



**PROCEEDING**

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## **International Conference of Green City Design**

**“The Concept of Green City Development for Medium City  
in Facing Global Warming”**

**Bukittinggi, 5<sup>th</sup>-7<sup>th</sup> of December 2013**



**PYAKUMBUH AGRICULTURAL POLYTECHNIC**  
**Jalan Raya Negara KM 7 Kec. Harau**  
**Kab. Limapuluhkota**  
**TELP (0742)7754192-FAX (0752) 7750220**

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**THE CONCEPT OF GREEN CITY DEVELOPMENT FOR MEDIUM CITY IN  
FACING GLOBAL WARMING**

**BUKITTINGGI, DECEMBER 5<sup>th</sup> and 6<sup>th</sup> 2013**



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**Editor :**

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*Ir. Muliadi Karo-Karo, MP*  
*Trinovita Z. Jingga, S.Kom.M.Kom*  
*Rilma Novita, STP, MP*

**Layout :**

*Muthia Dewi, S.Pt, M.Sc*  
*Yenni, SE*  
*Annita, SP*

**Cover Design :**

*Er Prabawa Yudha, S.Si. M.Sc*  
*Trinovita Z. Jingga, S.Kom, M.Kom*

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Address : Jalan Raya Negara KM 7 Tanjung Pati Kec. Harau  
Kab. Limapuluh Kota, Sumatera Barat 26271  
Telp. : (0752) 7754192  
Fax. : (0752) 7750220  
Website : <http://www.politanipyk.ac.id/>

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## Development Tool Grinder Mechanical Roller System For Cassava Cracker

Yuni Ernita, Sandra Melly, and Fithra Herdian

### Abstract

The results of research on potato chips industry by Yuni and melly (2012), suggest that the demand for cassava cracker products classified as very high, resulting in a purchase price of cassava crackers continue to compete. With limited resources there are many requests that can not be fulfilled in this maximal. The problems occurs due to several factors which are, processing equipment used in the production process there are crackers still done manually as in some process of pulverization, milling and drying crackers. Based on the line of thought, it is necessary to research on "Development Tool Grinder Mechanical Roller System For Cassava Crackers" are implemented gradually. The purpose of this study are as follows: Development of a mechanical grinder roller system for cassava crackers, functional and structural test tool grinder, tool performance testing with several parameters, economic analysis. The study was conducted in a workshop Polytechnic State Agricultural and Industrial Payakumbuh Crackers Sweet Sawahlunto Kubang Village from May to December 2013. From the results of mechanical testing tool grinder roller system can be concluded that the milling capacity is 20 kg / hour increased by 300% compared to the semi-mechanical mill with a capacity of 7 kg / hour. Results milling longer and wider, reaching 35 x 20 cm by means of a mechanical spring 25 x 15 cm. Thickness mechanical milling with grinding tool can be adjusted according to the desired thickness.

The results of the economic analysis of grinding using a grinding tool and a grinder mechanical spring mechanical roller system found that the cost of operating a mechanical grinding mill spring ranges between Rp 2217.7, - up to Rp. 776.2, - the working days 7-20 days / month, and the cost of operating a mechanical grinding mill roller system ranges between Rp. 873.81 to Rp.305.33, - with weekdays 7-20 days / month. NPV calculation results obtained Rp. 61,317,526.40, -, 450% IRR, B / C ratio 2:32, while the break-even point (BEP) by comparing the use of semi-mechanical grinding tool with grinding tool mechanical roller system obtained 2236 kg / year. Judging from the economic aspect, the use of a mechanical grinder roller system can be said to be feasible and advantageous than semi-mechanical grinding tool.

*key word : Tool grinder mechanical roller system, increase capacity, cassava crackers*

### I. Preliminary

Sweet potato crisps industry business is one form of natural resource utilization, which is the business adding value to cassava. Selection of cassava cracker industry business is for several reasons: (1) does not need a large place / special, can be done at home, (2) does not require a lot of time, (3) does not require a professional workforce.

