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EVALUATION OF MYCELIAL GROWTH OF OYSTER MUSHROOM (*Pleurotus ostreatus*) FROM CASSAVA AND TARO PURE CULTURE MEDIA IN CRACK CORN

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ABSTRACT:

The study aimed to evaluate mycelial growth of cassava + agar and taro + agar OM pure culture in cracked corn subculture media. Pure culture from cassava + agar (treatment 1) and taro + agar (treatment 2) were used in the inoculation of subculture media.

The data gathered was compared using T-test. The evaluation of the first mycelial growth appearance from inoculation in two treatments exhibited significant difference with an average of 1.33-day period in treatment 1 and 2.33-day period in treatment 2.

The analysis in number of days from inoculation to full mycelial colonization also showed significant differences. The shortest time was recorded in treatment 1 with average of 9.53-day period followed with an average of 10.76-day period for treatment 2. The result confirmed the result of Stanley and Nyenke (2011) that the cassava stimulated luxuriant mycelial growth rate and extension.

The use of cassava + agar pure culture in oyster mushroom subculture production was recommended for its faster response to the cracked corn subculture media due to its fast mycelial growth.

Keywords: Oyster Mushroom, Pure culture, Subculture, mycelial growth and mycelial colonization

INTRODUCTION:

Mushroom farming is becoming successful because of its very low inputs. In fact, mushroom farming is now one of the priority programs of the Department of Agriculture (DA). It is being promoted by DA because of low capital investments, 90% of mushroom fruits consumed and imported, production materials are mainly agricultural wastes, skills in propagation are easily acquired and it is environment friendly.

In Central Luzon, overall production volume is very limited and un-optimal. Producers tended to restrict production to volumes their regular markets demanded (DA, 2014). In marketing, few producers tried to market outside their immediate neighborhood and municipalities. It is because they are frightened by spoilage and extra costs.

Production of quality spawn having good ability to colonize fruiting bags at low risk of contamination is of utmost importance to the mushroom industry (Abdullah, 2013). Mother spawn was done using cereal grains, so it was termed as grain spawn. Many types of grains can be used for grain spawn (Ogden & Prowse, 2004). Cracked corn was used as subculture media in the study because of its abundance in the Philippines.

Dimalaluan (2015) recommended the use of sweet potato + agar, cassava + agar and taro + agar as substitute media in oyster mushroom pure culture production for their financial viability compared with the control (the potato + agar). However, most of sweet potato + agar and control (the potato + agar) were contaminated.

Hence, cassava + agar and taro + agar oyster mushroom pure culture media performed better than the use of agar + potato, a comparative study on the further performance

of the successful pure culture media (cassava + agar and taro + agar) on the mycelial growth in cracked corn as subculture media or maybe called mother spawn by Stamets (2000). The use of mother spawn is recommended for farmers use for it could be produce in less aseptic condition so this research was conceptualized and conducted.

Objective of the Study:

This study primarily aimed to evaluate mycelial growth of cassava + agar and taro + agar oyster mushroom pure culture in cracked corn subculture media.

Specifically, the study aimed:

- To determine the number of days from inoculation to emergence of mycelia.
- To evaluate the surface areas covered by mycelia in subculture media and the number of days to full coverage.

Scope and Limitation of the Study:

This study was conducted to evaluate the mycelial growth of oyster mushroom in cassava + agar and taro + agar pure culture in cracked corn subculture media. With this study, the mushroom producer was aided in making mother spawn. It also improved the development of the mother spawn production for mushroom.

In this study, the researcher has limited himself in evaluating the mycelial growth of two treatments. Observations were limited to determine the effect of the treatments in terms of production.

The research was conducted to determine the following:

1. Identify the pure culture that effectively encouraged fast mycelium growth.
2. Observe the trend of growth increment of mycelia.

Location:

The study was conducted at the Biology Laboratory Room, College of Agriculture and Veterinary Medicine, Ramon Magsaysay Technological University, San Marcelino Campus, San Marcelino, Zambales.

