

# PROMOTING THE PROCESSING OF POTATOES IN KENYA

## Final report to PRAPACE

By

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### Summary

The demand for processing potatoes is increasing rapidly in Kenya. Laboratory field investigations products showed that tubers of three newly released varieties were suitable for processing. The varieties Asante and Furaha produced acceptable crisps (chips) while Tigoni produced good quality chips (French fries). Frozen chips made from the three varieties were found to be acceptable up to 6 months of holding at 18°C. Large tubers of Asante and Furaha made acceptable chips while medium tubers of Tigoni could be used for crisps.

Several processing companies have expressed interest in introducing potatoes into their existing commercial lines. One based in Nakuru and other in Nairobi are interested in frozen potato processing for the export market. Support from KARI will be in the form of advice on the most suitable varieties for processing including field production and storage to maintain tuber quality. Further research is required to determine the influence of location, maturity and storage on processing quality on the varieties identified including clones with potential for processing. A survey of the processing quality of the common varieties used by processors is also required in order to make recommendations on the improvement of their qualities.

### Introduction

Manufacturers of potato crisps, potato chips and other potato-based snack foods have their own requirements with regard to variety, quality and quantity of the potatoes they are prepared to purchase (Anon, 1998; Walingo *et al.*, 1998). For processing plants to be economical, producers must be able to supply specific varieties to match the quality requirement of the consumers.

In Kenya, as in most other PRAPACE-member countries such as Ethiopia and Uganda, where interest in potato processing is growing, no varieties are grown specifically for processing. Processors in Kenya, however, are reported to prefer the long white-skinned varieties Nyayo and Roslin Tana for preparation of chips while the round red-skinned Kerr's Pink and Dutch Robyjin are commonly used for crisps (Walingo *et al.*, 1998). Experience at the Food Processing Laboratory at the National Potato Research Centre, Tigoni, however, shows that most of these varieties have rather low dry matter contents (<21%) and no wonder many processors interviewed by Walingo *et al.*, 1998) complained of the low quality of the raw material which

among other things (i.e immaturity of tubers, admixture of varieties, etc) points an accusing finger to the quality of some varieties currently marketed for processing.

Results of an earlier study have indicated that potato processors are very selective in the type of potato varieties they are prepared to buy (Haugerud and Kimani, 1995). Most of the varieties currently used for processing are very susceptible to late blight (*Phytophthora infestans*) and are expensive to produce by the small scale growers. Newly released varieties selected from germplasm obtained from the International Potato Centre (CIP) in the early 1990's and released in 1998 are reported (Mussukuya *et al*, 2000) to have been well adopted by farmers due to their blight tolerance and high yields. The farmers and the potato industry in general could benefit if the processing characteristics of these varieties is well elucidated since the provision of quality raw material is a major drawback to the further development of the potato processing industry (Walingo *et al*, 1997). Investigations are also required into the potential of existing germplasm for the production of value added foods such as crisps, fresh chips and par-fried frozen chips. The need for better understanding of current market demands in terms of potato varieties (preferences, production patterns etc) amongst others things, cannot be overemphasized. Improvements on product shelf life particularly in the case of crisps would also assist local processors compete well with imported products.

The main objective of this research was to conduct laboratory and market studies on chips and crisps to promote quality of the products. French fries are fast becoming as important food for urban areas in PRAPACE member countries and availability of good quality products in both fresh and frozen forms can enhance the utilization of potatoes in the urban areas. Consumption of potato crisps is also increasing among consumers and too merit attention. The research aimed at identifying good processing varieties and make preliminary attempts to forge linkages with processors to improve market quality of current products.

The specific objectives of the project were to:

- Evaluate germplasm for processing quality
- Conduct produce development studies for frozen par-fries with a view to
  - Introduce quality control procedures
  - Determine market requirements
  - Forge linkages with the processors
- Determine the most suitable varieties for processing

### **Materials and methods**

The varieties and advanced clones were grown under standard cultural conditions as given by Lung'aho and Kabira (1999). Supplemental water was applied through irrigation due to drought conditions prevailing during crop growth in the two years. The crops were dehaulmed 2 weeks before harvest and allowed to cure at ambient room temperature for 3 weeks prior to processing.

### **Effect of harvest maturity on processing quality**

The processing quality of established varieties was evaluated at different stages of growth (75, 90, 105, 120 and 135 days after planting). The crops were irrigated due to failure of the long rain season.

