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Papaya Fruit Processing as Meat Tenderizer in Ponggok Village, Blitar

Ratna Juwita[*1], Anita Valerie Stephani Simanjuntak[1], Devinda Anggita Putri Sejati [1], Estuning Tyas[1]
[1]*Biotechnology Study Program, Department of Applied Science, Faculty of Mathematics and Natural Sciences, Universitas Negeri Malang, East Java, Indonesia*
[*]Corresponding Author: ratna.juwita.fmipa@um.ac.id

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ABSTRACT
Papaya is one of the largest commodities in Ponggok Village, Blitar Regency. However, the papaya is only sold and consumed as a fresh fruit. Papaya sap contains protease enzymes (protein decomposers), papain and chymopapain, that can hydrolyze proteins. This protease enzyme is a key factor in increasing protein digestibility and absorption, which in turn affects growth of tissue fibers in meat. These two enzymes can break down the bonds in protein molecules into polypeptides and dipeptides. The purpose of this activity is to provide training on making papain enzymes from papaya fruit. The papain enzyme is used as a meat tenderizer. The target of the training participants was thirty people with the target being PKK women who were members of the Ponggok village farmer group. The method in this training uses the stages of preparation, implementation and evaluation. The survey results show that papaya fruit has not been utilized optimally in Ponggok Village, so it is important to hold training on making papain enzyme from papaya fruit.
Keyword: papaya fruit, papain enzyme, meat tenderness, protein, protease

ABSTRAK
Pepaya merupakan salah satu hasil komoditas terbesar di Desa Ponggok, Kabupaten Blitar. Namun, pepaya hanya sebatas dijual dan dikonsumsi dalam bentuk buah segar saja. Getah pepaya terkandung enzim-enzim protease (pengurai protein) yaitu papain dan chymopapain, yang dapat menghidrolisis protein. Enzim protease ini merupakan faktor kunci dalam peningkatkan daya cerna protein dan penyerapannya, yang pada akhirnya mempengaruhi pertumbuhan jaringan ikat pada daging. Kedua enzim ini mampu menguraikan ikatan-ikatan dalam molekul protein menjadi polipeptida dan dipeptida. Tujuan kegiatan ini yaitu memberikan pelatihan pembuatan enzim papain dari buah pepaya. Enzim papain digunakan sebagai pengempuk daging. Target peserta pelatihan adalah tiga puluh orang dengan sasaran ibu PKK yang tergabung dalam kelompok tani desa Ponggok. Metode dalam pelatihan ini menggunakan tahapan persiapan, pelaksanaan dan evaluasi. Hasil survei menunjukkan bahwa belum dimanfaatkannya buah pepaya secara maksimal di Desa Ponggok, sehingga penting diadakannya pelatihan pembuatan enzim papain dari buah pepaya.
Keyword: Buah Pepaya, Enzim Papain, Keempukan Daging

1. Introduction

Ponggok Village is a part of the Ponggok District which is located in Blitar Regency, East Java, Indonesia which geographically has an area of 103.83 km2. This village has a rich potential for fruit farming, for example papaya fruit farming. Unfortunately, the abundance of papaya harvests in Ponggok Village is only sold as fresh fruit and as a result causing its low value. Because of its low selling price, many papaya farmers let their papayas ripen until they fall on their own and rot on the ground because the selling price is not comparable to the wages of workers who harvest the papaya fruit. Therefore, to get around the derivation in the selling price of papaya fruit, the team of Pengabdian Masyarakat FMIPA consisting of lecturers from the Universitas Negeri Malang Biotechnology Department made innovations in developing the use of papaya fruit to be processed

into papain enzymes which can increase the selling price of the papaya fruit and maximize the agriculture potential of papaya fruit in Ponggok Village.

The product produced from the processing of papaya fruit yields by utilizing the papain enzyme in the papaya fruit can be used as a meat tenderizer. This attempt could be one of the alternatives in the utilization of papaya fruit during its harvest season. Papaya sap contains protease enzymes (protein decomposition), namely papain and chymopapain. The papain enzyme is a protease enzyme that hydrolyzes protein, which is a key factor for increasing protein digestibility and absorption and ultimately affects growth tissue fibers in meat. Both of these enzymes are able to decompose bonds in protein molecules into polypeptides and dipeptides [1]. The crude papain enzyme in papaya sap can have an effect on the texture, tenderness and cooking shrinkage of the meat.

One of the satisfactions of consuming meat is determined by its level of tenderness. Meat tenderness is determined by three main components, one of which is the degree of contraction of the sarcomere (sarcomere length), the extent of integrity/degradation of the structural myofibrillar proteins (proteolysis), and the connective tissue content/composition. The enzymes in papaya can penetrate the peptide bonds contained in myosin resulting in changes to the myofibril structure consisting of actin and myosin. The increase in meat tenderness occurs due to the weakening of the myosin bond to actin [2]. Weakening the bond between myosin and actin due to the addition of the enzyme papain can increase the tenderness of the meat. Papain enzymes can increase the tenderness of meat. The higher the concentration of enzymes used, the faster the reaction rate will increase, so that the work of enzymes in hydrolyzing muscle fiber proteins and binding fabrics is also higher, so that more tender meat can be produced [1].

