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Application and Socialization of Integrated Technology in Cultivating Coconut to Increase the Income of Coconut Farmers Community

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Abstract: The main purpose of this study was to give application and socialization to coconut farmers community about integrated technology in cultivating coconut products through oven drying copra by sand tank system; this is cultivating technology of high quality of coconut oil and coconut charcoal. Specifically, this study was aimed to implement appropriate technology in cultivating white copra by using fireproof furnace break. Technique of this article using socialization and simulation the application of appropriate technology with target communities was coconut farmer's community in Pohorua village of Muna Regency which consists of village officers, coconut farmers and house wife. The result of application and socialization of introduction technology appropriate in drying white copra was coconut farmers were easier to understand technology of cultivating white copra by using fireproof furnace break compared to technology appropriate oven drying copra by sand tank system as heat grading because the material were easy to find and can be made by community itself, simple to make and production price was more expensive. Next, socialization of quality coconut oil cultivation technology by fermentation technique was farmer's community was easy to understand the fermentation process and incubation compared to process of making coconut milk cream because market of production is access table, durable and simpler to make. Introduction of cultivating technology of coconut charcoal by tank technique is proper to be implemented and got positive response from coconut farmers because so far coconut shell was just waste. Result of appropriate technology of drying or cultivating white copra by using furnace break fire prof can increase farmer's income because the price is more expensive that is IDR 12.000/kg while price of black copra as cultivated by farmer's community is only IDR 4.500/kg. In addition, conventional drying construction was easy to be bunted because it is made of wooden board and copra produced still smelled of smoke.

Key words: Integrated technology, productivity, increase income, coconut farmers, techonology

INTRODUCTION

The role of coconut plantation in Muna Regency is very strategic to the community because it has high social-economy value. Coconut is one of potential and prospective community competitive commodity to develop agro industry because agro industry has important role in increase community socio-economy welfare. Pohorua village is centers of coconut production with production average per hectare are about 1 ton. This value can be increased if development of coconut commodity in the future gets serious attention and advance of appropriate technology (Asni *et al*., 2011). So far the main product of coconut in the farmers is just in the form of primary product such as coconuts, copra, frying oil which are produced traditionally while cultivating the side products such as charcoal, fiber, coconut water have not been optimal. Structure of coconut industry make value added obtained is not maximum and don't give chance to farmers to enjoy value added created in the process of coconut cultivation (Saragih, 2010). Besides that the main problems faced by farmers are low price and not optimal coconut product cultivation as well as limited budget or capital.

Cultivated product of coconut such as copra and frying oil still in low quality. This condition caused by product cultivation technology still use traditional way and lack of attention in sanitation factor. In addition, cultivation of coconut hasn't been done commercial and fit market need, limited market information make just few

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farmers understand on quality and hygienic as market needed. Therefore, in increasing quality and value added of coconut cultivation product, some innovations are needed to stimulate strong industry structure from upstream to downstream in agro industry framework in coconut base (Lay, 2012). Innovations are needed in the aspect of technology, funding institution and policy to develop this industry from upstream to downstream as well as wide spread information to community regarding to integrated coconut cultivation which cover some aspects such as improvement in process of cultivation copra and coconut oil. This project is aimed to introduce the appropriate technology to coconut plantation farmer's thus high quality of copra and coconut oil can be obtained.

Based on preliminary survey and discussion with coconut plantation farmers, some facts were found: equipment used by coconut farmers still traditional which is used 2x2m wooden cottage with 3 m high which put beside of their house. Drying process conducted by using coconut shell charcoal while the copra are put on the webbing floor made of mangrove wood with distance 2 m from the charcoal of coconut. The traditional drying process as usually done still has weakness particularly in the duration of drying process (around 2-3 days for 1000 coconuts), copra produced are still smell smoky and drying tools are easy to be burnt;

Copra traditionally produced by coconut farmers community in Pohorua village commonly directly smoked with low quality and uncompetitive price; not appropriate technology development thus farmers community very rely on fluctuation price of world crude oil which strongly influence sell price of their copra. Besides that with level difficulty of transportation and middleman culture has made the life of farmers community is always concerned and the level of life welfare is not increased; overall, all coconut plantation farmers in Pohorua village expect the attention from government, academics, or private sector who can help farmers in delivering appropriate technology so farmers can increase their income from the result of their coconut cultivation; looking at the progress, it is an open opportunity for investors or businessman to take role in developing business in this area not only for the sake of economic purposes but also has positive effects towards coconut plantation farmers community.

