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ETUDE COMPARATIVE EN NUTRIMENTS ESSENTIELS (PROTÉINE, MATIÈRE GRASSE, CELLULOSE) DANS QUATRE VARIÉTÉS DE HARICOT COMMUN (*Phaseolus vulgaris*). CAS DE LA VARIÉTÉ ROUGE RCB, D6 KENYA, GUANRATINO ET NCB NOIRE [COMPARATIVE STUDY IN ESSENTIAL NUTRIENTS (PROTEIN, FAT, CELLULOSE) IN FOUR VARIETIES OF COMMON BEAN (Phaseolus vulgaris). CASE OF THE VARIETY RCB RED, D6 KENYA, GUANRATINO AND BLACK NCB]

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Résumé

Le haricot est l'un des produits alimentaires les plus importants à la santé humaine car il est très riche en nutriment protéique, cellulosique en lipide… Dans les marchés locaux de la ville de Lubumbashi, on peut rencontrer une diversité de variétés de haricot commun (*Phaseolus vilgaris*). Cette diversification variétale conduit à une incertitude sur la composition nutritive de chacune de variétés afin de permettre aux consommateurs de s'en procurer selon leur revenu. C'est avec comme objectif de quantifier la teneur en protéine, matière grasse et cellulose que cette étude a été menée. Quatre variétés de haricot (Rouge RCB, D6 Kenya, Guanratino et NCB Noire) ont été soumises à une analyse nutritionnelle selon la méthode de Kjeldahl au laboratoire de contrôle qualité du Centre de Recherche Agro-Alimentaire (CRAA/RDC). Les résultats obtenus révèlent

que la variété D6 Kenya contient une teneur élevée en protéine (21.17%), alors que celle Guarantino en contenait en faible concentration (16.55%). D'autre part, la variété D6 Kenya avait une teneur en matière grasse supérieure (2.1%) comparativement aux autres variétés. Les résultats de cette étude démontre que les quatre variétés analysées contiennent de quantité acceptable de nutriments analysés et peuvent être recommandables aux consommateurs de les intégrés dans leur chaine alimentaire.

Mots-clés : *Phaseolus vilgaris*, méthode de Kjeldahl, protéine, lipide, cellulose, variété.

Summary

The bean is one of the most important food products for human health because it is very rich in protein nutrient, cellulosic in lipid ... In the local markets of the city of Lubumbashi, we can meet a variety of common bean varieties (Phaseolus vilgaris). This varietal diversification leads to uncertainty about the nutritional composition of each variety so that consumers can obtain it according to their income. It is with the objective of quantifying the content of protein, fat and cellulose that this study was conducted. Four varieties of beans (RCB Red, D6 Kenya, Guanratino and Black NCB) were subjected to a nutritional analysis according to Kjeldahl's method in the quality control laboratory of the Center for Agribusiness Research (CRAA / DRC). the results show that the variety D6 Kenya contains a high content of protein (21.17%), whereas the Guarantino variety contained a low concentration (16.55%). on the other hand, the variety D6 Kenya had a higher fat content (2.1%) than other varieties. .the results of this study demonstrate that the four varieties analyzed contain an acceptable amount of nutrients analyzed and can be recommended to consumers of the integrated in their food chain.

Keywords: Phaseolus vilgaris, Kjeldahl method, protein, lipid, cellulose, variety.

Introduction

The common bean (Phaseolus vulgaris) is one of the most widely grown legumes in the tropical region. The crop covers more than 27 million hectares worldwide with an average yield estimated at 720kg / ha [1]. Considering the food importance of the crop, with a daily consumption estimated at 300g per inhabitant, justifies the areas that 'it occupies [2]. In the Democratic Republic of the Congo this crop is considered to be one of the most important foodstuffs as the