### **Determination of physical tuber quality**

Duplicate samples of 5 kg each were used for evaluation of tuber quality (USDA, 1978; Gould, 1979). The physical characteristics of the tubers evaluated were: tuber size, skin and flesh colour; eye depth, and degree of greening.

### **Determination of dry matter content**

The dry matter content was determined by drying of 20 g duplicated samples of (1.3 mm) potato tubers at 105°C for 18 hours in a forced-air oven (NIVAA, undated). Specific gravity was determined by the under-water weight method using duplicates of 5 kg each.

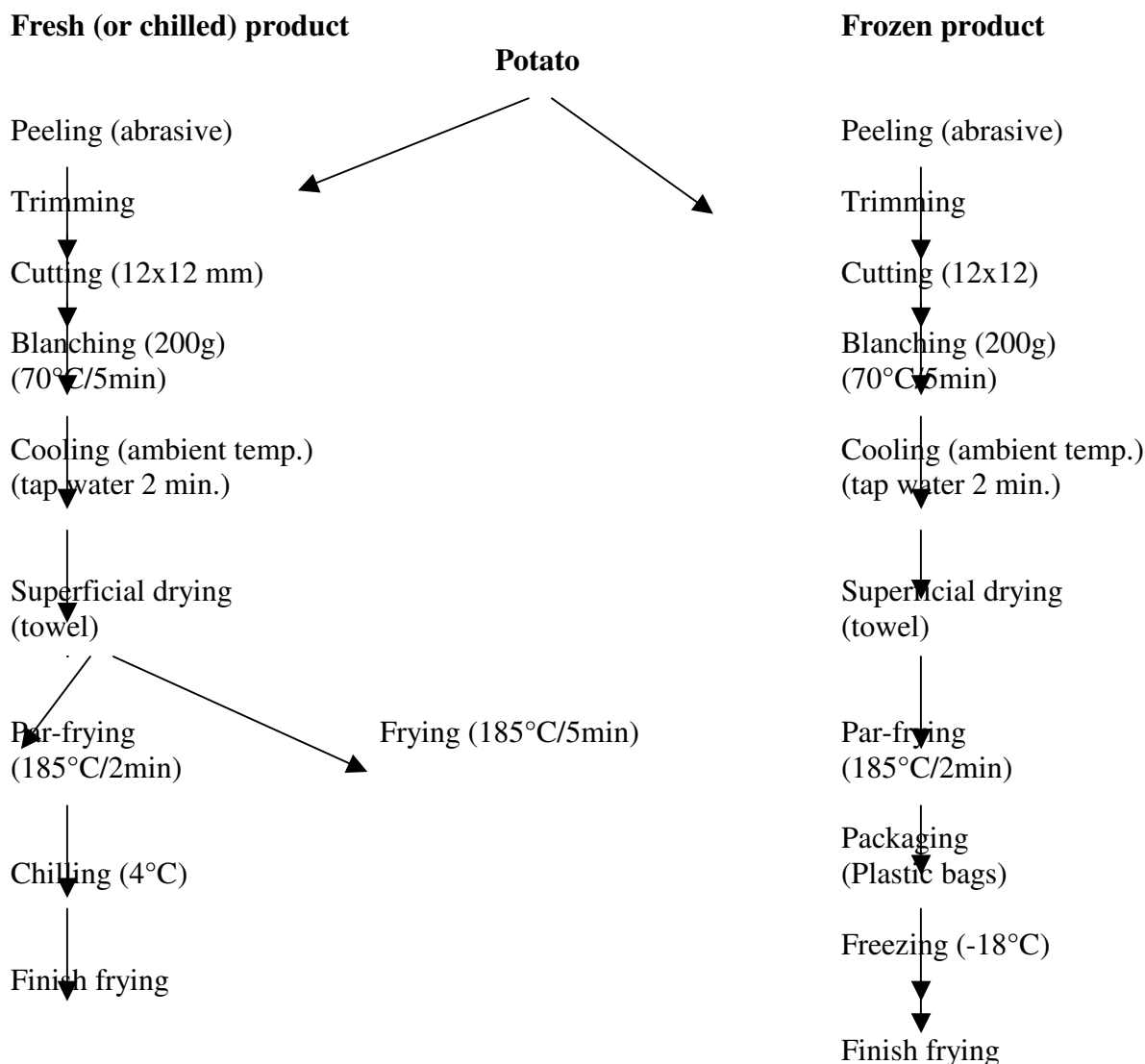
### **Determination of the quality of crisps**

Forty representative tuber samples were used for fry colour determination. Colour of fried slices was evaluated using the American Potato Chip Snack Food Association (PC/SFA) colour cards on a scale of 1 (very light) to 5 (very dark). A laboratory panel of 10 judges evaluated the sensory quality (colour; flavour; texture, and overall acceptability) on hedonic scale (Larmond, 1977) of 1 (like extremely) to 9 (dislike extremely).

