

# Community Empowerment With the Utilization of Yards For Grape Cultivation Using Biochar Mixed Media In Covid-19 Pandemic

Susila Herlambang <sup>1,\*</sup>, Danang Yudhiantoro <sup>2</sup>, Astrid Wahyu Adventri Wibowo <sup>3</sup>

<sup>1</sup> Soil Science Department, Universitas Pembangunan Nasional Veteran Yogyakarta, Yogyakarta, Indonesia

<sup>2</sup> Economic Management Department, Universitas Pembangunan Nasional Veteran Yogyakarta, Yogyakarta, Indonesia

<sup>3</sup> Industrial Engineering Department, Universitas Pembangunan Nasional Veteran Yogyakarta, Yogyakarta, Indonesia

\*Corresponding Author: [susilaherlambang@upnyk.ac.id](mailto:susilaherlambang@upnyk.ac.id)

## ARTICLE INFO

## ABSTRACT

### Article history

Received : August, 2021

Revised : March, 2022

Accepted : April, 2022

### Keywords

Biochar

Grape cultivation

Yard

Community service

**Background:** The social economic impact of the Covid-19 pandemic was felt by all levels of Indonesian society, especially the people in Mayungan, Potorono Village, Bantul Regency. Currently, compost houses and waste banks have been formed from the collection of household waste in RT 04 and RT 05 with a capacity of 1.5 tons per week. Community service activities were carried out in the form of using the yard for grape cultivation with mixed media of biochar. Mixed media technology is expected to increase the efficiency of agricultural costs and productivity of grape cultivation.

**Contribution:** Seeing the great potential of Mayungan and as an effort to improve the psychological aspects of the community due to the Covid-19 pandemic, community service activities were carried out using the yard for grape cultivation with biochar mixed media.

**Method:** The approach method used is the method of active community participation.

**Results:** The implementation of the Internal Community Service program uses the lecture, discussion, practice, mentoring and technical guidance methods. Community service activities can be carried out properly and have the expected impact.

**Conclusion:** Community service activities can be carried out properly. The empowerment program in the midst of the ongoing COVID-19 pandemic can relieve the mental burden of the community psychologically to strengthen the body's resistance to virus attacks through plant care every time.

This is an open access article under the [CC-BY-SA](https://creativecommons.org/licenses/by-sa/4.0/) license.  
Copyright © 2022 Susila Herlambang, Danang Yudhiantoro, Astrid Wahyu Adventri Wibowo

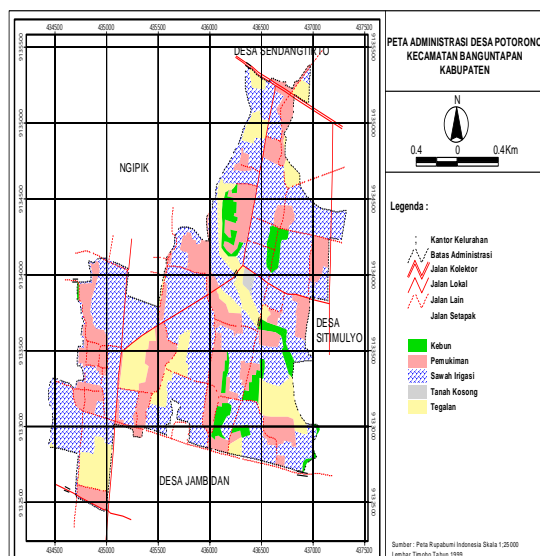


## INTRODUCTION

At the beginning of 2020, the world was shocked by the emergence of infectious diseases that changed the order of life. The disease was named Coronavirus Disease-2019 (COVID-19) by WHO on 11 February 2020 [1]. COVID-19 has been declared a pandemic by the World Health Organization (WHO) on March 11, 2020. The easy transmission of this virus makes the spread of this virus very fast. Transmission of this virus can occur through droplets or direct contact [1]. The Covid-19 pandemic caused the national economy to decline which was followed by the psychological impact of the community as a result of the Indonesian government's policy of staying at home (lockdown) until the Enforcement of Restrictions on Community Activities, called PPKM. Based on the Instruction of the Minister of Home Affairs No. 30 of 2021 concerning restrictions on community activities (PPKM) at levels 4, 3 and 2 of 2019 corona virus disease in the Java and Bali regions [2]. The implementation of PPKM brought the impact of a decline in the national economy accompanied by various community activities that were temporarily suspended.

