

## NUTRIENT CONTENTS OF CURED POTATOES FROM KENYAN HIGHLAND VARIETIES

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Cured potatoes from nine Kenyan highland varieties were analysed for proximate composition, ascorbic acid and the minerals sodium, calcium, phosphorus and iron. Considerable variations between varieties were observed particularly in dry matter contents and ascorbic acid. All varieties had high levels of sodium but low levels of iron.

KEY WORDS: Kenyan highland; potato varieties; cured potatoes; proximate composition; minerals; ascorbic acid

### INTRODUCTION

Irish potatoes (*Solanum tuberosum* L.) are becoming increasingly important in the diets of many Kenyans. Besides being incorporated into traditional dishes, they are also eaten boiled and baked. In the urban centres, they are becoming popular in form of French fries and crisps (potato chips).

Varieties suitable for growing under different Kenyan climatic conditions have been developed through controlled plant breeding. However, this breeding has not been adequately paralleled by analyses to determine nutritional value and suitability for different uses.

Fruits and vegetables which supply the bulk of vitamins and minerals to diets of most Kenyans are very scarce during the dry seasons. During these periods, potatoes are available. It is likely, therefore, that they may be a principal source of these nutrients in the diets. Also, as their consumption increases, potatoes will start to make a considerable nutritional contribution to diets of more and more Kenyans.

Reports have been made on the variation in potatoes of proximate composition (Augustin, 1975; Augustin *et al.*, 1975, Augustin *et al.*, 1978; Toma *et al.*, 1978) and nutritional composition (Smith, 1967 and 1977; McCay and McCay, 1967, Augustin, 1975; Augustin *et al.*, 1978). Although these reports have been on potatoes grown in places other than Kenya, it has been ascertained that composition of potatoes can vary between varieties and with differences in growing conditions.

The present study was, therefore, designed to determine the proximate and nutritional compositions of cured potatoes from nine Kenyan highland varieties.

### MATERIALS AND METHODS

#### *Materials*

All the nine varieties of potatoes had been grown at the National Potato Research Station, Limuru, Kenya, during the short rains (October–December 1985) under



conditions already described (Kabira, 1983). After harvest, the potatoes were cured for 14 days at an average daily temperature and relative humidity (RH) of 20.2°C and 75 %, respectively. Two samples each of six medium-sized tubers were randomly selected from each variety. The samples were stored in plastic bags at 4°C for periods not exceeding four days before analysis.

#### *Sample Preparation*

All the six tubers in each sample were washed with tap water, peeled and cut into small pieces which were then thoroughly mixed.

#### *Analyses*

For determination of ascorbic acid, 50 g of the potato were blended with 100 ml of 20% of trichloroacetic acid solution for one minute. The slurry was filtered through a Whatman No. 41 filter paper. Ascorbic acid was determined in 10 ml of the filtrate by titrating with a standard solution of N-Bromosuccinimide<sup>†</sup> (Barakat, El-Wahab and Ed-Sadr, 1955).

Dry matter content was determined by drying approximately 100 g of the potato sample in a porcelain dish at 100°C in an air oven until there was no further loss in weight.

The dried potato was ground into powder to pass through a 500 micron sieve. Protein as total nitrogen, ether extract, crude fibre and total ash were all determined in the powder by AOAC methods (AOAC, 1984). Total carbohydrate was calculated as a difference.

For determination of minerals, 0.05 g of ash was suspended in approximately 10 ml of 3N HCl in a 15 ml test tube, then heated on a boiling water bath for 15 minutes with frequent vortexing. The suspension was cooled down, made to volume in a 10 ml volumetric flask and filtered through a Whatman No. 41 filter paper. Sodium was determined in the extract on a Dr Lange Model M7D flame photometer, while calcium, phosphorus and iron were determined by modified methods for determination of these minerals in soil and plant extracts (Juo, 1978).

## RESULTS AND DISCUSSION

Table I gives the proximate compositions of the potato varieties. The dry matter contents varied considerably between varieties, with levels as low as 21.8% in Anett and levels as high as 29.3% in Dutch Robijn. The dry matter content is very important in selecting potatoes for processing. Potatoes with high dry matter contents give high yields of French fries and chips. Such potatoes also result in good texture of canned potatoes, French fries and reconstituted dehydrated products (Smith, 1967). Potatoes with low dry matter contents are suitable for soups, salads and boiled potatoes (Johnson and Peterson, 1974).

Although the levels of protein in the potatoes were generally low, their contribution in diets would be significant because of their high quality (McCay and McCay, 1967; Smith, 1977). It has been suggested that in the conversion to protein

<sup>†</sup> Titration of potato extracts with 2,6-dichlorophenolindophenol to determine reduced ascorbic acid, the commonly recommended AOAC method, was not followed because of the uncertainty of the end-point.



of the nitrogen determined by the Kjeldahl method, a factor of 7.5 instead of 6.25 be used (Augustin, 1975). If this is done, all the values of protein on Table I increase by 20%.

