RUFORUM Working Document Series (ISSN 1607-9345), 2019, No. 18 (1): 54 - 61.
Available from http://repository.ruforum.org

Research Application Summary

Production of Tomato Powder

Assogba, F. J.[1], Idohou, V.[1], Sewa, S. J.[1], Guidan, E. C.[1], Ologou, S.[1], Vitto, J.J. & Tchabosssou, F.[1]

'University of Abomey-Calavi, B.P. 526, Attorney-Calavi, Cotonou, Benin
Corresponding author: fructueux02@gmail com

Abstract

End hunger, achieve food security and improved nutrition, and promote sustainable agriculture. This is the second Sustainable Developmet Goal (SDG). But, while FAO is envisaging an increase of the earth population, there is high food waste through, among others, post-har vest losses. Tomato (*Solantim 1ycopersicum* L.), is one of the highly perishable fruits and its post-harvest losses are estimated at about 45% . In order to contribute to the achieving of the SDG and reducing the post-harvest losses for tomato, we engaged in a transformation process of ton ato from fruit to powder. This involves treatment of fruits to obtain a grindable powder product. After many attempts, we got into contact with the RECAP Project and were selected as young entrepreneurs. Helped by diverse coaches and administrative work, we have been able to conduct a series of product development attempts that culminated in a useful process now used to produce tomato powder. The first attempt with deseeding and a drying at 57°C was not conclusive (production ratio of 3%). Neither was the second without deseeding but at 50°C (production ratio of 4%). The final attempt gave a better result: a red powder, with a nice flavor after a soft drying at 48°C (production ratio is 5%). We can therefore say that production of tomato powder is a good way of preserving tomato as it avoids tomato waste and reduces post-harvest loss. The next step now is the reconstitution test to confirm that the powder can be used and consumed to the great pleasure of all.

Keywords: Food processing, oven, post-harvest losses, tomato powder

Résumé

Éliminer la faim, assurer la sécurité alimentaire et une meilleure nutrition, et promouvoir une agriculture durable. Il s'agit du deuxième objectif de développement durable (ODD). Mais, alors que la FAO envisage une augmentation de la population mondiale, le gaspillage alimentaire est élevé, notamment à cause des pertes post-récolte. La tomate (*Solanum lycopersicum* L.) est l'un des fruits les plus périssables et ses pertes post-récolte sont estimées à environ 45 %. Afin de contribuer à la réalisation des ODD et de réduire les pertes post-récolte de la tomate, nous nous sommes engagés dans un processus de transformation de la tomate du fruit en poudre. Il s'agit de traiter les fruits pour obtenir un produit en poudre broyable. Après de nombreuses tentatives, nous sommes entrés en contact avec le projet RECAP et avons été sélectionnés comme jeunes entrepreneurs. Aidés par divers coachs et par le travail administratif, nous avons pu mener une série de tentatives de développement de produits qui ont abouti à un procédé utile utilisé maintenant pour produire de la poudre de tomate. La première tentative avec un épépinage et un séchage à 57°C n'a pas été concluante (taux de production de 3%). La deuxième tentative, sans épépinage mais à 50°C, ne l'a pas été non plus (taux de production de 4%). La dernière tentative a donné un meilleur résultat : une poudre rouge, avec une saveur agréable après un séchage doux à 48°C (taux de production de 5%). Nous pouvons donc dire que la production de poudre de tomate est un bon moyen de conserver la tomate car elle évite sa détérioration et réduit

les pertes post-récolte. La prochaine étape est maintenant le test de reconstitution pour confirmer que la poudre peut être utilisée et consommée pour le plus grand plaisir de tous.

Mots-clés : Transformation alimentaire, four, pertes post-récolte, poudre de tomate.

Introduction

The 2030 agenda for sustainable development provides a goal for food security. In fact, the second Sustainable Development Goal (SDG) is to End hunger, achieve food security and improved nutrition and promote sustainable agriculture. Meanwhile, the FAO estimates that food production will need to grow by 70% to feed the world population which will reach 9 billion by 2050. Therefore, there is a need for a new approach to the global effort to ensure sustainable rood production and consumption. Nevertheless, we observed that despite this great need, massive amounts of food are lost due to many reason (FAO, 2002, FAO, 2011). Among these is post-harvest losses, especially for fniits.

