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Land Use and Environment Physical Condition on Sedimentation and Water Discharge of Lindu Lake Watershed

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ABSTRACT

Lindu lake sub-watershed has harmed by various human activities which do not pay attention to environmental sustainability principles. This research aims to know the influence of land use area and environment physical condition on sedimentation and water discharge in Lindu lake sub-watersheds. This research uses survey and non-experimental method on 3 rivers which are Langko (P1), Wongkodono (P2), and Kati (P3). The dependent variable in this research is land use area (area of the garden, shrubs, rice field, forest, and settlement) and environment physical condition (catchment area and average annual rainfall) and the independent variables are sedimentations and water discharge. The used statistical analysis is a multiple regression model. The result shows that the wider shrubs area (X2) reduces sedimentation (Y1) and increases water discharge (Y2). Each addition of one shrub unit will decrease sediment in amount of 0,208 mg/L and affects water discharge an amount of 0,258 m³/sec-1 with regression equation $Y1 = 185,903 - 0,208X2 - 587,269X8$ and $Y2 = 6,854 + 0,258 X2 - 71,708 X8$. As for the bigger river shape coefficient (X8) so the smaller water discharge average. Hence, each reduction of one river shape coefficient unit will affect water discharge in the amount of 71,708 m³/sec-1. It can be concluded that significant predictor factor on sedimentation and water discharge are shrubs and river shape coefficient.

Keywords---environment physical condition, lindu lake watershed, sedimentation, water discharge.

INTRODUCTION

There are various disturbances on watershed ecosystem especially from watershed inhabitants such as human (Jordan & Benson, 2015; Upadani, 2017; Williams et al., 2016). If the watershed function is disturbed, so the hydrology system as the watershed main function will be disturbed as well, also rainfall catchment, recharge, and water storage will decrease (Nasrullah & Kartiwa, 2009; Oktarian et al., 2016). That phenomenon will cause excessive water in the rainy season but lack of water in the dry season. Furthermore, it also causes fluctuation of river flow between the dry season and the rainy season which highly different. Hence, if the fluctuation of river flow is very sharp it means watershed is not functioning properly which also means the low quality of watershed (Hirpa, Gebremichael, & Over, n.d.; Rahman, 2009; Wahid, 2009; Wondzell et al., 2007).

According to Lukman and Ridwansyah (Lukman & Ridwansyah, 2003), recent measurable Lindu Lake maximum depth is 72,6 m. There is an indication of 30 m lake siltation since in 1970 Lindu Lake depth is

recorded around 100 m. Siltation is an effect of sedimentation. Based on the condition of Lindu lake sub-watershed, if it is not resolved there might be a worse crisis of land (soil) and water resources in the future because of human activities.

Land use is human intervention whether it is permanently or periodically to fulfill their needs in the form of material or spiritual to the needs of complex land resources. Land use pattern of a particular region can give a depiction of the region economics condition and as an indicator of environmental pollution. Hence, there is an interest to provide wider land to expand basic economy which number is increasing (Agustiningsih et al., 2012; Jie et al., 2010).

Lindu lake sub-watershed has harmed by various human activities which do not pay attention to environmental sustainability principles. Recently, Lindu lake sub-watershed has lost more than 16.000 ha of forest area (Lukman & Ridwansyah, 2003). The main reason is illegal forest conversion into agricultural land. It causes lake on succession condition where it changes from an aquatic ecosystem to the terrestrial ecosystem. Main physical condition factor which affects watershed management is the climate factor which is rainfall (Ningkeula, 2015; Yan et al., 2015).

There are several factors that affect water discharge such as rainfall intensity, deforestation, forest conversion into agricultural land, interception, evaporation and transpiration, wind, also flow velocity (Ahmad, 2014; Handayani & Indrajaya, 2011; Love et al., 2010; Quyen, Liem, & Loi, 2014; Wondzell et al., 2007). The amount of river flow fluctuation and sedimentation portrays land use pattern and environment physical condition such as rainfall, watershed area, and river shape coefficient (Berhanu et al., 2015; Duncan et al., 2017). This research aims to know the influence of land use area and environment physical condition on sedimentation and water discharge in Lindu lake sub-watersheds.