As a result, the use of papain enzyme in papaya fruit can benefit two sectors, namely agriculture and animal husbandry. In the agricultural sector, it is to be expected that the utilization of the papain enzyme will help the community to process their crops better and more creatively as well as prevent environmental pollution due to excess papaya production. Meanwhile, on the animal husbandry side, this papain enzyme can help accelerate the tenderness level of meat, even for old cattle whose meat is usually hard, which takes hours just to tenderize the meat. Therefore, with this community partnership program, we want to help the Ponggok village community in making innovations in the use of papaya fruit as a meat tenderizing papain enzyme to increase the selling price of the papaya fruit.

2. Methods

Community service activities are carried out through three stages, namely: (1) preparation, (2) implementation, and (3) evaluation.

2.1. Preparatory stage

- Team coordination. Team coordination to align perceptions of the stages, outputs, and objectives of the community service program.
- The trial of papain enzyme production using papaya extract aimed to determine the effectiveness of the enzyme.
- Making outreach materials. Aims to expedite the delivery of material to participants

2.2. Application stage

- Socialization. The socialization was carried out directly by visiting the service location Ponggok village with the target participants having papaya trees. Socialization related to the processing of papaya fruit as a meat tenderizer. We invite PKK women who were members of the Ponggok village farmer group in Ponggok village hall.
- Direct assistance for making papain enzymes in the Ponggok village hall twice a month and monitoring through the whatsapp group. The assistance is intended to prevent errors that occur in the manufacture of papain enzyme extract as a meat tenderizer.

2.3. Evaluation stage

- Testimonials. Aims to find out whether the implemented program has been implemented properly or

not.

- Assistance in the production of papain enzyme extract. This assistance aims to find out the changes in the Ponggok village community by involving papaya fruit as a basic ingredient for meat tenderizers. This can be seen from one of the participants who made his own meat tenderizer product after receiving this training. We follow-up by whatsapp group.
- Preparation of activity reports and outputs.

2.4. Survey stage

At this stage, a survey was carried out which aimed to find out the benchmarks for the success of implementing community service.

The way to make papain enzyme extract is firstly select a young papaya fruit [3]. Then, the fruits were washed and cut into small pieces then grinded by using a blender. An activating solution was made by mixing 4 liters of distilled water with 20 grams of NaCl. The papain extract made by a ratio 1:4, it means 1 kg papaya fruits mix with 4 liters activating solution then filtered. The filtrate is placed in a closed container.

The way to tenderize meat was by soaking the meat in papain solution for 20 minutes. After that, the meat was boiled at a maximum temperature of 100° C until cooked.

3. Results and Discussion

Community service in Ponggok Village, Ponggok District, Blitar Regency is carried out in the Ponggok Village Hall. By following the plan, this service was carried out offline, so that the communities can see the procedure for making papain enzyme extract directly. Moreover, the direct training made the material presented is easier to understand and lecturers and students can interact more closely with the community (Figure 1a).

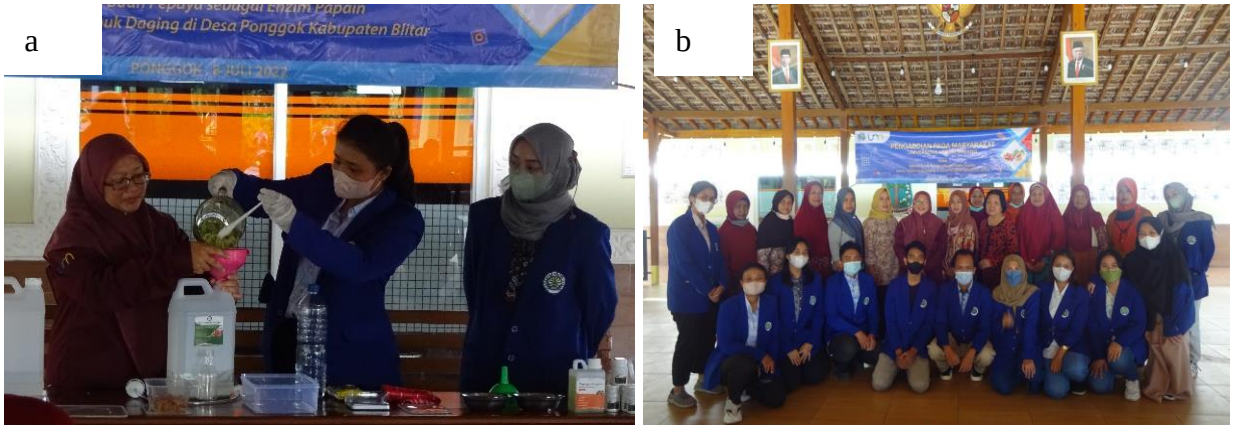

Figure 1. (a) Demonstration stage of making papain enzyme, (b) Service activities in ponggok village.

