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Comparative Studies of Physico-biochemical Parameters in *Abelmoschus esculentus* (L.) Moench and *A. moschatus* (Moench)

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Abstract: Morphological features and nutritional composition were investigated in *Abelmoschus esculentus* (L.) Moench and *A. moschatus* (Moench). The seedlings, raised naturally on the field in sandy loam soil were analysed for height, length of petiole, length and breadth of leaves, number of leaves per plant, number of buds and the fruits produced. Proximate analysis was also carried out to determine the chemical composition of the leaves as well as the fruits. The two okra species share similar attributes. Number of buds were positively correlated with fruit yield in *A. esculentus*. The basal portions of the fruit of both species are rich in carbohydrates and fibers. The leaves are rich in fats and crude protein.

Key words: Morphological features, proximate analysis, fruit yield, *Abelmoschus* species

Introduction

Okra is a fast growing animal herb cultivated for its young fruits and it is one of the most important vegetables in tropical and sub-tropical regions (Martin, 1982; Siemonsma, 1982). It shows high variability in its vegetative and fruits characters (Michra and Chchonkar, 1977). Ariyo and Aken'ova, (1986) also reported that there were many lines of okra, each with striking uniformity suggesting that the okra population under consideration had a wide genetic base.

Dormancy breaking, morphological features and yield have been documented (Swamy and Sathyavathi, 1976; Adeyilola, 1990; Morakinyo and Makinde, 1991; Singh and Kumar, 1998). Njoku (1958) has reported that for many plants growing around the equator, a difference of 15-minutes in photoperiod might mean flowering or vegetative growth. Fatokun *et al.* (1979) reported a case of supernumerary inflorescence in okra, which they found to be trait and which is dominant over normal inflorescence. According to Udengwu (1998), this trait is very important because it increases the total number of fruits per node as well as yield.

Okra is one of the commonest and cheapest sources of vegetables. It is very popular in Nigeria. The objectives of this study are to determine the nutritional status and morphological features in two selected species of okra.

Materials and Methods

Investigation was carried out at the Obafemi Awolowo University Ile-Ife, within latitude 7°26′ N-7°32′ N and longitude 4°31′ E-4°35′. The study sites were located on Research plots in-between Biological Science Buildings and Computer Center. The soil, characterized according to the methods of Bouyoucos (1951) was found to be sandy loam. The seeds of *Abelmoschus esculentus* (L.) Moench and *A. moschatus* (Moench) used for the studies were obtained from National Horticultural Research Institute (NIHORT) Ibadan. The seeds were sown in July (rainy season) on separate plots at a distance of 0.5 m apart and germination was observed six days after sowing. The seedlings

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were raised naturally on the field for five weeks before analysis of the morphological features: length of petiole, height of plant, number of buds and of fruits.

Nutritional contents of the leaves and fruits were carried out through proximate analysis according to AOAC standard methods (1980). The fruits were divided into two portions-the upper larger conical and basal portion usually discarded by consumers in urban areas. Carbohydrates, ash content, crude fibre, crude protein, lipids (ether extract), moisture and nitrogen contents in the two portions of the fruits were determined. The values were statistically subjected to the test (t-test) for significance or otherwise.

Results

Increase in length and breadth of leaf showed similar pattern (Fig. 1 and 2). There was a gradual increase from zero day till the 42nd day of analysis. The two parameters were observed to be higher in *A. esculentus* than in *A. moschatus*. However, there is no significant difference in the values recorded for the two species ($p<0.05$).

The number of leaves and plants heights per plants are shown in Fig. 3 and 4, respectively. The number of leaves is fairly higher in *A. moschatus* while *A. esculentus* recorded fairly higher height There is however no significant difference ($p<0.05$).

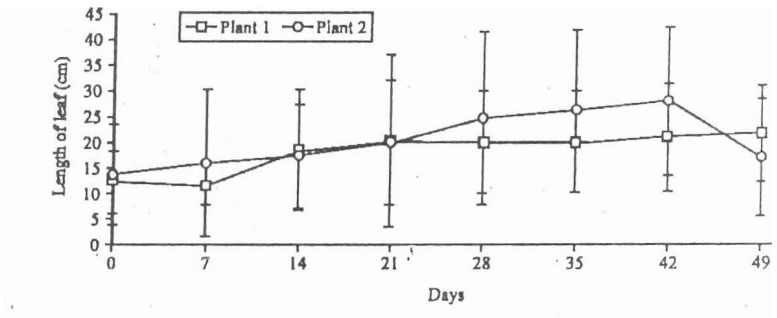

Fig. 1: Length of Leaves as measured in 1) *A. moschatus* and 2) *A. esculentus* over a period of 49 days of the experiment

