

Marketing Potentialities and Constraints for Frafra Potato: Case of the Main Markets of Ouagadougou (Burkina Faso)

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Abstract: Frafra potato (*Solenostemon rotundifolius*) is a herbaceous specie of the family of Lamiaceae. It is cultivated in the tropical regions of Asia and Africa, mainly by the small holder farmers, as a subsistence tuber crop. It is one of the neglected species with potential for commercialization. In Burkina Faso, Ouagadougou is known to be an important city of consumption of frafra potato. Previous research activities have revealed that profits made from marketing of frafra potato is decreasing compared to that of other tuber crops (yams, sweet potato). The objective of this study was to identify the marketing potentialities and constraints for frafra potato. Ten traders of frafra potato's tubers of three main markets in Ouagadougou were interviewed in 2015. They recognized the increasing demand for frafra potato tubers and its high economical potential. The frafra potato variety with black skin color were identified to be the preferred variety. However, the rapid tuber deterioration and the lack of efficient methods of storage, the small size of tuber and the short period of tubers availability on the markets were identified to be the main constraints of frafra potato marketing. These constraints should be addressed by future research programs.

Keywords: Tuber, Frafra Potato, Marketing, Neglected Species

1. Introduction

Solenostemon rotundifolius [(Poir.) J. K. Morton] (Lamiaceae) is an important tropical crop cultivated in various parts of Africa and Asia for its edible tubers. It is also known as Chinese potato, Innala, Hausa potato, Zulu round potato, Sudan potato, Saluga, fabirama or frafra potato. It is an annual herbaceous plant, 15-30 cm high, with ascending or prostrate stem and thick leaves having aromatic smell [1]. Frafra potato is adapted to the sahelian and soudano-sahelian regions of Burkina Faso. It grows well in large zone receiving annual rainfall between 400 and 1200 mm [2]. Local varieties of frafra potato produce many (up to 70/plant) small sized tubers; 3.78 cm long and 1.53 cm width [3]. Yields usually range from 7 to 15t/ha.

Three local varieties were identified in Burkina Faso based on the tuber skin color (white, red and black) [3]. These varieties are mainly grown by small holder farmers for domestic consumption and contribute to food security in a large part of the country. The tubers contain significant rate of carbohydrates, proteins, fibers, vitamins and antioxidants [4, 5] and are commonly consumed as a curry, baked, fried, or cooked [6]. The tubers are recognized to be one of the best tasted tubers. A part of the harvest can be sold to supplement household income. *S. rotundifolius* holds strong economic potentials and could be financially rewarding to the farm economy [7].

Despite its adaptation to the local farming conditions and its importance as foodstuff, frafra potato is currently a minor crop. Previous research activities have mentioned that profits made from marketing of frafra potato is decreasing compared

to other tuber crops (yams, sweet potato). However, significant information on marketing for frafra potato are not available. Understanding the marketing conditions of frafra potato tubers is an important step toward the objective of valorization of its genetic resources.

2. Methodology

This study is a survey that addressed the marketing potentialities and constraints for frafra potato in Ouagadougou from October to December 2015, coinciding with the period of marketing for frafra potato. Ouagadougou is known to be an important center of marketing for frafra potato during a short period after the harvests.

Frafra potato tubers' traders in three main markets of Ouagadougou with at least 3 years of experience were interviewed. The expected number of traders for this study was sixty but the information were generated from ten respondents, representing all the traders identified in the three markets. These markets were: the market of "Dassasgho" (in the east of Ouagadougou) and the main markets of "Gounghin" and "Pissy" (in the west of Ouagadougou).

The questionnaire captured data on the importance and the income implications of frafra potato in the market. Information were also generated on their methods of tubers' storage and the main constraints of marketing. Based on their own appreciation of the tuber sizes, each respondent divided a lot of its own tubers into 3 categories. These categories were: 1- small tubers; 2- intermediate tubers; 3- big tubers. From each category, ten tubers were randomly selected and the weight, the length and the width of the tubers were measured.

Data analysis such as frequency, mean value and variation for the different parameters were carried out using SPSS Statistics 20.

3. Results

3.1. Importance and Income Implications of Frafra Potato

The respondents were women whose age ranged from 30 to 65. For all of them, frafra potato is not the main crop or the main tuber they sold. The period of frafra potato tubers availability on the markets varied from September to January. Less than fifty percent (45%) of the traders start selling frafra potato tubers in September (figure 1). The most important period of tubers availability covered October and November. During these two months the majority of the traders (90% and 89%) continued selling frafra potato tubers. The percentage of the traders that could continue selling frafra potato tubers in December and January was respectively 22% and 11%. The tubers sold in the markets came from the southern region of Burkina Faso (particularly from the province of Sissili) or from the central region near Ouagadougou (examples: "Kokologho" and "Tanghin Dassouri").