The social economic impact of the Covid-19 pandemic was felt by all levels of Indonesian society, especially those in RT 04 and RT 05, Mayungan Hamlet, Potorono Village, Bantul Regency. The impacts experienced are: (1) access to public health facilities is increasingly difficult; (2) industrial trade and tourism activities have decreased; (3) limited community activities so that it has an impact on weak social support between communities; (4) online teaching and learning activities; (5) declining economic activity; (6) changes in social function (head of household loses job); and (7) gender inequality is getting higher (divided family roles are disrupted) [3]. In the end, these various impacts caused the psychology of the community to decline, so community empowerment activities were needed.

Most of the activities carried out by humans will inevitably produce waste [4]. The large population of cities and communities will have an impact on the emergence of illegal dumping sites and littering activities. These landfills will eventually become breeding grounds for rats and other pests, posing a significant risk to public health [5]. So that good waste management is needed to avoid this incident. Waste is formed in various forms. Some of the general characteristics used in waste classification include physical condition, physical properties, reusability potential, biodegradable potential, source of production and level of environmental impact [6] [8]. Besides that, increasing the value of the benefits and economics of a material in the surrounding environment that comes from waste which then goes through a good and correct process and processing can become a product that has many benefits, especially for the environment. This is what the people of Mayungan Hamlet, Potorono Village, Banguntapan, Bantul, Yogyakarta have done. A compost house and a waste bank have been formed from the collection of household waste from RT 04 and RT 05 with a capacity of 1.5 tons per week. This household waste treatment is separated into organic and inorganic waste. Coconut shell waste, which is widely found in the surrounding environment, especially in Indonesia, can be increased its usefulness and economic value by turning it into Biochar. The process also uses environmentally friendly tools and materials where the use of used drums as Rotary Drum Pyrolysis is an effort to reuse used goods in accordance with the 3R principle (Reduce, Reuse, and Recycle) [9] [10]. The use of organic compost by combining coconut shell biochar is an effort to increase the availability of plant nutrients in the yard. Biochar is a solid material that is rich in carbon and as a result of the conversion of waste or organic waste (agricultural biomass) through pyrolysis [11]. Biochar is also known as biological charcoal with black carbon content derived from biomass, the biochar process through combustion at a temperature <700°C in limited oxygen conditions produces organic material with a carbon concentration of 70-80% [12].



**Figure 1.** Map of Potorono Village

Seeing the great potential possessed by Dusun Mayungan and as an effort to improve the psychological aspects of the community due to the Covid-19 pandemic, community service activities were carried out in the form of using the yard for grape cultivation with biochar mixed media. The use of yards for plant cultivation is considered to be able to provide additional income [13] and increase community food sufficiency, security, and self-sufficiency [14]. In addition, mixed media technology is expected to increase agricultural cost efficiency and productivity of grape cultivation and is considered effective [15]. The addition of biochar to grape growing media can affect the development of grapes because biochar has the following functions: (1) increasing nutrient availability, (2) increasing nutrient retention, and (3) increasing water retention [16], (4) creating an environment quality habitat for symbiotic microorganisms, (5) increase the production of food crops, and (6) reduce the rate of CO<sub>2</sub> emissions, contributing to carbon stocks ( $\pm 52.8\%$ ) [17].