From the preliminary data and that condition of coconut plantation farmer's community, we found three important problems which need the effect of appropriate technology in cultivating coconut comprehensively. They are: First, copra oven drying with sand tank as grading heat. Concerning the process of drying among farmers as explained before surely needed improvement effort in the stage of drying process in order to increase capacity and capability of drying copra by designing appropriate technology. Oven copra if we see from how to make and the operation is suitable with the need and condition of coconut farmer's community in Pohorua village. Oven copra is planned to have capacity in drying 1000 coconut with heat source from coconut shell charcoal (DGP, 2010). Heat vapor is not directly to the drying room but goes through filter first to avoid the copra smells smoky and tightly closed with glass control and thermometer. Thus heat vapor produced is maximally kept. Efficiency is expected because the oven copra is not easy to be burnt because the wall of oven is made from steel plate.

Secondly, technology of cultivating white copra by using fireproof furnace breaks. The drying copra as commonly done by farmers is in small scale that is by drying and scoring technique. Drying by drying produces great copra but this technique strongly relies on weather condition. While smoking technique, produce low quality copra with brown to rather black copra color condition. Producing copra by smoking technique becomes the main option because it is custom (traditional production). This technique produce under standard quality of copra with quite high water content about 15-25% therefore, the copra is easy contaminated by microorganism, brown to black in color and smell smoky. The existence of the problems above, appropriate technology is strongly needed to be introduced in cultivating copra, by making copra oven by using materials available in Pohorua, economic and reachable price of materials by farmers that is making oven white copra with fireproof break. Finally, technology of cultivating quality coconut oil, technology of cultivation process develops in the farmers community is still limited thus the quality needs to be improved. Coconut oil, for example the cultivation process is still produced by direct heated in high temperature. This technique, produces low quality of coconut oil thus the coconut oil is fast become rancid, brown in color and storability is shorter (2 weeks). In this application and socialization process of making coconut oil with fermentation technique will be introduced (MAPI, 2006).

Three main programs they will be carried out in this application and socialization are introduction to appropriate technique that is oven drying copra with sand tank system as grading of heat, introduction of cultivation technology of white copra by using fire proof furnace break and introduction of quality coconut oil cultivation technology by fermentation process. The main objectives to be achieved in this application and socialization are: explain to coconut farmers about drying process by using

oven copra with sand tank system as grading heat; create and develop copra oven by applying the rules of appropriate technology for the purpose of drying copra; introduce and explain technology of producing white copra by using fire bricks; develop technology of making oven of white copra response the existing challenge; introduce technology of cultivation of quality coconut oil thus can increase socio-economy welfare.

Advantages that can be obtained in this application and socialization programs of introduction appropriate technology of integrated coconut cultivation: for coconut farmers community: explaining to the coconut farmers community about the using of oven copra with sand tank system as grading heat expected that farmers get knowledge about alternative appropriate technology in drying copra, save time, increase productivity as well as quality in drying copra, can make oven copra with sank tank system as grading heat by them self; obtaining proper price for the product mostly in the form of copra thus increase farmers income through understanding appropriate technology in cultivation coconut; providing socio-economy advantages to coconut farmer's community and to secure the availability of materials to buyers/businessman.

For businessman and industry: providing information of business opportunity for businessman to invest their capital in developing home industry or cultivating coconut industry or even to buyers of cultivating product of coconut; obtaining material for production such as guaranteed quality of coconut oil or copra and coconut material in plenty amount for production process and suitable price. Source of information for business world about potency development of coconut agro industry. Additionally, for academics: increase the role of academician in these case researchers in universities in knowledge and technology research activity to increase industry productivity and as the implementation of three functions of university.

Outcomes which can be obtained from this applications and socialization program introduction appropriate technology of integrated coconut cultivation: provide added value for community as coconut farmers partner in making oven copra by them self with sand tank system as grading heat; provide added value for the regions which produce clay until right now clay in Pohorua village because has not been maximum utilized; provide added value for house wives regarding to fermentation in making coconut oil for the daily life; Stimulate treatment change and transfer knowledge among coconut farmers in integrated coconut thus can increase social welfare.

MATERIALS AND METHODS

Target of implementation of appropriate technology of integrated coconut cultivation is coconut farmer's community in Pohorua village in Muna Regency, village officers, coconut agro industry, house wives and youth organization. Planning of application and socialization programs appropriate technology implementation of integrated coconut cultivation preceded by field survey and interview to community (coconut farmers), village officers, coconut agro industry businessman, house wives and youth organization in Pohorua village about potency and the problems. From the potency and existence problems, the planned programs to explore the potential and solve the problems. Socialization program and implementation of appropriate technology of coconut cultivation were carried out by lecturer's team by involving students and participation from coconut farmer's community. As evaluation, in the implementation of this activities used questionnaire as success parameter of the programs that have been conducted.

