Security in food, renewable resources, and natural medicines

SFRN 2019

PROCEEDING

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3rd INTERNATIONAL CONFERENCE ON SECURITY IN FOOD, RENEWABLE RESOURCES, AND NATURAL MEDICINES 2019 (SFRN 2019)

Convention Hall Politeknik Pertanian Negeri Payakumbuh
INDONESIA

QUANTUM-LEAP OF AGRI-FOOD SYSTEM 4.0 AND DELIVERY OF SUSTAINABLE DEVELOPMENTS GOALS (SDGS)

September 25-26, 2019

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Welcome Message
Executive Chairman of The 3rd International Conference on Security in Food, Renewable resources, and Natural Medicines (SFRN) 2019

Dear Honorable ladies and gentlemen,

Good Morning and Assalamu'alaikum wr.wb

On behalf of the SFRN 2019 organizing committee, I am really honoured and delighted to welcome all of you to the 3rd International Conference on Security in Food, Renewable resources, and Natural Medicines (SFRN) 2019 at the State Polytechnic of Agriculture Payakumbuh, West Sumatra Indonesia

Our technical program is rich and varied with 8 keynote speeches and 4 invited talks and more than 170 technical papers split between 8 parallel oral sessions and 1 poster sessions. The speakers and participants came from 8 different countries, consist of Academicians, Scientists, Researchers, Practitioners, Professionals, and Government Officialsin multidiscipline branch of knowledge, who gathered here today to share and discuss new findings and applications of innovations for promoting Food Security, Renewable Energy, Sustainable Resources and HealthCare Free for All, in particular for those who in needs. As the chairman of conference 2019 SFRN, I know that the success of the conference depends ultimately on the how many people who have worked in planning and organizing both the technical program and supporting social arrangements. This year, the conference is jointly organized by the Payakumbuh State Agricultural Polytechnic and Andalas University. We also thank to the steering committee fortheir wise and brilliant advice on organizing the technical program; and also to the the Program Committee, both from the Payakumbuh State Agricultural Polytechnic and Andalas University , for their thorough and timely reviewing of the papersand to the Directorof Payakumbuh State Agricultural Polytechnic and the rector of Andalas University, and the Head of the Institute forResearch and Community Service of Andalas University, and Payakumbuh State Agricultural Polytechnic. Our recognition should go to the Organizing Committee members who have all worked really hard for the details of the important aspects of the conferenceprograms and social activities, and then we extend our gratitude to our students who bore the arduous burden for preparing this event.

We hope this event is also a good step in gaining strengthenn cooperation between our universities as we know that the State Agricultural Polytechnicof Payakumbuh is part of the Andalas University previously, of course the psychological relationship between the State Agricultural Polytechnicand the Andalas University is really close.

Finally on behalf of the committee, we apologize profusely for all the shortcomings and everything that is not properly in organizing this event and hopefully AES-Network contributes significantly to the research and technology for the good of humanity.

Thank you

Fithra Herdian, S.TP, MP

Message from Afro-Eurasia Scientific (AES) Network
3rdInternational Conference on Security in Food, Renewable resources, and Natural Medicines (SFRN) 2019

Dear Honorable and Distinguished guests,
Ladies and gentlemen,

Assalamu'alaikum Warahmatullahi Wabarakatuh and Good Morning

On behalf of the AES Network, I am honored and delighted to welcome you to the 3rdInternational Conference on Security in Food, Renewable resources, and Natural Medicines (SFRN) 2019 at the Agricultural State Poly Technique of Payakumbuh, Indonesia. I believe we have chosen a venue that guarantees a successful technical conference amid the culture, delicacy and scenery of Payakumbuh, the city of "Rendang".

The AES-Network aims to Promote Livelihood Through Food Security, Promote Future Smart and Green Mobility by Using Renewable Energy, Promote Prosperity by Equally Managing and Distributing the Sustainable Resources and Promoting Enjoyable Long-Life by using Natural Medicines With Free Health Care For All. The AES-Network was established in 2018 and already have memberships from 12 countries. Our members consist of Academicians, Scientists, Researchers, practitioners, professionals, and government officials from multidiscipline branch of knowledge, who gathered and contributed their expertise to share and discuss new findings and applications of innovations for promoting Food Security, Renewable Energy, Sustainable Resources and Free Health Care for All.In particular, the network aims to alleviate the condition of those who in dire needs. In the future, we also expect to provide technical demonstrations, and numerous opportunities for informal networking for Promoting Food Security, Renewable Energy, Sustainable Resources and Free Health Care for All. In this opportunity, we invited you to become our members and join our efforts for a better life to all of mankind.

As a team, we acknowledge the existence of mutual interest among university and college educators, researchers, activists, business sector, entrepreneurs, policy

makers, and all society members. We must promote the need to strengthen cooperation for establishing Security in Food, Renewable Resources, and Natural Medicines in Africa, Europe, and Asia.

The AES-Network believe, a firm foundation for mutual collaboration with the spirit of equality and partnership and thereby contribute towards sustainable development in these three regions.