According to Alao (2000), post-harvest losses of fruits and vegetables is "that weight of wholesome edible product (exclusive of moisture content) that is normally consumed by human and that has been separated from the medium and sites of its immediate growth and production by deliberate human action with the intention of using it for human feeding but which for any reasons fails to be consumed by human". It represents a very big challenge for producers, especially with highly perishable products such as tomato. In sub-Saharan Africa countries and in Benin in particular, Fagbohoun and Kiki (1997) estimated food losses at 50-60% of the total harvest.

The production of tomato (*Solantini lycopersicum* L.) has recorded a mean increase of 7, 432 t between 2008 and 2015 but the post-harvest losses are estimated at 45% (PSDSA, 2017). Further more, the Government of Benin has a Strategical Plan for developing Agricultural sector (PSDSA) with an estimated increase of 25% of tomato production that is from 288 944 in 2015 to 361 111 t by the end of 2021. Knowing that an increase without a good policy for post-harvest management would create an increase of the losses, this project is intended to contribute to solving this challenge.

According to Vodouhe *et al*. (2014), tomato processing helps reduce post harvest losses and assure its availability at every period. In this regard, many people are trying to process tomatoes. We therefore have tomato mash, tinned tomatoes, etc. Many people have tried to process tomato in different fonns and even in a dry form, but few are trying to ground it into powder. The present effort aims at finding a new way of preserving highly perishable foods with focus on tomato. It specifically aims at the production of tomato powder.

Material and Methods

Materials. A local variety of tomato was used (A kikon) and also D iva F 1, Cobra F1 and Padina F1. We used them in order to choose the one that would give the best yield in terms of powder.

Pre-treatment were done using sa lt, water and bowls to wash the fruits; knifes to cut the fruits prior to drying; an oven and grids for the drying process; and a shredder for the transition from dry fruit to powder.

First series of attempts. We tried to produce tomato powder by using mashed tomato that we put on fire until it became pasty. We then tried to dry the paste in the nutrition laboratory of our School at University of Abomey-Calavi. The products obtained were like stones and were completely burnt.

Figure 1. Akikon Tomato

Application to the RECAP project . We heard about the RECAP project at the UAC Startup Valley Foundation and applied for funding from it. We were selected and went through a series of trainings about entrepreneurship, food quality, company management, etc. After the trainings, we were coached on writing a business plan and a financial proposal. Subsequently, we received financing to develop a prototype. The Foundation helped us obtain an IT into the same laboratory where we conducted our first process trials. The Foundation also helped us to obtain authorizations for product development from different laboratories that allowed his to conduct and obtain a prototype.

Second series of attempts. In this phase, we ran three trials:
Attempt n° 1: 2 kg of fruits (Diva F1) - Production with deseeding (18th May, 20 19)
Attempt n°2: 2 kg of fruits (Diva F1) - Production without deseeding (15th July, 2019)
Attempt n°3: 2 kg of fruits (Akikon) - Production with partial drainage (26th July, 2019)

Results and Discussion

First attempt. The first step was to deseed the fruits. The fruits were dried at 57°C. We obtained a powder lightly burnt red, with a little dark aspect. The powder obtained was 64 g. That is a ratio of 3% powder produced from the fruits.

Second attempt. For this attempt, we did not deseed the fruits. The fruits were dried at 50°C. We registered a larger portion of burnt powder (30 g). The remaining weighed 56g and was red. The production ratio was 4%.

Third attempt. For this production, we used a partial drainage method after parboiling. We obtained a red powder, with a nice flavor after a soft drying at 48°C. The production ratio was 5%.

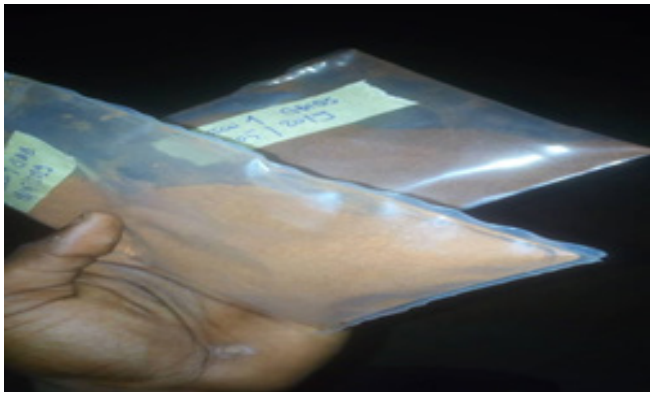


Figure 2. Product obtained after first attempt

Figure 3. Product obtained after second attempt

Figure 4. Product obtained after third attempt

Production process. The process of production of tomato powder can be summarized as follows: Obtaining the fruits: the fruits are strong, red and ripe. They were bought at Dantokpa Market (Cotonou-Benin). The fruits were brought in baskets and well-conditioned.