### **Determination of the quality of chips**

Representative tubers of 5 kg each were selected and used for chips quality evaluation. Following peeling and trimming, the tubers were cut into square (6mm) strips and those less than 30 mm sorted out. Samples were either par-fried (150+5°C) in vegetable oil for 5 min then finish fried for 3 min or water blanched (70+5°C) for 5 min and deep-frozen (-18°C) and fried later from the frozen state. Sensory evaluations were conducted as for the crisps.

Figure 1. Laboratory processing scheme for chips



**Determination of the shelf life of potato products**

Samples of potato crisps from supermarkets in Nairobi and those of materials from the food processing laboratory in Tigoni were used for shelf life analysis. Rancid odour analysis was done on a scale of 0 (none) to 6 (very rancid) using the method of Robards et al. (1998). The packaged crisps samples were kept at ambient room temperature (18-25°C) and sampled periodically. A laboratory panel of 10 judges familiar with food rancidity was used for the evaluations.

**RESULTS AND DISCUSSION**

**Processing Quality of Newer Varieties and Advanced Germplasm**

The physical tuber characteristics of the three new varieties compared with that of established varieties are given in Table 1.

Table 1. Physical tuber quality characteristics of the different potato varieties

Variety	Skin colour	Eye depth	Tuber shape	Tuber size (mm)	Greening rank <sup>1</sup>	DMC2 (%)
Asante	Red	Medium Shallow	Round	40-65	6	23.7
Dutch Robyjn	Red-Purple	Shallow	Round	40-55	5	25.2
Furaha	White	Medium	Oval	50-56	4	23.9
K. Dhamana	White	Medium	Round	50-56	3	25.5
Kerr's Pink	Pale purple	Shallow	Round	45-65	7	24.1
Nyayo	White	Medium	Oblong	45-55	1	25.7
Tigoni	White	Shallow	Round oval	50-65	2	25.2

<sup>1</sup>After 5 days holding at ambient room temperature

<sup>2</sup>Dry matter content

Shape, size and eye depth are important with regard to the appearance of the tubers and influence the wastage that will occur during peeling. These characteristics are important in potatoes for processing with a long-oval shape such as that of Nyayo and Tigoni incorporating a size of 50 mm and above being ideal for chips while round tubers with a size ranging from 40 to 60 mm such as Asante, Dutch Robyjn and Furaha being ideal for production of crisps (NIVAA, undated). The shallow eyes of the three new varieties makes them suitable for machine peeling due to reduced losses on peeling and trimming; however, the greening tendency in Tigoni and Nyayo will require agronomic and postharvest intervention to curtail losses due to excessive trimming following peeling.

The red and pink skin colour of Asante, Dutch Robyjn and Kerr's Pink are usually associated with good quality by Kenyan consumers (Durr and Lorenzyl, 1980). Asante should therefore have no problem for the processing market since it has the distinct colour of the well-established varieties.

The specific gravity of advanced clones is given in Tables 2 and 3.

Table 2. Specific gravity of advanced clones 2000 long rains (NPRC-Tigoni)

388791.20	1.0882±0.0016
392637.73	1.06767±0.0013
392622.69	1.07782±0.0008
382155.2	1.0797±0.0004
U5	1.0759±0.0008
392637.29	1.0772±0.0006
KP9280.13	1.0829±0.0008
KP90142.7	1.0645±0.0031
KP3761.6	1.0821±0.0013
KP90132.20	1.0667±0.0008
392650.32	1.0835±0.0016
P90280.12	1.0767±0.0020