LITERATURE:

Oyster Mushroom (*Pleurotus ostreatus*):

The oyster mushroom has many advantages as a cultivated mushroom: rapid mycelial growth, high ability for saprophytic colonization, simple and inexpensive cultivation techniques and several kinds of species available for cultivation under different climatic conditions. In addition, oyster mushroom is low in calories, sodium, fat and cholesterol, while rich in protein, carbohydrate, fiber, vitamins and minerals. These nutritional properties make this mushroom as a very good dietary food. In addition, consumption of oyster mushroom has positive effects on the general human health because of a number of special substances (Kues & Liu, 2000).

Stanley and Nyenke (2011) found out that Malt Extract Agar (MEA), Corn cob Extract Agar (CCEA) and cassava peelings Extract Agar (CPEA) media were found to stimulate luxuriant mycelial growth rate and extension whereas poor mycelial growth were recorded on potato Dextrose Agar and plantain peelings Extract Agar media.

According to Askitosari, Purwanto and Sabrina (2014) sweet potato and cassava can be used as alternative substrates for F0 and F1-mycelial growth of Shiitake and Lingzhi cultures. Dimalaluan (2015) recommended the use of sweet potato + agar, cassava + agar and taro + agar as substitute media in oyster mushroom pure culture production for their financial viability compared with the control (the potato + agar).

Mother Spawn:

Nwanze, Khan, Ameh and Umoh (2005) stated that spawn grains such as wheat, millet and corn have been reported to affect carpophores production. He examined the effect of spawn grains such as wheat, millet and corn on the culture of *Lentinus squarrosulus*. The results showed that corn spawn induced highest yield and dry weight of fruiting as compared to wheat and millet spawn.

The study of Stanley (2010) clearly demonstrated that between various substrates used, maximum and minimum growth rate were recorded that white maize (Bende Local) and least mycelial extension and fresh weight on wheat. The second best grain for both species used was Red Sorghum. He also described spawn (active mycelium) production as the inevitable bedrock for the development of the mushroom industry and also the limiting factor to mushroom cultivation or production all over the world.

MATERIALS AND METHODS:

Research Design:

This study was conducted to evaluate the mycelial growth of two pure cultures in cracked corn where five (5) bottles in each treatment was used as samples and was replicated three (3) times.

The following oyster mushroom pure cultures were used as treatments:

Treatment 1 - Cassava + Agar
Treatment 2 - Taro+ Agar

Research Materials and Equipment:

The materials used in the study are the following: Pure culture of oyster mushroom; Cracked corn; Bottles; Cotton; Aluminum foil; Weighing balance; Beaker; Bleach; Pressure cooker; Plastic cover; Inoculating camber; Customized cabinet; Improvised inoculating rod and Improvised transparent measuring sheet.

Research Procedure:

Selection and Gathering of Planting Source:

The cassava + agar and taro + agar oyster mushroom pure culture was obtained at College of Agriculture and Veterinary Medicine, Ramon Magsaysay Technological University San Marcelino Campus, San Marcelino, Zambales.

Preparation of Improvised Transparent Measuring Sheet:

An improvised transparent measuring sheet was made of thick plastic cover. Table of 1 cm^2 was printed on the coupon and mark in plastic cover with ball pen.

Preparation of Media:

Cracked corn was obtained at Agricultural Supply in Public market of San Marcelino, Zambales. It was cooked for 10 minutes. After cooking, it was drained to remove the syrup. 15 grams of cracked corn was placed in a bottle until 9 cm and it was plugged with cotton and was sterilized in pressure cooker at 15 psi for 15 minutes (Department of Science and Technology, 2007). Then it was allowed to cool.

Subculture Inoculation:

All the necessary materials were prepared. Seventy percent (70%) ethyl alcohol was used to disinfect the materials and area. The working area was disinfected and kept from the dust and air current. The inoculating rod was sterilized in the flame of an alcohol lamp. The inoculum about 1.5 cm^2 from cassava + agar and taro + agar oyster mushroom pure culture was lifted and was transferred into sterilized bottled media. The lip of the bottle as well as the lip of the flat bottle containing the inoculum was flamed before lifting a portion for transfer. It was plugged with sterilized cotton and was covered with aluminum foil and tied with a rubber band. The inoculum media was now termed spawn.

Care and Management:

The subculture was placed in the improvised inoculating chamber in order to avoid contamination. The hole of the inoculating chamber was closed with an aluminum foil.