Application and socialization programs were coordinated by lecturer's team from Halu Oleo University which is legal government institution as scientific institution to develop sustainable science and technology. Three main functions loaded by every university known as Tridharma of university (education, research and dedication to community) become duty for every lecturer to be implemented responsibly and professionally (Sugiyono, 2012). Operational team in this project based on the expertise has sufficient ability to introduce and develop appropriate technology to increase development, particularly in order to increase economic income of community and community empowerment. Lecturer's team who were directly involved in this project came from interdisciplinary expertise thus process of constructive transfer and sharing of knowledge and provides problems solving toward problems faced by community.

Basically, the success of this application and socialization programs were not only decided by lecturer's team as operator in the field but also involvement of students and community that is farmer's coconut community as the target groups. In addition, local government stakeholders such as head of district, head of village and public figure were expected to help and involve actively in this project. The project implementation can be valuable and usable if there is synergy and team work between institution and cross sectoral as linkage to joint local and national program needs as has role as supervisor mechanism and source of information regarding to development community potency

activity in Pohorua village. The existence of university in the community can give advantage in increasing community income per capita, creating business opportunity and community welfare particularly community that become target of this project. Operationally, this application and socialization programs were preceded by proving supporting material to students as participant who was involved in this project as follows: Application and socialization of oven drying copra with sand tank system as grading heat. This activity used problem solving and applicative method with the steps as follows:

- Operator team explained the importance of using oven copra with sand tank system as grading heat and increase productivity by using oven copra with sand tank system as grading heat
- Operator team socialize or introduce design of oven copra with sand tank system as grading heat as appropriate technology
- Operator team introduce appropriate technology of self modification oven copra with sand tank system as grading heat
- Operator team showed testing sample of oven copra with sand tank system as grading heat as well as evaluate and revise if needed
- Operator team explained benefit and usage of oven copra with sand tank system as grading heat to the farmers or copra company as partner of this project in order to can be implemented in the real production process.

Application and socialization of cultivation technology white copra by using fireproof furnace break. In this activity, method used was simulation in making oven of white copra with the stages are as follows:

- Operator team gave explanation the impotence of using cultivation technology white copra by using fireproof furnace break which produce high quality of white copra
- Operator team designed cultivation technology white copra by using fireproof furnace break by directly involve coconut farmers community
- Operator team together with students and community made and simulated fireproof furnace break with thermometer (Heat and Exchanger)
- Operator team observed level of water content in the white copra with duration 2-36 h
- Operator team observed color of copra produced and recorded amount of fuel needed
- Operator team gave cultivation technology white copra by using fireproof furnace break to farmers or copra partner company to be used in the real production process
- Operator team evaluated and supervised farmers and copra partner company to observe the affectivity and efficiency of cultivation technology white copra by using fireproof furnace break was operated for production

Cultivation technology of high quality coconut oil by fermentation technique and side products of coconut such as charcoal and coconut fiber. In this activity, method used were problems solving and applicative with the steps were as follows:

- Operator team explained production of coconut oil by fermentation technique
- Introduced design and prepared tools/materials needed in producing coconut oil by fermentation technique
- Introduced equipment which must be prepared and simulated the process of making coconut milk cream Operator team socialized process of making fermentation and incubation as well as how to produce side products of coconut such as charcoal and fiber coconut

RESULTS AND DISCUSSION

Based on target that wanted to be obtained, operator team has carried out field survey and interview to communities and officers in Pohorua village regarding to potency as well as problem faced by community. Based on potency and problem exist, programs to explore potency and as well as to solve problems. In implementing the programs used kinship approach to choose small scale copra Partner Company which involved in this project. Effort to solve the problems used more applicative and problem solving ways. Moreover, team introduced cultivation technology of side products of coconut such as charcoal and coconut fiber.

