

Technology Of Tapioca Syrups In The Village Toddotoa, Pallangga District, Gowa, South Of Sulawesi

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Abstract: In the business people tapioca, tapioca drying is often a problem because they rely on sunlight. In the rainy season would be disrupted so that drying The resulting starch quality were poor and lower selling prices. An attempt developed of glucose and fructose syrup production from starch wet expected to increases added value for farmers. Manioc starch yield of about 15-25 percent and the yield into glucose syrup 80-95 percent of the dry starch. The quality of the production process glucose syrup can enhanced by peruses liquefaction, saccharification, purification and neutralization, as well as evaporation. The purpose of food science and technology service activities of knowledge and technology for the community (Ktfc) is to improve the quality of people's tapioca syrup and glucose/sugar liquid produced from tapioca starch processing, using appropriate technology. Community groups of food science and technology program for the community (Ktfc) as partner in service activities is a business group Tapioca People "Tapioca Jaya" and cassava farmer group "Sinar Jaya" in the Village Toddotoa, Palangga District of Gowa, South of Sulawesi. Plan service activities this form of raising the target groups: group Tapioca business people and farmer groups cassava "Sinar Jaya" as a producer of cassava. This service activities begins with conducting a survey to location where industry partners during these activities. Extension of the function and the importance of appropriate technology which will be applied, in particular to a group of business people tapioca "Tapioca Jaya" i.e. improvement of appropriate technology (the process of liquefaction, saccharification, purification, neutralization and evaporation) and the improvement of post-harvest processing of cassava namely: eliminate shrinkage results, and stripping is done with a mechanical device that previously had to be washed to eliminating the silicon content.

Index Terms: Technology, tapioca syrup, Tapioka Jaya, Sinar Jaya, Toddotoa village, South of Sulawesi

1 INTRODUCTION

Situation Analysis Sugar cassava can be provided easily and cheaply, then drinks and snacks can use cassava sugar as a sweetener of the sweetener artificial unhealthy. Needs Indonesian sugar reached 3.3 million tons / year while domestic production is only 1.7 million tons or 51.5 percent of the national requirement. In an effort to open up opportunities glucose production in the countryside, the development of production glucose and fructose syrup for rural scale that can be applied to tapioca people. In an effort to open up opportunities glucose production in the country side, the development of production glucose and fructose syrup for rural scale that can be applied to the tapioca industry people. In indus tri people tapioca, tapioca drying is often a problem, because still rely on sunshine during the rainy season. Certain drying will be interrupted so the quality of the resulting starch poor and lower selling prices.

Therefore, efforts to develop the production of glucose syrup and fructose from starch wet expected to increase added value for farmers. Cassava is a perishable foodstuffs (perishable) and will be rotten in 2-5 days if they do not receive adequate post-harvest treatment. Estimated Post-harvest losses of harvest cassava more than 25 percent. Shrinkage that occurs in cassava can be in the number or or both. Losses can be caused by physical factors, physiology, pest or a combination of these factors. Physical losses caused by mechanical damage during post-harvest and handling, and due to changes in temperature. Settlement cassava farmers are located in the Village Toddotoa, Subdistrict Pallangga, Gowa, South of Sulawesi there are 220 heads of households by the number of people in 1100 soul with details of 435 men and 665 women who occupy residential areas covering 445.3 ha and has a 60% livelihoods depend on cassava farm sector. Tapioca people, is the third major food industry after rice and corn. Cassava is a material source of energy that are rich in carbohydrates and containing glucose. Cassava that tastes less sweet to bitter due glucoside content which can form toxic cyanide acid. Cassava (*Manihot aculeata*) produces tubers that for many people in the tropical zone is food staples (staple food crop). The government recommends that people used foodstuffs as a staple food in addition to rice. Lique faction, saccharification, bleaching, and evaporation is so proper technique flour produced glucose and glucose syrup are good and which meets the appropriate requirements quality standards. Community groups science and technology program for the community (Ktfc) is a business group Tapioca People "Tapioca Jaya" and farmer groups Cassava "Farmers Group Sinar Jaya" in the Toddotoa village, Pallangga District of Gowa, South of Sulawesi. Business groups and farmer groups since 2009. Cassava farmers group is a group of assisted farmers of the group Usaha Rakyat Tapioca. Tapioca Business Group People using materials Raw of target farmer groups scattered in the District Pallangga Gowa, one of which is the Farmers Group

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"Sinar Jaya" as partners in activities of this devotion.