KP71280.13	1.0824±0.0015
720097	1.0876±0.0042
390830.32	1.0625±0.0013
KP90420.5	1.0793±0.0008
KP91276.6	1.0754±0.0008
391049.88	1.0872±0.0030
389499.7	1.0748±0.0025
KP0374.12	1.0801±0.0013
384298.59	1.1001±0.0016
384559.6	1.0805±0.0025
392656.32	1.0744±0.002
383383.12	1.0843±0.0012
KP2390.1	1.0826±0.0011
KP0301.8	1.0842±0.0026
KP91253.1	1.0730±0.0016
720118	1.0864±0.0025
KP91301.10	1.0781±0.0001
392640	1.0865±0.0040
384299.55	1.0770±0.0024

The specific gravities of most clones grown in the long rains (2000) were high possibly due to dry weather which required supplemental water through irrigation when normal rains failed. Potatoes with higher specific gravity generally have higher yields, lower oil absorption, better texture and flavour, and are more economic to process (Lulai and Orr, 1979; Burton, 1989). The specific gravity (dry matter content) of potatoes is affected by variety, maturity, and cultural factors such as irrigation or soil moisture, fertilization, etc.

The specific gravity for germplasm material grown at Loreto, Limuru is shown in Table 3.

Table 3. CIP germplasm 2000 long rains (Loreto)

Clone	Specific gravity	Crisp colour
720150	1.07921	2.0
386040.9	1.08650	1.0
389746.2	1.08085	1.5
CRUZA	1.080223	2.5
380389.1	1.08225	1.0
381381.20	1.07342	2.0
TEENA	1.07991	1.0
386209.10	1.08241	1.5
381381.13	1.08238	1.5
Kerr's Pink	1.09361	1.0
D. Robyjn	1.06655	2.0
382178.14	1.07828	1.5
Bionta	1.06428	2.0
387205.5	1.06678	1.0
379055.1	1.07342	1.0
389866.5	1.1062	1.5
800953	1.0936	1.0
720071	1.1062	1.0
Danva	1.0929	2.0
Torridon		1.5

The specific gravity of most of the germplasm grown at Loreto was higher than the 1.070 minimum required for processing. Evaluation during normal growing seasons is required to check on the consistency of the clones having specific gravity.

### **Potato crisps**

The crisp colour scores showed that all the varieties and clones tested were suitable for processing (Table 3 and Figure 2). However, due to shape considerations, only the round Asante, Furaha and Kenya Dhamana and germplasm materials having round shapes would be most suitable for processing into crisps. The shape and eye-depth determines the suitability, respectively for machine peeling and cutting ability into the required thin slices. The potato tubers, however, have to be harvested at maturity to maintain their reducing sugars at their lowest levels in order to obtain the required light yellow crisp colour (Talburtt and Smith, 1975).

### **Potato chips**

All the 6 varieties tested made chips that were acceptable up to 6 months during frozen storage (Figure 2). Asante, Furaha and Tigoni compared favourably with Nyayo, the only one of the established varieties used by the processors used in this study. On account of the long fry pieces preferred by hotels (Walingo et al., 1996), Tigoni seems acceptable while Asante and Furaha can

be used by the fast food outlets where the consumers do not mind shorter pieces. The frozen samples tended to change colour to dark grey at  $-18^{\circ}\text{C}$  although the colour of the fried product was acceptable. This implied that all the varieties tested require chemical treatments for frozen storage to improve market acceptability (Talburd and Smith, 1975). High dry matter content is desirable for French fries and shape is important. A long French fry piece is preferred. Tigoni had the best color scores.

It was noted in an earlier study (Haugerud and Kimani, 1995) that processors in Kenya are very selective in the type of potatoes they demand since only six out of more than 60 clones available were used for processing. Red potatoes used for crisping are normally more expensive than those French fries, probably due to lower supplies since the red varieties demand excessive use of expensive chemical spray which small scale farmers in the growing areas cannot afford. Asante being more tolerant to late blight than Dutch Robyn and Kerr's Pink could be promoted amongst the small scale growers for crisps processing. Kenya Dhamana, although it has deeper eyes than Kerr's Pink has more tolerance to late blight and could be suitable for crisps wherever hand peeling is used. Tigoni is better for production of French fries than Nyayo which has less tolerance to late blight, bruises easily and is not firm enough for mechanical peeling and subsequent cutting into the long pieces desired by processors for institutional and hotel supplied. Tigoni can also be used for preparation of crisps due to its oblong shape.