Therefore, through networking, friendships, and joint efforts, the capacity of our network can be enhanced to address major challenges in securing the Food, Renewable Resources, and Natural Medicines in Africa, Europa, and Asia.Our Network goals areto increase the awareness of educators, researchers, scientific community, business sector, entrepreneurs, and policy makers in Africa, Europa, and Asia, that the future of a better world, lies within their responsibilities, and to improve the networking, mobility and mutual collaboration of scientific community, business sector, entrepreneurs, and policy makers in Africa, Europe, and Asia to energize the delivery of Sustainable Development Goals.

Finally, I hope that, by registering our network, you will be provideda common platform and support the exchange of knowledge, while at the same time, we offer constructive dialogue across and within the various interest and stakeholder groups, including the intended beneficiaries, and arrived at the best solutions to our terminal goal, Promoting Food Security, Renewable Energy, Sustainable Resources and Free Health Care based on scientific evidence in Africa, Europa, and Asianregion.

Thank You for Joining us!

President
Assoc. Prof. Dr. Eng. Muhammad Makky

Welcome Message
Head of Institute for Research and Community Service
Universitas Andalas

Dear Honorable and Distinguished guests,
Ladies and gentlemen,

Assalamu'alaikum Warahmatullahi Wabarakatuh and Good Morning

It is with great pleasure that I welcome the participants of the SFRN 2019 in Payakumbuh, the city of "Rendang", the prime of Indonesian delicacy.

In this esteem event, we share the knowledges, and imparted it to the people. The quest for knowledge has been from the beginning of time but knowledge only becomes valuable when it is disseminated and applied to benefit humankind. It is hoped that this conference will become a platform to gather and disseminate the latest knowledge which can be adopted for securing the food, resources, and health for mankind, in Asian, European and African region.

Academicians, Scientist, Researchers and practitioners from multidiscipline branch of knowledge who gathered here today will be able to share and discuss new findings and applications of innovations for ensuring food security, in particular for those who reside in developing countries. It is envisaged that the intellectual discourse will result in future collaborations between universities, research institutions and industry both locally and internationally. In particular it is expected that focus will be given to issues on environmental and sustainability. Therefore, we urge to all participants, to establish a scientific network that will voice the needs

Researchers in the multi sectoral aspects related to the benefit of mankind have been progressing worldwide. Food is a basic right, while energy drive the world. Human need a lot of resources so the civilization can be flourished. But human is not immune, and thus, ones need to take care of their health regularly. Modern Agri-food systems is the foundations of a decent life, a sound education and the achievement of

the Sustainable Development Goals. Over the past decade, we have witnessed a chain reaction that threatens the very foundations of life for millions of the world's people. Rising energy prices drove up the cost of food and ate away the savings that people otherwise would have spent on health care or education. Unsustainable plantation management induced forest fire and posed haze hazard to the whole Sumatra island and our neighboring countries.

The human cost of the food and energy crisis has been enormous. Millions of families have been pushed into poverty and hunger. Thousands more suffering from the collateral effects. Over the past year, food insecurity led to political unrest in some 30 countries. Yet because the underlying problems persist, we will continue to experience such crises, again and again -- unless we act now. That is why we are here today.

We must make significant changes to feed ourselves, and most especially, to safeguard the poorest and most vulnerable. We must ensure safety nets for those who cannot afford food, or energy, nor even a health service. We must transform agricultural development, markets and how resources is distributed. We must do so based on a thorough understanding of the issues. That is the only possible way we can meet the Goals of Sustainable Development.

Thank You,

Assoc. Prof. Dr.-Ing. Uyung Gatot S. Dinata,MT.

Opening Ceremony
Rector of Andalas University

Dear Honorable and Distinguished guests,
Ladies and gentlemen,

Assalamu'alaikum Warahmatullahi Wabarakatuh and Good Morning

I welcome the opportunity to address you at this important event.

It gives me great pleasure in welcoming you to this 3rdConference on "Security in Food, Renewable resources, and Natural Medicines (SFRN)" 2019. I am delighted that so many have accepted our invitation. I am particularly happy that we have in this room, dedicated individuals from so many stakeholder groups — including our most respected and distinguished guest "The ministry of Agriculture of the Republic of Indonesia". We also welcome the mayor of Payakumbuh and the Regent of Lima Puluh Kota. We extend our welcome to the civil society, the private sector, international organizations; the science community; and others dedicated to help create an environment in which people can escape food insecurity. Imagine what we can do together if we make the security for all as an our top priority, and pull in the same direction. We can make a difference in the lives of millions.

Food is a basic right. Food security are the foundations of a decent life, a sound education and the achievement of the Sustainable Development Goals Access to medicines - a fundamental element of the right to health. Health is a fundamental human right, indispensable for the exercise of many other rights in particular the right to development, and necessary for living a life in dignity. Moreover, human rights principles and language are being used to support resource access claims as rights-based approaches empower individuals and groups to gain or maintain access to natural resources

Much progress has been made during the last decades but much more needs to be done. Millions of people are Insecure worldwide, meaning that they either starve or they do not know from where their next meal, health care or resources will come.

Much of the progress on security has occurred at the expense of our environment. With business as usual, we foresee that the production improvements during the next decade will be less than the last one, while the environmental degradation will continue, and health will deteriorate significantly. Without available resources to seek, mankind will become endanger species in a very short time.