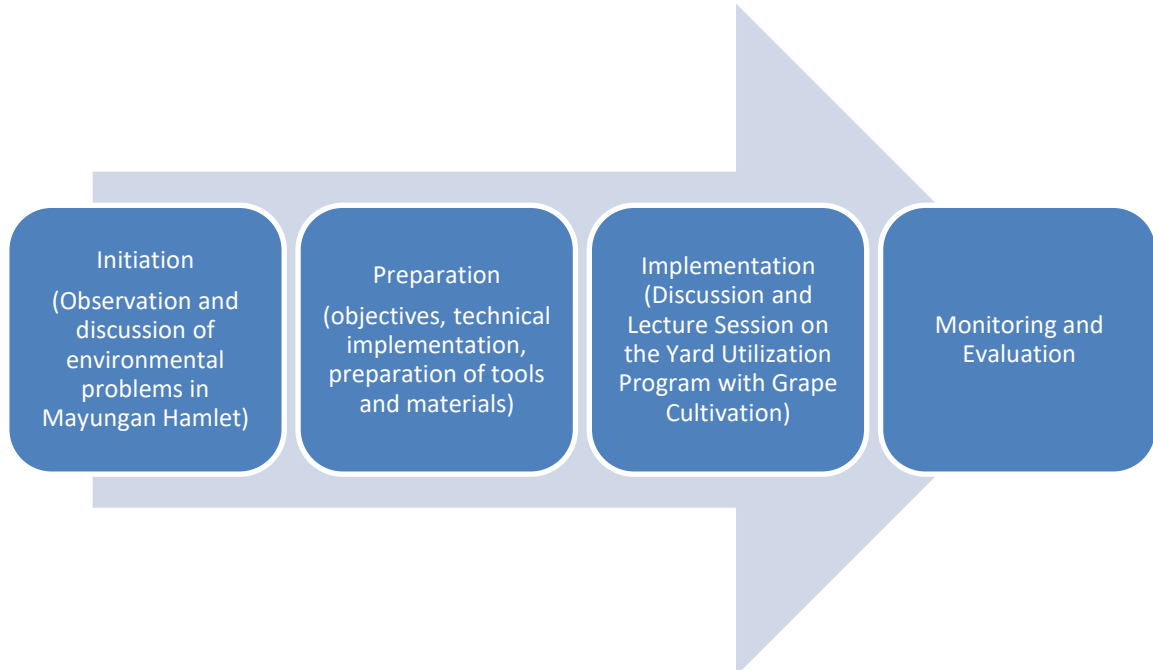
## METHOD

The technology for utilizing organic waste composted with coconut shell biochar is an environmentally friendly technology that has great potential in Mayungan Hamlet, Potorono Village, Yogyakarta. Utilization of waste to be used as a medium for growing grapes in densely populated yards. The approach method used is the method of active community participation. This method is a tool to generate a diagnosis of the competitive advantages and weaknesses of an area. The implementation of the Internal Community Service (PbM) program uses the lecture, discussion, practice, mentoring and technical guidance (technological guidance) methods. This method makes it easier for people to accept new technology by formulating planting media made from compost and coconut shell biochar. The lecture and discussion methods were carried out to provide material on the technology of planting media formulations for grapevines that were environmentally friendly, while the results of the delivery of knowledge materials were carried out in practice so that it was hoped that each of them had expertise in the formulation of planting media in narrow land (yards). This vine was chosen because of its characteristics that are easy to adapt to any type of soil, such as sandy soil to heavy clay [18] so that it is hoped that it will make it easier for people to choose planting media.

To maintain the quality and quantity of practice and its sustainability, regular assistance and

*Community Empowerment With The Utilization Of Yards For Grape Cultivation Using Biochar Mixed Media In Covid-19 Pandemic (Herlambang et al)*

guidance and technology (bimtek) are carried out. This activity aims to increase the economic value of the household and increase immunity during the COVID-19 pandemic. The compost house partners, which consist of 118 families with a capacity of 1.5 tons per week, are looking forward to the presence and participation of universities to mobilize rural communities to improve the eco-friendly economy by cultivating grapes in their yards.



**Figure 2.** Method for community service program

## RESULTS AND DISCUSSION

Community service activities start from program socialization, program counseling, technical guidance and distribution of grape seeds as well as community assistance. The program implementation was attended by 20 people consisting of RT 04 and 05 Mayungan Potorono hamlet with a sense of pleasure and very welcoming of the program. This can be seen from the seriousness of the participants in participating in the program from beginning to end (Figure 3 and Figure 4) and the timeline of activities is reported in table 1.



**Figure 3.** Discussion Session on the Yard Utilization Program with Grape Cultivation in Mayungan Potorono Banguntapan Hamlet, Yogyakarta



**Figure 4.** Lecture Session on the Yard Utilization Program with Grape Cultivation in Mayungan Potorono Banguntapan Hamlet, Yogyakarta

**Table 1.** Timeline Activities

No	Activities	Month								
		1	2	3	4	5	6	7	8	
1	Village potential mapping	■								
2	Stabilization of activity methods and initial review		■							
3	Data collection preparation			■						
4	Program implementation				■					
5	Grape seed planting					■				
6	Program monitoring						■			
7	Program evaluation							■		
8	Reporting								■	

The people of RT 04 and 05 of Dusun Mayungan really welcomed this program well. Implementation of the Community Service (PbM) program while still complying with health protocols, first officers and community service managers starting with washing hands and checking temperature and wearing masks and keeping a distance to avoid the covid 19 pandemic. narrow can produce high economic value. Understanding and technical knowledge of making a mixture of media where grapes grow is a major part of cultivating plants in a narrow yard of land. The adequacy of plant nutrients in the root complex area is one indicator of plant growth and development for production. The more adequacy of nutrients in the planting medium that is sustainable will provide good grape growth. Correct and good planting media technique by adding ameliorant material in the form of coconut shell biochar is an alternative method of storing nutrients provided through plant fertilization (Figure 5 and Figure 6).