During the period of availability, the quantity of tubers sold varied from 16 to 32 Kg/day/person. According to the period and the tubers availability, the prices varied from 1.2 to 3 USD/Kg. This important variation of prices (250%) showed the economic potential of frafra potato.

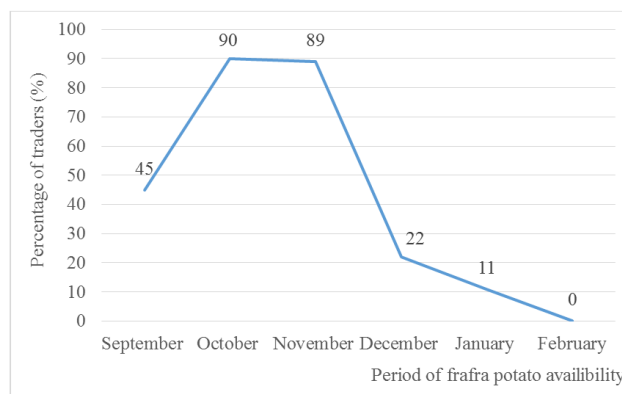


Figure 1. Evolution of the percentage of traders involved in frafra potato tubers trading during the period of tubers availability.

3.2. Traders Preferred Varieties

The local varieties with black or red skin color were mentioned to be the most common varieties in the market (figure 2). However, the variety with black tuber skin is the main variety sold by all the traders and the preferred one. Only 30% of the traders sold the tubers of the red skin frafra potato. The big size of the tubers, the good taste and the easiness to be peeled compared to the other varieties were identified as the main preferred characteristics of the black skin frafra potato.

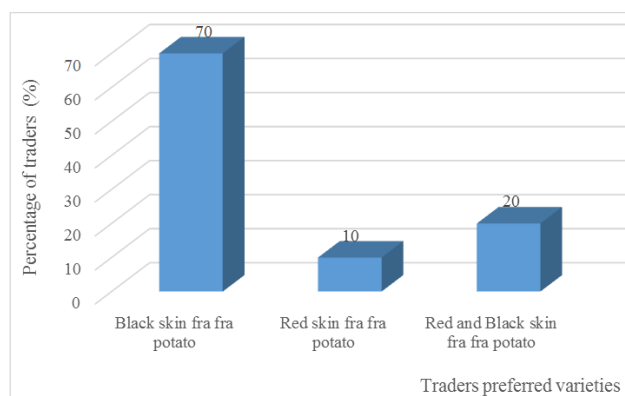


Figure 2. Variation of the trader's preferences for the main varieties of frafra potato.

3.3. Tubers Size and Weight

The three categories of tubers (small, intermediate and big) significantly differed for the diameter and the weight (table 1). The tubers diameter varied from 1.2 cm (for small tuber) to 2.4 cm (for the big tubers). The length varied from 2.7 cm to 4.2 cm and the weight from 7 g to 15 g/tuber.

Table 1. Tuber size and weight.

Categories of tubers	Diameter (cm)	Length (cm)	Weight (g)
Small	1.2 ^a	2.7 ^a	7 ^a
Intermediate	1.8 ^{a/b}	3.5 ^a	11 ^{a/b}
Big	2.4 ^b	4.2 ^a	15 ^b
df	2	2	2
F	9.616	2.905	6.443
p value	0.007	0.112	0.032

The averages followed by the same letter are not significantly different at the 0.05 level of the Student-Newman-Keul's test

3.4. Main Marketing Constraints for Frafra Potato

Many marketing constraints were identified. The most critical one mentioned by 90% of respondents is the rapid deterioration of tubers in storage (figure 3). The method of storage involves keeping the tubers at room temperature in a bag or in a basket. This method of tuber preservation did not allow tuber storage more than one month.

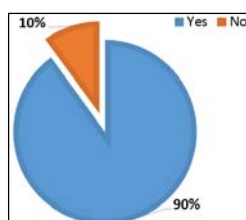


Figure 3. Importance of tuber rapid deterioration as a main problem for frafra potato marketing.

The short period of tubers availability and the small size of the tubers were identified as important marketing constraints. Tubers were only available from September to January and the traders did not meet frafra potato tubers demand. They also mentioned the consumers' preference for big tubers.

3.5. Priorities for Future Research on Frafra Potato

All the respondents recognized the marketing potential of frafra potato but some characters need to be improved. The black tuber skin frafra potato is preferred for its good taste. However, a short term research objective should be to contribute to increase tuber's length (figure 4) and diameter (figure 5). The expected minimum tuber length mentioned by traders ranged from 5 to 9 cm. While the expected diameter varied from 3 to 5 cm. According to the traders, the mentioned tubers size meet consumers need and could help improving frafra potato marketing.