poor use it as a source of protein [3]. In fact, legumes are consumed as a meat substitute, a very expensive condiment for low-income populations [4]. Others, legumes are distinguished from other plant species by their large amounts of nutrients [5]. Its diversity and taste give it the particularity of being consumed fresh, dry or prepared [6]. Beans are grown for these seeds, the shapes, color and mineral composition of which vary according to genotype [7]. And also cultivated thanks to its richness in nitrogenous matter; protein; vitamin, zinc; iron ; fat, fiber, cellulose to which minerals important to human health [8]. Certain other fortified organic varieties make this culture even more interesting in terms of its very important mineral compositions [9]. Having a vague nutritional knowledge of the bean, our populations demand it more and more on the markets, to which market remains flooded with several richer varieties and less rich at the same time in minerals useful for human consumption [10]. However, the nutritional requirements for nutrients such as those found in beans differ from the peculiarities of individuals [11]. Studies have shown that people such as pregnant women are recommended to consume beans rich in zinc, iron, and vitamin [12] and young people beans rich in protein, vitamin, fiber, fat [13]. Hence the information in our circles on the type of bean according to their compositions is very useful.

This is how this work set itself the objective of identifying a variety rich in protein, fat and cellulose.

Material and method

Four common bean varieties (RCB Red, Kenya D6, Guanratino and NCB Black) were used as biological materials for this study.

Methodology

Around this study, the Kjeldahl method was used for the quantification of proteins, fat and cellulose. Below are detailed dosing techniques for each component of the study.

Assaying the protein:

- ✓ Attack or dissolution
- ✓ Test sample 2g of sample and 0.2g of copper sulphate
- ✓ 0.2 g of mercury chloride
- ✓ 2g of sodium sulphate

- ✓ All heated for 24 hours until the light green coloring.
- ✓ Dilute the product of the attack in 250 ml of distilled water
- ✓ Mixed 200 to 300ml of distilled water in 25 ml of the sample
- ✓ added 5 to 10 g of phenotinin added a quantity of the sodium hydroxide solution until a persistent pink coloring and the distillate is collected in a jar containing 25 ml of 0.1N sulfuric acid and distilled for 30 minutes
- ✓ The excess of the acid is titrated with 0.1N caustic soda until green in the presence of the RB indicator.

2. Dosage of the fat:

- ✓ Test taking 2g
- ✓ Pack in the filter paper all in a test tube
- ✓ Mix 50ml of benzene and leave the solution for 24h
- ✓ after weighing and taring of the catalisoire the solution is poured there and then left in the oven for one night
- ✓ Weigh again the catalisoire then consider the difference of the capsule with sample before steaming minus the empty capsule after steaming divided by the test portion multiplied by 100.

3. Cellulose dosage:

Acid hydrolysis

- ✓ Test taking 1g
- ✓ 100 ml of sulfuric acid 1.25% heated for 30 minutes the container washed hot in a sieve.

Basic hydrolysis

- ✓ 2.5% basis
- ✓ Distilled in 50ml
- ✓ 50ml of caustic soda 2.5ml heated for 30 minutes.
- ✓ the contents poured into the porcelain capsule
- ✓ Past the steaming of the solution overnight
- ✓ Weighed after desiccation

Calcined at 800 ° C for 30 minutes and weighed after desiccation the difference is considered by dividing by the test sample and multiplied by 100.

Result

Determination of the protein content of four common bean varieties

The protein content of each of the common bean varieties analyzed in this study is given in the figure below. The result of the chemical analysis reveals that the RCB Red variety contained 18.65% of proteins, that D6 Kenya had 21.17% whereas the Guarantino variety contained 19.91 and 16.55% of proteins was contained in the variety Black NCB.