Data Gathered:

The data were observed and recorded every 3 days. Photographs were taken also in every replicate of the treatments.

The data gathered were as follows:

1. **Number of days to first appearance of Mycelium:**

The first appearance of the mycelium in the treatments was recorded a day after inoculation.

2. **Number of days to full mycelial colonization:**

The number of days to full mycelial colonization of the oyster mushroom was observed and recorded.

3. **Growth increment of mycelia:**

Growth increment of mycelia was recorded 3 days after inoculation and every 3 days hereafter. It was measured using improvised transparent measuring sheet and was monitored for 2 weeks.

Statistical Analysis of Data:

T-test was used to compare and determine the difference between the means of two treatments.

RESULTS AND DISCUSSION:

In this research, the mycelial growth of cassava + agar and taro + agar oyster mushroom pure culture in cracked corn mother culture media was evaluated.

The evaluation of mother culture media in stimulation of immediate first mycelium appearance showed significant differences between the two treatments. The first appearance of the oyster mushroom mycelia was recorded to be faster is in treatment 1 (cassava + agar) with average of 1.33-day period from inoculation, while treatment 2 (taro + agar) has an average of 2.33-day as showed in Table 1. The result confirmed the result of Stanley and Nyenke (2011) that the cassava stimulated luxuriant mycelial growth rate and extension.

Table 1. Average number of days on the first mycelium appearance

Treatment	Treatment Mean
Treatment 1 – Cassava + Agar	1.33*
Treatment 2 – Taro + Agar	2.33*

There is a significant difference between Treatment 1 and Treatment 2 as to the number of days to full mycelial colonization. The shortest time with average of 9.53-day period was recorded in treatment 1 (cassava + agar) and an average 10.67-day period in treatment 2 (taro + agar). The data in the time of full mycelial colonization of oyster mushroom in the different treatments was summarized in table 2. Picture of fully colonized mother culture spawn was showed in Figure 6. The result confirmed the result of Stanley and Nyenke (2011) that the cassava stimulated luxuriant mycelial growth rate and extension.

Table 2. Average number of days in from inoculation to full mycelial colonization

Treatment	Treatment Mean
Treatment 1 – Cassava + Agar	9.53*
Treatment 2 – Taro + Agar	10.67*

On its 3rd day, the growth increment of mycelia was observed faster in Treatment 1

with an average of 29.33 cm^2 than that of Treatment 2 with an average of 15.2 cm^2. Rapid growth increment in both Treatment 1 and Treatment 2 was observed during the 6th day but Treatment 1 has a higher average of 80.8 cm^2 than that of Treatment 2 with an average of 66.67 cm^2. But during the 9th day the rate of growth become slower. Treatment 2 had a higher average of 58 cm^2 than that of Treatment 1 with an average of 35.34 cm^2. During the 12th day, the Treatment 1 had an average of 2.6 cm^2 and Treatment 2 having an average of 4 cm^2. The growth rate continued to slow down bur rise during the 15th day with an average of 3.93 cm^2 and 8.13 cm^2 for Treatment 1 and Treatment 2 respectively. The trend of growth increment of oyster mushroom mycelia was showed on Figure 6. The result confirmed the result of Stanley and Nyenke, (2011) that the cassava stimulated luxuriant mycelial growth rate and extension.

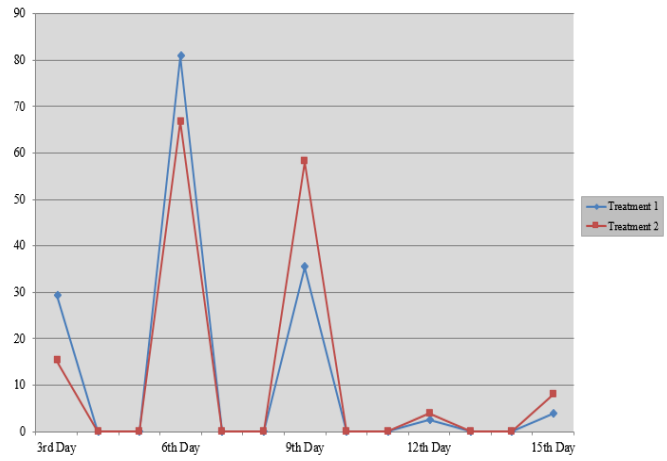

Figure 1. Graph Showing the Growth Increment of Mycelia in cm^2 every 3 days after inoculation

CONCLUSION AND RECOMMENDATION:

This study was an evaluation of oyster mushroom pure culture from cassava and taro media. With the result, it was concluded that Treatment 1 (cassava + agar) perform better compare to Treatment 2 (taro + agar) in cracked corn mother spawn media.

