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Research Article

PERFORMANCE EFFICIENCY OF IMPROVED BARBECUE FOR ROASTING CORN COBS

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ABSTRACT

Various technologies have been created to make the process of roasting easy, quicker and stress-free but most of these were developed outside India. The economic situations of the corn cob roasting vendors have limited the use of automated and power driven equipment to a few large scale processors and vendor. Therefore, to reduce the stress and accidents during roasting and increasing the efficiency, a roasting device with increased efficiency and productivity is needed to be developed. The present study is an attempt to design, develop and test the performance of improved barbecue stove.

Keywords:

Barbecue,
Roasting Machines,
Corn Vendors.

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INTRODUCTION

Street food vending is a large source of employment in many cities of developing countries (Choudhury *et al.*, 2011). This contributes significantly to households incomes (Feglo and Sakyi, 2012; Biswas *et al.*, 2010; Oladipo, 2010). Many urban dwellers obtain a significant portion of their diet from street foods which increase the street food demand in major cities (Pikuda and Ilelaboye 2009). The local street vendors selling roasted corns operate seasonally, as per the availability of maize crops. The corn cobs roasted on hot coals serves as a tasty and nutritious snack. Roasting of corn cobs is done by placing the maize on a glowing charcoal and then turning it occasionally to allow even distribution of heat. A hand fan is used by the vendor to blow the air so as to maintain the glowing of charcoal. The rate of heat transfer from the charcoal to the maize depends on how fast the hand fan blows the air current. The process is strenuous as the vendor is tired out with the time before the corn cob is completely roasted.

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Various indigenous roasting equipments are used by vendors for roasting purposes like tandoor, barbecue, grill, corn roaster etc. The models of stoves used by the local street vendors have capability of cooking two or three corns at a time. When the number of customers is more, it becomes difficult for the vendor to roast more corns in minimum time. Moreover, the direct contact and exposure of the human body to the heat emitted from the charcoal causes damaging effect on the skin and some organs in the body. Despite the problems and risks associated with the business, people continue to use this as a source of earning their living (Pearce and Bankole, 1988). In view of the problems identified it was felt that there is a need to develop a corn roasting machine that will be able to roast with higher efficiency and speed, with less stress and accidents. The objective of this study is to design, develop and test the performance of improved barbecue stove for roasting corn cobs.

RESULTS AND DISCUSSION

Utilizing charcoal as a fuel, the average time consumed for the roasting process by barbecue stove was 23.16 ± 1.47 minutes which was less than the average time consumed by the conventional stove i.e. 25.66 ± 2.80 minutes.



Fig. 1. The Improved Barbecue Stove: It was designed with features to minimize the stress on arms, probability of accidents and improving the performance of the stove. The stove is in cubical shape with insulations to avoid the direct contact of heat to the body and the provisions were made to avoid the contact of fire with the body part (fingers). Instead of making use of hand fan, a blower was attached to the model to reduce the stress produced by constant fanning



Fig. 2. Vendors performing the experiments: To test the performance of the barbecue stove, the experiments were carried out taking charcoal as source of fuel. The time and fuel consumption in barbecue stove was calculated during the process of roasting and the results were compared with that in conventional stove. Five corns were taken as a standard since the barbecue stove had the provision of cooking five corns at a time

The average time taken to roast five corns in barbecue stove was 9.5 ± 0.54 minutes which was comparatively less than the average time consumed in conventional stove to roast five corns i.e. 14 ± 1.09 minutes. This was statistically approved, where a significant difference was observed in the time taken for the roasting process indicating a significant difference between the performance of conventional stove and barbecue stove. The average charcoal consumption in barbecue stove was 325 ± 27.38 grams while in conventional stove, it was observed to be 338.33 ± 31.88 grams. There was no significant difference observed in the average quantities of charcoal consumed by two different stoves in roasting process.

When the barbecue stove and conventional stove were compared with respect to the fuel consumption, the average quantity of charcoal consumed in barbecue stove was less than the average quantity of charcoal consumed by conventional stove. An organoleptic evaluation of the maize cobs roasted in two different stoves with charcoal as a fuel was done to evaluate the product. A 5-point scale was used for rating five characteristics of the product (color, flavor, taste, texture, overall acceptability). Comparing the maize cobs roasted using charcoal; the barbecue stove had more overall acceptability than maize cobs roasted in conventional stove. The customer evaluation has shown no major mean difference in score between the stove models suggesting that they were not able to differentiate between them. However the overall acceptability of roasted corns is also dependent on the stage of maturity of corn which is an individual preference.

Conclusion

Street food has always been a part of Indian urban life but its popularity escalated in the last two decades with more women working outside the home. The food is cheap, easy to find, and, if chosen correctly, healthy. The improved barbecue stove was designed to improve the productivity and reduce the stress faced in the roasting activity. It can accommodate 5 corns at a time. Moreover the use of blower helped in reducing the stress of fanning. The separate coal tray and ash tray were provided in the model. Results showed that the barbecue stove was found to be more performing more efficiently than the conventional stove when charcoal was used as a fuel for roasting process. However the average time for igniting the charcoal was higher in barbecue stove but the stove took comparatively very less time in roasting the corn cobs. Since, fuels are ignited once but the roasting process continues throughout. Hence it can be said that the barbecue stove, when charcoal is used, is better and more efficient than the conventional stove.

These experiment results are for only five corn cobs as it was only a laboratory study. However it can be concluded that, once the fuel is ignited it can be used for continuously roasting more corns and thus on an average time consumed for roasting about 50 corn cobs can be reduced much further ± 5 minutes which may be required for refilling the fuel.

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