Figure 2. Sensory quality characteristics of frozen French fries made from different potato varieties

### Effect of maturity period on processing quality

The specific gravity of potato varieties and advanced clones grown at Tigoni during the long rains seasons and harvested at different times during growth are shown in Table 4.

**Table 4. 2000 long rains specific gravity (NPRC-Tigoni)**

Variety	Days after plantings	
	80	120
Tigoni	1.0737 ±0.005	1.07764 ±0.010
Asante	1.0760 ±0.001	1.0751 ±0.007
Nyayo	1.0874 ±0.003	1.0786 ±0.008
Dutch Robyn	1.0826 ±0.0018	1.838 ±0.006
Kenya Dhamana	1.0574 ±0.002	1.0652 ±0.006
KP91301.10	1.799	1.0853 ±0.003
U5	1.07528 ±0.005	1.07211 ±0.001
Rutuku (720097)	1.0874 ±0.003	1.0802 ±0.008
Kerr's Pink	1.0925 ±0.006	1.0769 ±0.008

Most of the varieties had acceptable specific gravities (i.e above 1.070) except for Kenya Dhamana which increased only marginally between 80 and 120 days after planting. Rutuku had consistently higher specific gravity than both Asante and Tigoni. Difficulties encountered in watering the crop due to power rationing could have contributed to lower specific gravities in some of the maturing varieties.

The colour of potato crisps of different cultivars harvested at various maturity periods is given in Table 5.

Table 5. Potato crisp colour

Variety	Day after planting		
	90	105	120
Rutuku (720097)	1.5	2.5	2.0
U5	1.5	2.0	2.0
Kerr's Pink	1.5	10	1.5
Kenya Dhamana	2.0	2.0	2.5
Tigoni	2.0	2.5	2.0
Nyayo	2.0	2.0	2.0
Dutch Robyjn	2.0	2.0	1.5
Asante	2.0	2.5	1.5
KP910301.10	1.5	2.0	1.5

All the test varieties produced acceptable crisp colour from 90 to 120 days after planting. Since the crops were grown under irrigation it is proposed to repeat this trial under normal rainfall conditions to determine varietal differences in a conclusive manner including the influencing of harvest maturity on storability.

#### Processing quality of market samples

The specific gravities and the colour of the chips and crisps of potato tubers of different varieties procured from three Kenyan supermarkets are presented in Table 6.

Table 6. Tuber specific gravity and processed product colour of potato samples from Limuru, Uchumi and Njabini markets

<b>Limuru market</b>			
Variety	Specific gravity	Chips colour	Crisp colour
Tigoni	1.0715±0.0015	1.0	1.0
Nyayo	1.0721±0.0016	2.0	2.0
<b>Uchumi market</b>			
Kerr's Pink	1.0521±0.0009	3.0	3.0
Tigoni	1.0639±0.0006	2.0	2.0
<b>Njabini (South Kinangop)</b>			
	1.06776±0.0001	1.0	1.0

The specific gravities of the tubers from Uchumi and Njabini were rather low probably due to harvesting by farmers before the tubers are completely mature. Although the product colours are acceptable, it is unlikely the tubers will be economic to process due to low yield and higher oil absorption. It would be interesting to find out the keeping quality of processing potatoes from the major potato growing regions of the country in addition to conducting a larger market survey to determine the quality of potatoes used by processors.

Preliminary attempts to forge linkage with processing companies

A review of literature and visits to several supermarkets in Nairobi showed that up to 30 firms are involved in processing of crisps and chevera (Table 7).