Application and socialization of introduction appropriate cultivation technology of coconut: Based on three main programs that were conducted, thus we also applied and socialized problems solving by developing appropriate technology as follows:

Applied and socialized of oven drying copra with sand tank system as grading heat: Steps in making oven drying copra with sand tank system as grading heat in this program are as follows:

- Operator team gave explanation about:
- The importance of using oven copra with sand tank system as grading heat
- Increasing capacity and productivity
- Operator team introduced design of oven copra with sand tank system as grading heat by appropriate technology based
- Operator team explained benefit of oven copra with sand tank system as grading heat as well as compared it with traditional/ conventional drying technique
- Operator team introduced experiment result of oven copra with sand tank system as grading heat
- Operator team provided offers and comparison between design of oven copra with sand tank system as grading heat and traditional drying to small copra company in order to be used in the real production process
- Operator team were willing to help, supervise farmers and small company in operating the project to see affectivity and efficiency of oven copra with sand tank system as grading heat in the production

Application and socialization of appropriate technology of oven copra was designed to have drying capacity of 1000 coconut with the heat source was from coconut shell. Heat vapor was not directly entering drying room, but goes to filter first to avoid the copra smell smoky and tightly closed with glass control and thermometer. Thus, the heat vapor produced was maximally kept. Efficiency was expected because the oven copra is not easy to be burnt because the oven wall is made from steel. Next, explained and introduced the comparison with traditional/ conventional drying technique as follows: drying copra in conventional technique took long time (12 hours). In addition, the construction is easy to be burnt because it made of wooden board as well as the copra produced was still smell smoky; drying copra with oven took short time (3 hours). In addition, the construction is not easy to be burnt because it made of steel as well as the copra produced was not smell smoky; percentage of level water content which lost was higher using oven (40.30%) compared to conventional technique (37.11%) (Fig. 1-3 and Table 1).

Application and socialization of cultivation technology of white copra: Stage of applied and socialized of cultivation technology of white copra were as follows: operator team gave explanation about: the importance of using cultivation technology of white copra, the increase of capacity and productivity by using cultivation technology of white copra; operator team introduced design of making cultivation technology of white copra; operator team explained benefit of cultivation technology of white copra and explained comparison with the traditional technique;operator team introduced technology of producing white copra to be implemented in the real production process; operator team observed and supervised coconut farmer community in their activity to see the affectivity and efficiency of cultivation technology of white copra.

The form of white copra is white in color, it's more complicated in the process compared to the process of producing black copra and therefore it is more expensive. Commonly, white copra is used for cosmetic needs. Drying process of white copra usually takes 2 days or±24 hours with average temperature above 60 C (UNIDO. 1980). Besides that, team also introduced alternative specification machine of producing white copra from oven copra or drying copra machine:

- Drying capacity 3000 up to 5000 coconut
- Building wide 6× 2×2m (W×L×T)
- Type of shelf was 12 shelves
- Iron hole frame 4×4 cm and building made of polycarbonate
- Electricity needs 450 W for 2 blowers and 2 Industrial Fans 10 inch
- Two gas oven
- Control panel and thermometer
- Temperature 60 C s/d 80 C

Table1: Testing Comparison between Oven and Conventional Technique

Testing with oven copra (Mass, gr)				
Initial	Initial	Initial	Initial	Initial
1000	1000	1000	1000	1000
2000	2000	2000	2000	2000
3000	3000	3000	3000	3000
Testing with conventional technique				
1000	1000	1000	1000	1000
2000	2000	2000	2000	2000
3000	3000	3000	3000	3000

