

Application of blender speed control technology in the processing of salak pondoh into coffee in Sibolong Hamlet

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ABSTRACT

Sibolong hamlet comprises nine neighborhoods with a total population of 672 people. Based on information obtained from Mr. Suharno, the hamlet's head, there are several informal community organizations in the hamlet, including a youth organization and a family welfare program aimed at educating women on various aspects of family welfare. The majority of Hamlet's population is Muslim and works as a laborer, but some work as entrepreneurs. Sibolong Hamlet's geographical location is in the highlands. The natural potential of Sibolong is Zalacca Pondoh. Zalacca (Salacca zalacca) is a species of palm tree native to Java and Sumatra in Indonesia. It is cultivated as a food crop. Zalacca pondoh is a variety of zalacca, widely known for its sweet taste and crunchy texture. One of Mr. Suharno's businesses is making zalacca syrup, which produces approximately 600 bottles per month. However, the abundant production of zalacca requires another innovation that will result in a product with a higher selling value, improving the village community's economy other than selling this as fresh fruit. The Muhammadiyah University Yogyakarta community service team, through a proposed program of science and technology activities and based on the needs analysis carried out, offered a solution to this problem with a touch of science and technology by designing a grinding zalacca seed machine and processing zalacca seed into zalacca coffee.

KEYWORDS

Zalacca Coffee;
Coffee Bean Grinding Machine;
Zalacca Pondok;
Zalacca Seed Processing



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1. Introduction

Sibolong hamlet comprises nine neighborhoods with a total population of 672 people. Based on information obtained from Mr. Suharno, the hamlet's head, there are several informal community organizations in the hamlet, including a youth organization and a family welfare program aimed at educating women on various aspects of family welfare. The majority of Hamlet's population is Muslim and works as a laborer, but some work as entrepreneurs. Sibolong Hamlet's geographical location is in the highlands. The natural potential of Sibolong is Zalacca Pondoh. Zalacca (Salacca zalacca) is a species of palm tree native to Java and Sumatra in Indonesia. It is cultivated as a food crop. Zalacca pondoh is a variety of zalacca, widely known for its sweet taste and crunchy texture. One of Mr. Suharno's businesses is making zalacca syrup, which produces approximately 600 bottles per month. However, the abundant production of zalacca requires another innovation that will result in a product with a higher selling value, improving the village community's economy other than selling this as fresh fruit.

Zhang measured the magnetic dimensions of soft magnetic composite materials under 3D SVPWM excitation [1]. P. Chandran designed and analyzed BLDC motors using FEA tools for electric vehicle applications [2]. Dabbagh designed electromechanical modeling and high-speed design of the tubular ultrasonic motor [3]. Woo used two rotors and different winding patterns for the experimental verification and analytical approach for the electromagnetic characteristics of high-speed permanent

magnet motors [4]. Liu studied High-Speed Permanent Magnet Motor Design with Rotor Radial Force and Motor Loss [5].

Anderson studied windage losses in the narrow-slit region of high-speed electric motors [6]. Current loss and structure design with Magnetic-Thermal Coupling for Toothless BLDC high-speed PM motor were investigated by Du [7]. Kalarikovilagam Srinivasan set up preliminary design and system considerations for an active hybrid laminar flow control system [8]. Saloner discovered that chronically elevated depressive symptoms interact with increased acute inflammation to predict poorer neurocognition in HIV patients [9]. Huang investigated the agitation losses of a 2D high-speed piston pump numerically and experimentally [10]. Allemeersch used secondary acute myocardial infarction for traumatic coronary artery dissection after thoracic-blunt trauma [11]. Suzukamo discovered that short-term chlorogenic acid intake increases an adult's psychomotor and motor speed [12]. Mikolajczak conducted a vibration analysis of a reconditioned high-speed electric motor [13]. Setiawan investigated the Fuzzy, ANN, and ANFIS characteristics of brushless DC motor controllers and evaluated them with a dynamic test [14]. Newman examined Twister3, a simple and fast microwire twister [15]. Garcia used an IMU sensor to study smooth movement in chronic post-stroke individuals walking in an outdoor environment [16].

Nageswara Rao proposed a new technique for controlling the speed and position of a bearing less switch reluctance motor using a sensor less shift mode observer [17]. Brekacz used a high-speed generator for a high-speed induction engine driven by a SiC inverter and operating on a shared shaft [18]. Trung Hieu set up the design and control of high-speed 2-phase 4/2 switch reluctance motors for blender applications [19]. Liu, based on performance optimization, investigated adaptive truncation control for road headers [20]. K. Kails analyzed the loss characteristics of HTS-coated conductors in the field windings of electric aircraft propulsion motors [21]. LI designed and studied centrifugal compressors in fuel cell vehicles [22]. Gianfilippo investigated Humeral Head Fracture with Intrathoracic Migration [23]. Gomez-Serrano examined the production and dispersion of aerosols during otologic surgery [24]. Cheng studied the rotor dynamics of a very high-speed permanent magnet synchronous motor supported on a bidirectional gas foil bearing [25]. H. Ren investigated the referenced nodal coordinate formulation [26]. Alkhafaji used a PID cascade controller with the PSO algorithm to set up the design and speed control of SynRM [27]. Bortnowski analyzed the energy efficiency of the copper ore ball mill drive system [28]. Ogawa explored multistage fixed pulse pattern control for medium voltage high-frequency inverters [29]. Hu considered the effect of the assembly compressive force for the rotor strength of high-speed permanent magnet motors [30].