1.2. Problems Partners

Sugar from cassava can be made with simple technology. The result is a glucose syrup and flour glucose is mainly used for food and beverage industry. If sugar cassava can be provided in the community to easily and inexpensively, then processing Food and drinks can use cassava sugar as a sweetener and no longer use artificial sweeteners that have a negative impact and unhealthy. If the production of sugar from starch continues to increase then the price will be competitive with sugar sand. Sugar from starch has a flavor and sweetness is almost the same as cane sugar (sucrose) there is even sweeter. Rakyat tapioca production process is still a problem because they rely on light sun. In the rainy season the drying would be disrupted so that the quality of starch resulting poor and lower selling prices. Thus, efforts to develop glucose and fructose syrup production from wet starch are expected to increase the added value for farmers. The yield of cassava starch is less than 15% and the yield of syrup glucose is less than 80% of dried starch, so the quality of the resulting glucose syrup still low. In the processing of glucose syrup in partner groups did liquefaction and saccharification so well that the levels of amylose is not known. In the process saccharification is also not done with those perfect so DE value reached 65.5%, which should have a minimum of 94.5%. 40% transmittance color values should have 60% transmittance. and briks 20-26 brix, which is supposed to be 30-36 brix. Also in the evaporation process, this is the end of the process of manufacture of glucose syrup to get a good viscosity of acid or enzymatic way not yet reached the optimum briks. Partners in a business group that only reach 25-30 brix ways acid, which is supposed to be 50-85 brix sour way. And for how enzymatic only 20-29 briks, which should have been 43-45 brix. So the quality of starch and glucose syrup resulting poor and not appropriate requisite. The main obstacle faced by farmer groups, namely cassava harvest time yet precise, and had done post-harvest handling well, so that after shrinkage harvesting (mechanical damage during harvesting, and due to changes in temperature) it experiencing post-harvest losses of more than 45%. To obtain tapioca starch, glucose syrup which fits the standard required processing with the process of liquefaction, saccharification and evaporation careful. Too to produce cassava with good quality still needs post-harvest handling which tepa

2. TARGET AND OUTPUTS

The application of science and appropriate technology, especially in the production of syrup. Glucose is expected both product quality and the achievement of higher levels of income. The application of post-harvest handling and treatment can improve the quality of cassava. Cassava in terms of both color and physical appearance, decreased shrinkage results, improvements nutrition, quality and security of the value of food safety. Through training, coaching and application of appropriate technology, especially in the group business people tapioca is in the process of production of glucose syrup is done liquefaction, saccharification and evaporation, expected by the refinement of these processes then improving the quality and added value of products produced. For drying flour tapioca will convey the use of ovens for drying and more controlled

temperature. Handling techniques and post-harvest treatment on cassava farmer groups so that shrinkage post-harvest in farmers' groups can be overcome to 5% previously 35%. Component quality fresh cassava include moisture, starch content, efficiency levels decrease HCN, shape and size of the sweet potato and yam skin thickness, and this will be done on guidance partners. By doing the appropriate technology improvements and the handling and treatment of post Harvest will be able to increase the income and living standards of business groups Tapioca and cassava farmer groups. Expected outcomes of this activity is "Glucose Syrup made from Tapioca" with better quality.

3. IMPLEMENTATION METHOD

3.1. Method Approach

Implementation of this program will be conducted by a business group tapioca "Tapioca Jaya" and cassava farmer groups "Sinar Jaya" as a producer of cassava in the village Toddotoa, Palangga districts-Gowa, South of Sulawesi. The application of science and appropriate technology, particularly in the production of glucose syrup expected either product quality or achievement higher income levels. These activities will be carried out through training, coaching and application of appropriate technology in order in particular " the process of liquefaction, saccharification and evaporation "the business group tapioca. Training, coaching and implementation of post-harvest handling and treatment at cassava farming groups. Where they got the guidance and knowledge about the importance of post-harvest handling and treatment so that the quality of cassava produced better and fisual shrinkage due to mechanical damage during harvesting and handling, temperature changes lead to shrinkage caused by physiological level water, enzymes da respiration all resolved bias. Then the process of making syrup from cassava produced good quality glucose syrup in accordance with quality Standard National of Indonesian (SNI). The impact of service activities is very positive for the business group tapioca "Tapioca Jaya "and cassava farmer group" Sinar Jaya "which produces the corresponding glucose syrup standard (SNI) and indirectly resulted in increased revenue or value economic community cassava farm and business groups tapioca.