Fig. 1: Traditional conventional drying technique

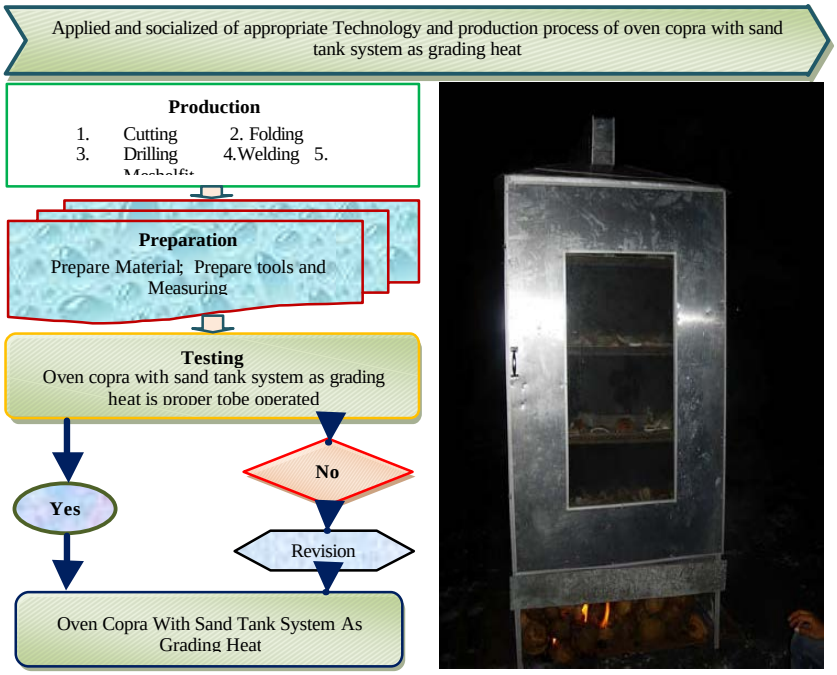

Fig. 2: Application and production steps of oven copra with sand tank system as grading heat introducing and explanation of testing result of percentage of level water content which lost in drying copra through traditional technique: Undried coconut meat (1 kg); Dried coconut meat

Fig. 3: Coconut meat before and after drying process.

Fig. 4: Making white copra from oven copra drying machine modification

In addition, operator team also introduced how to make white copra by using traditional drying technique (Fig 4-6).

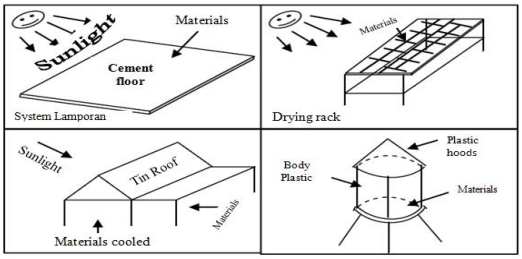

Fig. 5: Technology of making white copra by drying technique

Fig. 6: Production of white copra by traditional drying system

Applied and socialized of cultivation technique of high quality coconut oil by fermentation technique: In the programs of introduction of cultivation technique of high quality coconut oil by fermentation technique by

explaining that coconut production is one of many types of plant which can be used to produce oil. The production of coconut oil traditionally carried out by heating the coconut in high temperature. This traditional technique caused many disadvantages (Saragih, 2010). For example, high temperature heating can change oil structure and produce not good color oil. Recently has been found a method of producing coconut oil that can reduce disadvantage/loss. This method was based on simple biotechnology finding that is the use of Saccharomyces sp to separate the oil from carbohydrate and protein contained in the endosperm cell of coconut. This method is well known as producing coconut oil by using yeast or producing coconut oil by fermentation.

In this fermentation coconut oil making process, some enzymes are needed which was produced by fungus Saccharomyces sp. The enzymes produced by fungus of Saccharomyces sp were released to the environment around the fungus to break the substrata place in which this organic compound can be dissolved (Nur Asni *et al*., 2011). Sub-strate which were broken mostly in the form of carbohydrate compound. Oil commonly tied up with carbohydrate and protein. Breaking out the carbohydrate by enzymes produced, thus the oil and protein will be separated automatically. This settled protein that by Sudanese known as calando.

Making coconut oil by fermentation technique has many advantages compared to traditional technique. In the traditional way, marinade oil that we found is about 156-17% while by fermentation technique around 22-24%. In addition, making oil through fermentation process the procedure is easier, save fuel, and produce clean and high quality oil that meet the Indonesian oil standard. However, put in high concern that the success of making oil with this technique is strongly influenced by types of substrata, types of yeast and environmental factors that influence the life of Saccharomyces sp (Diana Rochintaniawati, 2012). Operator team introduced tools and materials of cultivation technology of high quality coconut oil by fermentation method as follows:

Tools

Materials:

- Plastic jar which has been holed and linkage to plastic hose as 20 cm length
- Washbasin, filter, measuring glass and Baker glass
- Weighed and Thermometer
- 1 kg scarred coconut
- Warm water with 50-600C temperature
- Bread yeast

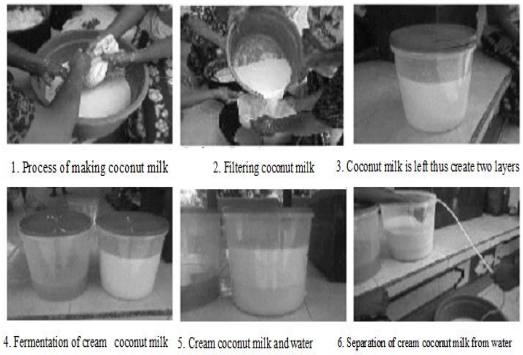

Fig. 7: The work of cultivation technology of coconut milk through

Fig. 8: Mechanism of cultivation technology of coconut oil through

Next, the team introduced how the works of cultivation technology of coconut oil through process of making coconut milk with the steps were as follows: coconut that have been scarred watered by 1 Liter warm water (temperature of 50-60 °C), then wring until we get coconut milk around 1.5 Liter. To obtain maximum result, the pulp that we get can be watered again with 0.5 Liter warm water then we wring it again; coconut milk which obtained then pours into jar that has been linkage with plastic hose in the bottom; close the jar that has been contained coconut milk with paper in order to avoid contamination and then keep it for 6-12 h in order to separate the water and the coconut milk; after the water and the coconut milk is separated, pour away the water through the sole in the bottom of the jar, thus only coconut milk stay in the jar (Fig.7). process of cream coconut milk .