RESEARCH METHOD

The used materials are roll meters, sample bottles, cameras, GPS, hagameter, filter paper, and stationery. This research is conducted with survey and non-experimental method. The variable approach is conducted by field survey.

This research started from January until April 2017 which located in the Catchment area of Lindu Lake. Afterward, the sedimentation analysis is conducted in the Laboratory of Soil Science Unit, Faculty of Agriculture, Tadulako University, Palu.

Examined Catchment Area of Lindu Lake

Table 1 : Sub-watersheds research

No	Sub-watersheds		Area (km ²)
	River Name	Observation Station	
1.	Langko River	P1	9,68
2.	Wongkodono River	P2	2.794
3.	Kati River	P3	138,04

RESEARCH VARIABLE

The dependent variable in this research is land use area (area of the garden, shrubs, rice field, forest, and settlement) and physical condition of the environment (catchment area, and average annual rainfall) and the independent variables are sedimentations and water discharge (Table 2).

Table 2 : Dependent and Independent Variable

Variable	Sub Variable	Notation	Unit*)
Area of Land Use Pattern	Plantation	X ₁	%
	Shrubs	X ₂	%
	Rice field	X ₃	%
	Primary forest	X ₄	%
	Secondary forest	X ₅	%
Environment Physical Condition	Area of sub-watersheds	X ₆	km ²
	Average of rainfall	X ₇	mm th ⁻¹
	River shape coefficient	X ₈	Km ²
Sedimentation		Y ₁	Ton ha ⁻¹ th ⁻¹
Water Discharge		Y ₂	m ³ /det

DATA COLLECTION

Number of Points and Observation Period

a) There are 3 (three) catchments of the observation point, each observation points is measured twice at the edge of the river and middle of the river. Thus, the number of water sample on each 3 observation points is 6 samples on each measurement.

b) For observation period, on each of the points is repeated with an interval 7 days (1 week), so measurement during research is 7 times measurement.

FLOW RATE MEASUREMENT

The measurement of river discharge and flow rate uses the direct method with the equation of a buoyancy formula:

$$Q = V \cdot A$$

Information: V= Average flow rate (m/sec); A= Area of river cross section (m²);

Q = river flow rate (m³/sec)

Water Sampling Technique (Floating Sediment)

Water sampling technique by using bottle is a modification of Depth – Integrating Suspended technique. The bottle of sediment sample is made simpler with two holes. The first hole for water sample entry and another one for an air hole.

Floating Sediment Analysis

The amount of sediment concentrate is determined from sediment sample analysis which using evaporation method with equation:

$$C = x (b-a) \times 1000 \text{ (mg/l)}$$

Information:

C = Sediment concentrate (mg/l)

V = Volume of sediment sample (ml)

b = The weight of the cup contains sediment deposition (gram)

a = The weight of empty cup (gram) the amount of sediment concentrate and water discharge are determined with equation : $Q_s = 0,00864 \cdot C \cdot Q$.

where Q_s = total of sediment (ton/day).

C = sediment concentrate (mg/l), and Q = river flow rate (m³/second)

Transported Sediment Value

The amount of sediment per area is calculated with the equation:

$$SDR = \frac{\text{Transported Sediment (Y)}}{\text{the amount of erosion (A)}}$$

Where the determination of erosion amount (a) is obtained from the application of simulation formula USLE which is: $A = R \cdot K \cdot LS \cdot C \cdot P$. therefore, transported sediment is obtained with the formula: $Y = SDR/A$.

Statistical Analysis

The used statistical analysis method is the multiple regression model to know the relation of an independent variable (X) with the variable response (Y)

This research uses the regression equation as follows :

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + b_8X_8 + \epsilon \dots\dots\dots$$

Where:

Y_1 = Sedimentation

Y_2 = Water discharge

X_1 = Plantation

X_2 = Shrubs

X_3 = Rice field

X_4 = Forest

X_5 = Settlement

X_6 = Sub-watershed

X_7 = Average of rainfall

X_8 = River shape coefficient

a = Constants value

b (1-5) = Regression coefficient value

ϵ = Error

RESULTS AND ANALYSIS

Table 3 shows the river with the highest water discharge is Kati river (P³) with average 10,0 m³/sec when it is not raining and after raining it becomes 24,58 m³/sec. Meanwhile, the smallest water discharge is on Wongkodono river (P2) 0,125 m³/sec when it is not raining and after raining it becomes 1,25 m³/sec.