3.2. Solutions Offered

Kftc program implementation, will be done by the business group tapioca "Tapioca Jaya" and cassava farmer group" Sinar Jaya "as a producer of cassava in the village Toddotoa, Palangga districts, Gowa. The technologies offered in the form of appropriate technology in business groups, namely tapioca the production process glucose syrup carried liquefaction process, saccharification and evaporation in Toddotoa, Palangga district, Gowa. As partners in service activities of this Kftc. The implementation of post-harvest handling and treatment is working to provide maximum benefit to partners Kftc location service activities with the aim of improve the quality of glucose syrup by providing basic knowledge about engineering the production of glucose syrup with liquefaction, saccharification way and evaporation in the group efforts and provide guidance to the group. Glucose syrup quality can be improved by applying the appropriate technology that is using the process of liquefaction, saccharification, and evaporation and improved

handling and post-harvest treatment on farmer groups so that this method can improve the quality of syrup according requisite glucose in the SNI. Glucose syrup production process includes liquefaction process is a process of hydroxy starch to dextrin by an enzyme alpha amylase at temperatures above the gelatinization temperature with Ph optimum for alpha-amylase activity, during the time specified for each type enzyme. After that the temperature is maintained at 105°C and pH 4-7 for cooking syrup until whole amylose degraded into dextrin. In the process of saccharification, starch dextrin which has been cooled to 50°C with Ph 4 to 4.6. This process takes approximately 72 hours with continuous stirring. This process is completed in the color value of 60% transmittance and brix 30-36. In the evaporation process performed on reactor together (on one fermentator). When the production process is done every day then three fermentator the same, because the fermentation process lasts two days.

3.3. Event

Prior to this service activities carried on in advance to conduct the survey the location where the partners for this business group conducts its business activities. Then will do counseling about the function and importance of appropriate technology to be applied. Particularly to the business group tapioca "Tapioca Jaya". then the next describes the processing of glucose syrup and after that it will demonstrate of appropriate technology in the production of glucose syrups, ie liquefaction, saccharification, and specifically on the evaporation and cassava farmer groups will be given counseling about handling and post-harvest treatment. The various steps of the following activities:

1. Entered into a collaboration with the business group tapioca "Tapioca Jaya" and cassava farmer groups "Sinar Jaya" special on tapioca processing units into glucose syrup.
2. Invite members of the business group tapioca and cassava farmer groups in unit processing of glucose syrup.
3. Explain the importance of glucose syrup as a substitute for artificial sweeteners.
4. Explaining the technique, by showing posters, drawings and shapes as well as examples of cassava post harvest handling and application of technology to processing of glucose syrup.
5. Hold a discussion with members of the business group tapioca and farmers cassava.
6. Provide specific guidance to members of business groups and farmers tapioca cassava.

4. FEASIBILITY OF HIGHER EDUCATION

4.1. Performance In Community Service Agency (LPPM)

University 45 Makassar foster 9 (Nine) faculty and one (1) diploma and graduate program with a number of experts and teaching staff available, namely Faculty of Economics, Faculty of Law, Faculty of Engineering, Faculty of Agriculture, Faculty of Letters, Social Political Science Faculty, Faculty of Psychology, the Faculty of Education. Since establishment of the University 45 Makassar in 1986 has established in a Service Agency of Community (LPPM) that is structurally separate research institute. The vision of

University 45 Makassar is "Entrepreneurship Development Center" as an institution higher education in the development of science technology and art-minded entrepreneurship development as well as maintaining the spirit and values kejuangan and supporting national development and public welfare. LPPM University 45 Makassar active supervision to professors who are interested be a servant in the community schemes funded community service by the Ministry of Education and Culture Performance LPPM University 45 Makassar manifesting itself as mandated Tri Dharma College University LPPM 45 ever won the highest number of beneficiaries Vucer of Kopertis IX zones, ever KKN PPM organized in cooperation with the University of Gadjah Mada in 2009 as KKN PPM students of the two universities are placed in Mangala village sub-district and village Tamangapa Untia District of Biringkanaya Makassar municipality.

5. THE RESULTS ACHIEVED

1. Local Local Government Coordination

Coordination with the local government to bring a letter of permission to perform devotion in the village Toddotoa, District Pallangga, Gowa. For understand and apply the technology offered is characterized by the number Participants who attend training as many as 27 people, while the number of partner members as many as 12 people, this can be seen in Table 1 as follows:

Table 1. Level of Education member partners

No	Level of education	Number of comprehension person (level %)
1	Graduated from elementary school (SD)	17 (75)
2	Level of secondary school (SMP)	12 (90)
3	The level of senior school (SMA)	5 (95)
4	Diploma (D3)	1 (100)
5	The Bachelor (S1)	1 (100)

2. Coordination Program Partners (Business Group and Farmers)

The success of this activity is the high response of cassava farmer group "Rays Jaya "and Starch Enterprises group" Tapioca Jaya ", Sub District Pallangga, Gowa, for Visited Partner Program which Cassava Farmers Group "Sinar Jaya" and a group effort "Tapioca Jaya". Implementation of this program, carried out with cassava farmer groups and being cassava processing tapioca starch and glucose syrup economically valuable to do so absolute high.