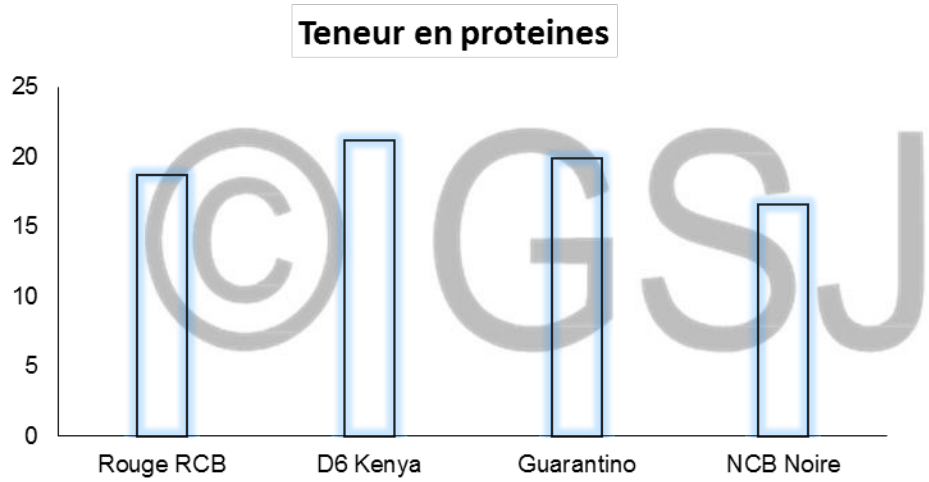

Fig I: Red, RCB, D6 Kenya, Guarantino and Black NCB protein content

Determination of the fat content of four varieties of common beans

The chemical analysis of the sample of each of the bean varieties reveals that the fat content varies between 1.5% for the Guarantion variety and 2.1 for that D6 Kenya, the other two varieties having intermediate values.

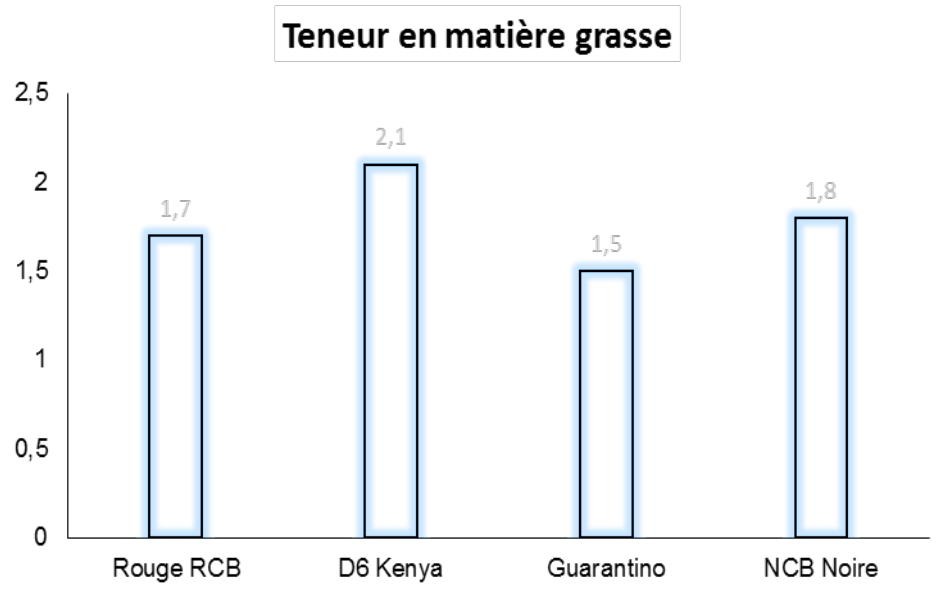

Fig II: Fat content of Red RCB, D6 Kenya, Guarantino and Black NCB varieties

Determination of the cellulose content of four common bean varieties

According to the chemical analysis of the cellulose content, values ranging from 4.2 to 5.6 were obtained.

