

The effect of mechanical slicing on yam chip quality

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Processing of yam tubers into sun-dried chips is a traditional technique in West Africa, especially in Nigeria and Benin. Tubers are peeled, blanched (30 min at 70°C) and sun-dried for 4 to 10 days. The microbiological quality of chips is closely related to the rate of drying, so processing occurs generally within the periods of harmattan, a very dry wind coming from the Sahara during the dry season. For consumption, the chips are processed into flour used to prepare a coloured gel-like paste called amala.



Objectives of the experiment

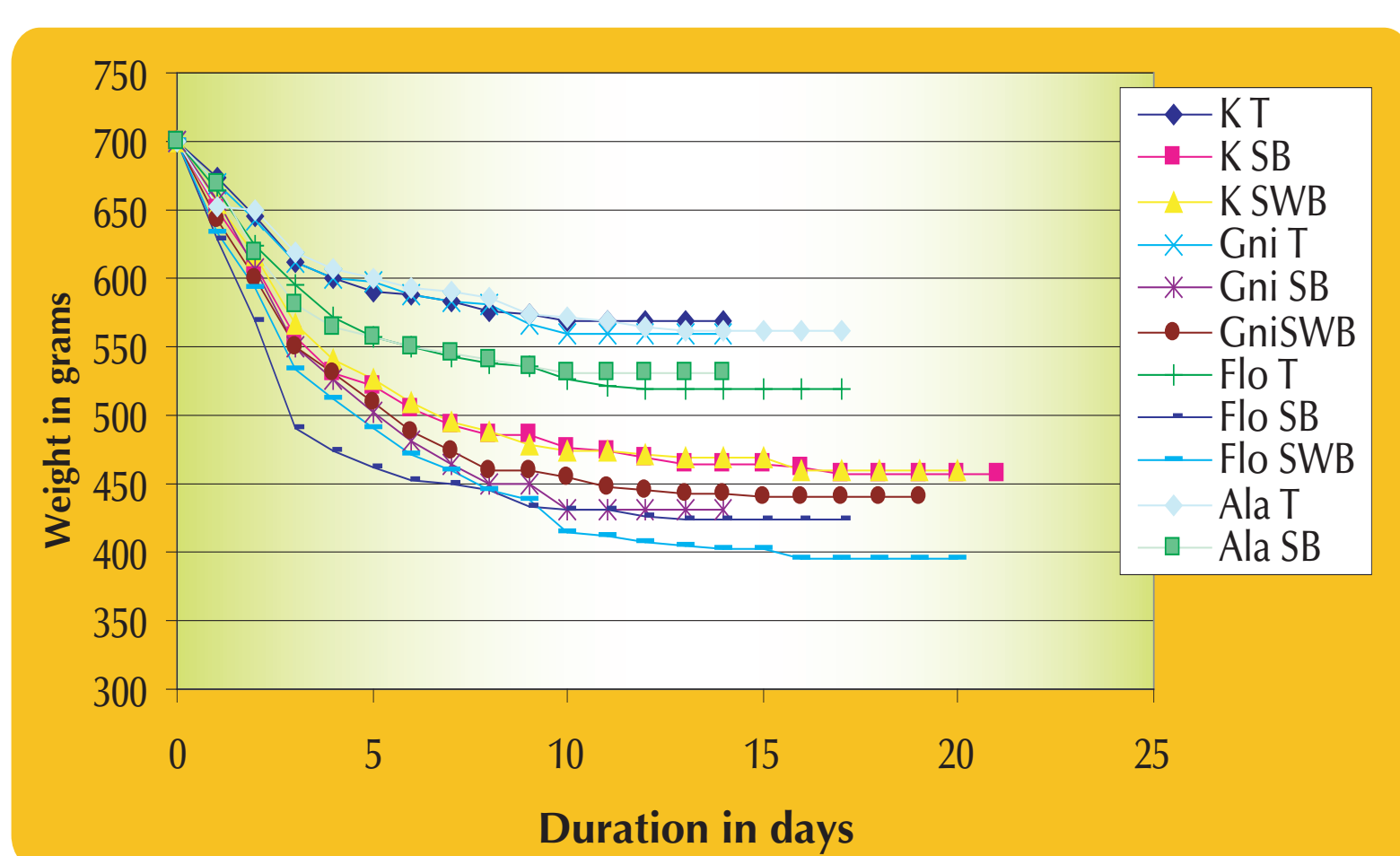
Mechanical slicing using a slicing machine developed for cassava could be a way to accelerate drying by using thin slices (1-2 cm) instead of pieces of tubers, resulting in processing being more independent of climatic conditions. The aim of this experiment was to assess the effect of mechanical slicing on the duration of drying and the sensory quality of amala.

Methodology

Tubers of 4 yam cultivars [Kokoro (K), Gnidou (Gni), Ala-kodjewe (Ala) (*D. rotundata*) and Florido (Flo) (*D. alata*)] were processed into chips according to 3 different techniques: traditional (T), mechanical slicing with (SB) and without blanching (SWB). The blanching was done by pouring hot water (70°C) on the yam slices in a metal pot and then leaving them to soak for 30 min off of the fire. Water temperature varied from 59-61°C at the beginning to 47-50°C at the end of the soaking. Sensory quality was assessed by hedonic sensory tests carried out in 2 villages in Central Benin. Each tester scored the different doughs from 1 (very poor) to 5 (very good).

