

Developing Village Youth Entrepreneurs Through Technology For Making Liquid Smoke Based On Agricultural Waste

Bambang Piluharto, Ahmad Roziq, Asnawati

Abstract: there are not many activities aimed at creating an entrepreneurial spirit for village youth. Meanwhile, many young people of productive age villages have the potential to become entrepreneurs based on local resources by utilizing biomass waste. Liquid smoke is the result of condensation or condensation from the biomass pyrolysis process. The content of liquid smoke includes phenols, organic acids and carbonyl, which are widely used as an anti-bacterial, anti-fungal and food preservative. Sources of raw materials that can be used to produce liquid smoke can be obtained from agricultural production wastes such as coconut shells, corncobs and sugarcane bagasse. This activity aims to develop rural youth entrepreneurial skills through the manufacture of liquid waste based on agricultural waste. The form of liquid smoke making activities includes training in making liquid smoke. The training was emphasized on making liquid smoke using agricultural waste as raw material. The results of this activity can improve the skills of rural youth in applying liquid smoke generation technology with various sources of biomass waste. The results of this training can improve the skills of rural youth entrepreneurs through making liquid smoke and encourage village youth to become entrepreneurs.

Index Terms: Liquid Smoke, Waste, Pyrolysis, Biomass, Entrepreneurship, Village Youth

1. INTRODUCTION

Pontang Village is one of the villages in Ambulu sub-district which is located around 35 km from the city of Jember. Based on data from the Central Statistics Agency (BPS) in 2016 it has a population of 11 458 people with a total population of 5,777 men and a population of 5,681 women. The population density of Pontang Village is 1,147 people per square kilometer. Pontang village has 3,273 households with an average of 3 inhabitants per household. Pontang Village is divided into 3 hamlets namely South Pontang, Central Pontang and North Pontang. The numbers of citizen associations in Pontang Village are 18 with 72 neighborhood Associations.

The area of Pontang village is 1113.69 ha consisting of:

- a. Rice fields : 464.00 ha
- b. plantation land : 69.00 ha
- c. Yard : 293,00 ha
- d. Forest : -
- e. Building and yard : 232.49 ha
- f. Other : 55.20 ha

Most of them are paddy fields and yards because the majority of Pontang Village residents work as farmers who are mostly members of farmer groups. The total number of farmer groups in Pontang Village is 9 groups. Corn, orange and papaya are the main commodities of Pontang Village. Figure 1 below shows a portion of paddy fields which constitute the majority land area in Pontang Village. Based on their livelihood, the majority of Pontang villagers are working in agriculture, followed by trade, industry, transportation and construction. The details are in table 1 below.

Table 1 Pontang Village Residents Based on Main Livelihoods in 2018.

Field of work	Number of Residents
Agriculture	2.824
Industry / Crafts	18
Construction	6
Trades	2.086
Transportation	15
Others	983
Total	5.932

Source: Central Statistics Agency of Jember-Indonesia 2019

In carrying out the program of activities, Pontang village has various community groups that contribute to the smooth operation of village activities. These groups include the PKK group, the Farmer group and Youth Organization. Socialization activities of government programs and counseling, social activities that involve villagers, the implementation involves these community groups. One of the community groups that have the potential to be the driving force for activities in the village is the youth cadets Group. Pontang village has a Youth Organization called Karang Taruna Karya Muda. This youth organization is a forum for young people with ages ranging from 18 to 30 years engaged in social fields that support the implementation of village activities programs. However, so far the activities mostly have been on incidental social activities such as community service, socialization of government programs, activities to commemorate Indonesian Independence Day (Figure 1.2). There are not many activities that lead to youth empowerment through debriefing or skills upgrading. whereas the potential of the Pontang village both natural resource potential from agricultural products and human resources, especially youth, it is necessary to carry out an activity directed at economic empowerment in the long term and improving youth skills in the short term. Liquid smoke is the result of distillation or condensation from the biomass hydrolysis process. Sources of biomass can be obtained from coconut shells, wood chips, corncobs, sugarcane bagasse.

- Bambang Piluharto E-mail: bampito.fmipa@unej.ac.id
- Ahmad Roziq, E - mail: ahmadroziq.feb@unej.ac.id
- Asnawati, E - mail: asnawati08@yahoo.com