Weighing. The fruits were weighted to know the exact weight.
Sorting. The fruits were sorted to separate fruits that were matured from those that were not matured enough.
Washing. The fruits sorted and separated were washed three times with clean water
Cutting. The fruits washed were cut to obtain fruits with regular and small size. The slices were soaked in salty water for l5 minutes. At this stage salt reduces part of the water contained in the fruit and diminishes microbial charge.

Parboiling: it is the partial or semi boiling of the fruits by soaking them in boiled water during one hour.
Drainage: This is to separate water from the fruit without pressing it.
Drying. The slices of tomato were dried in an Attesta Oven at 45°C for 20 hours.
Grinding. The slices were grinded to obtain the powder.

Figure 5. Cut tomato

Figure 6. Drainage of the water

Figure 7. Drying of the tomato slices

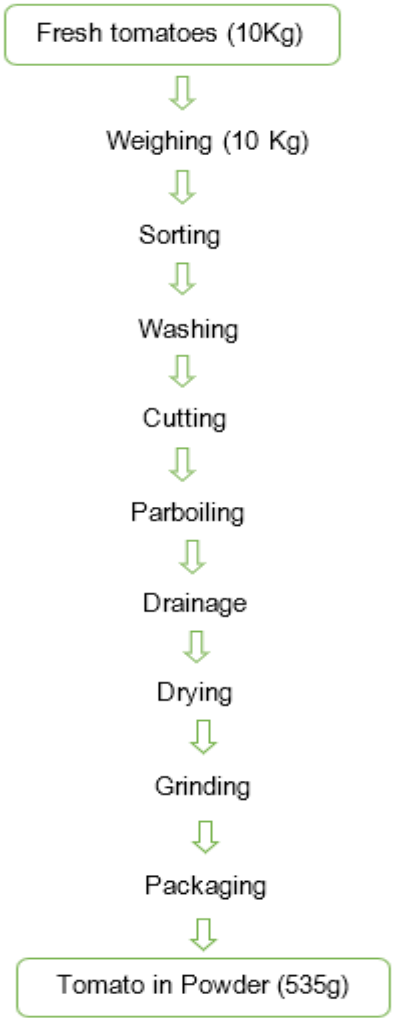
Conclusion

Tomato powder can be produced following a specified process that respects the hygienic rules and quality and guaranties a good food for consumers. It recommended to conduct a study on the preservation for at least six months to be sure about the physical, chemical, microbiologic and sensorial stability.

Figure 8. Grinding of the dried slices

Figure 9. Tomato Powder packaged

The flow process of the production is outlined below:



Tomato Powder

Acknowledgement

We thank the UAC Startup Va Hey Foundation through the R ECA P Project for funding our work. This paper is a contribution to the Fifieenth RUFORU M Annual General Meeting held 2-6 December 2019 in Cape Coast, Ghana.

References

Alao, S, E. L. 2000. The in pottance of post-harvest loss prevention. Paper presented at graduation ceremony of School of Food Storage Technology. Nigerian Stored Products Research Institute

Food and Agriculture Organization (FAO). 1989. Prevention of post-harvest food losses fruits, vegetables and root crops a training manual. Rome, FAO.

Food and Agricu hire Organization (FAO). 2002. Postharvest losses: Discovering the full story. Overview of the phenomenon of loses during the posthar vest system. FAO, Rome.

Food and Agriculture Organization (FAO). 20.11. Global food losses and waste: Extent, Causes and Prevention. FAO, Rowe.

Vodouhe, M.C.D.N., Houssoii, A.P. F., Kpangbin, C., Labintan, E. and Mensah, G.A. 20.1.4. Sechage de la tomate (*Lycopersicon esculentum*) : une autre alternative pour sa valorisation an Bénin Bulletin de la Recherche Agronoin ique dli Bénin (B RAB). Agro-biodi versité et Santé Ptibliqrle.