Solutions to the security problems need to be designed and implemented within a new and rapidly changing environment. Globalization and sweeping technological changes offer new opportunities for solving these problems. A number driving forces or trends must be taken into account in developing appropriate action. Some of the action needed, such as appropriate technology for small farms, is not new but it must be cast in the new and changing global and national environment, taking into account new opportunities and risks. I hope that by providing a forum for knowledge exchange, this conference will help identify the action to be taken. Furthermore, this conference will help to provide constructive dialogue across and within the various interest and stakeholder groups, including the intended beneficiaries, and arrive at the best solutions.

In conclusion, even if those responsible give high priority to achieving sustainable security for all and back it up with action, the world may not achieve the goal by 2030. But we will be much closer than with business as usual. I urge all of us to provide the strongest support for this event, to enable securing the food for all in the closest time possible. It is my sincere optimism that through the accomplishment of the objectives of this event, we will come to an important step nearer to secure the food for all.

Finally, I would like to thank the organizing committee who have spent their utmost efforts to prepare and manage this event successfully. Let me conclude my remarks by wishing our guests happiness, good luck and great success in the conference.

May I announce now the opening of the "3rd International Conference on Security in Food, Renewable resources, and Natural Medicines (SFRN) 2019" in Payakumbuh.

Thank you.

Rector,
Prof. Tafdil Husni, SE, MBA, PhD

Welcome Message
Director of Politeknik Pertanian Negeri Payakumbuh

Dear Honorable ladies and gentlemen,

Good Morning and Assalamu'alaikumwr.wb

I congratulate to all participants on the invitation and participate at our beloved campus Payakumbuh StateAgricultural Polytechnic. I feel really honoured to welcome all of you at our event, the 3rd International Conference on Security in Food, Renewable Resources, and Natural Medicines (SFRN) 2019 at thePayakumbuh State Agricultural Polytechnic, Indonesia.

Food security is a very important aspect in a country's sovereignty. Food also determines the future direction of a nation. Many social and political fluctuation can also occur if food security is disrupted. Food availability that is smaller than its needs can create economic instability. This critical food condition can even endanger economic and national stability. In the current situation, there are many challenges in exteriorize food security, such as climate change, population, limited natural resources and other challenges both locally, regionally and globally.

Renewable resources are also our starting point to start sustainable development. Research on renewable resources is also very important as the solution in meeting the principles of sustainable development. As we know that Sustainable development is the development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

Sustainability is the foundation for today’s leading global framework for international cooperation - the 2030 Agenda for Sustainable Development and its Sustainable Development Goals (SDGs)

The discovery of treatment based on local culture also contributes greatly to the good of humanity. Unfortunately, there are still many treatments that have not been carried out by scientific research. So, through this conferencewe hope it can be a trigger to increase in traditional plant-based treatments that not go through complex

chemical processes, so that the effectiveness of the pillars can be further suppressed and also contribute to the community's economy.

Finally, I would like to express my gratitude to all people who involved in organizing this event and to all ofstakeholders who have helped to make this event go on succesfully. Please accept my apologize for any shortage, Assalamu'alaikumwr.wb.

Thank you

Ir. Elvin Hasman, MP

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Application of POC from Leachate Landfill on Growth and Yield of Maize (*Zea mays*)

Hasnelly[1)], Syafrimen Yasin[2)], Agustian[2)], Darmawan[2)]
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Abstract-Corn is the main food crop after rice. It is also an ingredient for livestock feed. The availability of corn needs to be supported by the availability of sufficient fertilizer during plant growth, including liquid organic fertilizer. The high price of liquid organic fertilizer is one of the obstacles in the use of this fertilizer. Therefore a cheaper source of liquid fertilizer is needed. This study investigates the best effect and dose of the use of POC from landfill leachate on the growth and yield of corn. The research method is an experimental method using a Completely Randomized Design (CRD) consisting of six treatments and four replications using polybags. The treatments: A = 60 ml leachate + biochar (without microorganism); B = 20 ml POC/L water; C = 30 ml POC/L water; D = 40 ml POC/L water; E = 50 ml POC/L water; and F = 60 ml POC/L water. The results showed that POC awarding significantly affected leaf area (cm2), and cob weight (g) but not significantly different from plant height (cm) and stem diameter (cm). The dose of 40 ml of POC/L water is the best treatment of the use of POC from landfill leachate on the growth and yield of corn plants.

***Keywords*:** POC, leachate landfill, and Corn

INTRODUCTION

Corn (Zea mays) is currently a strategic commodity in Indonesia. The need for corn is always increasing every year. From the data of the Directorate General of Food Crops, national corn production in 2018 is 33.9 million tons. Corn in Indonesia is an ingredient of animal feed as well as industrial raw materials (snacks, porridge, and cornflour). The ever-increasing need for corn must be accompanied by increased production so that demand and supply are balanced. Increased production can be by implementing intensive corn cultivation by providing adequate fertilization during the growing period of the plant. Fertilizer is a source of nutrition for plant needs. The availability of fertilizers will determine the success of crop cultivation. So that the availability of fertilizers in general and liquid organic fertilizer (POC), especially at affordable prices by farmers, is one of the crucial factors in efforts to meet the needs of corn nationally.

