.70 (± 0.89) ^a
English faba bean	5.00 (± 1.02)	2.60 (± 0.30)	20.33 (± 0.85) ^{cdet}
kidney bean	3.90 (± 0.00)	3.60 (± 0.53)	21.17 (± 0.57) ^{bcd}
chick pea	4.50 (± 2.15)	2.70 (± 0.30)	22.27 (± 0.55) ^b
lablab bean	3.40 (± 2.18)	2.23 (± 1.26)	19.92 (± 0.83) ^{efgh}
cow pea	4.27 (± 0.60)	2.83 (± 0.40)	19.50 (± 0.108) ^{efg}

Values are means \pm SD (between brackets)

Means not sharing common letters in column are significantly different at $p \leq 0.01$

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