**Figure 5.** Materials Needed





**Figure 6.** Technique of Media Making by Mixing Coconut Shell Biochar

Factors that affect plant growth consist of internal factors and external factors [19]. Internal factors come from the seeds, seeds, or the plant itself while external factors are factors that come from outside the seeds, seeds, or plants, one of which is the planting medium. Plant media using coconut shell biochar ameliorant is a suitable medium for storing plant nutrients that are applied to narrow land plant cultivation. Biochar material is obtained by burning by pyrolysis on carbon-rich organic materials in the form of twigs and plant roots [20]. The function of carbon in the soil is to bind plant nutrients weakly which when plant nutrients are needed by plants will be released by carbon bonds in the soil [21]. The manufacture of biochar is carried out using a technique owned by the service team with the method of making a rotary sleeve tool that has been patented No. IDS00002403 and can be uploaded openly on YouTube so that people can make media independently. Technical guidance can be accessed via the URL <https://www.youtube.com/watch?v=70I4pG275ek> [10].

The empowerment program in the midst of the ongoing COVID-19 pandemic can relieve the mental burden of the community psychologically to strengthen the body's resistance to virus attacks through plant care every time. Grape seeds during the program were given free of charge to the community with the aim of providing motivation to start a new spirit in the downturn of the family's economy (Figure 7 and Figure 8).

The selection of quality grape seeds is largely determined by the physiological form of the plant. Healthy seeds will have an impact on growth and development after the plant seeds are transferred to planting holes that have been prepared in the community's reef. Seedlings that appear green and not thin is an indicator that the seedlings are in a healthy condition and ready to be planted (figure 3). The selection of quality grape seeds is largely determined by the physiological form of the plant. Healthy seeds will have an impact on growth and development after the plant seeds are transferred to planting holes that have been prepared in the community's reef. Seedlings that appear green and not thin is an indicator that the seedlings are in a healthy condition and ready to be planted (figure 3). It is necessary to maintain grapevines with sustainable fertilization techniques until the grapes produce fruit and post-production. Maintenance and care of plants is an indicator of fruit production to be of high quality. Residents of RT 04 and 05 already know and understand grapevines to fill their yards to maintenance to obtain good and quality grape

production.



**Figure 7.** Grape Seeds for Yard Utilization in the Covid-19 Pandemic in Mayungan Potorono Hamlet



**Figure 8.** Empowerment of Giving Grape Seeds to Residents of Mayungan Potorono

## **CONCLUSION**

Community service activities can be carried out properly and have the expected impact. The empowerment program in the midst of the ongoing COVID-19 pandemic can relieve the mental burden of the community psychologically to strengthen the body's resistance to virus attacks through plant care every time. To maintain the quality and quantity of practice and its sustainability, it is necessary to provide regular assistance and guidance.

## **Acknowledgement**

The author would like to thank the Institute for Research and Community Service, Universitas Pembangunan Nasional Veterans Yogyakarta, Indonesia, which has provided financial support for this service. Thanks are conveyed to those who have made a positive contribution to community service by explaining the form of contribution that has been given.