Liquid organic fertilizer, in addition to containing macro and micronutrients, also contains microorganisms that can help plants absorb nutrients so that it can support growth and increase crop yield. However, the source of raw materials and the manufacturing process determine the price of liquid organic fertilizer (POC). So far, the amount of dissolved organic fertilizer is still high in the market. This high price is due to the high cost of raw materials and their production processes. Therefore, it is necessary to find alternative raw materials that are cheaper and lower production costs to make the price of POC fertilizer affordable in the market by farmers. In this study, the source of raw material used is landfill leachate as an alternative raw

material source for making liquid organic fertilizer. Landfill leachate is a liquid arising from a pile of garbage due to percolation of rainwater and moisture, contains natural, inorganic, and microorganisms and has a high heavy metal content. Landfill leachate, when discharged directly into the environment, can pollute the soil, waters, and toxins for plants (Ali, 2011).

In general, leachate contains heavy metals in sufficient quantities that it is toxic when given directly to plants. According to the results of Hasnelly *et al*., (2018a) research, the provision of landfill leachate as a liquid fertilizer without treatment on leachate with concentrations of 100%, 50%, and 25% show that increasing leachate concentration affects the decrease in plant growth and yield. The amount of Cr and Cd as Pb metal residues are high in plant and fruit tissue. Zupancic *et al.* (2009) added that high chromium content in plants could be toxic. It can inhibit enzyme activity, mutagenesis of root growth, and interfere with the absorption of several elements such as K, Mg, P, F, S, Mn, Mo, N, Ca, B and Cu.

The reduction of heavy metal content in leachate is possible to make. One of the ways is by using biochar. In Hasnelly *et al*., (2018b) research results, the use of palm shell biochar at a size of 140 mesh with a dose of 80 grams/liter of leachate can reduce the content of heavy metals to liquid fertilizer quality standards.

Increasing the effectiveness of leachate utilization as a source of nutrition for plants is one of the things that need to be done, one of which is giving treatment microorganisms into leachate. According to Higa and Parr, (1994); Berg, (2009); Simarmata, (2013), microbes can play a role as fixing nitrogen from the atmosphere. It can increase nutrient availability, degrade of poisons from pesticides or other chemicals, produce simple organic molecules to be absorbed by plants, increase the complexity of heavy metals. For those reasons, plants cannot consume them. In this study, the microorganisms used were *Azotobachter*, *Azospirillum*, *Bacillus* sp, *Pseudomonas fl*uorescence bacteria. The results of previous studies indicate that these bacteria can play a role in increasing the availability of nutrients for plants. As research conducted by Widawati and Muharam (2012), that the activity of the bacteria *Rhizobium*, *Azospirillim*, *Azotobacter* can provide N elements, and some can offer P elements to plants and produce growth hormones such as IAA (Indol Acetic Acid). Furthermore, Istiqomah *et al*. (2017) research results suggest that *Pseudomonas fluorescen*ce and *Bacillus* sp can dissolve various types of P including Al-P, Ca-P, and phosphate stones.

The research results of Pangaribuan *et al*., (2017) stated that the use of liquid organic fertilizers with *Azotobacter*, *Azospirillium*, *Rhizobium*, *Aspergillus*, *Lactobacillus*, *Mychoriza*, and *Saccharomyces*, were not significantly different from the treatment of 100% recommended inorganic fertilizers. The same thing happens for liquid organic fertilizer + inorganic fertilizer 100 % recommendation, liquid organic fertilizer + inorganic fertilizer 60% recommendation, and dissolved organic fertilizer + inorganic fertilizer 20% recommendation. Mahdiannoor *et al*., (2016), the application of liquid organic fertilizer to corn plants showed the best results at 800 ml / L. Pasta *et al*. (2015) suggested that the application of biological fertilizer to sweet corn plants had a positive influence on plant growth and yield. Sangadji (2108) research results, the use of Nasa POC at a concentration of 30 ml / L water significantly affected the growth and yield of sweet corn plants with cob weight of 286.41 g / plant.

The research conducted aims to determine the best effect and dose of the use of POC from landfill leachate on the growth and yield of corn.

MATERIALS AND METHODS

1. Research Place and Time

The research was carried out at the Balai Benih dan Hortikultura Lubuk Tenam, Muara Bungo from 30 January 2019 to 20 May 2019.

2. Materials and Tools

The materials used in this study were corn seeds, POC from Gamut Muara Bungo landfill leachate, urea, TSP, KCl fertilizer, dolomite, biochar, microorganisms (*Bacillus* sp, *Pseudomonas fluorescens*, *Azotobachter*, *Azospirillum*) and Ultisol soil types. The tools used in this study are 10 kg polybags, hoes, analytical scales, sieves, filters, measuring cups, slide calipers, gauges, and stationery.

3. Research Methods

The method used in this study is an experimental method using a Completely Randomized Design (CRD) consisting of six treatments and four replications. Treatments: A = 60 ml leachate + biochar / L water (without microorganisms); B = 20 ml POC / L water; C = 30 ml POC / L water; D = 40 ml POC / L water; E = 50 ml POC / L water; and F = 60 ml POC / L water.

