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Development of an Electric Yam Pounding Machine

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ABSTRACT

There are different ways in which yam is processed, like pounding using mortar and pestle, some use blender for small quantity and other use machine. Processing of food needs quality check to ensure that what is consumed from the end product is safe and healthy. Hence, this led to the development of an electric yam pounding machine. The material selected for the chamber of the yam pounding is stainless steel, which is a very good material for such process, as it will not contaminate the food. High temperature difference did not affect the production, due to the material used. The machine was produced essentially to accommodate for large capacity of pounding process. The machine saves consumers of stress, as it can pound two and a half tubers of yam for few minutes, depending on its texture. The machine is durable, user friendly, has a clean production and has a good factor of safety.

INTRODUCTION

Yam is one of the varieties of consumed by man. It is a tuber crop, which has a place with the class of sugar and has been a piece of the African dinner for quite a long time. Yam is the normal name for the specie in the class Dioscorea (family Dioscoreaceae). The Wolof word nyam, which translates to "to taste" or "to sample," is where the Portuguese or Spanish names that eventually led to the English word "yam" came from. In other areas of geographical locations, dialects it can likewise imply "to eat" for example yamyam and nyama in Hausa (Mignouna et al., 2003). Additionally yam is the normal name for certain species in the class and they are enduring herbaceous plants developed for the utilization in various continents. According to Amusa et al. (2003), various species of this perennial herbaceous crop include the white yam , the yellow yam , the water yam, and the trifoliate yam (Nweke, 2019). Crude yam has just moderate supplement thickness, with apparent substance (a greater amount of the Everyday Worth, DV) restricted to potassium, vitamin B6, manganese, thiamin, dietary fiber and L-ascorbic acid (Ita et al., 2020). Yam supplies Calories for every hundred grams. Yam by and large has a lower glycemic record, contrasted with potato items (Harvard Clinical School. 2008). Roots and tubers have a lower protein content and quality than other staple foods, with yam and potato having around two percent protein per pound of fresh weight. Yams, with cassava, give a lot more noteworthy extent of the protein consumption. As a somewhat low-protein food, yam is definitely not a decent wellspring of fundamental amino acids. According to Tropical Medicine Central Resource (TRISRD, 2008) and The Merck Manual (2010), experts stress the importance of adding more protein-rich foods to a diet that focuses primarily on yams in order to encourage healthy growth in children. They are utilized in a design like potatoes and yams, (Brand-Mill operator et al, 2003). There are north of ethnic gatherings and dialects in Nigeria, and every ethnic gathering has different language names for yam and the beat yam, for example The Yoruba word for yam is "Isu," and the name given to it when it was pounded was "Iyan." It is likewise a staple harvest of the Igbo nation of Nigeria, in their language it is known as "Iji". It is celebrated with the New-Yam festival in the South-Western region of Nigeria and the Iri-ji or Iwa-ji festival in the Southern part of the country. In 1993, the Food Information Network estimated that 28.1 million tons of yam were produced worldwide, with seventy one coming from Nigeria and ninety six percent coming from the tropical regions of West Africa. This figure was audited later in year 1998, for around of the world absolute creation of twenty nine million tones (Meta, 2024). Additionally, as indicated by the Government Office of Insights, Nigeria is the world's biggest maker of yam having the water yam (Dioscorea alarta) and the yellow yam (Dioscorea rotundata) as her most developed types of yam. Yam, being quite possibly of the most extravagant feast, can be ready in different ways. The yam is a flexible starch which has different items after process, it tends to be grilled; simmered; seared; barbecued; bubbled; smoked; beat and when ground it is handled into a pastry recipe (Sani & Aziz, 2013).

MATERIALS AND METHOD

The workings of the yam pounding are accomplished by belt and pulley. This output generated is communicated to a propeller with a propeller ready to perform the necessary process. The programmed yam pounding machine is planned and created to cleanly deal with yam and pounding different loads of cooked yams for homegrown and wide consumption is made. The main parts of the automated yam pounding machine are the loading supports both in

axial and radial, speed transmission systems, yam propeller beater, bowl, propeller, and frame. The yam blender cutting edge is situated on the top of the propeller which is coupled straightforwardly to the electric engine framework. When the processes begin, the cut previously cooked yam are filled the pot-like pounding chamber and covered with the processing chamber cover. Through its armature section, the electric motor delivers power to the propeller. As the propeller rotates, the yam beater blade is actuated, and the yams in the yam processing chamber begin to be pounded. The processing chamber bears the propeller and the blenders. Pounded yam preparation involves cleaning process of the tuber, removal of unwanted shelling, chopping to smaller pieces, parboiling, and processing the yam with a processing machine before packaging.