Results

Drying



Graph 1: Drying duration according to treatments.

Sliced chips dried more rapidly than traditional chips, while blanched forms (T and SB) needed more time to dry than un-blanching chips (SWB).

Colouration

Blanched slices (SB) produced lighter flours and doughs than unblanched slices (SWB). Both gave a much more coloured dough than the traditional chips.

Table 1: Browning index of flours

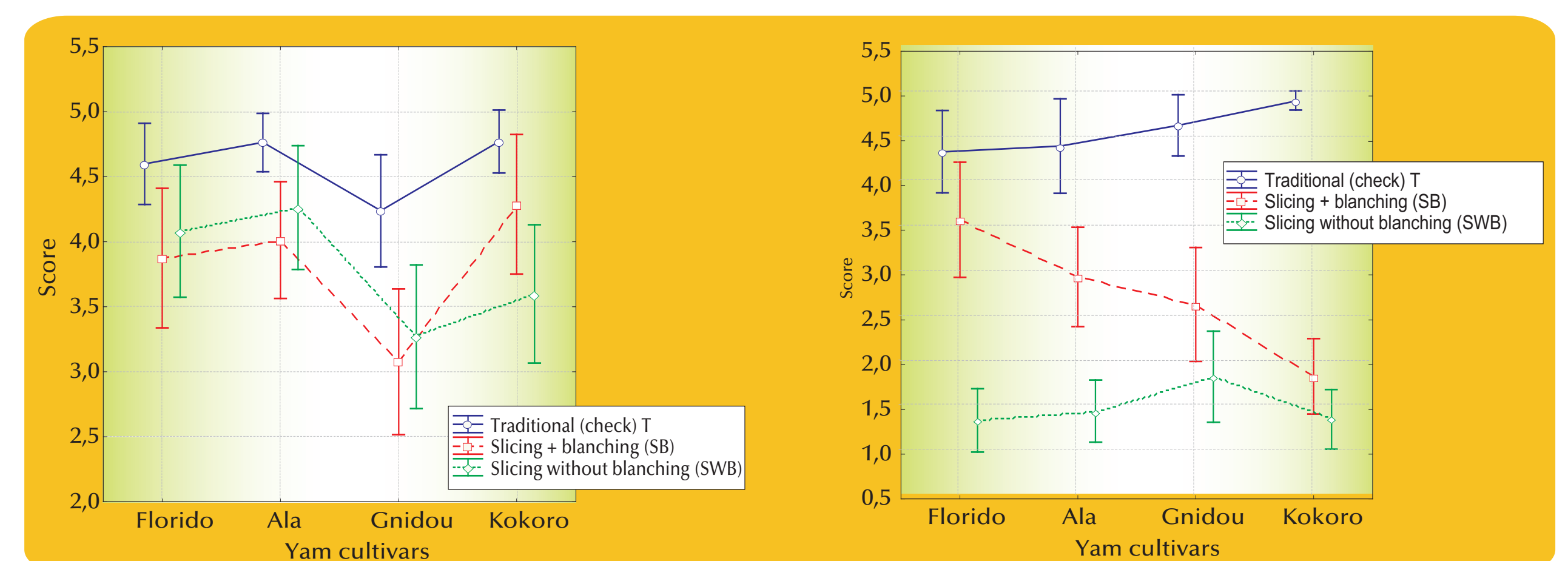
Processing method	BI (browning index)	ΔE (total colour difference)	Yellow saturation
Traditional (check)	18,5 c	20,6 c	20,6 a
Slicing + blanching (SB)	27,8 b	29,6 b	8,9 b
Slicing without blanching (SWB)	32,9 a	34,3 a	8,6 b

Conclusion

Mechanically sliced chips produced a very dark product (flour and dough) not fully appreciated by all consumers. It seems that the blanching method used in this experiment for slices (soaking at between 60°C to 47°C) was not hot enough to control browning processes in the same way as the traditional method (stable temperature 70°C for 30 min). Further work is needed to establish a blanching method at higher temperature in order to lighten the colour of the product to better match consumers' preferences.

Hedonic sensory assessment

Graph 2: a and b: Hedonic sensory assessment of amala according to yam variety and processing method



A: Village of Malaté (ethnic group Yoruba, traditional consumers), panel of 32.

B: Village of Ouédémé (ethnic group Fon, occasional consumers), panel of 26.

Consumers' preferences were quite different with regards to ethnic group. Occasional consumers (Fon people) preferred the traditional method of preparation (score: 4.6 vs 3.6 with sliced chips) and the variety effect was significant: cv Gnidou was less appreciated (3.5) than the three other cultivars (score 4.2 to 4.4).

With traditional consumers, no significant variety effect was observed, but the influence of processing was more marked with the traditional method of preparation (score of 4.6) far more preferred than those using sliced chips (SB=2.8; SWB=1.5).



Slicing machine



Different kind of chips with regards to processing method



Coloration of flour and dough (amala) according to processing method



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