Research Implementation:

The planting media used were from Ultisol soil types at a layer thickness of 20 cm, which was first mashed and sieved. Then the soil was given lime dolomite 1.1 tons / ha equivalent to 5.5 g / polybag (1.5 x Al-dd with Al-dd 0.3 me / 100g). Furthermore, the soil is put into polybags as much as 10 kg/polybag. After incubating the soil for two weeks, planting corn seeds is done by making a hole in the middle of the polybag and putting two seeds in each polybag. Then do the watering, and after two weeks of age, the plants do thin by selecting one plant that has the best growth.

The Making of POC. TPA Lindi from TPA Gamut Muara Bungo is filtered. After that, biochar was added, which was mashed and filtered with a 140 mesh size sieve of 80 g / L leachate, stirred, and filtered after 3 hours (Hasnelly et al., 2018b). Then enter microorganisms (*Bacillus* sp, *Pseudomonas flourescens*, *Azotobachter*, *Azospirillum*), each as much as 1.5 ml with a population of 10^8 (Hasnelly *et al*., 2018). POC from the landfill leachate is given every four days, poured into the soil after the plant is 3 MST under treatment.

POC treatment is given every week until four weeks before harvest. **Maintenance**. Plant maintenance includes watering, replanting, weeding, controlling weeds, and pest. **Sprinkling.** Conducted in the morning and evening by using a fat, adjusted to the moisture conditions of the soil. **Watering plants**. Done if there are plants that die or plants that grow abnormally until the age of 14 HST by using reserve plant seeds that are available on separate media. **Weeding**. Manually done by pulling weeds that grow in the media. **Plant control**. Spraying. To control *Spodoptera liptura* armyworm, spray Matador 25 EC with a concentration of 0.25 ml / L water. Giving insecticides was done twice at the age of 45 HST and 60 HST. **Harvest**. After the plant enters the period of 80 days after planting, it is time to do the harvesting.

Observed parameters:

Components of growth and yields observed were (1) plant height (cm), measured from the surface of marker to the longest leaf, at 7 MST. (2) leaf area (cm^2), the leaves are green and have opened entirely, done once at the age of 70 HST. (3) stem diameter (cm) is measured on the stem within 5 cm from the stake, performed once at the age of 70 HST. (4) the crop weight (g) is done at harvest time, and (5) the weight of corn cobs (g) done at harvest.

4. Data Analysis

The data obtained were analyzed using variance (Anova), and if significantly different, further tests were performed using the Duncan New Multiple Range Test (DNMRT) at a 5% level.

RESULTS AND DISCUSSION

1. Plant Height

Based on the results of variance tests showed that the use of POC from landfill leachate was not significantly different from the height of corn plants. The treatment of 60 ml leachate + biochar/L water (without microorganisms) was the lowest plant height yield of 164.71 cm (Table 1 and Figure 1), much lower than all treatments using POC. The highest plant height value was found in the POC treatment of 40 ml / L of water, which was 214.99 cm. This result shows that increasing the use of POC above 40 ml/L of water will reduce plant height even though it is not statistically significantly different.

Table 1.Use of POC from landfill leachate on plant height (cm) of corn

Treatments	Plant Height(cm)
L0 = 60 ml Leachate+ biochar/L water (without microorganisms)	164,71 a
L1 = 20 ml POC/liter water	190,46 a
L2 = 30 ml POC/liter water	199,13 a
L3 = 40 ml POC/liter water	214,99 a
L4 = 50 ml POC/liter water	191,74 a
L5 = 60 ml POC/liter water	190,36 a

Note: the numbers followed by the same letter are not significantly different according to the DMRT test at the 5% level.

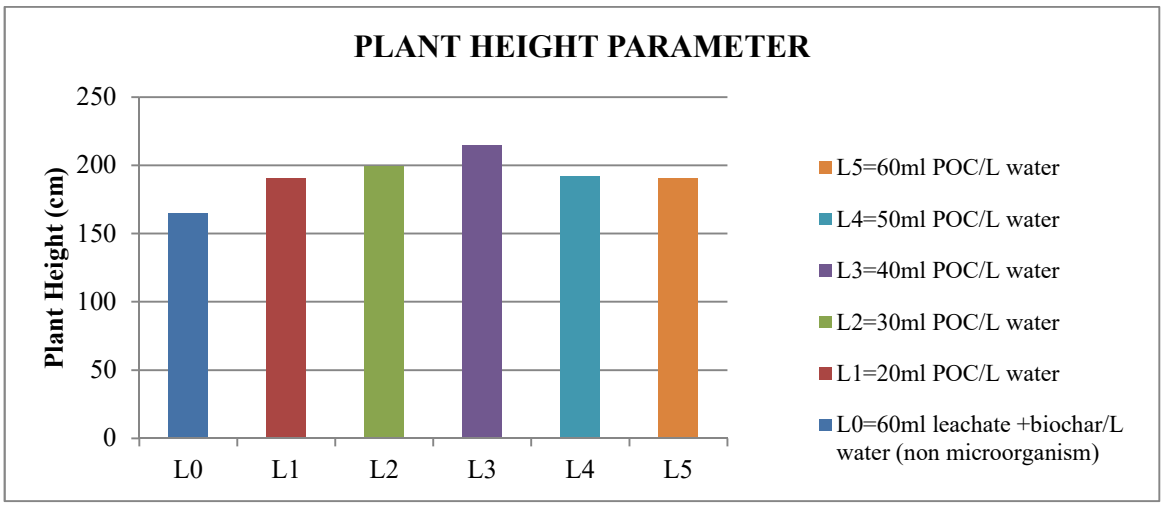

Fig. 1 Diagram of the use of POC from landfill leachate on plant height (cm) of corn