The content of chemical compounds in liquid smoke such as phenols, organic acids and carbonyl makes liquid smoke has the potential as an anti-bacterial agent, antifungal agent, coagulant and food preservative. Thus the potential of liquid smoke becomes a very large business unit considering that raw materials can be obtained easily and the added value of liquid smoke is also economically promising. The Karang Taruna Karya Muda activity program in Pontang village so far has been mostly on social activities that support village programs such as government program socialization, accompanying counseling and routine annual activities to commemorate Indonesia's Independence Day. There are not many activities that lead to the provision or improvement of skills for young people. The potential of the Pontang village in the form of agricultural products and the potential of human resources, especially youth, has not been widely used as capital for youth empowerment in the Pontang village. Liquid smoke is a product of distillation or condensation using biomass based on agricultural waste. Chemical content of liquid acids including phenols, organic acids, and carbonyls are chemical compounds that act as anti-bacterial, anti-fungal, coagulant (Lingbeck, et.al., 2014). Thus its usefulness is quite large and feasible to be developed as a Karang Taruna Karya Muda business unit. However, the limited knowledge and training experience of the Youth Cadets Organization has become a major problem in exploiting the potential of natural and human resources in the Pontang village. Based on this, the problem in this activity is that Karang Taruna Karya Muda, as a forum for youths in Pontang village, does not have yet the knowledge and skills about making liquid smoke based on agricultural waste utilizing agricultural waste into economically valuable products.



Figure 1. Coconut shell

Corn cobs are the inside of the female organ where the grains sit attached. This term is also used to refer to all parts of female corn ("corn fruit"). The cob is wrapped in klobot ("corn fruit" skin). Morphologically, corncobs are the main stems of modified panicles.



Figure 2. Corncobs

2 LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Liquid smoke is a liquid from the distillation / condensation of smoke obtained through the pyrolysis process. Pyrolysis is the decomposition of carbon-containing material in plants or minerals through a process of burning above 300 oC with limited oxygen. Phenols: as antioxidants, antibacterial organic acids. Carbonyl: forming brown in smoke, mainly derived from the components of glyoxal aldehydes and glyoxal metals (astuti, 2000)

Materials of Liquid Smoke Maker

The materials used to produce liquid smoke are biomass waste, namely coconut shells, corncobs and rice husks. Coconut shell is a part of coconut fruit in the form of endocarp, which is hard, and covered by coconut fiber. Coconut shell is usually used as a craft material, fuel, and briquettes. Coconut shell that is processed can produce valuable added value.

Husks are parts of grains (cereals) in the form of dry sheets, scaly, and not edible, which protect the inside (endospermium and embryos).



Figure 3. Rice Husk

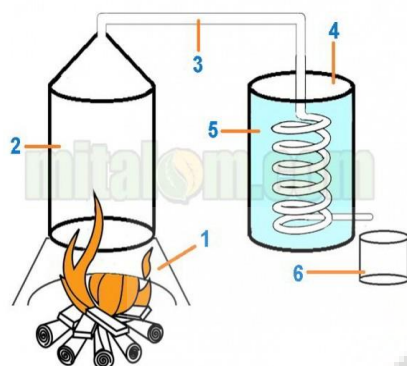
Liquid Smoke Making Process

The process of making liquid smoke using biomass waste materials: coconut shell, corn cobs and rice husks as above can be explained briefly as in the picture below.

Penjelasan:

1. Furnace
2. heating room
3. smoke pipe

4. cooling drum (condenser)
5. water
6. liquid smoke receptacle



Bagan sederhana alat pembuat ASAP CAIR

Keterangan :

1. Tungku pembakaran
2. Ruang pemanasan
3. Pipa penyalur asap
4. Drum pendingin (Kondensator)
5. Air
6. Penampung asap cair

Figure 4: a Simple illustration of a liquid smoke maker

3 METHODOLOGY

Implementation Method

To achieve the target of proposed solutions, this activity is divided into 3 stages, namely counseling and training (workshops) accompanied by assistance. The detailed stages of this activity are described as follows:

1. Counseling. In this counseling, the materials that will be presented are (1) the potential of agricultural waste to become material that is economically added value, (2) making liquid smoke based on agricultural waste. At the end of this counseling activity, Youth organisation will be given a questionnaire to see the level of enthusiasm and understanding of this activity.
2. Training in making liquid waste based on agricultural waste. This training is a following-up activity from previous counseling by practicing making liquid smoke from agricultural waste. In this training will be guided by a team of proposers and assisted by 2 students. Making liquid smoke is divided into 3 stages, namely:
 - (a) Material preparation. Material preparation begins with collecting agricultural wastes such as corncobs and coconut shells. These materials are cut into small pieces and put in a tightly closed vessel.
 - (b) Pyrolysis process. The pyrolysis process is carried out in a reactor at a temperature of around 300-400 oC for 4 hours. During the heating process there will be a cracking process. Then the cooling process occurs through the condenser, and the liquid condenses for 2-3 hours. The liquid is collected and left overnight.
 - (c) Distillation stage. The pyrolysis liquid is then distilled at 150 oC to remove harmful substances such as polycyclic aromatic hydrocarbon (PAH) and benzopyrene. To find out the distillate components produced, it will be analyzed using GC-MS.
3. Assistance and evaluation. The target of the assistance is youth cadets are able to independently make liquid smoke from agricultural waste. There will be three assistances during this activity, with mentoring time intervals every month. In each assistance, youth cadets report the results

obtained independently to the mentor, as well as an evaluation. At the end of the assistance, it is targeted that liquid smoke products will have been made by the participants independently. At the end of this activity, youth cadets participants will receive a questionnaire related to the satisfaction and level of understanding of counseling and training materials.