Table 3 River Water Discharge Based on Rainfall Period during Research

River Name	Water Discharge (m ³ /sec)							
	Not Raining				After Raining			
	1	2	3	4	1	2	3	4
Langko (P1)	0.4	0.5	0.6	0.9	1.1	1.2	7.2	1.1
Wongkodono (P2)	0.1	0.2	0.1	0.1	0.5	0.5	3.6	0.4
Kati (P3)	6.8	6.8	13.7	12.7	15.1	15.6	52.5	15.1

Table 4 Shows River with the largest sedimentation is Kati River (P3) with average sedimentation value (when raining or after raining) in the amount of 165 mg/L and the least is in Langko River (P1) with sedimentation average (when raining and after raining) in the amount of 109.42 mg/L.

Table 4 : Data of River Sedimentation Based on Rainfall period during Research

River Name	Sedimentation (mg/L)	Information
Langko River (P1)	100	Not raining
	128	Not raining
	108	Raining
	168	Raining
	126	Not raining
	118	Not raining
Wongkodono River (P2)	18	Raining
	124	Not raining
	124	Not raining
	122	Raining
	144	Raining
	174	Not raining
Kati River (P3)	120	Not raining
	126	Raining
	144	Not raining
	190	Not raining
	303	Raining
	264	Raining
	14	Not raining
	56	Not raining
	184	Raining

Table 5 shows land use by local inhabitants is garden and rice field. The biggest garden land use is in Langko River (P1) in the amount of 16,91% and rice field in the amount of 8,78%.

Table 5 : Land Use

Land Use	Langko river (P1)		Wongkodono river (P2)		Kati river (P3)	
	Area of Ha	%	Area of Ha	%	Area of Ha	%
Garden (X1)	163.73	16.91	336.76	12.06	974.31	7.06
Shrubs (X2)	14.75	1.52	0	0	46.88	0.34
Rice Field (X3)	84.98	8.78	112.41	4.03	116.83	0.85
Primary Forest (X4)	314.08	32.43	1,662.70	59.56	5,396.10	39.07
Secondary Forest (X5)	390.84	40.36	678.64	24.31	7,275.87	52.69

Table 6 shows the largest catchment area is in Kati River (P3) in the amount of 13,809.99 km² and the smallest in Langko River (P1) in the amount of 968.38 km². Meanwhile, the average of rainfall is 2.205.42 mm th⁻¹ and the biggest river shape coefficient is in Langko River (P1) in the amount of 0.125

Table 6 : Environment Physical Condition

Environment Physical Condition	Langko river (P1)		Wongkodono river (P2)		Kati river (P3)	
	Nilai	Satuan	Nilai	Satuan	Nilai	Satuan
Catchment Area (X6)	968.38	Km ²	2,790.54	Km ²	13,809.99	Km ²
Average of Rainfall (X7)	2,205.42	mm th ⁻¹	2,205.42	mm th ⁻¹	2,205.42	mm th ⁻¹
River Shape Coefficient (X8)	0.125	-	0.089	-	0.036	-

Factors which Influence Sedimentation (Y₁)

The result of multiple regression analysis from eight variables, it turns out only two variables which have a significant influence on sedimentation and an equation is obtained as follows:

$$Y_1 = 185,903 - 0,208X_2 - 587,269X_8$$

Where Y_1 = Sedimentation, X_2 = shrub, X_8 = River shape coefficient

The result shows that variables which have a significant effect on the sedimentation process are river shape coefficient and shrubs. The bigger river shape coefficient, sediment will increase in the amount of 587,269 mg/L as multiple regression calculation has been conducted that Lindu lake watershed has big river shape coefficient so the occurrence of sedimentation is also bigger.