## REFERENCES

- [1] Y. C. Wu, C. S. Chen, and Y. J. Chan, "The outbreak of COVID-19: An overview," *J. Chinese Med. Assoc.*, vol. 83, no. 3, pp. 217–220, 2020, doi: 10.1097/JCMA.0000000000000270.
- [2] Menteri Dalam Negeri Republik Indonesia, *Instruksi Menteri Dalam Negeri Nomor 30 Tahun 2021 Tentang Pemberlakuan Pembatasan Kegiatan Masyarakat Level 4, Level 3, dan Level 2 Corona Virus Disease 2019 di Wilayah Jawa dan Bali*. 2021, pp. 1–25.
- [3] Pemerintah Kabupaten Bantul, "Dampak dan Upaya Pemulihan Sosial Ekonomi Masyarakat di Kabupaten Bantul Akibat Covid-19," *Pemerintah Kabupaten Bantul*, 2020.
- [4] P. H. Brunner and H. Rechberger, "Waste to energy—key element for sustainable waste management," *Waste Manag.*, vol. 37, pp. 3–12, 2014, doi: <https://doi.org/10.1016/j.wasman.2014.02.003>.
- [5] E. Amasuomo and J. Baird, "The Concept of Waste and Waste Management," *J. Manag. Sustain.*, vol. 6, no. 4, p. 88, 2016, doi: 10.5539/jms.v6n4p88.
- [6] A. Demirbas, "Waste management, waste resource facilities and waste conversion processes," *Energy Convers. Manag.*, vol. 52, no. 2, pp. 1280–1287, 2011, doi: <https://doi.org/10.1016/j.enconman.2010.09.025>.
- [7] N. Dixon and D. R. V Jones, "Engineering properties of municipal solid waste," *Geotext. Geomembranes*, vol. 23, no. 3, pp. 205–233, 2005, doi: <https://doi.org/10.1016/j.geotexmem.2004.11.002>.
- [8] P. R. White, M. Franke, and P. Hindle, *Integrated Solid Waste Management: A Lifecycle Inventory*. Berlin: Springer, 1995.
- [9] S. Herlambang, A. Z. P. B. Santosa, and S. Rina, *Petunjuk Teknis Pembuatan Biochar Dengan Sistem Selongsong Putar*. Yogyakarta: Gerbang Media Askara, 2017.
- [10] S. Herlambang, A. P. B. Santosa, H. T. Sutiono, and S. R. Nugraheni, "Alat Pembuatan Biochar dengan Sistem Selongsong Putar," 2019.
- [11] N. L. Nurida, A. Rachman, and S. Sutono, *Biochar Pembenh Tanah yang Potensial*. Jakarta: IAARD Press, 2015.
- [12] J. Lehmann and S. Joseph, "Biochar for environmental management: An introduction," in *Biochar for Environmental Management: Science and Technology*, vol. 1, 2012, pp. 1–12.
- [13] E. Suwarno, E. Suhesti, and Nahlunnisa, "Pengembangan Agroforestry Sederhana Di Sekitar Rumah," *Din. J. Pengabd. Kpd. Masy.*, vol. 2, no. 2, pp. 113–120, 2018, doi: 10.31849/dinamisia.v2i2.1255.
- [14] E. Djuwendah, T. Karyani, Z. Saidah, and O. Hasbiansyah, "Pelatihan Budidaya Sayuran Secara Vertikultur di Pekarangan Guna Ketahanan Pangan Rumah Tangga," *Din. J. Pengabd. Kpd. Masy.*, vol. 5, no. 2, pp. 349–355, 2021, doi: 10.31849/dinamisia.v5i2.5291.
- [15] G. M. S. Wibawa, I. D. G. Agung, and I. K. Suamba, "Efektivitas Penggunaan Faktor Produksi Usahatani Anggur di Desa Kalianget , Kecamatan Seririt , Kabupaten Buleleng," *J. Agribisnis dan Agrowisata*, vol. 9, no. 1, pp. 89–98, 2020.
- [16] B. Glaser, J. Lehmann, and W. Zech, "Ameliorating physical and chemical properties of highly weathered soils in the tropics with charcoal - A review," *Biol. Fertil. Soils*, vol. 35, no. 4, pp. 219–230, 2002, doi: 10.1007/s00374-002-0466-4.
- [17] N. L. Nurida, A. Dariah, and A. Rachman, "Peningkatan Kualitas Tanah Dengan Pembenh Tanah Biochar Limbah Pertanian," *J. Tanah dan Iklim*, vol. 37, no. 2, pp. 69–78, 2013, doi: 10.2017/jti.v37n2.2013.69-78.
- [18] L. Rombough, *The grape grower: A guide to organic viticulture*. Chelsea Green Publishing, 2002.
- [19] I. G. A. Gunadi and I. K. Sumiartha, "Pertumbuhan Bibit Anggur Prabu Bestari Asal Okulasi pada Berbagai Campuran dan Kandungan Air Media Tanam," *AGROTROP*, vol. 9, no. 1, pp. 42–55, 2019.
- [20] S. Herlambang, A. P. B. Santosa, H. T. Sutiono, and S. R. Nugraheni, "Application of coconut biochar and organic materials to improve soil environmental," 2019, doi: doi:



- 10.1088/1755-1315/347/1/012055.
- [21] S. Herlambang, A. Z. Purwono, M. Gomareuzzaman, and A. W. A. Wibowo, *Biochar: Salah Satu Alternatif untuk Perbaikan Lahan dan Lingkungan*. Yogyakarta: LPPM UPN "Veteran" Yogyakarta, 2020.

