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Application of Shell Washing Machine to Improve Hygiene of Fishermen Groups in Tambakrejo Semarang

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Abstract

Increasing public awareness in Tambakrejo, North Semarang for improve the quality, hygiene and income of the group fisherman from cultivation shellfish. The presence of fishermen in the area oyster harvest done in a way traditional without use machine, then a group of fishermen was created The King to be able to process Hygienic and quality shellfish . The technological transformation that was developed is improve the hygiene and quality of shellfish by using manufacturing technology machine washer shellfish. Downstream research results from the UNNES Team. Machine application technology washer shell For improve hygiene and income fisherman so that in accordance with need market and energy efficiency. Application of machines washer shell is a new innovation technology for downstreaming products from UNNES research team. Machine manufacturing technology washer shellfish, can increase fishermen's income, improve the quality of shellfish green and energy efficiency. Machine manufacturing Shellfish washing is a new innovative technology for downstreaming products resulting from research by the Community Service team. UNNES. During the activity, mentoring and monitoring evaluation were carried out to measure target achievement.

Keywords: washing machine, shellfish, fishermen, hygiene, Tambakrejo

INTRODUCTION

Tambakrejo is is fishermen located in Tanjung Mas Village, North Semarang District, Semarang City, Semarang Province Central Java. Number the population is 600 people family with The number of RTs is 6. The majority eye livelihood resident Tambakrejo is cultivation shellfish [1]. The existence of shellfish is very abundant in Tambakrejo Village, Semarang City, has biological resources that can have economic value for the community. One of the biological resources that can have economic value is green mussels (*Perna viridis*). The shells are taken from their natural habitat, and are also cultivated by the local community. Shells green has cultivated in Tambakrejo and the results the harvest commercialized to collector [2]. Therefore that, a number of group care environment as well as group fisherman The Temple of the King in Tambakrejo own development program plan technology post harvest cultivation shell green This is . accepted and supported with enthusiastic Because aiming For increase income economy fisherman local. Shellfish own price affordable, delicious, and rich in protein. However, Thus, the condition of fishery resources is public property, resulting in competition for shellfish and traditional fishermen will lose in the competition [3][4]. Meanwhile, shellfish that are not cleaned have a pungent odor and a dirty appearance. Post-harvest management is constrained because it is carried out in traditional ways. Survey results field, shows that the utilization shell green the arguably Not yet effective in increase economy fishermen. The low income fishermen, due to various matter like absence ability utilise technology caused by level education fishermen who are still low, sales shell green, price shell green that is not stable and also factors location cultivation shell green is very decisive results production shell green [6][7]. The price of contaminated shellfish on the market dropped sharply to around 3000-6000/kg. While the price of uncontaminated shellfish is around 10,000/kg [8]. The solution needed at this time is How fisherman get tool washer suitable shells with need fishermen [17]. The creativity and skills of fishermen in managing green mussel production are very much needed in the Tambakrejo Semarang environment. Semarang State University, which is housed in the Institute for Research and Community Service (LPPM UNNES) as

a facilitator for downstreaming research products towards the application of research results, especially the technology for making mussel washing machines as a tool for washing mussels [18]

METHOD

Based on problems in the field, based on mutual agreement between the fostered partners and the service team, several problems will be handled together. The problems to be resolved are:

Making of Shell Washing Machine

The design of the shellfish washing machine begins with a design that is tailored to the needs of fishermen, then an initial design is made. After that, it is continued with the manufacturing process. This process is carried out in the Mechanical Engineering laboratory, Faculty of Engineering, UNNES. The processes carried out include welding and other fabrication processes. The final result of the shellfish washing machine is ready for use.

Introduction of Machines to Partners

The machine that was made was then disseminated to partners to introduce and provide information about standard operating procedures and maintenance for the tools produced. Machine evaluation was also carried out to measure its performance [19] [20]. The implementation team of community service activities also carried out intensive monitoring of each activity plan carried out, to ensure that the implementation of the activity could be carried out according to plan. The assessment was carried out as part of the monitoring process, so that obstacles could be fixed immediately. Evaluation was carried out at each stage of the activity, while the evaluation design included a description of how and when the evaluation would be carried out, criteria, indicators of goal achievement and benchmarks used to explain the success of the activities carried out.

