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Determination of protein content in the two types of *parkia biglobosa* (fermented and unfermented) seeds and seedlings.

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Abstract

The determination of the protein content in two types of *Parkia biglobosa* seeds (dark brown and reddish brown testa), fermented and unfermented seedlings were analyzed. Three stages were used to determine the protein content which was digestion, distillation and titration. The protein content of fermented seeds of reddish brown testa was found to be 43.09%, fermented seeds of dark brown was 33.25% which indicated that the reddish brown has higher crude protein content. The protein content of unfermented seeds and seedlings of reddish brown testa was 44.41% in resting seed (0 day), 15.31% in 5-day, 9.625% in 12-day and 7.66% in 19-day. The level of protein in the dark brown testa of unfermented seeds was 47.25% in resting seeds (0 day), 14.44% in 5-day, 8.75% in 12-day and 6.78% in 19-day.The result for protein analysis indicates that the seeds contain higher amount of crude protein compared with the fermented seeds and seedlings. This study revealed that the fermented seeds of *Parkia biglobosa* and the unfermented seeds seemed to be a potential source of protein.

Keywords: *Parkia biglobosa*, fermentation, protein, seed testa, seedlings.

1. Introduction

The African locust bean (*Parkia biglobosa*) is a perennial legume which belongs to the family leguminosae and sub-family mimosoideae. It grows in the savannah region of West Africa up to the southern edge of the Sahel zone 13°N and widely distributed. It therefore has a wide distribution range across the Sudan and guinea savannah ecological zones. The range extends from the western coast of African in Senegal across to Sudan and is found in nineteen African countries: Senegal, The Gambia, Guinea Bissau, Guinea, Sierra Leone, Mali, Cote d'Ivoire, Burkina Faso, Ghana, Togo, Benin, Niger, Nigeria, Cameroon, Chad, Central African republic, Zaire, Sudan, and Uganda [4].

The traditional uses for *P. biglobossa* can be defined as non-timber forest products (NTFP) uses, which include wood energy (fuel wood and charcoal) and other tangible products other than timber. Non-timber products derived from locust bean are food, medicine, glazes and animal fodder, soil amendments or enrichment. The most significant product from *P. biglobossa* is food.

Fermented seeds of pigeon pea (*Cajanus cajan* (L) Mill sp.), Baobab (*Adansonia digitata* L.) and red sorrel (*Hibiscus sabdariffa* L.) are used as a substitute for fermented *Parkia biglobossa* seeds in Burkina Faso, in Benin, those of *Prosopis sp* are used [7].

Parkia comprises about 30species and has a pantropical distribution. Only 3species, all belonging to the section Parkia, occur in continental Africa and a fourth one on Madagascar. *Parkia biglobosa* is found in the savannah woodland of the sudan region, whereas the other two continental African species (*Parkia bicolor* A. chev and *Parkia filicoidea* Welw. Ex oliv.) are principally rain forest species [5, 6].

Many developing countries are still preparing traditional fermented products for human consumption [3]. Fermented products remain of interest since they do not require refrigeration during distribution and storage. The traditional condiments have not attained commercial status due to the very short shelf life, objectionable packaging materials, stickiness and the characteristic putrid odour [2]. Fermented condiments often have a stigma attached to them; they are often considered as food for the poor.

2. Material and Methods

2.1. Samples

The sample used for analysis is African locust bean and it was collected from a local market at Alate in Oyo state.

2-2. Processing the fermented seeds samples

The sample was washed thoroughly to remove the outer (less tougher) seed coat, boiled in water for 12hrs, dehulled by pressing between palms of hands, the inner (tougher) seed coat removed by washing and sieving. The cotyledon boiled again in water for 45minutes, drained on a piece of basket overlain with a piece of cloth spread whilst hot in wide calabash trays stacked together and wrapped with pieces of

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heavy clothes. The seeds were then subjected to fermentation for 36 hours to obtain Iru. The sample of Iru was dried and grounded into fine powder and was labeled as appropriate.

2-3. Processing the unfermented seeds samples

2.3.1. Viability Test

The seed was subjected to viability test using the flotation method. The seed was soaked in water and those that floated were presumed not viable and hence rejected, the viable ones were then utilized for the experiment.

The viable seeds was washed thoroughly to remove the outer (less tough) seed coat and dried at room temperature before they were used for germination studies. Careful observation however revealed that two types of seeds were present in each pod on the basis of their testa colours. These were designated reddish brown (RB) and dark brown (DB). Seed collections used for this study were thus separated into these two groups. The dormancy of this seeds were break using diluted sulphuric acid (H_2SO_4) for 10 minutes, washed in running water and soaked in water for 3hours before planting.

The containers were filled with loamy soil collected from biological garden of University of Ilorin, Ilorin kwara state. The seeds was sown and irrigated with bore-hole water to establish it, the containers were perforated at the bottom to allow for aeration of the soil so as to prevent the root from becoming water logged.