3. Training / Mentoring, Handling of Harvest and Post-Harvest Treatment of Cassava.

This activity is done through mentoring, handling and, after treatment harvest. Diversification variety of processed cassava products (flour and glucose syrup). be expected with the processing of cassava into various cassava product, then the farmer groups can increase revenue more than doubled than usual. Extension cassava farmer level consist of:

1. Post-Harvest Handling Technology cassava include activities for determining when harvest, harvesting, stripping, washing accompanied by immersion, cutting,

drying, packaging fresh yam storage.

- a. Determining the time of harvest should be made based on the description of varieties of cassava (age planting) and visual observation (physical appearance)
- b. Harvesting cassava should be performed in accordance with the appropriate age the characteristics of the variety. Harvesting cassava ranged from 8-12 months. Harvest carried out too early will provide fiber content and high rough.

Harvesting done in the following manner:

1. On the loose soil and bulbs pull rod with both hands.
2. However, if the soil conditions rather loud necessary tools in the form of a lever, if there tubers left in the soil, the tubers can be dug with a hoe. Excavations carried out carefully so as not cut or broken bulbs
3. Pemanent with more efficient means of relative lever 67 hours/ha/person) when compared by pulling by hand (113 hours/ha/person)
4. Harvest using pengunkit relatively smaller harvest losses (1.3%) compared to using a hand up to 7%.
5. Separate the bulbs of the rod with the help of a machet carefully at the core of lagging.
6. Enter into a sack and lift of road to be transported home growers by bicycle or wagon. In manual stripping the skin is a way of stripping cassava the best. This method provides a high yield but it takes time a relatively long time and a lot of labor.
 - a. Peeling skin can be done with tools or special tools stripping knife cassava. Mucous in a layer of cassava should be eliminated by means of scraped.
 - b. This treatment is done immediately after the peeled bulb to reduce the levels of cyanide (HCN).
 - c. Paring skin that is not clean will cause the dirt that many cling so resulting in shrinkage stripping increased to 4-10%.
 - d. Washing cassava is peeled immediately washed with running water if still pending to be processed cassava peel should be soaked in water while (Note, all bulbs must be immersed water, the submerged part colored chocolate).
 - e. The cutting process cassava interpreted as slicing/shrink peeled bulb size. Cutting can be done with the tool. Stage process important and fairly determine the quality of flour.

The method of diversification of various cassava product performed as following:

A. Preparation of Cassava Flour (Wheat Starch)

Tapioca is a type of flour made from cassava tubers which wood. Ways of making flour is quite easy and simple as evidenced by more people who are able to apply the process. The main principle flour-making are drying (conventionally with the hot sun) until a certain moisture content, and dried cassava into starch grains.

1. Paring

Done manually which aims to separate the meat cassava off his skin. During stripping, sorting is also performed to select cassava High quality of other cassava. Low quality cassava is not processed and used as animal feed.

2. Laundering

Done by manually by wringing cassava in bathtub filled with water, which aims to separate the dirt on cassava.

3. Cutting

Pemarutan aims to break cassava to be more easily processed further extortion/extraction. Extortion cassava porridge is done by hand using a cloth strain, then kneaded by adding water in which the liquid is obtained. Starch is accommodated in the bucket. The drying process is carried out;

4. Drying

After the precipitate is collected, starch and dried on a sheet of plastic or winnowing of bamboo to be dried for about 48 hours to obtain Moisture Content 14%. This technique requires a land area because it uses sunlight to drying the starch. In the rainy season may not be done except burning of created a kind of green house usefully be put to use as an oven.

4. Training /mentoring appropriate technology (liquefaction, saccharification, and evaporation) of glucose syrup making and mentoring

B. Analysis of Quality of Wheat Starch and Glucose Syrup

The second analysis was conducted in laboratory of Food Technology University 45 Makassar. Tapioca starch contained in the moisture content, ash content, and fiber content. The content of the flour used as a parameter in the testing and the results compared with the existing standard. This test was conducted in the Laboratory Food Technology University 45 Makassar. Analyzed were water content, fiber content and ash content.

1. Analysis of Water Content (Thermogravimetri)

Water content is the water content contained in the material. The principle evaporating water in the material by way of heating. then weigh ingredients until constant weight which means that all water has evaporated. All materials already experiencing the drying is more hygroscopic than the original material.