Operator team also introduced and explained the process of fermentation and incubation as follows: measuring cream coconut milk obtained in the previous process, then added bread yeast with total 0.5% from total weight of cream coconut milk and stir it; close and kept cream coconut milk that has been added with yeast in the incubation room with 30°C temperature for 24 hours for fermentation process by the yeast takes place; After the incubation reached 24 hou, the oil which is created will be in the surface. This oil next separated from material (Fig. 8).

Application and Socialization of Cultivation Technology of Coconut Shell Charcoal: Charcoal is widely used in many industry and household needs. The main benefit of charcoal in the industry is as one of active material of charcoal. Production of charcoal that can be used as active charcoal need to meet the quality requirement that has been decided, for that purpose, socialization of charcoal cultivation tools has been conducted by introducing tank method to farmers in Pohorua village in Muna Regency. The socialization of tool to cultivate coconut shell charcoal consists of three steps: desk study about the utilization of coconut shell and how to manage it in the level of farmers. In this step, data was collected which covered wide of areal, production as well as coconut and the side products in Pohorua village in Muna Regency; Introduction of tools in making cultivation tool of coconut shell charcoal and verification in laboratory to the cultivation of coconut shell. Technique of cultivation charcoal by using tank/drum (Fig. 9) with specification as follows: 90 cm drum tall 60 cm diameter, the height of chimney 30 cm and diameter 10 cm, diameter of ventilation 13 mm (3 lines ventilation with 4 holes in each line); the tool capacity is 90 kg of charcoal (Lay, 2012). Steps of burning coconut shell with drum/tank method as follows: Cleaning charcoal, filling drum/tank step by step until the drum is full and controlling process of burn through ventilation, the burning process about 7 hours (90 kg charcoal), stop the burning process by closing all ventilation, cooling and package.

Applied and socialized cultivation tool of coconut shell to the farmer's community in Pohorua village. Before the Applied and socialized proceeded by meeting between team and farmer's community to explain the using of burning tool and the advances. Next, group members applied the burning of charcoal with the burning drum/tank and compared it with the charcoal result as usually done by farmers (stacked burnt). Each charcoal produced obtained then analyzed to know the quality.

The production of charcoal with controlled air supply system basically is not very different with what usually done by farmers and local charcoal craftsman. But, there are differences in the stage, tool/place of burning and way to extinguish the fire. The mechanism which was introduced in producing coconut shell charcoal with controlled air supply is as follows:

- The 7.5 kg coconut shell is put into drum/tank of burning place that has been provided until reach 1/4 part of drum/tank
- Ventilation of air control in the burning place must be closed, except the hole in bottom line was left opened
- The first burning then done by burning the coconut fiber that has been dip to the kerosene as enticement
- After the fire was perfectly burnt, added charcoal to the hole of drum/tank step by step in order to the fire was not extinguish until the drum is full (about32 kg) Put the cover of drum, but the chimney in the top of drum was left opened
- The smoke which came out from the chimney must be observed; if the smoke is quite a lot means that the burning process was running perfectly
- From the opened air control hole ventilation in bottom (line 1), can be seen that charcoal have been perfectly burnt or not. If the charcoal have became coals, it means that the charcoal burnt in the bottom is perfect
- Air hole control in line 1 was tightly closed and hole in line 2 was opened, then added coconut shell until the drum full (about 12 kg) by opening the top drum/tank cover, then the drum was closed again
- Process to open and close the whole air control was conducted as the coconut shell was added into the drum. The procedure was same with previous steps until whole air control in the top line (5 lines)
- After the smoke that came out from the chimney was not dense anymore, but become cleaner, all the holes of air control and chimney hole will be closed