Table 7. An inventory of potato processing companies in Kenya\*

Ambica Foods Limited, Box 44855. Tel. 22574, Nairobi  
Cofresh Limited, Box 57892. Tel. 743973, Nairobi  
Deepa Industries, Box 44804. Tel. 552638/552640, Nairobi  
Vital Products  
Propack Kenya Ltd. Tel. 861185, Nairobi  
Standard Confectioners Ltd. Tel. 750003/742440, Nairobi  
One-stop Enterprises  
Karackles Ltd  
Galaiya Food Industries, Box 43293. Tel. 540918, Nairobi  
Sweet Centre Ltd. Box 63469. Tel. 607719/20, Nairobi  
Supa Snacks Ltd., Box 38983. Tel. 552083, Nairobi  
Wakarita Enterprises, Box 57739. Tel. 763591, Nairobi  
Top Snax Industries, Box 12275, Nairobi  
Easy Life Ltd., Box 17791, Nairobi  
Chiraq (K) Ltd., Box 31150, Nairobi  
Jannoka Traders, Box 60990, Nairobi  
Sweet Bite Manufacturers, Box 21809. Tel. 727428/533475, Nairobi  
Vina, Box 47582, Nairobi. Tel. 600140  
Bakeman Products Ltd., Nairobi  
Metro Bottling Co. Ltd. Tel. 532411/213, Nairobi  
Bright Foods Products, Box 172, Uthuru  
RSFC, Box 32847, Nairobi  
One Stop Enterprises, Box 45015, Nairobi  
IBBA Foods, Box 19569, Nairobi  
French Products (K) Ltd, Box 67598. Tel. 782005, Nairobi  
Crunchos, Box 11726, Nairobi  
Hitech Food Industries. Tel. 761326, Nairobi  
Deluxe Food Industries Ltd., Box 6955. Tel. 762394, Nairobi  
Miki Megabite, Box 61969. Tel. 503959, Nairobi  
Country Farm, Box 12952. Tel. 448714 Ex. 444 (Frozen fries), Nairobi.

\* Obtained through literature search and visits to selected supermarkets

The above inventory demonstrates that potato processing is already a serious business than hitherto anticipated. Some of the companies have strange sounding names just as their products particularly those products that are fried when thinly cut.

### **Shelf life of potato crisps**

The moisture content of potato crisps sampled from Nairobi supermarkets compared to that of six varieties are given in Table 8.

Table 8. Shelf life (rancidity) evaluation in potato crisps – Moisture content (%)

Company	Moisture content (%)
Top Supplies	2.0
Galaiya Food Industries	1.8
Propack Kenya Ltd	1.0
Golden Wonder	2.0
Dee[a Industries Ltd	1.5
French Product (K)	2.5
Amigos products	2.5
Vina Enterprises	2.0
Chiraq Kenya Ltd	1.5
Dutch Robyjn	2.0
Furaha	2.5
Tigoni	1.5
Asante	1.5

The moisture contents of commercially available potato crisp samples are less than 3.0%. At this moisture content, the shelf life is assumed to have been reached as far as staling and crispness are concerned (Gould, 1980). The moisture contents indicate that the handling of the processing oil and the amount of light getting through the product packaging materials were ideal.

The rancidity scores of potato crisp samples from different processors compared with that of advanced clones and several varieties are given in Table 9.

Table 9. Rancidity/off flavour scores of potato crisp at ambient room temperature

Sample	2 days	4 weeks	6 weeks	8 weeks	10 weeks
Top supplies	1.0+0.96	2.2+1.44	2.3+0.95	1.9+1.20	2.3+1.89
Galaiya Food Industried	0.8+0.89	2.3+1.79	2.5+1.35	2.1+1.20	1.4+1.27
Propack (K) Ltd	0.6+1.34	1.6+1.80	1.7+1.12	2.4+1.07	1.6+0.79
Deepa Industries Ltd	0.9+1.14	1.3+1.35	1.4+1.23	2.6+1.58	1.4+1.13
French Product	1.4+1.23	2.7+1.62	2.6+1.35	2.2+1.48	2.7+1.70
Amigos	2.3+1.54	3.0+1.41	2.2+1.48	2.8+1.23	2.4+2.07
Vina Enterprises	3.4+1.44	3.8+1.33	3.5+1.65	3.1+0.99	4.3+1.98
Chiraq	1.7+1.54	3.1+1.51	2.1+1.20	1.9+0.88	2.1+1.77
Dutch Robyjn	1.9+1.60	2.9+1.38	3.8+1.14	3.0+1.05	1.7+1.80
Furaha	0.8+1.37	2.5+1.86	2.0+1.63	1.7+0.48	2.3+1.60
Tigoni	2.2+1.37	3.2+1.72	3.0+1.50	2.8+1.32	2.9+1.77
Asante	2.1+1.70	4.1+1.70	2.8+1.32	3.1+1.63	2.0+2.24
B53	1.1+1.21	2.3+1.19	1.9+1.20	1.9+0.88	2.7+2.63
K. Dhamana	2.1+1.61	2.9+1.38	2.4+1.58	2.1+1.37	2.1+2.41
U5	2.2+1.58	3.5+1.44	2.7+1.50	2.7+0.67	1.4+1.40
Desiree	2.2+0.08	2.4+1.36	2.5+1.72	3.0+1.15	2.9+2.41
Nyayo	1.4+1.60	1.9+1.38	1.8+1.23	2.4+1.58	2.3+1.98
KP90142.7	3.1+1.98	2.9+0.4	2.5+1.58	3.6+1.65	3.9+2.27
KP91280.13	2.6+1.87	3.6+1.43	2.3+1.64	3.0+1.41	2.9+2.12
800098	1.9+1.73	3.2+1.99	1.6+1.07	3.5+1.65	2.9+2.11
720122	2.6+2.21	3.5+1.51	2.4+1.71	3.4+1.26	4.0+2.00
382155.2	3.1+1.66	4.0+1.41	3.3+0.95	3.5+1.58	2.7+1.70
KP1201.10	2.0+1.18	2.2+1.40	2.2+0.42	2.6+1.26	5.6+1.40
KP92387.5	2.4+1.74	3.6+1.38	2.1+1.00	2.4+1.07	2.4+1.81
720097	2.1+1.51	2.5+1.21	2.1+1.20	2.0+0.94	1.6+1.40
38208.2	2.1+1.21	2.0+1.10	2.6+0.84	2.5+0.97	2.4+1.27