2. Content Analysis of Ash

The principle of incineration is to provide specific chemical reagent into the material. The use perchloride acid and nitric acid can be used for material that is highly difficult to oxidize. With the oxidizer perkhlorat excellent allows ashing can be accelerated. As the dry method, after completion ashing material is then taken from the inside Muffle and put into oven 105°C for about 15-30 minutes then transferred into the eksikator has been equipped with a moisture absorbent material.

3. Analysis of Fiber Content

Using the ADF detergent Acid Detergent Fiber is a gravimetric method which can only measure the component insoluble dietary fiber.

Table 2. Results tapioca flour quality analysis

No	classification	Specification
1	Circumstances	
	Odor	Normal
	Color	Normal
	Sense	Normal
2	Water Content (%)	12.5
3	Levels Abu (%)	0.30
4	Levels of Fibers (%)	0.10

Table 3. Results quality analysis glucose syrup

No	Classification	Specification
1	Circumstances	
	Odor	
	Sense	Normal
	Calour	Normal
2	The conversion rate of starch (DE)	Normal
	pH	
3	The solids content classification	12.5
	Levels Abu (%)	0.30
4	Levels of fibers (%)	0.10

Table 4. Summary of activities for the training materials provided to employers partners:

No.	Material Time	Method activities	activities place	(Hour)
1	Lecture government policy and farmer groups village	MSME development FAQ	Toddotoa Village, District. Pallangga	2
2	The method of handling post of 4 lectures	Group Tani village harvest FAQ	Toddotoa Village, District. Pallangga	4
3	The appropriate of 4 lectures Technology Business Group	Liquefaction, saccharification, FAQ	Toddotoa Village evaporation, excl. Pallangga	4
4	Flour Quality Analysis of 4 lectures	Business group and glucose syrup FAQ	Toddotoa Village, District. Pallangga	4
5	Guidance feasibility studies of 4 lecturer	Group businesses Preparation of credit proposals	Todotoa Village Discussions, excl. Pallangga	4
6	Packaging design of 4 lectures	business groups And Labeling FAQ	Toddotoa Village, District. Pallangga	4
7	Guidance of 4 Lectures marketing business group	Product and development FAQ	Toddotoa Enterprises, excl. Pallangga	4

6. PHASES OF MENTORING TRAINING

A. Training and Mentoring manufacture of packaging

The training program aims to improve the packaging development potential product tapioca starch and glucose syrup in the Toddotoa Village, Gowa District. Through this program, partners are given the motivation and understanding of the function and the importance of packaging and packaging design in order to increase product sale. This training also practice hand how make creative and attractive packaging using materials easily available and affordable prices, through this training was also delivered of Balai POM importance of halal certification, expiration date, brands and other stuff the associated labeling. Training materials:

1. Know the types and packaging materials
2. Packaging Standard SMEs
3. Creativity Packaging Design

B. Training and Mentoring Product Marketing Methods

Marketing of products is very important to be known by both partners group partners cassava farm and business groups, as this represents an increase income and welfare partners. In addition to guided partners can access bank loans to improve their business. Explains the root cause analysis of alternative marketing strategies, namely:

1. Problems of Human Resources
2. Operational Issues
3. Marketing Problems
4. Financial issues
5. Environmental Issues

C. Research Seminar

D. Loading scientific journal

E. Preparation of the final report and administrative activities

7. CONCLUSIONS AND RECOMMENDATIONS

A. Conclusion

Cassava can be processed into a variety of processed products such as flour starch and glucose syrup. The preparations are very simple, easy to do and does not require a high cost. Simplicity and production costs low gives motivation to the farmer groups of Toddotoa Village, Subdistrict Pallangga-Gowa, South of Sulawesi in developing a business. The process of the activities carried out as follows: the initial phase of the program is socialization to the partner and continued with training and mentoring. The training materials were given to the farmer groups are processing of post-harvest, including how to be a good harvest cassava not easily damaged during harvest time, the timeliness of harvesting, storage. The training materials provided to the business group to create cassava starch and glucose syrup and determine the quality analysis cassava flavour and glucose syrup. The results of evaluation of the understanding partners on how to make cassava flour da glucose syrup, has reached 70 percent. It is measured through practice and market the product. However, it was realized that it was not closed to possibilities there are still

shortcomings and weaknesses, to him it is needed thorough goodness for these activities to be sustainable.

B. Recommendation

1. Undertake integrated cooperation between local government and related agencies in an effort to diversify the application of technology product range cassava processing in farmer groups and business partners.
2. Please do continuous guidance technology of diversification various cassava product on partner business group.

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