The results of research on potato chips industry by Yuni and melly (2012), suggest that the demand for cassava cracker products classified as very high, resulting in a purchase



price of cassava crackers continue to compete. With limited resources there are many requests that can not be fulfilled to the fullest. This problem occurs due to several factors which are, processing equipment used in the production process are still done manually crackers as in several processes: potato pulverization, milling and drying cassava crackers.

In the milling process cassava dough for crackers made do with a simple mechanical spring tool. Milling cracker dough using Alati is very inefficient in terms of time and energy that is used, the results of research Yuni and Sandra (2012) milling capacity in a simple crackers are dry crackers 5-7 kg per hour, the resulting output does not match what expected as well as the milling process takes a long time cracker. This causes frequent delays request crackers and make a purchase crackers consumer interest shifted to other plants.

Based on that line of thought, it is necessary to research on "Development Tool Grinder Mechanical Roller System for Cassava Crackers" which begins with the development of sitem roller cracker mill with functional and structural test of the device, test performance, and the use of economic analysis tools.

## II. Literature Review

As a source of food, cassava is rich in carbohydrates, vitamin C and iron. In addition to the fresh tubers, bulbs leaves young wood can be used as a vegetable because it is rich in vitamin A and contains iron, calcium, and vitamin B, and C. With processed into cassava flour and tapioca as a source of food and the food industry in the form of noodles, rice noodles, bread, pastry and Tiwul wet and dry instant rice Tiwul gatot instant and ready to eat will be more acceptable to the general public and are now beginning to be developed for improve its flavor.

Crackers are made from dough that its main ingredient is starch. A variety of starchy materials can be processed into chips, such as cassava, sweet potato, rice, sago, wheat, tapioca and taro. In general, the manufacture of crackers are as follows : starchy materials are crushed with or without seasoning, then cooked (boiled or steamed) and the printed form of thin plates and dried called dry crackers. Before consumption, dry fried or baked crackers first (Warintek, 2011).

Crackers are a popular type of food in the Indonesia. Berbagai love this kind of food either lower class or high class. Crackers are very diverse in shape, size, smell, color, taste, crispness, thickness and nutritional value. This difference could be due to the influence of culture-producing areas crackers, raw materials and auxiliary materials used as well as the tools and the way of processing. The composition of the material itself and its processing will greatly affect the quality of crackers, wherein the composition also affects the development of the crackers ([free-download-latest-books.blogspot.com](http://free-download-latest-books.blogspot.com)).

Size reduction can be interpreted also as a form of destruction process of cutting solid form into smaller forms by mechanical force. There are four ways that applied to their prey size reduction, namely (1) compression, size reduction with a hard texture, (2) impact or punch, used for solid materials with a rough texture, (3) attrition, is used to produce a product with smooth texture and (4) cutting, is used to produce a product with a certain size and shape (McChili, et al, 1976). According to Brennan et al, (1974), size reduction aims to: 1. assist in the extraction

2. reduce the material to a certain size for a particular purpose 3. enlarge the surface the material for further processing 4. assist in the mixing.

### III. OBJECTIVES AND BENEFITS RESEARCH

The purpose of this study is as follows:

1. Development tool grinder crackers
2. To test the functional and structural
3. To test the performance of the several parameters, such as the thickness of the crackers and capacity printed
4. Perform testing tool grinder in cracker industry
5. Conduct economic analysis

### IV. Research of Methode

#### 1. Time and Located of study:

The study was conducted in the workshop Agricultural Polytechnic State Payakumbuh Mei to November 2017

2. Analisis milling system
3. Making sweet potato cheep tool grinder
  - a) functional design
  - b) structural design
4. Technical Evaluation Tool for Identifying Performance Grinder
  - a. milling efficiency
  - b. milling capacity crackers
  - c. success rate of grinding crackers
  - d. thickness crackers millstones
5. Economic analysis

Economic analysis is done to determine the operating costs, break point (BEP), the ratio of profits - cost (B / C ratio), and internal rate of return (IRR) of the grinding tool. The calculation is done based on the cost analysis suggested by Hunt (1986) and De Garmon et al. (1984).