Factors which Influence River Flow Rate (Y_2)

Multiple regression analysis from eight variables in equation generates only two variables which have a significant influence on the change of measured average flow rate and an equation is obtained as follows:

$$Y_2 = 6,854 + 0,258 X_2 - 71,708 X_8$$

Where Y_2 = measured average flow rate, X_2 = shrubs, X_8 = river shape coefficient. From regression relation in equation (1) it is obtained a very good R_2 which is 1 or 100% the change of measured flow rate average is related to variables of shrubs and river shape coefficient.

DISCUSSION

The result of the research shows the largest shrubs so it will decrease sedimentation and make water discharge higher, each addition of one shrub unit will decrease sediment in the amount of 0,208 mg/L and affects water discharge the amount of 0,258 m³/sec-1. Shrubs existence maintains Lindu Lake watershed sustainability in a longterm, so it will prevent the occurrence of the siltation process in Lindu Lake watershed. Nevertheless, water discharge will be high if shrubs less absorb the water. Hence, if the rain pours the water will runoff directly to the river and make water discharge high. Water runoff is an amount of water which flows over the land in the form of canals or creeks and end up gather/flow to the main river.

Shrubs and bushes are an area of dry land which has been overgrown with various heterogeneous and homogeneous natural vegetation which its density is rare until dense (BSN, 2010). In Indonesia, generally, shrubs is a former forest area that does not show any trace of trees cutting down (Savitri & Pramono, 2017). Generally, shrubs also an unproductive area and was abandoned by farmers. Hydrologically, shrubs have important hydro-orological functions especially to maintain microclimate, soil moisture, and microorganism activity (Makarieva et al., 2018; Ryu et al., 2008). Shrubs in several areas are so wide and usually, it is untouched by farmers' activity so the existence is still original.

Furthermore, the bigger river shape coefficient the smaller water discharge average. Thus, each reduction of one unit river shape coefficient will affect water discharge in the amount of $71,708 \text{ m}^3/\text{sec}^{-1}$. When an amount of water in a region increases so the faster time that needed for water to flow. Consequently, water discharge will increase when the rain comes.

The increasing of water discharge after rain comes in several sampling points is still normal. It causes by not very high rainfall when the samples are taken. The highest water discharge after rain is in Kati River in the amount of $52,5 \text{ m}^3/\text{sec}$ since there was heavy rain the whole day before the data was taken. That increasing of water discharge will not cause any negative effect on local inhabitants activity especially agricultural activity such as rice field area (Suadnya et al., 2017; Wagner et al., 2009). Moreover, the amount of water discharge will not affect other agricultural activity such as seasonal crops around sampling points.

The amount of water discharge has an effect on the agricultural activity which is the amount of water that enters the agricultural area. If the discharge is too low the lack of water to fulfill agricultural need will possibly happen. In contrast, if the discharge is too high it will give a negative effect to agriculture especially rice field area. Nonetheless, water availability is important to run agricultural activity, and basically, all the crops such as seasonal crops around the research area need more water than annual crops.

CONCLUSION

The main factor and predictor on sedimentation and water discharge of Lindu lake watershed are shrubs and river shape coefficient. Hence, land expansion by reducing shrubs can give negative effect in form of siltation and causes damage such as river ecosystem loss and flood because of high sedimentation.

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REFERENCES

- Agustiningsih, D., Sasongko, S. B., & Sudarno. (2012). Analisis Kualitas Air dan Strategi Pengendalian Pencemaran Air Sungai Blukar Kabupaten Kendal. *Jurnal PRESIPITASI*, 9(2), 64–71.
- Ahmad, S. W. (2014). Hydrology Analysis On Characteristics Of Forest Area Conservation Efforts In Sustainable Water Resources. *Biowallacea*, 1(2), 97–106.
- Berhanu, B., Seleshi, Y., Demisse, S., & Melesse, A. (2015). Flow Regime Classification and Hydrological Characterization: A Case Study of Ethiopian Rivers. *Water*, 7(12), 3149–3165. <https://doi.org/10.3390/w7063149>