The problem with producing innovative zalacca products was a lack of human resources with technical and management skills, the manual production equipment which hampered the production process, and the salad processing, which was not maximized. The community service was looking into these issues to help with the motor speed control algorithms in designing zalacca seed grinding machine.

2. Method

The activity plans in order to implement the solutions offered were to manufacture of Zalacca pondoh seed coffee powder maker and conduct training to operate and maintain the machine.

The steps to build the grinding machine were first scheduling the work, , designing the machine, preparing the materials for the tool, creating the parts of the tool, assembling the spare parts of the tool, testing and refining the tool, and finally measuring the performance of the tool in terms of ease, safety and speed of the production process according to its function. The training included formulating relevant training materials, making a training schedule, preparing training tools and materials, instructor division of duties, implementation, and evaluation

Zalacca farmers, who were partners in this science and technology activity, actively participated in all events. The leader and some of them played a role in providing training venues, promoting consumption, and socializing the training program to farmers outside the hamlet.

3. Results and Discussion

An initial site survey was conducted to identify issues and opportunities in Sibolong Village. The following step was to collaborate with partners to plan the socialization activities, focus group discussions, and do training for the advancement of the hamlet.

A mutual agreement to carry out community service activities according to the predetermined process and time has been reached in this coordination. This agreement represents a significant commitment to the success of the community service program empowering zalacca farmers to advance their economic lives by processing zalacca seeds into zalacca coffee grounds. On January 4, 2020, the entire community service team, partners, the community service team from Muhammadiyah University Yogyakarta, and hamlet heads attended the opening of the socialization.

This activity resulted in an agreement on the tasks and responsibilities within each community service partner group. The residents' reaction to the introduction of this program was very positive; they fully supported it, as evidenced by the positive response and expectations conveyed to the community service team. Following the socialization activity, the training was held on January 21–23, 2020.

The zalacca seeds were peeled and sun-dried before being processed into zalacca coffee. The training materials covered peeling the epidermis, drying the zalacca seeds, roasting the zalacca seeds, and grinding them in a zalacca seed grinding machine. Figure 1 shows how cleaned and dried zalacca seeds are roasted in a Sangria frying pan. Zalacca seeds were roasted on an anglo, a traditional wood charcoal or firewood-fueled stove.



Fig. 1. Zalacca roasting

The zalacca seeds are roasted until they are evenly black as shown in figure 2. From the picture it can be seen that about using a coffee roaster to cook zalacca seeds so that the beans mature evenly. The seeds are processed using traditional sangria without compromising the taste and aroma of the original zalacca.



Fig. 2. Zalacca seeds roasted in a traditional sangria pan

Figure 3 depicts the process of processing zalacca seeds into zalacca ground using a zalacca seed grinding machine. The ground-roasted zalacca seeds were then refined followed by a packaging process to extend their shelf life.



Fig. 3. Grinding zalacca seeds

The zalacca coffee powder was placed in an airtight plastic sealer to preserve the aroma of the coffee. The resulting aroma is similar to that of coffee, but the resulting taste retains the distinct flavor of zalacca. Furthermore, Zalacca coffee does not contain caffeine, making it suitable for caffeine-sensitive consumers.



Fig. 4. Refining zalacca seeds into powder

Socialization and training activities in developing natural potential as a manifestation of the zalacca coffee center, Girimulyo District, Kulonprogo Regency, were published in the Jogja Daily on Tuesday, March 17, 2020.

4. Conclusion

Zalacca coffee is made from zalacca seeds processed into ground coffee like coffee beans but not mixed with coffee. Several stages are required to process zalacca seeds into quality zalacca coffee. First, the zalacca seeds are separated from the zalacca fruit, washed, and cut into 2 or 4 parts. Then the pieces of zalacca seeds are sun-dried until the moisture content is 10–12%. After that, the dried zalacca seeds are roasted in a pan. The resulting roasted zalacca seeds are directly ground and sieved or refined. Then proceed with the packaging process to increase the shelf life of zalacca coffee. The socialization was carried out on January 4, 2020, and was attended by all service teams, partners, the KKN UMY team, and the village head. The socialization was continued with training on January 21–23, 2020, which was attended by all service teams, partners, the community service team of Muhammadiyah University Yogyakarta, and the village head. The activity produces packaged instant coffee powder products. Suggestions for future activities include monitoring and evaluating the sustainability of the zalacca coffee powder business, ensuring product quality standards for instant coffee produced, improving product packaging and labeling, and expanding retail-based marketing networks.

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Author Contribution

This community service activity program contributes to training in the development of zalacca coffee by involving partners in the Sibolong hamlet in Girimulyo District, Kulon Progo Regency.

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Conflict of Interest

The authors declare no conflict of interest.

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