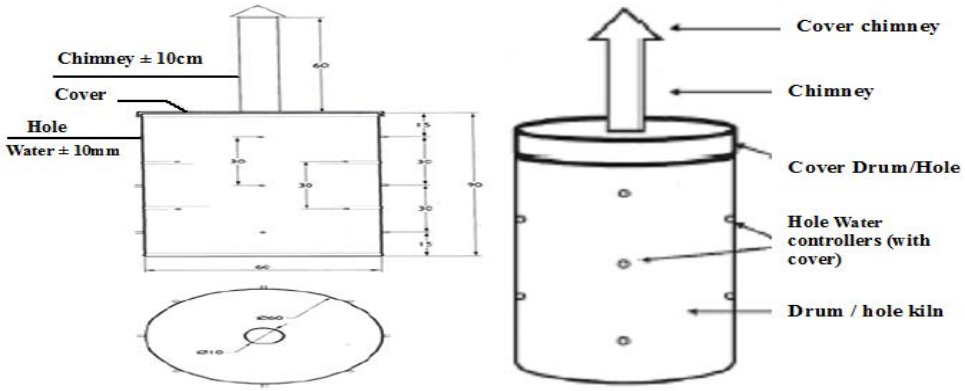

Fig. 9: Applied and socialized of cultivation technology of coconut shell charcoal

Fig. 10: Applied and socialized of charcoal cultivation result, coconut fiber as accessories and household utensil

- The cover must be very tight and make sure there was no leak thus the drum became vacuum. To ensure theres no leak, all cover of holes air control and hole of chimney must be patchwork with clay
- Due to the condition inside the drum is vacuum, fire in
  the drum will be extinguish automatically (around 1.5 hour after closing)
- The top cover of drum can be opened after the temperature is cool enough. Result of burnt which was charcoal then taken out in order the charcoal become cool. The cool charcoal then can be packaged as needed

Response of community after the team introduced the mechanism of tool through discussion with participants who join the socialization of this tool were various, but most of them were interested to use that tool. Farmer's community was interested with this tool because the construction is simple, the material was easy to find, removable, not need special place, low price and quality charcoal produced is better. Most of those wives use coconut shell charcoal as fuel to cook. Due to the better quality of charcoal produced and the yield is higher, the artisans or coconut shell charcoal businessman can use this tool to fulfill the demand of charcoal from other areas, particularly as active material of charcoal. Next, team also socialized cultivation product of coconut shell as accessories and household appliances (Fig. 10).

Applied of appropriate technology in cultivating white copra by using fireproof furnace break: The mechanism to implement appropriate cultivation technology of white copra by using Fireproof Furnace break by the operator team to the farmer's community is as follows:

- Prepared material
- 3 mil iron elbow = 10 rods
- Iron plate from steel 5 mil = 2 Layers

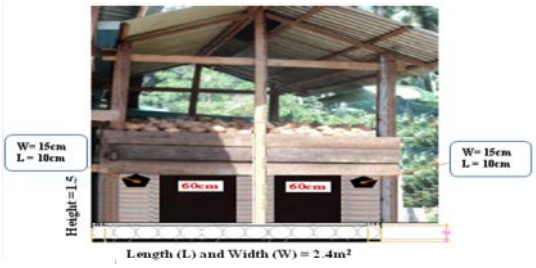

Fig. 11: Design of making fireproof furnace break

Fig. 12: Activity after making fireproof furnace break

- Red Break = 1 M^3
- Cement = 10 sack
- Sand = 4 M^3
- Mountain roach = 3 M^3
- Wood = 1 M^3
- Tin roof = 15 sheet
- Nail =4 Kg

Deciding measurement design of Fireproof Furnace break:

- Length and wide of furnace is 2.4 square meter
- Furnace height 1,2 m
- Furnace tight 10 cm
- Burning whole 60 cm.
- Capacity is about 1.000 to 3.000 coconuts
- Figure 11 of design fireproof furnace break

The production of fireproof furnace break by community: deciding location to make Fireproof Furnace break; foundation making; Arranging the red break as well as design hole of chimney and hole of charcoal burnt; mounting brackets and plates of steel; making the roof frame to protect Fireproof Furnace break (Fig. 12-14).