This diagram shows that the content of nutrients contained in the treatment and addition of bacteria, especially *Azotobachter* and *Azospirillum* bacteria given in the procedure, can meet the needs of nutrients, especially nitrogen in corn. Based on the report of Aly *et al*. (2012), Razie *et al*., (2013), *Azotobachter* bacteria play a role in fixing nitrogen (N2) and produce phytohormone. Furthermore, the results of Widawati and Muharam's (2012) study stated that laboratory tests showed *that Azospirillum* was able to produce IAA, tether nitrogen in the air, and dissolve phosphate.

The results of the research of Antonius and Agustiyani (2011) explain that microbes contained in organic fertilizer are beneficial to plant growth. Added Antonius *et al*., (2009) bacteria *Pseudomonas* sp., *Bacillus* sp., and *Streptomyces* sp. is a root fertilizing microbe that can provide nutrients and growth hormones for plants.

2. Stem Diameter

Table 2.Use of POC from landfill leachate on stem diameter (cm) of corn

Treatment	Stem Diameter (cm)
L0 = 60 ml Leachate+biochar/L water (without microorganism)	2,06 a
L1 = 20 ml POC/liter water	2,12 a
L2 = 30 ml POC/liter water	2,12 a
L3 = 40 ml POC/liter water	2,26 a
L4 = 50 ml POC/liter water	2,00 a
L5 = 60 ml POC/liter water	2,02 a

Note: the numbers followed by the same letter are not significantly different according to the DMRT test at the 5% level.

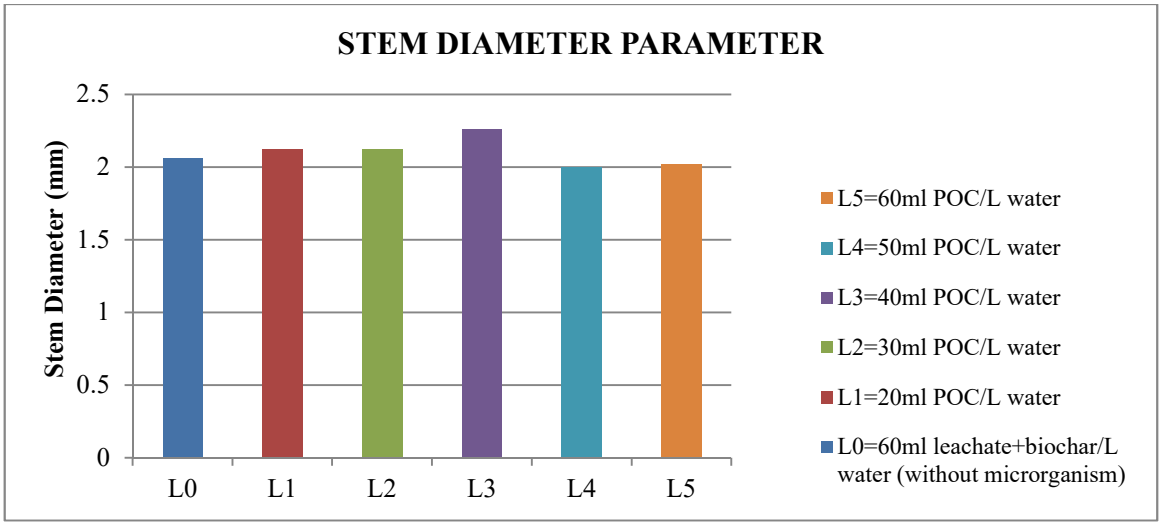

Fig. 2 Diagram of the use of POC from landfill leachate on stem diameter (cm) of corn

The treatment of POC and without bacteria, according to statistical analysis, did not show any significant difference in stem diameter. From the observations, it can be seen that the values between treatments are almost the same, although, in terms of numbers, the L3 treatment (40 ml POC / L water) is the highest stem

diameter of all treatments (Figure 2). The results of Saragih *et al*. (2013), increasing the dose of nitrogen, will affect plant growth. Nitrogen is involved in making up plant biomass, including in the formation of stem diameters. The sufficient amount of nitrogen given will increase the biomass produced, as well as the width of the plant stems. According to Sutedjo (1999), the presence of the element nitrogen influences plants growth, which plays a role in the formation or growth of vegetative parts of plants, such as leaves, stems, and roots.

3. Leaf Area

Table 3. Use of POC from landfill leachate on leaf area (cm^2) of corn

Treatment	Leaf Area (cm^2)
L0 = 60 ml Leachate+biochar/L water (without microorganism)	2607,01 a
L1 = 20 ml POC/liter water	3959,34 b
L2 = 30 ml POC/liter water	4282,08 cb
L3 = 40 ml POC/liter water	4363,66 c
L4 = 50 ml POC/liter water	3966,95 b
L5 = 60 ml POC/liter water	3964,05 b

Note: the numbers followed by the same letter are not significantly different according to the DMRT test at the 5% level.

