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Studies on seed characteristics and chemical composition of three morphotypes of *Mucuna urens* (L.) Medikus – Fabaceae

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Abstract

Seed characteristics and nutrient composition of three morphotypes of big-grained *Mucuna urens* (L.) Medikus were studied. Results showed that 100-seed weight ranged from 3200.2 to 4700.9 g, cotyledon weight per seed (23.2–26.6 g) and testa weight per seed (9.0–21.2 g). The testa constituted 43.7%, 28.1% and 44.7% of the average seed weight for morphotypes 1, 2 and 3, respectively. The cotyledon also constituted 56.3%, 71.9% and 55.3% of the average seed weight for morphotypes 1, 2 and 3, respectively. Nutrient composition analyses showed that the three morphotypes of *M. urens* are good sources of crude protein (19.97–20.57 g 100 g^{-1}), carbohydrate (72.39–75.49 g 100 g^{-1}) and fat (1.84–5.05 g 100 g^{-1}). Other nutritional components, including ascorbic acid, calcium and phosphorus are present in the three morphotypes in moderate amounts. The iron content of the *M. urens* is low. The three morphotypes contain appreciable amounts of essential amino acid. The oxalate content is low. The variations observed in the seed characteristics and nutrient compositions are suspected to be due to genotype. Genetic improvement of this plant is recommended to remove the itching hair trait so as to encourage its cultivation.

Keywords: *Mucuna urens*; Morphotypes; Seed characteristics; Nutrient composition

1. Introduction

Increasing population, high prices of available food staples and policy constraints on food importation are the major factors worsening the food situation in developing countries (Weaver, 1994). The Food and Agricultural Organisation of the United Nations (FAO) (1994) recognized protein deficiency as the commonest form of malnutrition in developing countries, particularly in regions where diets are mainly starch-based. Therefore providing sufficient protein should be given the highest priority in every effort to increase national food supplies (Ezeagu et al., 2002). Several authors including Grivetti, Frentzel, Ginsberg, Howell, and Ogle (1987), Vietmeyer (1990), Adebooye (1996), Ezeagu et al. (2002), and El-Adaway and Taha (2001) among others stated that attention should now be focused on inexpensive and lesser known traditional useful plants as food for man and feed for animals.

An under-exploited, neglected and lesser-known plant used for food by the Igbos of southwest Nigeria is *Mucuna urens* (L) Medikus, also known as Horse Eye Bean; occurs in Nigeria, Ghana and Sierra Leone. The plant has not been given any research attention in Nigeria because it is regarded as a weed and more important because the fruits (pods) have stinging hairs. The stinging hairs make farmers avoid this plant even during land clearing. The stinging hairs that have long-lasting itching characteristic, is a major factor that prevents farmers from cultivating this plant.

The Igbo community in South-Eastern Nigeria uses the seed of the *M. urens* as a soup thickener and source

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of vegetable oil (Afolabi et al., 1985; Ukachukwu, Ezeagu, Tarawali, & Ikeorgu, 2002). *Mucuna* seeds generally are a relatively good source of crude protein and fats (Ajiwe, Okeke, Nnabuike, Ounleye, & Emeka, 1997; Ezeagu et al., 2002; Mohan & Janardhanan, 1995; Prakash & Misra, 1987; Rajaram & Janardhanan, 1991), have a relatively favorable amino acid composition (though certain amino acids are deficient), and contain high amounts of certain minerals, including Ca, Mg, and Fe (Badifu & Okeke, 1992; Ezeagu, Maziya-Dixon, & Tarawali, 2003; Prakash & Misra, 1987; Rajaram & Janardhanan, 1991).

Recent observation has shown that some of the indigenous African plants are disappearing because they are not domesticated and research and development process have not given them attention for several years (Adebooye, Ogbe, & Bamidele, 2003). Consumers are still gathering *M. urens* from the wild and evidence has shown that the gathering is becoming increasingly difficult. Some of the factors that have led to the reducing population of this plant are bush clearing and uncontrolled bush burning which are rampant in the dry season in Nigeria and other parts of Africa where this plant is endemic. Perhaps a more important factor is the fact that only a few seeds germinate in the field after many months of dormancy (Esenowo, 1990).

There is no information in the literature on the seed characteristics and chemical composition of the three Nigerian big-grained morphotypes of *M. urens* that are reported in this paper. This study was therefore conducted to document the fruit characteristics and nutrient composition of three big-grained morphotypes of *M. urens* found in the southern region of Nigeria.

2. Materials and methods

Seeds of *M. urens* used in this study were collected from the farmers in local villages in *M. urens* endemic areas in Southwest and Southeast Nigeria. For the purpose of collection, four zones were selected. In each of the zones, two local government areas (LGA) were chosen and in each LGA, four villages were selected for survey and collection of *M. urens* seed. In each village, local farmers served as guide for the researchers in the collection of the samples. All the samples were collected from forests where there was no cultivation and no application of agrochemical, at least in the last 15 years. Table 1 shows the summary of the selected zones, LGAs and villages in the survey area. Samples collected from each tree were bagged separately and taken to the laboratory for sorting and analyses. After sorting on the basis of collection site, observation showed that there were three identifiable morphological variants among the seeds collected. The three identifiable variants are:

(i) Morphotype 1 – dark brown testa type.
(ii) Morphotype 2 – black testa type.
(iii) Morphotype 3 – light brown testa type.

The dark brown testa type (morphotype 1) was collected in Imo zone; black testa type was collected in Osun and Ogun zones while the light brown testa type was collected in Anambra zone. Because of the difficulty encountered in seed collection, a total of 400 seeds were collected per morphotype for physical and chemical analyses. The seeds of each morphotype were weighed in a batch of 100 seeds three times independently. The average of the three measurements gave 100-seed weight. A sub-sample of 50 seeds was randomly taken per morphotype and the seeds were split open carefully using sharp knife. The testa was separated from the cotyledon and each component was weighed separately using an electronic scale (Mettler Toledo P153). Thereafter, the average fruit whole weight, average testa weight and average cotyledon weight were calculated.

The cotyledons (1 kg) of each morphotype were dried at 80 °C for 24 h. Dried samples were ground into powder using a Wiley microhammer stainless mill and samples were packed in screw-capped bottles and stored at −4 °C in a refrigerator until required for analyses. All the chemical analyses described below were carried out in triplicate. For the determination of essentials amino acids, 0.1 g digested sample was suspended in 5 ml 6 N

Table 1
Summary of the sites in Nigeria from where samples of *M. urens* seeds were collected

Zone	Local Government Area(LGA)	Village from where samples were collected	Morphotype collected
Imo	Isu	Agbobu, Alulu, Ugwuoba, Amafor	Dark brown testa type
	Nkwere	Awlu, Obiogo, Obizi, Naze	Dark brown testa type
Osun	Ayedaade	Akiriboto, Ogbaaga, Animu, Onimu	Black testa type
	Irewole	Odeyinka, Elekiri, Arinkinkin, Majeroku	Black testa type
Ogun	Shagamu	Makun, Ogijo, Ogunsolu, Orija	Black testa type
	Obafemi-Owode	Owode-Egba, Ofada, Papa, Ibafo	Black testa type
Anambra	Ihiala	Amichi, Neni, Ndiowu, Okija	Light brown testa type
	Njikoka	Nsugbe, Nkpor, Ojoto, Ogboji	Light brown testa type