The material provided includes insights regarding the use of papaya fruit, the understanding and benefits of papain enzymes, and how to extract papain enzymes from the papaya fruit. Then, the activity proceeds with a demonstration of making papain enzyme extract as a meat tenderizer which is presented in two forms, liquid, and powder. At the end of the demonstration session, a question and answer session was also held to measure how clearly the material was conveyed to the public. In addition, the papain enzyme extract which had been previously produced by the team was given to the active participants in the question and answer session. The event ran efficiently, attended by 30 participants and 12 students from Universitas Negeri Malang while adhering to health protocols (Figure 1b).

Based on the survey results, it was found that before the training was carried out, 90% of the participants had never known about the utilization of papaya sap and fruit into the papain enzyme. This can be seen in Figure 2 where the participants learned about this for the first time.

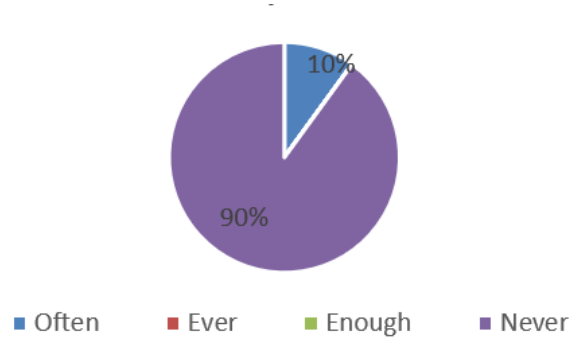

Figure 2. Papain enzyme knowledge.

As many as 100% of the participants had never made papain enzyme extract as a meat tenderizer before (Figure 3). Therefore, it can be concluded that the people of Ponggok Village have not utilized papaya fruit as a papain enzyme. This is a result of they have not received information regarding the use of papaya fruit for the papain enzyme as a meat tenderizer.

Figure 3. Ever Have or Never Made Papain Enzyme.

Meanwhile, 90% of the participants admitted that papaya fruit and sap were very easy to find around them (Figure 4). This answer indicates that papaya fruit is abundant in Ponggok Village and there is no optimal utilization. Therefore, a lot of papaya sap and fruit are simply thrown away without being processed into useful products such as papain enzymes. Training like this is very necessary for the people of Ponggok Village to increase their skills and knowledge about the utilization of papaya sap and fruit.

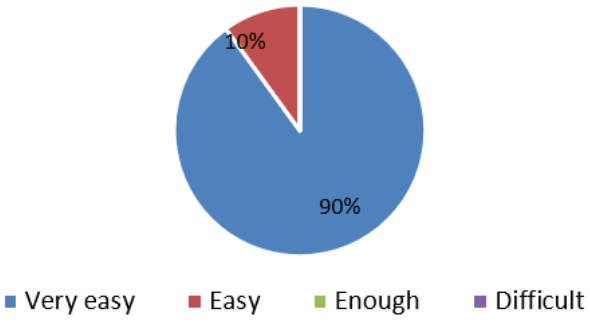

Figure 4. The frequency of seeing the papaya latex.

After the training was held, the participants felt that the training was very useful because, with it, they could find out the procedure for making papain enzymes and maximizing the use of papaya sap and fruit. This is evidenced by the fact that 80% of the participants were very satisfied with the service for questions related to the submission of the DEMO by the organizers (Figure 5).

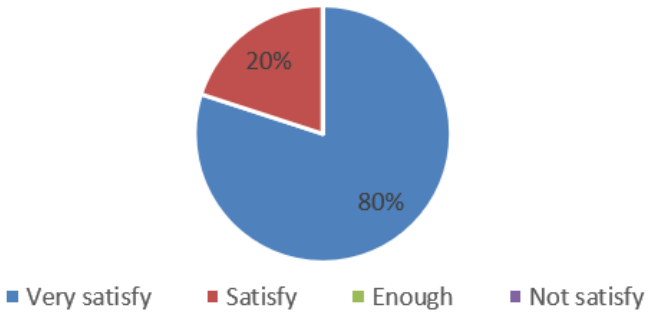

Figure 5. Participant satisfaction with questions related to DEMO service by the organizer.

4. Conclusions

Community training activities on the use of papain enzyme extract from papaya fruit as a meat tenderizer which was held in Ponggok Village, Ponggok District, Blitar Regency received a good response from the community. By holding this training, the community can maximize the utilization of papaya fruit, even though in the implementation of the training, there are still many people who do not understand the papain enzyme and its function. After this training, we monitored through the whatsapp group for one month, it was discovered that ten training participants who were members of micro, small and medium enterprises started to make papain enzymes and market it through village cooperatives and online as the superior product of Ponggok village. This affects economic growth and increases the welfare of Ponggok village farmers.

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