Based on the result in t-test in number of days from inoculation to mycelia first appearance and in number of days from inoculation of full mycelial colonization showed significant differences between the two treatments, therefore, the use of Treatment 1 (cassava + agar), in oyster mushroom mother spawn production was recommended for its faster mycelial growth on mother spawn media compared to treatment 2 (taro + agar). The result confirmed the result of Stanley and Nyenke (2011) that the cassava stimulated luxuriant mycelial growth rate and extension.

Hence, there are researchable areas to be addressed such as the evaluation of the mother spawn from oyster mushroom pure culture from cassava and taro in fruiting bags for growth and yield performance. A study on the growth and yield performance of oyster mushroom is recommended.

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APPENDIX A

Table 3.1. Number of days on the first mycelium appearance

Treatment	Rep. I	Rep. II	Rep. III	Treatment Total	Treatment Mean
T1	1.4	1	1.6	4	1.33
T2	2.2	2.4	2.4	7	2.33
Grand Total (G)				11	
Grand Mean					1.83

Table 3.2. T-test in Number of days on the first mycelium appearance

T-test	T value	Critical Value
	3.69	2.57*
*significant		

APPENDIX B

Table 4.1 Number of days in from inoculation to full mycelial colonization

Treatment	Rep. I	Rep. II	Rep. III	Treatment Total	Treatment Mean
T1	8.6	9.6	10.4	28.6	9.53
T2	10.4	10.6	11	32	10.67
Grand Total (G)				60.6	
Grand Mean					10.1

Table 4.2 Number of days in from inoculation to full mycelial colonization

T-test	T value	Critical Value
	40.2	2.57*
*significant		

APPENDIX C

Table 5.1. Growth increment in cm^2 of mycelia in 3rd day after inoculation

Treatment	Rep. I	Rep. II	Rep. III	Treatment Total	Treatment Mean
T1	24.6	42.2	21.2	88	29.33
T2	23.8	9.6	12.2	45.6	15.2
Grand Total (G)				133.6	
Grand Mean					22.27

Table 5.2. Growth increment in cm^2 of mycelia in 6th day after inoculation

Treatment	Rep. I	Rep. II	Rep. III	Treatment Total	Treatment Mean
T1	116.2	112.6	101.6	330.4	110.13
T2	88.2	76.4	81	245.6	81.87
Grand Total (G)				576	
Grand Mean					96

Table 5.3. Growth increment in cm^2 of mycelia in 9th day after inoculation

Treatment	Rep. I	Rep. II	Rep. III	Treatment Total	Treatment Mean
T1	152	145.2	139.2	436.4	145.47
T2	135.8	145	138	419.6	139.87
Grand Total (G)				856	
Grand Mean					142.67

Table 5.4. Growth increment in cm^2 of mycelia in 12th day after inoculation

Treatment	Rep. I	Rep. II	Rep. III	Treatment Total	Treatment Mean
T1	152	147.2	145	444.2	148.07
T2	139.4	151.4	140.8	431.3	143.87
Grand Total (G)				875.8	
Grand Mean					145.97

Table 5.5. Growth increment in cm^2 of mycelia in 15th day after inoculation

Treatment	Rep. I	Rep. II	Rep. III	Treatment Total	Treatment Mean
T1	152	152	152	456	152
T2	152	152	152	456	152
Grand Total (G)				912	
Grand Mean					152

APPENDIX C

Table 6. Growth Increment of Mycelia every 3 days in cm^2

Treatment	3rd Day	6th Day	9th Day	12th Day	15th Day
T1	29.33	80.8	35.34	2.6	3.92
T2	15.2	66.67	58	4	8.13