Testing preparation of fireproof furnace break by coconut farmers community: pour the sand on the iron plate of steel; arrange the coconuts on the iron plate that has been poured by sand evenly; burning through hole of furnace as designed before. The use of Fireproof Furnace break by community as coordinated by head of village Result of testing as conducted by coconut farmer's community, can be concluded that:

Fig. 13: Activities in testing preparation of drying white copra with fireproof furnace break

Fig. 14: Fireproof furnace break is ready to be used result of product with traditional/ conventional drying system; Result of product of white copra with the use of fireproof furnace break technology

Fig. 15: Comparison of quality of production and pricing copra using break furnace fireproof with traditional way through fumigation; a) Sell price IDR 4.500/kg; b) Sell price IDR 12.000/kg

- Burnt duration needed to dry copra was about 2 days or ± 24 h with average temperature was above 60 C
- The white copra produced not smoky smelt
- The non-flammable drying
- The heat is evenly distributed

The use of fireproof furnace break by community was fit to be operated. The use of fireproof furnace break by coconut farmer's community has given benefit to the increasing of copra sell price. Comparison of product quality and price of white copra which use fireproof furnace break with traditional technique by smoke system by community can be seen in Fig 15.

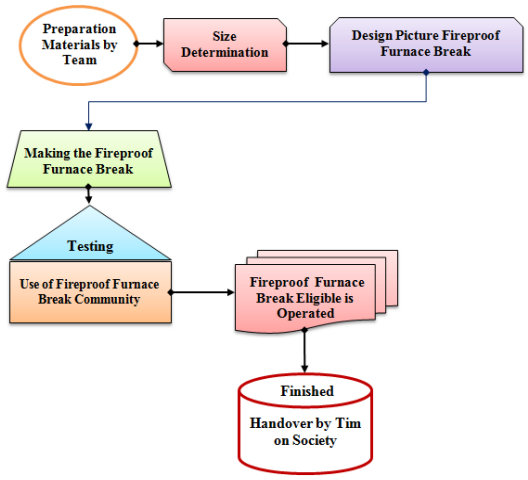

Fig. 16: Steps of making white copra using appropriate technology of; firepro of furnace break

Handover of fireproof furnace break by operator team project to the coconut farmers community which represented by the head of village.

Based on the stage of integrated technology implementation for cultivation white copra using fireproof furnace break to the coconut farmer's community can be presented in Fig. 16.

CONCLUSION

Result of application and socialization integrated technology of cultivation coconut towards the coconut farmers in Pohorua village can de concluded as follows:

Applied and socialized to introduce appropriate technology of drying copra to the coconut farmer community. For farmers, it was easier for them to understand the cultivation technology of white copra using fireproof furnace break than technology of copra drying oven with sand drum/tank system as the grading heat due to several reasons: material is easy to find and can be made by the community itself, simple to make and the product price is more expensive.

After introducing and explaining the cultivation technology of coconut oil with fermentation system to the community. The community is easier to understand how to make fermentation and incubation system than process of making cream coconut milk because the market production is reachable, durable and the process is simple. Because of that the coconut farmer's community was very enthusiastic after the socialization stage completely done and continued to the action/program implementation and supervisory of making high quality coconut oil with fermentation and incubation method.

Introduction through applied and socialized of cultivation tools of the coconut shell charcoal with drum

method to the community. It is economically proper to be operated and got positive responses by coconut farmers because so far the was concerned just as waste. Technically cultivation tool of coconut shell charcoal can be implemented in the level of farmers because the material needed is easy to find with effort able price.

Drying copra with conventional technique needs long time about 2-3 days. In addition, the drying construction is easy to be burnt because it's made of wooden board and the copra produced still smell smoky. Result of implementation of appropriate technology of white copra with fireproof furnace break needs shorter time about ± 24 hours and the construction is not easy to be burnt because it's made of fireproof furnace break, iron plate of steel and the copra produced is not smell smoky again.

Based on the conclusion of application and socialization integrated technology of coconut cultivation toward the coconut farmer community, some recommendations that can be given are as follows:

Principally, coconut farmers community district have positive response towards the introduction of innovation in appropriate technology of drying copra, because it can increase the production quality, more proper price for the cultivation product of copra, coconut oil and can give socio-economic advantages for the coconut farmers community. In addition, support from related stakeholders is needed to supervise in order to this charcoal cultivation can be developed to become agro-industry with community based. After the socialization of introducing cultivation technology of copra and coconut oil in this area, strongly expected that the government of Muna Regency can follow up this project thus can help the farmers to increase their income.

Introduction of technologic of making high quality coconut oil with fermentation method and cultivation of coconut shell charcoal with drum/tank method to the community. Principally the farmers gave positive response because so far the side product of coconut shell was concerned as waste. Therefore, support and supervision from stakeholders to guide the community in order to the cultivation of coconut oil and charcoal can give economic value to the coconut farmers then finally expected that can increase their income. After the socialization of cultivation technology in Pohorua village, academics are expected and agro-industry actors as well the local government of Muna Regency can follow up the project to help farmers to create value added for their business.

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