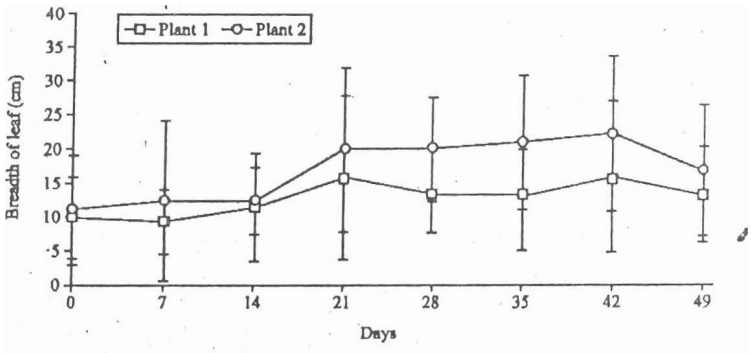

Fig. 2: Breadth of Leaves as measured in 1) *A. moschatus* and 2) *A. esculentus* over a period of 49 days of the experiment

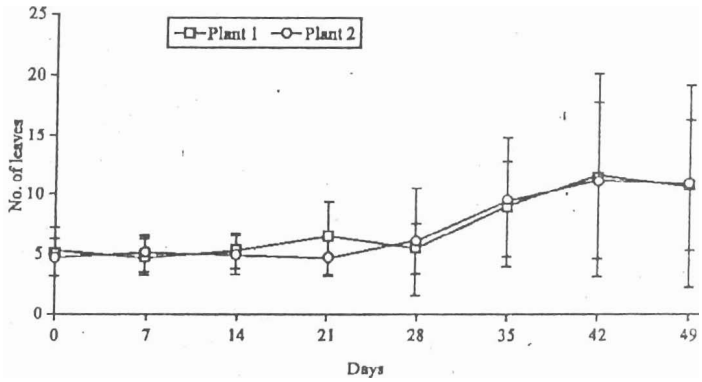

Fig. 3: Number of leaves as measured in 1) *A. moschatus* and 2) *A. esculentus* over a period of 49 days of the experiment

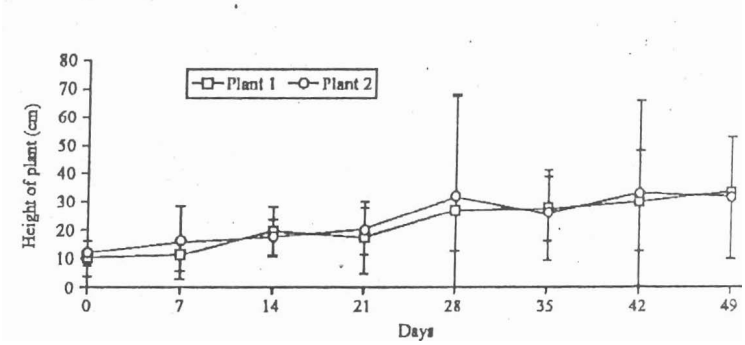

Fig. 4: Height of plants as measured in 1) *A. moschatus* and 2) *A. esculentus* over a period of 49 days of the experiment

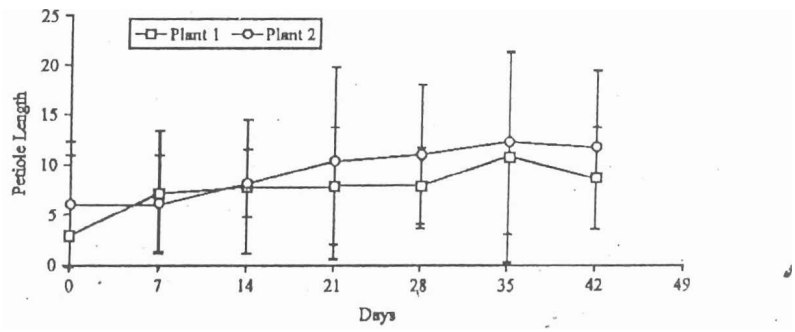

Fig. 5: Petiole length of plants as measured in 1) *A. moschatus* and 2) *A. esculentus* over a period of 49 days of the experiment

Table 1: Proximate analysis of leaves and fruits of *Abelmoschus esculentus* and *A. moschatus* (values are means of three replicates)