### V. Results and Discussion

#### 5.1. Development Tool Grinder Crackers

Mechanical System Specification Tool Grinder Mill Dough Roller For Cassava Crackers

1. Tool Height: 95 cm
2. Tool length: 70 cm
3. Tool Width: 70 cm
4. Tool Weight: 85 Kg
5. Engine: 1/2 Hp
6. Engine RPM: 1400





To more clearly seen in Figure 5.1.

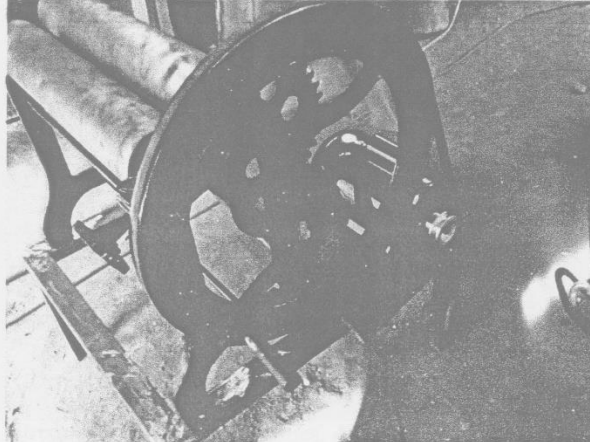


Figure 5.1. Tool Grinder

## 5.2. Cassava Processing Crackers

The processing of cassava to be a cracker, consists of several activities, can be seen in Figure 5.2

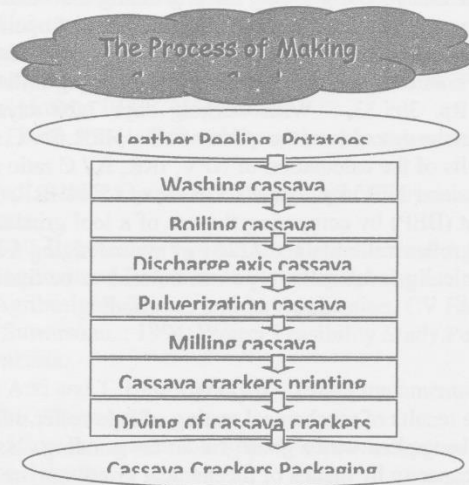


Figure 5.2. The Process of Making Cassava Crackers

### 5.3. Results of mechanical testing tool grinders in industrial and mechanical semi cracker

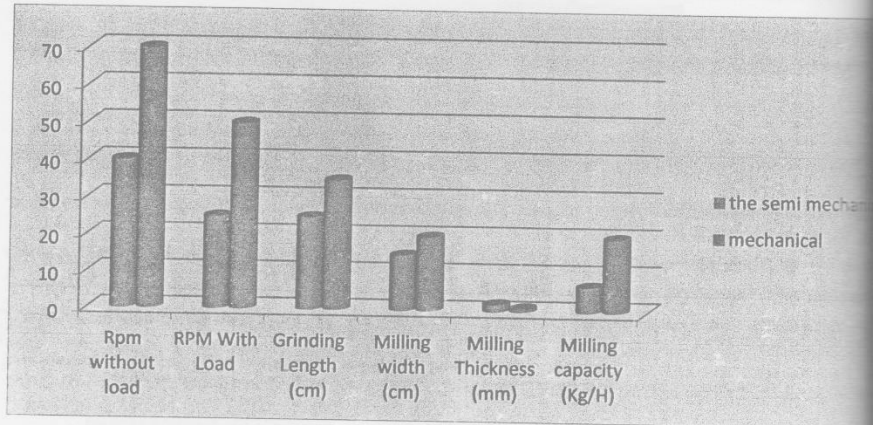


Figure 5.3. Results of Mechanical Testing Tool Grinders in Industrial and Mechanical Semi Cracker

### 5.4. The results of the economic analysis of mechanical roller system

Economic analysis of grinding using grinding tools and the mechanical spring-type mechanical roller mill can be concluded, that the cost of operating a mechanical grinding mill spring ranges between Rp 2217.7, - up to Rp. 776.2, - the working days 7-20 days / month, and the cost of operating a mechanical grinding mill roller type ranges between Rp. 873.81 to Rp. 305.33, - With working days 7-20 days / month, based on the calculations it can be determined the value of NPV, IRR, B / C ratio and BEP.