The low levels of ether extract and crude fibre and the high levels of total carbohydrate are in agreement with levels reported for potatoes grown in places other than Kenya (Toma *et al.*, 1978). The low levels of crude fibre indicate that the total carbohydrate is predominantly starch.

As Table II shows, all the potato varieties are good sources of ascorbic acid and have levels of sodium much higher than the extremes so far reported (McCay and McCay, 1967). They are also good sources of calcium and phosphorus but relatively poor sources of iron. It has been reported that varietal comparisons of ascorbic acid are relatively unaffected by location (Smith, 1977). Ascorbic acid is, however, destroyed during processing but to varying amounts depending on the method of processing (Watt and Merrill, 1966). Potatoes have been reported to have low levels of phytin. The calcium and iron would, therefore, be well utilized.

TABLE I  
Proximate composition of cured Kenyan potatoes<sup>a</sup>

Variety	Total Solids	% Of Total Solids				
		Crude Protein (Nx6.25)	Ether Extract	Crude Fibre	Total Ash	Total Carbohydrate
Anett	22.7 ± 3.4	14.3 ± 1.3	0.2 ± 0.1	1.5 ± 0.2	5.1 ± 0.8	78.9 ± 2.2
Desiree	21.8 ± 0.5	11.8 ± 1.2	0.5 ± 0.1	1.4 ± 0.2	4.2 ± 0.2	82.2 ± 1.7
Dutch Robjin	29.3 ± 2.3	13.5 ± 0.4	0.4 ± 0.1	1.1 ± 0.1	5.4 ± 0.3	79.6 ± 0.8
Feldeslohn	24.0 ± 1.6	12.7 ± 0.8	0.3 ± 0.1	1.4 ± 0.1	6.2 ± 1.3	79.5 ± 2.2
Kenya Baraka	28.2 ± 0.6	11.0 ± 0.8	0.4 ± 0.1	1.2 ± 0.1	4.9 ± 0.2	82.5 ± 1.2
Roslin Eburu (B53)	28.1 ± 1.7	11.0 ± 1.3	0.2 ± 0.1	1.2 ± 0.1	4.4 ± 0.8	83.3 ± 2.3
Roslin Gucha	27.3 ± 2.7	11.4 ± 0.6	0.6 ± 0.3	1.3 ± 0.1	4.3 ± 0.3	82.4 ± 1.3
Roslin Tana	26.9 ± 1.5	12.9 ± 2.9	0.5 ± 0.1	1.1 ± 0.1	5.4 ± 0.3	80.3 ± 3.3
CIP 800224	23.2 ± 1.5	11.7 ± 0.2	0.2 ± 0.1	1.1 ± 0.1	5.3 ± 0.4	81.7 ± 0.8

<sup>a</sup>Mean ± SD.

TABLE II  
Vitamin C and mineral contents of cured Kenyan potatoes (per 100g dry matter)<sup>a</sup>

Variety	Vitamin C (mg)	Sodium (mg)	Calcium (mg)	Phosphorus (mg)	Iron (mg)
Anett	114 ± 13	322 ± 45	30 ± 7	62 ± 8	4.9 ± 0.7
Desiree	120 ± 20	306 ± 15	29 ± 5	37 ± 7	3.9 ± 0.2
Dutch Robjin	66 ± 10	517 ± 28	22 ± 1	54 ± 7	5.2 ± 0.4
Feldeslohn	129 ± 20	545 ± 61	43 ± 9	42 ± 3	4.7 ± 1.0
Kenya Baraka	147 ± 27	379 ± 18	40 ± 5	77 ± 13	4.4 ± 0.3
Roslin Eburu (B53)	98 ± 3	381 ± 66	30 ± 2	58 ± 9	4.5 ± 0.4
Roslin Gucha	145 ± 33	362 ± 41	31 ± 9	79 ± 24	3.2 ± 0.4
Roslin Tana	132 ± 36	488 ± 73	26 ± 8	74 ± 13	5.9 ± 2.0
CIP 800224	168 ± 28	514 ± 38	43 ± 4	57 ± 7	5.6 ± 0.4

<sup>a</sup>Mean ± SD.



In Kenya, breeders need to make a distinction between potatoes with high dry matter contents for processing into chips and French fries and for mashing; and potatoes with low dry matter contents for preparation of stews and for boiling.

#### ACKNOWLEDGEMENT

The author wishes to thank Mr. J.N. Kabira, National Potato Research Station, Limuru, Kenya, for helping with the procurement of the potatoes used in this study.

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