		Crude Protein (%)	Crude Fibre (%)	Fat (%)	Ash (%)	Moisture (%)	Total Nitrogen (%)	Carbohydrate (%)
A. esculentus	Top	4.56±1.07b	35.94±7.83a	4.25±1.68a	10.19±1.62b	9.21±0.58a	7.30±0.17	71.80±4.19b
	Base	4.13±0.41b	52.66±9.16	0.62±0.30	8.33± 1.27b	8.30±1.99a	0.66±0.07	78.62±3.98b
	Leaf	10.92±2.50a	6.75±1.64b	4.98±1.05a	34.60±5.55	8.12±2.25	1.76±0.42	41.38±8.48a
A. moschatus	Top	4.01±0.22b	33.58±1.91a	2.95±2.02	10.38±1.12b	12.37±3.70	0.65±0.04a	70.22±2.58b
	Base	3.92±0.36b	37.93±8.12a	1.63±1.32	14.15±3.29b	9.86±0.02a	0.63±0.23a	70.44±1.63b
	Leaf	11.38±0.66a	7.52±1.06b	12.94±2.76	33.24±10.04	5.79±0.06	1.82±0.11	36.64±6.56

aValues denoted by same letter in each vertical column are not significantly different at the 5% level

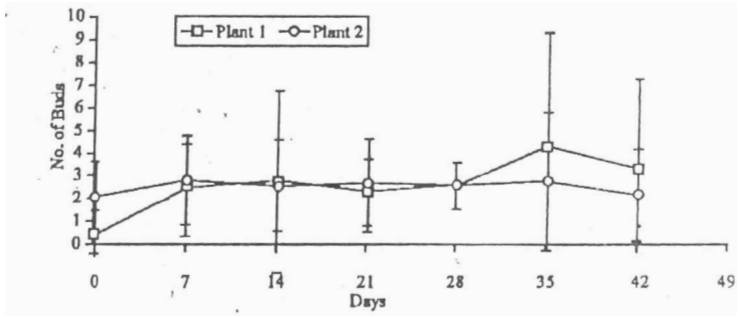

Fig. 6: Number of buds in plants as measured in 1) *A. moschatus* and 2) *A. esculentus* over a period of 49 days of the experiment

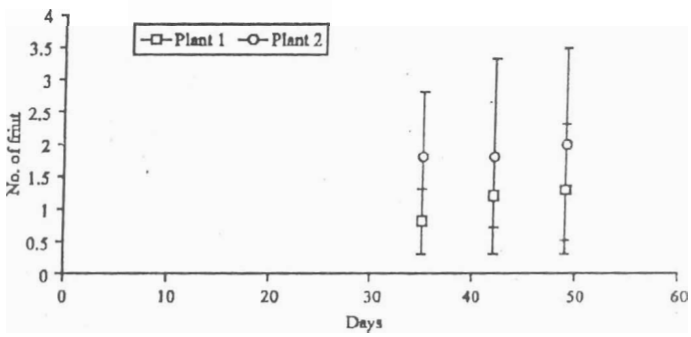

Fig. 7: Number of fruit in plants as measured in 1) *A. moschatus* and 2) *A. esculentus* over the period of the experiment

The length of petiole and number of buds are shown in Fig. 5 and 6, respectively. The petiole of *A. esculentus* is fairly longer than those of *A. moschatus* (Fig. 5) and the number of buds observed in *A. moschatus* were higher than those of *A. esculentus* (Fig. 6). However, no significant difference in the number of buds in both species.

The fruits were produced between the 5th and 7th weeks of analysis (Fig. 7) *A. esculentus* produced more fruits than *A. moschatus*.

Analysis of nutrients of the fruits showed that crude protein, crude fibre, total nitrogen and carbohydrates are higher in *A. esculentus* while ash contents were higher in *A. moschatus* (Table 1)

Based on separation of fruits into top and basal portions, crude proteins fats, moisture and total nitrogen were higher in the top portion in both species. However, it can be noted that while the ash content was higher in the top portion of *A. esculentus*, it is the basal portion that was higher in *A. moschatus*.

Carbohydrates and crude fibre were higher in the basal portions of the fruits in both species By the same token, crude protein, crude fibre, fats and total nitrogen were higher in the leaves of *A. moschatus*. Ash content and carbohydrates were higher in the leaves of *A. esculentus*. In these findings, it can be noted that crude protein, fats, ash and total nitrogen were higher in the leaves than the fruits of *A. moschatus*.

Discussion

The findings in this study have clearly shown that the two species of okra share similar attributes The number of flower buds produced is supposed to correlate positively to fruit yield. It appears *A.esculentus* had sustained but positive correlation between number of buds and fruit yields whereas the correlation is negative for *A. moschatus*.

Morakinyo and Makinde (1991) observed that once the flower buds developed into flowers, they had equal chances of developing into fruits whether in rain or dry season. It is interesting to note that the basal portion of the fruit is usually discarded by a large number of okra consumers. For high crude fibre, carbohydrate, the base of either of the species provides a good source. That the edible portion of *A. esculentus* and *A. moschatus* are rich in carbohydrates and fibre conforms with the findings of Tindal (1983).

The leaves, which are hardly consumed perhaps owing to the hairy (pubescent) nature, could be another source for fats and crude protein.

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