The results of the calculation of NPV, IRR, B / C ratio and the BEP can be seen in appendix 3, obtained NPV Rp. 61,317,526.40, -, 450% IRR, B / C ratio 2:32, while the break-even point (BEP) by comparing the use of a tool grinder with a mechanical spring-type mechanical roller mill obtained 2236 kg / year. Judging from the economic aspect, the use of a mechanical grinder roller type can be said to be feasible and advantageous than the semi-mechanical grinding.

### VI. Conclusion

- From the results of mechanical testing of type roller mill can be concluded that the tool can be applied with a good grinder for grinding cassava cracker dough.
- Milling capacity by means of mechanical grinding type roller reaches 20 kg / h. In other words the capacity increased by 300 % compared to the semi-mechanical mill where grinding capacity by means of a mechanical spring is 7 kg / hour.
- Judging from the results of milling, by applying a mechanical -type roller mill grinding result is longer and wider than the results of using the tool grinder grinding with mechanical spring, which reaches 35 x 20 cm, previously with semi-mechanical grinding.



- tools only 25 x 15 cm . So is the case with the thickness of the mechanical milling with grinding tool can be adjusted according to the desired thickness .
- d. The results of the economic analysis of the use of tool grinding roller type mechanical milling operating costs obtained ranged from Economic analysis of grinding using a grinder and tool grinder mechanical spring -type mechanical roller milling was found that the cost of operating a semi mechanical grinders range between Rp 2217.7 , - up to Rp . 776.2 , - the working days 7-20 days / month , and the cost of operating a mechanical grinding mill roller type ranges between Rp . 873.81 to Rp . 305.33 , - With working days 7-20 days / month
  - e. NPV calculation results obtained Rp . 61,317,526.40 , - , 450 % IRR , B / C ratio 2:32 , while the break-even point ( BEP ) by comparing the use of a tool grinder with a mechanical spring -type mechanical roller mill obtained 2236 kg / year . Judging from the economic aspect , the use of a mechanical grinder roller type can be said to be feasible and advantageous than semi- mechanical grinding tool .

#### REFERENCES

- Asri N., 2003, Introduction to Microeconomics, Applications and Management, Banyumedia Publishing, Malang.
- Bishop, CE, and Toussaint, WD, 1986, Introduction to Agricultural Economic Analysis, translated by Wisnuadji, Harsojono, Suparmoko, Faculty of Economics UGM Team, Pearl SumberWidya, Surakarta.
- Damardjati . , 2000. Cassava and the National Rice Production. One Day Seminar. Bogor Agricultural University.
- Faried W, 1991, Macro Economics, BPFE UGM, Yogyakarta.
- Gunawan Sumodiningrat, Dr., M.Ec., 1997, Introduction to Econometrics, First Edition, Fifth Printing, BPFE, Yogyakarta.
- Martinich, Joseph S. , 2003. Production and Operation Management. John Wiley & Sons, N.Y, USA
- Prawirosentono, Suyadi. , 2007. Operations Management. Analysis and Case Studies. Earth Literacy. Jakarta
- Sandra and Yuni. , 2010. Engineering Economics. Department of Agricultural Technology. Agricultural Polytechnic State Payakumbuh.
- Soekartawi . , 1991. Agribusiness Theory and Its Application. CV Eagles Press. Jakarta
- Suad, H, and Suwarsono. , 1994. Project Feasibility Study. Publisher UPP AMP YKPN, Yogyakarta.
- Subagyo, P, Marwan Asri and T. Hani Handoko. , 1984. Fundamentals of Operations Research, BPFE, Yogyakarta.
- Sugiarto et al., 2002, Microeconomics A Comprehensive Assessment, PT. Gramedia Pustaka Utama, Jakarta.
- Suharjo, A. , 1991. Role of Agro-Industry in Improving Revenue and Creating Jobs in the countryside. Papers on Rural Industrialization Symposium.
- Unus Suriawiria. , 2002. Cassava potential. Compass. Sept. 25. , 2002. Jakarta.
- Warcito. , 1991. Agribusiness Cooperative Integration, Conceptual Overview of the PJP- II. Seminar papers. Tanjung Sari