- BSN. (2010). *Klasifikasi penutup lahan (SNI 7645:2010)*. Badan Standarisasi Nasional.
- Duncan, J. M., Welty, C., Kemper, J. T., Groffman, P. M., & Band, L. E. (2017). Dynamics of nitrate concentration/discharge patterns in an urban watershed: DYNAMIC URBAN NITRATE C-Q PATTERNS. *Water Resources Research*, 53(8), 7349–7365. <https://doi.org/10.1002/2017WR020500>
- Handayani, W., & Indrajaya, Y. (2011). The Analysis of Rainfall and Discharge Relationship on Ngatabaru Sub Sub Watershed, Central Sulawesi. *Jurnal Penelitian Hutan Dan Konservasi Alam*, 8(2), 143–153.
- Hirpa, F. A., Gebremichael, M., & Over, T. M. (n.d.). River flow fluctuation analysis: Effect of watershed area. *Water Resources Research*, 46(12). <https://doi.org/10.1029/2009WR009000>
- Jie, L., Jing, Y., Wang, Y., & Shu-xia, Y. (2010). Environmental Impact Assessment of Land Use Planning in Wuhan City Based on Ecological Suitability Analysis. *Procedia Environmental Sciences*, 2, 185–191. <https://doi.org/10.1016/j.proenv.2010.10.022>
- Jordan, S. J., & Benson, W. H. (2015). Sustainable Watersheds: Integrating Ecosystem Services and Public Health. *Environmental Health Insights*, 9(Suppl 2), 1–7. <https://doi.org/10.4137/EHI.S19586>
- Love, D., Uhlenbrook, S., Corzo-Perez, G., Twomlow, S., & van der Zaag, P. (2010). Rainfall–interception–evaporation–runoff relationships in a semi-arid catchment, northern Limpopo basin, Zimbabwe. *Hydrological Sciences Journal*, 55(5), 687–703. <https://doi.org/10.1080/02626667.2010.494010>
- Lukman, & Ridwansyah. (2003). Kondisi Daerah Tangkapan Dan Cirri Morfometri Danau Lindu. *Oseanologi & Limnologi Indonesia*, 35, 11–20.
- Makarieva, O., Nesterova, N., Lebedeva, L., & Sushansky, S. (2018). Water balance and hydrology research in a mountainous permafrost watershed in upland streams of the Kolyma River, Russia: a database from the Kolyma Water-Balance Station, 1948–1997. *Earth System Science Data*, 10(2), 689–710. <https://doi.org/10.5194/essd-10-689-2018>
- Nasrullah, & Kartiwa, B. (2009). Hydrological Model of Upstream Aih Tripe Watershed for Drought and Flood Prediction. *Jurnal Tanah Dan Iklim*, 29, 35–52.
- Ningkeula, E. S. (2015). Analisis Karakteristik Meteorologi Dan Morfologi DAS Wai Samal Kecamatan Seram Utara Timur Kobi Kabupaten Maluku Tengah. *Jurnal Ilmiah Agribisnis Dan Perikanan*, 8(2), 81–91.
- Oktarian, D., Liesnoor, D., & Setyaningsih, W. (2016). Analisis Spasial Perubahan Penggunaan Lahan Di DAS Babon Hulu Terhadap Debit Puncak Sungai Babon Jawa Tengah. Universitas Negeri Semarang, Semarang.
- Quyenn, N. T. N., Liem, N. D., & Loi, N. K. (2014). Effect of land use change on water discharge in Srepok watershed, Central Highland, Viet Nam. *International Soil and Water Conservation Research*, 2(3), 74–86. [https://doi.org/10.1016/S2095-6339\(15\)30025-3](https://doi.org/10.1016/S2095-6339(15)30025-3)
- Rahman, A. (2009). The Influence of The Area of Land Use Patterns and Physical Environment Condition on Water Debit and Sedimentation at Various Catchment Areas in The Upper Cimanuk Sub Watershed West Java. *J. Agroland*, 16(3), 224–230.
- Ryu, Y., Baldocchi, D. D., Ma, S., & Hehn, T. (2008). Interannual variability of evapotranspiration and energy exchange over an annual grassland in California. *Journal of Geophysical Research*, 113(D9). <https://doi.org/10.1029/2007JD009263>
- Savitri, E., & Pramono, I. B. (2017). Reklasifikasi Peta Penutupan Lahan untuk Meningkatkan Akurasi Kerentanan Lahan. *Jurnal Wilayah Dan Lingkungan*, 5(2), 83. <https://doi.org/10.14710/jwl.5.2.83-94>
- Suadnya, D. P., Sumarauw, J. S. F., & Mananoma, T. (2017). Analisis Debit Banjir dan Tinggi Muka Air Banjir Sungai Sario Di Titik Kawasan Citraland. *Jurnal Sipil Statik*, 5(3), 143–150.
- Upadani, I. G. A. . (2017). Model Pemanfaatan Modal Sosial Dalam Pemberdayaan Masyarakat Pedesaan Mengelola Daerah Aliran Sungai (DAS) Di Bali. *Wicaksana, Jurnal Lingkungan & Pembangunan*, 1(1), 11–22.
- Wagner, K., Neuwirth, J., & Janetschek, H. (2009). Flood risk – Prevention and Impact on Agricultural Lands. In *The 83rd Annual Conference of the Agricultural Economics Society* (pp. 1–7). Dublin: The Agricultural Economics Society.
- Wahid, A. (2009). Analisis Faktor-Faktor Yang Mempengaruhi Debit Sungai Mamasa. *Jurnal SMARTek*, 7(3), 204–218.
- Williams, C. J., Frost, P. C., Morales-Williams, A. M., Larson, J. H., Richardson, W. B., Chiandet, A. S., & Xenopoulos, M. A. (2016). Human activities cause distinct dissolved organic matter composition across freshwater ecosystems. *Global Change Biology*, 22(2), 613–626. <https://doi.org/10.1111/gcb.13094>
- Wondzell, S. M., Gooseff, M. N., & McGlynn, B. L. (2007). Flow velocity and the hydrologic behavior of streams during baseflow. *Geophysical Research Letters*, 34(24). <https://doi.org/10.1029/2007GL031256>
- Yan, Q., Lei, T., Yuan, C., Lei, Q., Yang, X., Zhang, M., ... An, L. (2015). Effects of watershed management practices on the relationships among rainfall, runoff, and sediment delivery in the hilly-gully region of the Loess Plateau in China. *Geomorphology*, 228, 735–745. <https://doi.org/10.1016/j.geomorph.2014.10.015>