Choice of Materials for Development of the Machine

The accompanying elements were thought about while building the electric yam processing machine in view of the strategies depicted by (Oladeji, 2012).

i. The reliability of the material: The reliability of every part of the machine was considered while choosing the materials. The sort of powers that will be experienced during the activity of the machine were placed into thought.

ii. Ability to cut to shape: The materials utilized are not difficult to machine and frame into the expected shape and size.

iii. Costing of material:The expense of the machine planned was placed into thought since it can either make or blemish the outcome of the item. Since designing a machine with no commercial value because of its high cost is pointless, the materials used are reasonable.

iv. Erosion Obstruction: The materials utilized for creation are non-destructive in order to forestall tainting and nontoxic to the food test.

v. Maintenance Stability: The materials used are simple to clean, keep in good condition, and replace if they become damaged. Treated steel was utilized for both processing chamber and instrument which doesn't erode after washing.

vi. Utilization essential parts: The utilization of essential parts was placed into thought to save a great duely and improve consistency.

vii. Accessibility: They are promptly accessible, simple to access and source locally.

Processing Chamber

This is where the bubbling and processing activity happens. It has a diameter of 300 mm and a height of 200 mm and is hollow made up of stainless steel material.

Processing Instrument

This is comprised of treated bar of steel made up of two rotating chopping-process closures. It is found in the processing and the primary part pounds the yam.

RESULT

The outcomes exhibit the adequacy of the electric yam pounding machine in further developing effectiveness, efficiency, and item quality. The machine's exhibition and client input show a high potential for reception and versatility. The machine is an appealing option for consumers who care about the environment because of its energy efficiency and shorter processing time, both of which are in line with objectives for sustainable development. Future upgrades could zero in on further improving energy utilization, coordinating high level elements (e.g., computerized stripping), and investigating applications for other root crops. Figures 1, 2, 3 show the Top, Side, and Front Views of the Developed Electric Yam Pounding Machine.

Figure 1: - Top View of the Yam Pounding Machine

Figure 2: - Side View of the Yam Pounding Machine

Figure 3: - Front View of the Yam Pounding Machine

CONCLUSION

The electrical yam pounding machine was developed, the chamber for pounding was made up of stainless steel for the safety of the food. The frame was made up of mild steel because of strength and durability. Rollers were fabricated with the machine for easy carriage. The performance was smooth, user friendly, less noisy and the end product of the yam pounding was safe for consumption.

REFERENCES

Brand-Miller, J., Burani, J., & Foster-Powell, K. (2003). The New Glucose Revolution-Pocket Guide to the Top 100 Low GI Foods. ISBN1-56924-500-2

Ita, E.E., Uyoh, E.A., Nakamura, I., & Ntui V.O. (2020). Efficient elimination of yam mosaic virus (YMV). *Cryotherapy of auxiliary buds*. South Afr. J. Bot. 123-129. doi:10.1016/j.sajb.2019.12.022.

Meta AI (2024). Sustainable Development Goals (SDG) that align with the development of an automated yam pounding machine. *Meta AI Assistant*. 18-05-2024.

Nweke, F. I. (2019). Obstacles to Improvement in Rudimentary West African Yam Food Technologies. *A Synthesis Food & Nutrition*. Current Research, 2(2), 155–157.

Odior, A.O., & Oyawale, F.A. (2012). Analysis of Production capacity of ka yam flour producing firm using a mathematical model. *ARPN Journal of Engineering and Applied Science*. Pp 820-823.

Odior, A.O., & Orsarh, E.S. (2008). Design and Construction of a Yam Pounding Machine. *International Journal of Nature and Applied Sciences*. 4(3), 319 - 323.

Osueke, C.O. (2010). *Design and Construction of a Yam Pounding Machine;* Available online (blog-site) accessed on the 12th of September 2018.

Sani, M. S., & Aziz, F. A. (2013). Advanced manufacturing systems in food processing and packaging industry. *IOP Conference Series: Materials Science and Engineering*. 46(1), 1–9. https://doi.org/10.1088/1757-899X/46/1/012042

TISRD. (2008). *Tapas Institute of Scientific Research and Development University Press*, Ibadan, pp. 112-118