Development of off-flavour was steady in all the samples showing that the quality of the frying oils was good. Only a few samples reached the unacceptable levels of beyond the score of 4.0. More samples from the processors and the supermarkets need to be tested to confirm the observation regarding the quality of different frying oils.

## **Collaborating processors**

The Tigoni food-processing laboratory has collaborated with the companies given below.

**Mugumo Farm Ltd (Limuru)** processes 4 bags/day and pack in 100kg. Plastic bags for frozen storage to sell on demand or for fresh delivery to the National Airport Service, Nairobi. Besides potato the Company processes green peas, Brussels sprouts and Brocoli (all frozen). Due to power rationing however, the company processes on Mondays, Wednesdays and Fridays. The peeled potatoes are cut (12 x 12 mm), blanched, cooled with a blower fan then packed before removing from the solution and air dried for at least one hour. The company previously used to supply the now defunct African Tours and Hotels Ltd. The chips can be stored at 4°C for 2-7 days.

Country Farm Ltd is located at the Landmark Hotel, Westlands Nairobi. The company processes potato crisps and frozen potato chips quite apart from frozen vegetables such as pears and carrots. The company supplies frozen chips to the large Supermarkets such as Uchumi and Nakumatt quite apart from the Landmark Hotel and other large Hotels in Nairobi.

Potato processing into crisps made very dark coloured products necessitating a lot of sorting to obtain lots of acceptable quality. Immaturity coupled with processing without curing (i.e soon after delivery) were major drawbacks. Greening was another problem encountered as the large cellar (capacity more than 0.5 tonne) had ventilation ducts facing sunlight. Covering the cella ventilation system with black plastic and switching off the lights greatly improved tuber quality for processing.

**Njoro Canning Factory** had a contract with a European processor of frozen chips. The processing variety recommended was Morene (parentage Renova x AM 66/44; Breeder Hattema now part of HZPC). The company wanted details of this variety. The company has all the equipment for processing in place. Since importing the variety recommended by the European contractor will take a long time to go through the local variety release and seed multiplication system, the company has agreed to try the variety Tigoni to begin with since many farmers in the Nakuru area are already growing it in sufficient quantities to sustain the processing capability for export purpose.

**London Food Ltd** is a small-scale food processing company based in Nairobi. The company processes potato crisps besides fruit juices, chevra and groundnuts. This year, the company is processing the Tigoni variety.

**Frigoken Ltd** is a processing company based in Ruaraka, Nairobi. The company has a food canning line and is now interested in potato processing. The company has a contract with a European company to supply frozen potatoes. They have already obtained trials samples including Tigoni.

## ACKNOWLEDGEMENT

I wish to thank Mr. Nderitu (KARI-Tigoni), Dr. Ramzy (CIP-Nairobi) and Mr. Karuri for providing the materials used in this study. Mrs Jane. Matu, the Manager Country Farm Ltd, provided the potato crisps and French fried samples of the Tigoni variety used as the control. The study was funded by PRAPACE, the Regional Potato and Sweetpotato Network.

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