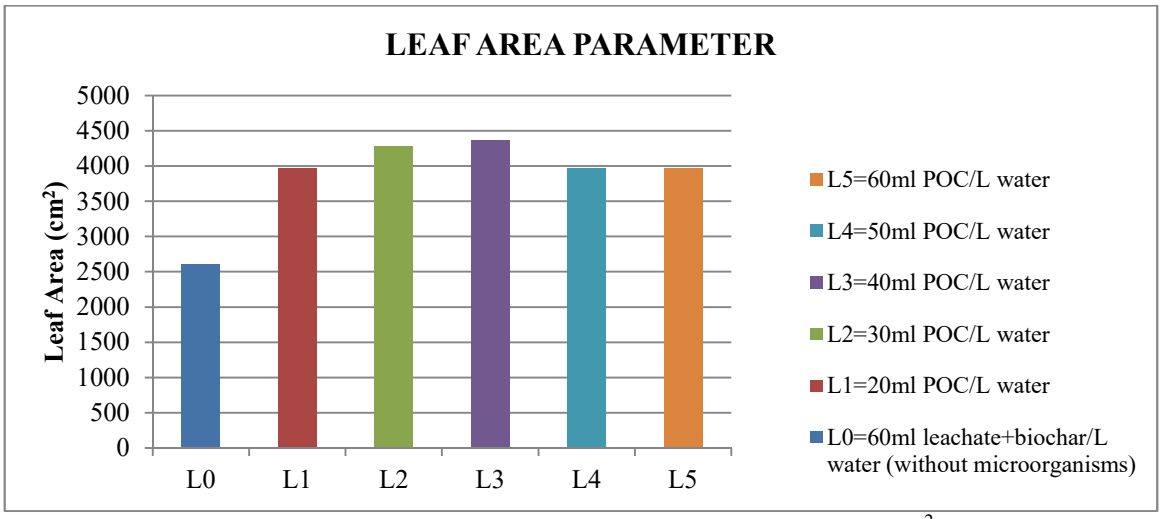

Fig. 3 Diagram of the use of POC from landfill leachate on leaf area (cm^2) of corn

If seen in Table 3, the use of POC shows a significant effect on the leaf area. The treatment of 40 ml POC / L water (L3) was significantly different from other treatments, although it was not substantially different from the treatment of L2 (30 ml POC / L water) and was the best treatment. The smallest leaf area of corn was found in the treatment without bacteria (Figure 3). Increasing the POC dose tends to increase the leaf area of the plant to the optimum POC dose of 40 ml / L of water by 4363.66 cm^2, which is the highest leaf area. Increasing the POC dose above 40 ml/liter of water is 50 ml/liter of water, and 60 ml/liter of water tends to reduce the leaf area. Mukhlis and Lestari (2013) explained that biological fertilizers contained in microorganisms could produce hormones, especially Indole Acetic Acid (IAA),

which can increase plant growth. Sangadji Research (2018), states that giving POC Nasa 30 ml / L of water can increase the leaf area of plants.

4. Crop Stover Weight

In Table 4, it can be seen that the treatment of 40 ml POC / L water (L3) is significantly different from other treatments and is the best treatment for the crop stover weight of the corn. Increased crop stover weight is closely related to an increase in plant leaf area. The broader the leaves of the plant, the higher the results of photosynthesis produced, which will affect the crop stover weight of the plant. Increasing the POC dose above 40 ml / L of water will cause a decrease in crop stover weight. The treatment without microorganisms is the treatment with the lowest crop stover weight (Figure 4), although it is not different from the treatment of L1, L2, L4, and L5. Mengel and Kirkby (2001) argue that an increase in plant dry weight is one of the characteristics of increased nitrogen uptake in plants.

Table 4.Use of POC from landfill leachate on the crop stover weight (g) of corn

Treatment	Crop Stover Weight (g)
L0 = 60 ml Leachate+biochar/L water (without microorganisms)	124,13 a
L1 = 20 ml POC/liter water	145,34 a
L2 = 30 ml POC/liter water	147,86 a
L3 = 40 ml POC/liter water	180,45 b
L4 = 50 ml POC/liter water	144,87 a
L5 = 60 ml POC/liter water	141,46 a

Note: the numbers followed by the same letter are not significantly different according to the DMRT test at the 5% level