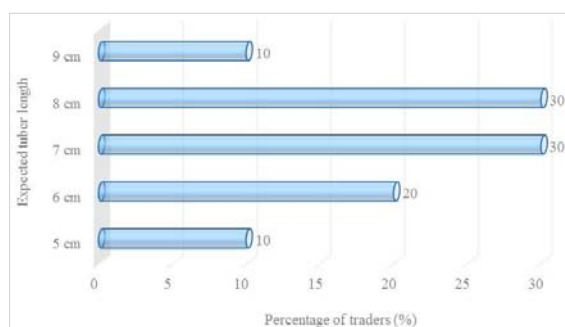


Figure 4. Expected minimum length of tuber.

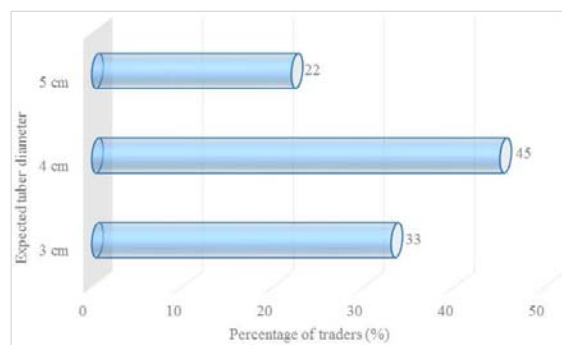


Figure 5. Expected minimum diameter of tuber.

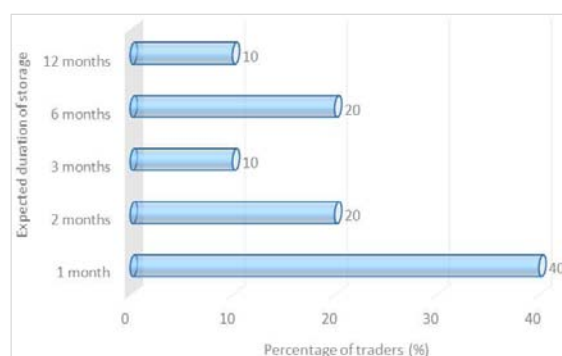


Figure 6. Expected minimum duration of tubers storage at room temperature.

Besides increasing tubers size, another priority mentioned by the traders is the need to develop variety with good potentialities of storage at room temperature. The expected minimum duration of storage ranged from 1 to 3 months for the majority of the traders (70%) but some of them mentioned an expected duration up to 6 months (20%) or 12 months (10%) (figure 6).

4. Discussion

Previous research identified 3 varieties in Burkina Faso based on the tuber skin color (white, red or black) [3]. However, this survey revealed that the black skin frafra potato is the most common and the preferred variety because of its good taste and the acceptable tuber size. Similar situation between two varieties of Anchote (*Coccinia abyssinica*) was also reported [8]. Tubers characteristics are very relevant parameters to be included in the strategy of neglected species promotion.

The high prices variation represents an economic opportunity for many actors (farmers and traders) [1, 7].

Some researches already underlined the nutritional potential of frafra potato and its contribution to food security [5, 9]. These results suggested that frafra potato could be promoted as a tuber for food and a source of income.

The tubers are sold during a short period compared to other tubers (yam or sweet potato). Low productivity and rapid deterioration of tubers of frafra potato could explain this situation. The rapid deterioration of frafra potato tubers was also identified by the farmers as one of the main constraints for frafra potato cultivation in Burkina Faso [2] and in Ghana [1]. The bad conditions of tubers storage after harvest by farmers could contribute to fast deterioration of the tubers. It is therefore important for traders and farmers to be able to store the tubers for a relatively long period in their own conditions for a good planning of tubers uses [10]. The development of efficient methods for tubers storage could include appropriate techniques to be applied on farm. Another alternative could be the processing of the tubers [11].

Previous research showed that there was a low variability for the frafra potato tuber size and the small tubers represented 75% of produced tubers [12]. The small tuber size was mentioned to be an important constraint for frafra potato promotion [13, 14]. A breeding program and the improvement of cropping conditions (irrigation, fertilization) could contribute increasing the tuber size.

By addressing the problem of tubers storage and improving the tubers characteristics, research could significantly improve economical potentialities of frafra potato and contribute to a long term valorization of its genetic resources. Many neglected crops have the potential to contribute to food security but investigation should be done to clearly demonstrate their potentialities and the priorities in term of research on these crop as suggested by [15, 16].

5. Conclusion

Frafra potato has an important economic potential but many constraints including the rapid tuber deterioration, the small sized tuber and the short period of their availability were mentioned as the main problem to be addressed. Developing proper methods for tubers preservation or tubers transformation could be a short term alternative. Breeding program and the development of cropping techniques should contribute to increase in tuber size.

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