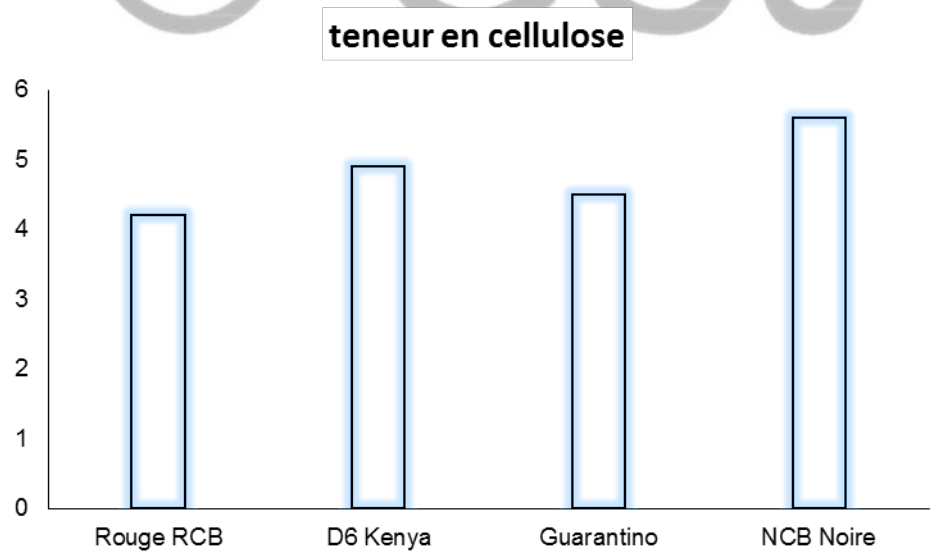

Fig III. Cellulose content of Red RCB, D6 Kenya, Guarantino and Black NCB varieties

Discussion

Discussion

The result of the protein content analysis of four bean varieties compared those obtained by other researchers [14] who reveal that the NCB Black variety has a low content, the RCB Red variety has an equal proportion, while the varieties Guanrantino and D6 Kenya have shown a protein content above 18.5%, a value obtained by these authors. This result demonstrates the importance of integrating the bean into the eating habits of low-income populations [15]. Indeed, the high protein content allows the production of very resistant protein fibers thus forming structures such as tendons, ligaments and the framework of cells and even blood clots [16]. They also carry important substances like serum albumin in the blood [17]. A group of researchers [18] reveals that proteins are involved in the formation of the human body and they also have an enzymatic function in the chemical reactions of human cells [19]. The fat content of four varieties of beans varied between 1.5 and 2.1%, this finding corroborates with those obtained in Mexico by previous studies [20]; the literature states that the bean lipid content is between 1.3 and 2.8% [21]. Sought after for its role in providing energy and also being the calorie stores stored by the body [22]. Fat also has an aesthetic role in adipose tissue [23] and coats the muscle, thus giving shape to the body [24]. Fat is very important in regulating human weight [25]. The presence of cellulose in bean seeds indicates that this food would be easily digested by the human organism, because cellulose constitutes a carbon source for the bacterial strains of the intestinal flora [26]. The increase in the cellulose content is inversely proportional to the cholesterol content in the body [27]. Cellulose also reduces the risk of gallstones, cardiovascular disease and respiratory infections [28]. Consumption of foods containing cellulose balances body weight, hypoglycemia and diabetes [29].

Conclusion

at the end of this study, which set the objective of quantifying the primary metabolic capacity (protein, fat and cellulose) of four varieties namely Red RCB, D6 Kenya, Guarantino, Black NCB of common bean (Phaseolus vulgaris). To achieve the chemical analysis by conventional methods according to Kjedalhl done at the laboratory of the agribusiness center CRAA Lubumbashi / DRC have allowed us to arrive there. The results obtained showed that all the varieties used in this study contain acceptable amounts of nutrients useful for human health. It was then that the D6 Kenya and NCB black varieties successively presented a high level of

protein and cellulose than the variety RCB Red and Guarantino. Thus we encourage and recommend our populations to consume more beans of the variety D6 Kenya because often very available in local markets and very rich in nutrients. And to the farmers we recommend them to cultivate more variety D6 Kenya and NCB Black.

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