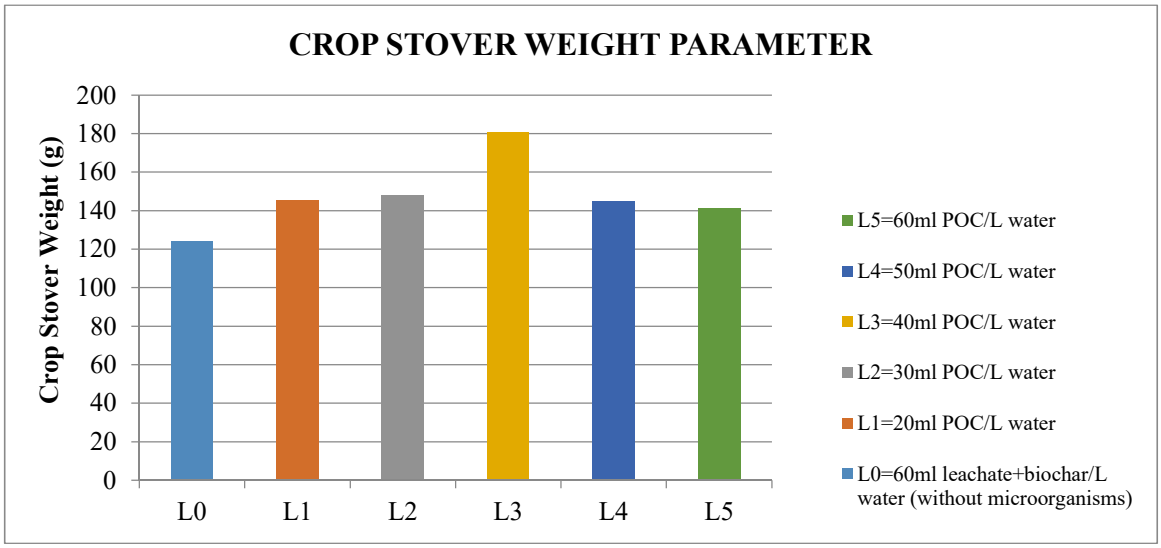

Fig. 4 Diagram of the use of POC from landfill leachate on crop stover weight (g) of corn

5. Weight of Corn Cobs

In corncob weight, the POC 40 ml / L water (L3) treatment was significantly different from the other treatments, and the POC 40 ml / L water (L3) treatment was the best treatment. An increase in POC treatment above 40 ml / L of water causes a

decrease in the weight of plant cobs. According to Istiqomah *et al*. (2107), the different weight of stover and cob is the role of phosphate solubilizing bacteria *Bacillus* sp and *Pseudomonas flourescens*. It plays a role in increasing the supply of P elements in the soil by dissolving various types of P, including Al-P, Ca-P, and rocks phosphate.

Table 5. The use of POC from landfill leachate on the weight of cob (g) corn

Treatment	Weight of Cob (g)
L0 = 60 ml Leachate+biochar/L water (without microorganisms)	123,62 a
L1 = 20 ml POC/liter water	133,47 a
L2 = 30 ml POC/liter water	137,21 a
L3 = 40 ml POC/liter water	178,67 b
L4 = 50 ml POC/liter water	129,05 a
L5 = 60 ml POC/liter water	130,62 a

Note: the numbers followed by the same letter are not significantly different according to the DMRT test at the 5% level.

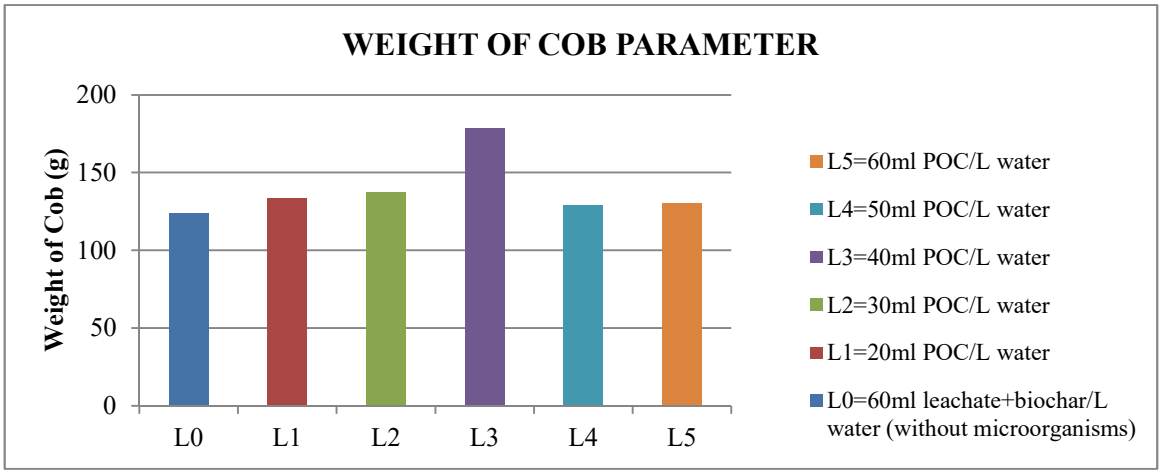

Fig. 5 The use of POC from landfill leachate on the weight of cob (g) of maize

The study of Pangaribuan *et al*. (2017), suggested several things about the use of liquid organic fertilizer on the weight of the cobs. First, the weight of the cobs without cornhusk was not significantly different from the treatment of 100% inorganic fertilizer recommendations as well as for liquid organic fertilizer + 100% inorganic fertilizer recommendations, liquid organic fertilizer + 60% inorganic fertilizer recommendations , and liquid organic fertilizer + inorganic fertilizer 20% recommendation. In addition to it, Syofia *et al*. (2014), showed that liquid organic fertilizer "Santamicro" concentration of 3 ml / L of water applied by spraying can give the best results on the weight of sweet corn cobs of Jamboree and Bonanza varieties.

CONCLUSION

The use of POC significantly affected leaf area (cm^2), plant stover weight (g), and cob weight (g) but not significantly different from plant height (cm) and stem diameter (cm). In this study, the best treatment for the use of POC from landfill leachate on growth and yield of maize was a dose of 40 ml POC / L water.

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