The samples; the reddish brown and dark brown was separated from each other and treated separately. Six containers were used for both samples; three containers for sample A and three containers for sample B, the seeds were planted for 5days, 12days and 19days. The plants were wetted early in the morning and late in the evening, and begin to germinate and grow into seedlings.

2.4. Methods

2.4.1. The crude protein content

The crude protein was demonstrated using the method described by AOAC [1].The crude protein content of the sample was determined by measuring its ammonia-nitrogen content (Nx6.25).

2.5.Test of hypothesis

H_0: RB has no statistical significance with DB in respect of crude protein level

H_1: RB has statistical significance with DB in respect of crude protein level

2.6. Decision rules

If calculated value is greater than table value, reject H_0 and accept H_1 if calculated value is less than table value, accept H_0 and reject H_1.

3. Results and Discussions

The crude proteins value in fermented seed of RB was found to be 43.09%. The crude proteins value in unfermented seeds of RB was found to be in 0 day (RB) = 47.25%, 5days (RB) = 14.44%, 12days (RB) = 8.75%, 19days (RB) = 6.78%; and in unfermented seeds of DB was also found to be 33.25%, 0 day (DB) = 44.41%, 5days (DB) = 15.31%, 12days (DB) = 9.625%, 19days (DB) = 7.66% as shown in Table 1.

Table 1.Proteins content of Reddish brown and Dark brown

Time of planting	Reddish brown (RB) Proteins (%)	Dark brown (DB) Proteins (%)
Fermented seeds	43.09%	33.25%
Unfermented seeds, day 0	47.25%	44.41%
Unfermented seeds, day 5	14.44%	15.31%
Unfermented seeds, day 12	8.75%	9.625%
Unfermented seeds, day 19	6.78%	7.66%

In relations to the decision rule that states as follows. H_0: reddish brown has no statistical significance with dark brown with in respect of crude proteins level and H_1: reddish brown has statistical significance with dark brown in respect of crude proteins level; then from the data analysis, reject H_0 and accept H_1 if calculated value is greater than table value.

The level of crude protein in seed of the dark brown was higher than the reddish brown and also compared to the fermented seeds. The seed of the reddish brown has the higher amount of crude protein. The level of crude protein in the seed of reddish brown has 47.25%, it was observed that after 5 days of planting, the level of protein decreases to 14.44% meaning that the amino acid has been fully utilised by the seed. The level of protein starts to decrease, after 12 days of planting the level dropped from 14.44% to 8.75%, after 19 days of planting, the level also dropped to 6.78%. It was noted that the level of

protein decreases because the amino acid was utilized by the seedlings.

For the dark brown, the ordinary seed has the crude protein level of 44.41% compared to the reddish brown that has 47.25%. After 5 days of planting, the level of protein also dropped to 15.31%, the amino acid was utilised by the seedlings, the level of protein decreases to 9.625% after 12days of planting until finally it decreased to 7.66% after 19 days of planting, the seedlings make use of the amino acid that was available.

Comparing results of reddish brown and dark brown after 5 days of planting, the reddish brown has the higher value. After 12days of planting, reddish brown has the higher value than dark brown, reddish brown has the higher value of protein than dark brown after 19 days of planting.

It was deduced from the experiment that as the seed grow into seedlings, the level of crude protein decreases for both the reddish brown and the dark brown unlike the fermented and the ordinary seed (unfermented).

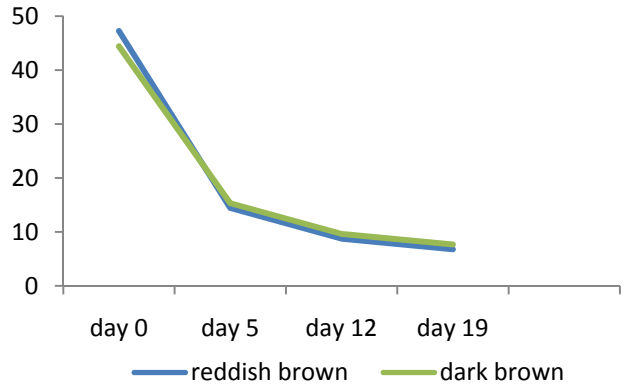

Figure 1. Protein content of *Parkia biglobosa* seeds

It was observed that the level of crude protein in the ordinary seed was higher compared to the level of crude protein in the fermented seed, and the level of protein decreases in the subsequent days for the two types of seed.

4. Conclusions

In conclusion, this study revealed that the fermented and the unfermented seeds of *Parkia biglobosa* seemed to be a potential source of protein for further exploration to cope with the increasing demand of protein. Processing techniques such as heating and fermenting has greatly improved the digestibility of this locust bean.

5. References

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