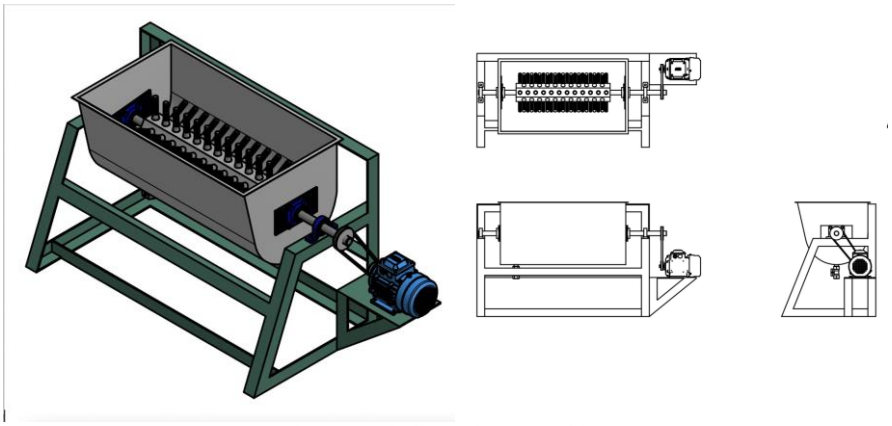

Figure 2. Shell Washing Machine

Analysis of Shellfish Quality

Testing the quality of green mussel products includes the content of hazardous chemicals in mussel production, including: Pb, Zn and Cd. In accordance with the objectives of the activity, the method that will be taken in this community service activity will be implemented in 4 (four) stages of activity, namely; (1) Socialization, (2) Competency Improvement

Pb Testing

Analysis lead (Pb) levels can done with the most common method that is use Spectrophotometry Atomic Absorption Analysis (AAS) Process analysis This involving a number of stage, namely preparation sample, destruction (if required), and measurement use appropriate instrument .

1. Preparation Sample :

The sample to be analyzed that is shell prepared with method filtered, ground and homogenized .

2. Destruction :

If the sample contain compound organic or matrix complex that can bother measurement, then

need done destruction with sour strong such as HNO_3, $HClO_4$, or H_2O_2 for free Pb.

3. Measurement with AAS (Spectrophotometry) Atomic Absorption):

Samples that have been prepared and/ or destroyed entered to in AAS tool. This tool will measure absorption light by heated lead atoms in sample .

4. Data Analysis :

Data obtained from AAS measurements were analyzed For determine Pb concentration in sample .

Zn Testing

Analysis Zn (zinc) is a process for determine level or concentration zinc in a sample. The method used is spectrophotometry atomic absorption assay (AAS)

Following is steps general in Zn analysis :

1. Preparation Sample :

a. Withdrawal Sample :

Sample collected For analyzed is shell results dedication in the field

b. Cleaning and Drying :

sample cleaned up from dirt, gravel, or other materials that can bother results analysis. After that, sample dried, mainly If sample in the form of material congested .

c. Dissolution :

Samples that have been prepared dissolved with use sour nitrate. This process usually done with warming up inside a durable container to sour .

2. AAS Analysis

Method This measure absorption light by Zn atoms in gaseous state. Samples that have been dissolved sprayed to in fire (for example, fire air-acetylene) until the Zn atoms are ionized. Then, the absorbance light on length specific waves for Zn measured .

RESULTS AND DISCUSSION

Heavy Metal Test Results

Measurement results content metal weight of lead (Pb) and zinc (Zn) in shell green in Tambakrejo, Semarang City can seen in Table 1.

Table 1. Content Test Metal Weight on Green Mussels Tambakrejo, Semarang

No	Code	Content (ppm)	Information
A	Green Mussels	0.00 ±0.00	Pb content
B	Green Mussels	2.10 ±0.01	Zn content

Analysis results content metal heavy lead (Pb) such as in Table 1. inside body shell green (*Perna) viridis*) for 3 repetitions own same value which is 0.00 mg/kg which is safe in accordance with standard quality according to PP No. 22 of 2021 Attachment VIII concerning standard quality shell green For commodity food that is around 0.008 mg/L. This is happen due to the place taking sample own mark temperature and salinity good, and No existence input from activity *anthropogenic* like waste domestic, waste industry, waste agriculture, tidal drainage or fresh water influx from rivers, and activities boat fisherman .

Contents metal weight of lead (Pb) in network soft shell green (*Perna) viridis)* ranges from between 0.01- 0.10 mg/kg for size small, size currently range between 0.01- 0.13 mg/kg, and the size big range between 0.04- 0.20 mg/kg. When compared with results the analysis obtained, shows that Pb content is still below maximum threshold condition quality and safety food by ingredients national through SNI 7387:2009 regarding contamination limits metal heavy on food For level metal permissible lead (Pb) weight in marine biota body that is around 1.5 mg/kg. Handayani *et al .,* (2020) said that metal non- essential weight in bivalves including shell green such as Pb, Cd, and Hg are difficult regulated so that will accumulated in a way continously .

