EFFECTS OF FRUIT AGE ON THE NUTRIENT AND CHEMICAL COMPOSITION OF OKRA (ABELMOSCHUS) ESCULENTUS (L) MOENCH

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ABSTRACT

Fruits of Okra (Abelmoschus esculentus (L) Moench) of different ages were analyzed periodically for crude protein, crude fibre, ash content, ether extracts, ascorbic acid, pH and titratable Acidity, fat and oil, calcium, sodium, potassium, chloride and phosphorus. The fruits were harvested at ages varying from 2 to 10 days. Six – days – old fruits were excellent for harvesting. When the average weight is 11.7g, length is 6.70cm and Girth is 3.02cm. The ash content range from 8.34 to 9.41%, crude fibre from 2.5 to 4.90%, ether extracts 2.11 to 4.20 % while Ascorbic Acid and Titratable acidity were not detected in the samples. The mineral contents ranged from 0.03 to 0.09% (chloride) Phosphate (0.32 to 0.58%) and Potassium (0.004 to 0.012%). Ten days old fruits gave higher fresh weight, length and thickness; however it is not suitable for consumption because of the high fibre content (4.90%).

INTRODUCTION

Okra, is a highly variable morphologically warm season crop that is best grown in a hot humid climate (Morakinyo and Makinde; 1991). It has been found that seasonal variability had a significant effect on a number of characters of okra plants such as the yield per plant, seed pod and weight (Mishra and Chhoicar 1997). The report had it that the yield of okra was directly correlated with length and thickness of the fruit and number of fruits produced per plant. Pednosa *et al.,* (1983) working on variations in 100 varieties of okra reported a wide range of variation among them and Ariyo and Akenova (1986) pointed out that the number of days to flowering was the most discriminating character in classifying okra varieties.

Okra, Abelmoschus esculentus (b) Moench was given the name by Medikus (Joshu *et al.,* 1974). It is widely grown for its edible fruits and leaves in nearly all tropical and subtropical regions of the world. Both the fruit and the leaves are eaten as vegetables in tribes Nigeria. In many areas of west Africa, where mucilaginous foods are commonly used to import a desired slimy consistency to local soups and stews, okra is highly indicative because of the thin different contents of mucilage (Woolfer *et al.,* 1977). It has been suggested that okra seeds meet all the requirements of a rich protein food or feed and should be further explored (Savello *et al.,* 1980). Okra fruit has been variously harvested at its young stage – the stage during which it is more edible with good mucilaginous quality. As a result of the variable age of harvesting, the present work is aimed at determining the best stage of harvest with the view to utilising this information in future of breeding programme in sorder to improve the okra yield for the benefit of mankind.

MATERIALS AND METHODS

Dried seeds of okra (Abelmosclus esculentus variety NHA. 47-4) was collected from the National Horticultural Research Institute (NIHORT) Ibadan in paper packets and stored at room temperature. A small plot of land was properly cleared in the demonstration farmland in the Lagos State University, Ojo Campus and suitable homogenous beds constructed. Sowing was done by direct seeding and about two or three seeds where introduced into a 1 cm deep hole. Proper farm hygiene were maintained throughout the planting period. After germination thinning was done to maintain one plant per stand. Weeding was mechanically undertaken with holes and cutlasses once a week. The fruits were harvested at two days interval between day 2 and day 10. The opened flower was tagged to stipulate the ages. The weight, length and thickness were measured after which the fruits were sliced and air dried for days prior to chemical analysis.

The ash, crude fibre, ether extracts were determined according to AOAC, 1990. Nitrogen was determined using microkjeldahl method and a conversion factor of 6.25 employed to get the crude protein contents. pH was estimated using calibrated pH meter after the ashed sample was dissolved in demineralised water. Titratable acidity and ascorbic acid contents were determined by titrimetry involving sodiumhydroxide and 2,6 – dichlorophenol indophenol respectively. Mohr's method was employed to determine sodium chloride content (AOAC 1990).

Calcium was determined from the dry ashed sample using Atomic absorption spectrophotometer (Pye Unicam Sp. Cambridge). Flame photometer was used to estimate the potassium content while phosphorous was determined colorimetrically using phophomolybdenum Blue method (AOAC 1990).

RESULTS AND DISCUSSION

The characteristics of the fresh fruit are presented in Table 1 while the biochemical composition is shown in Table2. As shown in Table 1, the yields in okra increase as the fruits advanced in age and the observation was consistent with the report of Kolhe and Chavan (1964). With the exception of either extracts which decline as the fruits advanced in age, all other parameters, protein, ash, crude fibre show consistent increase with fruit age. Singh (1967) reported that the fats and oils usually declined as fruits advanced in age. Our findings are in line with this report.

Nutrients identified and detected also increase steadily with fruit age. Phosphorous was consistently higher than other nutrients investigated. Calcium and phosphate are indicated in formation of strong bone and this variety may supplement the body requirements of the beneficial nutrients. The drying method employed must have been responsible for the non-detection of ascorbic acid in the samples.

Since the parameters tested pointed upward with the fruit age, picking the optimum day of harvest might be difficult from these findings. It should be noted, however, that the fruit is one of the examples of foods used to give mucilaginous quality and the very essence of eating the fruits in many areas. Reports have shown that after 9 days, the fruit become extremely fibrous and as shown in Table 2, the fibre contents stood between 2.5 and 4.9% on the tenth day.

Preliminary investigation in this work too revealed that slicing became difficult beyond 8 days and mucilaginous quality and feeling declined. A compromise was, therefore needed between nutritive benefits and palatability of the fruit. As a result, it is suggested that the best period for picking this variety of okra should be before the eighth day. Beyond these days, the fruit tends to be woody in nature and loss of palatability creeps in. For quantity and quality of this okra variety, it might be better to harvest on the sixth day, a finding that has been supported by Wooffe *et al.*, (1997).

There has been a dramatic increase in the ability to manipulate and study genetic pool. With the constantly expanding world population there is need for improving and increasing yields of crops. This can be effectively achieved through a breeding selection programme and the agronomical trait information this study has provided. Governmental organs are encouraged to establish more research Institutes which will work more on the genetic of okra and breed for better varieties.

Table 1 CHARACTERISTICS OF FRESH OKRA FRUITS

Fruit Age (Days)	Weight (g)	Length (cm)	Thickness (cm)
2	1.89	4.48	2.33
4	4.80	4.35	2.77
6	11.72	6.07	3.02
8	26.10	8.31	3.52
10	50.10	10.41	3.55

Table 2 BIOCHEMICAL COMPOSITION OF OKRA FRUITS

Parameters	2 days	4 days	6 days	8 days	10 days
Ash Content (%)	8.3	8.7	8.9	9.0	9.41
Titra table acidity (%)	ND	ND	ND	ND	ND
pH	12.6	12.7	12.8	12.1	12.1
Crude Protein (%)	3.4	3.8	4.5	5.1	5.3
Crude Fibre (%)	2.5	2.8	3.1	4.4	4.9
Esther Extracts (%)	4.2	4.2	3.8	3.6	2.11
Ascorbic Acid (%)	ND	ND	ND	ND	ND
Calcium (%) (mg/g)	53	72	80	94	100.2
Phosphate (%) (mg/g)	32	42	46	48	58
Potassium (%) (mg/g)	4.0	6.1	6.3	10.0	12.4
Chloride (5) (mg/g)	34	40	46	70	80

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