4 RESULTS AND DISCUSSION

This activity was divided into 3 stages, namely counseling and training (workshops) accompanied by assistance. However, before describing the 3 steps, the Team of activities made the construction and installation of liquid smoke tools. The process of making liquid smoke production equipment. The initial stage made the components of liquid smoke production equipment consisting of (1) a container for collecting raw materials, used as a pyrolysis combustion reactor. (2) Tar collectors (3) condensers and (4) liquid smoke containers. Liquid smoke production equipment is shown in the following figure.

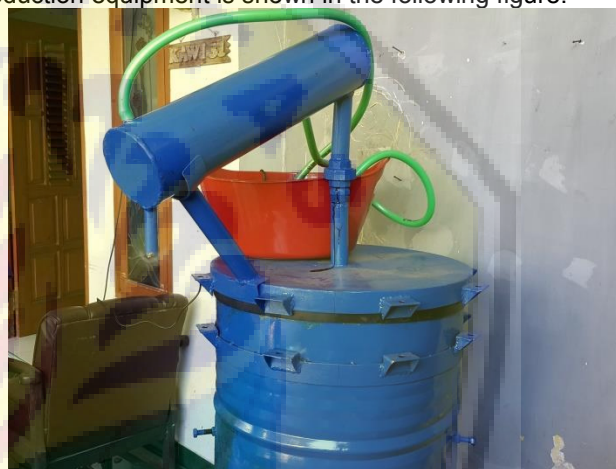


Figure 5. Liquid smoke production reactor

The design of the liquid smoke production equipment above produces less liquid smoke and the product is still mixed with TAR so it produces a black product. Next, it is evaluated and improvements are made to obtain tools such as the following figure,



Figure 6. Modification of Liquid Smoke Production Equipment.

Modifications to the tool shown in Figure 3 produce more liquid smoke. In addition, Tar products can be separated with liquid smoke. Liquid smoke produced from this tool, categorized as grade 2 which can be applied for the treatment of skin for farm animals, and also termite resistant.

COUNSELING ACTIVITIES

Counseling covered the potential of agricultural waste into economic valuable material such as the potential to become organic fertilizer, and liquid smoke. This activity was followed by 10 youth cadets, at the Pontang village hall, Ambulu sub-district, Jember district. The counseling participants were enthusiastic about listening to this activity. This activity was closed with a question and answer session.

Liquid Smoke Production Training Activities

This training activity was a follow-up activity of counseling. In this training, coconut shell was used as biogas material. The training process began with inputting coconut shell raw material into the pyrolysis reactor (figure 7).



Figure 7. Pyrolysis reactor

Then, combustion was done through the technique of "inducement" by burning coconut shell so that it can burn completely (Figure 8).



Figure 8. Combustion Process

Next, when the smoke had overflowed, the reactor was closed and a condenser pipe was installed (Figure 9)



Figure 9. Condenser Installation Process

The process of cooling the smoke was by leaving it for about 8 hours, and then the smoke obtained was collected to produce liquid smoke (Figure 10)



Figure 10 The process of producing liquid smoke

CONCLUSION

Raw materials for producing liquid smoke could be obtained from agricultural production wastes such as coconut shells, corncobs and sugarcane bagasse. This activity aimed to develop the skills of youth cadets through making liquid smoke based on agricultural waste. The forms of liquid smoke manufacturing activities included counseling and training. Counseling was done by lecturing method about the potential of agricultural waste into material with economic value. The training focused on making liquid smoke using agricultural waste as raw material. The results of this activity could improve the skills of rural youth in applying liquid smoke making technology with various sources of biomass waste. The results of this training can improve the skills of rural youth entrepreneurs through making liquid smoke and encourage village youth to become entrepreneurs.

REFERENCES

- [1] Badan Pusat Statistik [BPS]. (2016). Statistik Daerah Kecamatan Ambulu 2016 : Badan Pusat Statistik Kota Jember.
- [2] Jayanudin dan Endang Suhendi, (2012), Identifikasi komponen kimia asap cair tempurung kelapa dari wilayah anyer banten, Jur. Agroekotek 4 (1) : 39-46, Juli 2012
- [3] Lingbeck J.M , Cordero P , O'Bryan C.O, Johnson M.G ,Ricke S.C, Crandall, P.G, (2014), Review: Functionality of liquid smoke as an all-natural antimicrobial in food preservation, Meat Science 97, 197-206
- [4] Darmaji, P., (2002), Optimasi pemurnian asap cair dengan metode redistilasi, jurnal Teknol. dan Industry Pangan, volume XIII, No. 3
- [5] Mawa J.M., Sirun A , Kaligis, G.J.F, (2015), Assess Experimental Use Fractionation Column on Distillation System Liquid Smoke as Preservatives Food of Coconut Fiber, Food Science and Technology 3(1): 18-22