Sudewo (2018) said that every the size of the biota has different roles Good in function metabolism or physiological so that can influence distribution metal weight on different networks from biota as a result of the detoxification process metal weight can also be different. Haryono *et al .,* (2017) accumulation metal heavy in biota through chain food, which ultimately will endanger health man

(*biomagnification)*. Factors accumulation can due to difference that is properties biological (type, age, and physiological) of each type of biota, differences characteristic physics-chemistry, and marine biota activities the is located. Juharna *et al .,* (2022) accumulation metal heavy occurs in shellfish green Because metal heavy to form compound complex with substance organic that causes metal heavy No Can quick excreted by shellfish green. Suryono, (2015) metal heavy such as lead (Pb) will accumulated in network gills that will responded with emit mucus covering gill so that result in decline filtration in shellfish green .

Balqis *et al .,* (2021) said that on the shells green bigger size big or shell aged green more old can accumulate metal heavy more tall compared to with shell green in size small or which is still young. Speed accumulation in shells more green young very tall and declining along with increase age, but Because accumulation walk then, then amount metal weight accumulated at age old become more high. This is happen Because accumulation metal heavy No identical with growth in shellfish green .

Table 2. Indonesian National Standards Content Metal Heavy For Commodity Food

No	SNI No.	SNI (mg/kg)	Information
A	SNI 7387:2009	≤1.5	Pb content
B	SNI 7387:2009	2.0	Zn content

Content value Zinc (Zn) is obtained in the field around 2.10 mg/kg slightly exceed standard quality of PP No. 22 of 2021 Attachment VIII concerning Implementation Protection and Management Environment Life mark content metal heavy Zinc (Zn) for marine biota like in Table 2 Above that is around 2.0 mg/kg.

Contents metal heavy zinc (Zn) in network soft shell green (*Perna) viridis)* namely range between 2.10 mg/kg. Content metal heavy zinc (Zn) in network soft shell green (*Perna) viridis)* obtained exceed maximum threshold condition quality and safety food by ingredients national through SNI 7387:2009 for level metal heavy zinc (Zn) is allowed in marine biota body that is around 1 mg/kg. Metal heavy zinc (Zn) is included metal heavy essential where Still needed by the body in amount or dose small. Careful *et al .,* (2020) metal heavy essential like copper (Cu), selenium (Se), iron (Fe), and zinc (Zn) function For guard metabolism body man in amount certain, if excessive will cause toxic to the body. Metal weight that is essential needed organism in formation *hemocyanin* in system blood and *enzymatic*. Measurement results content metal heavy zinc (Zn).

Existence metal heavy zinc (Zn) as metal heavy essential needed by the organisms concerned with the process of growth and development so that during that time ability For accumulate metal heavy Zinc (Zn) is also increasing high. Os *et al .,* (2014) Growth and development shell green has experience the peak after at the stage size currently Then experience decline development at stage size big. However, the results research conducted by Os *et al .,* (2014) in the waters of Tanjung Balai Asahan content metal heavy Zinc (Zn) is highest in shellfish green size big which is 295.93 mg/kg. Amriani *et al .,* (2011) increasingly big size shell so age species it is also estimated that more high, so that time accumulation metal heavy has in progress longer than shell with size shell small. This is suspected in the bioaccumulation process metal heavy zinc (Zn) in shell green influenced by type and size .

Sari *et al .,* (2017) stated that the magnitude size a biota, identical with the age of the biota so that the exposure time metal weight received by the biota that has older age old will accumulate metal more many. In theoretical, shell shell green in size big in line with increasing age, then will increase concentration metal heavy in body shellfish. shellfish green (*Perna) viridis)* which is sized small, will accumulate metal heavy zinc (Zn) more small. Condition This researched by Os *et al .,* (2014) stated that happen *growth- dilution* with use object research on *Mytilus edulis* includes shell green. Mechanism *Growth-dilution* related with method Eat shell that is *filter-feeder* namely sea water flow will to be continued going to to *labial palp* where in the part the will through several filtering processes with *cilia-cilia*. Particles that are sized small will pass, while the size big will issued return through *incurrent siphon* in form *pseudofeces*. Shellfish green in size small capable reach efficiency Drainage *(removal efficency)* with need longer time than shell green in size big .

The results of community service show that the technology for making machines washer shellfish, able to increase income Fisherman, Machine Making washer shell is a new innovation technology to improve the quality of shellfish and energy efficiency.

CONCLUSION

Community service program to public Utilization of Shellfish Washing Machines to Improve the Hygiene of Fishermen Groups in Tambakrejo Semarang. Content metal weight of lead (Pb) in body shell green (*Perna) viridis)* still Good For commodity food, while content zinc (Zn) in the body shell green (*Perna) viridis)* a little exceed standard quality. However, the value content metal heavy lead (Pb) network soft shell green (*Perna) viridis)* is still below standard quality. Machine manufacturing technology washer shell able to improve the quality of shellfish and energy efficiency .

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