Chemical on Pleurotusostreatus

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ABSTRACT

Oyster mushroom (Pleurotusostreatus) is a fungus that is much-loved by the people. In addition to deliciousness, oyster mushrooms are also very beneficial for health. High nutritional content with a variety of essential amino acids contained therein, oyster mushrooms also contain other compounds that are important for the medical aspects. The more days of oyster mushrooms increasingly interested in the community, this is apparently a result of the impact of increasing public awareness of the benefits and nutritional value of oyster mushrooms. In nature, Oyster mushroom grows only in certain seasons in limited quantities so that the oyster mushroom has good prospects to be cultivated. Mushrooms Lampung is a business that is engaged in the cultivation of oyster mushrooms. The oyster mushroom is grown on the media can be sawdust packed in plastic bags. In the oyster mushroom cultivation activities include preparation of tools and materials, raw material preparation, mixing media, composting, pasteurization, inoculation, incubation, growth and maintenance, harvesting, post-harvest, and marketing. The pasteurization process using oyster mushrooms media banker and a vessel of water.

Keywords---medicine, place, pleurotusostreatus, powder wood, seeds.

INTRODUCTION

Oyster mushroom (*Pleurotus ostreatus*) is so named because of its shapes like oysters or mushroom users. Oyster mushrooms are woody mushrooms growing side by side on weathered logs. This mushroom has a body fruit that grows in bloom forms a shallow funnel such as shells. But some call it West Mushroom. There are several types of oyster mushrooms namely milk white oyster mushrooms, pink oyster mushrooms, gray oyster mushrooms, and brown oyster mushroom. White oyster mushrooms are best known for being delicious and liked community (Sumarmi, 2006).

Oyster mushrooms are one of the many healthy vegetables known and consumed. White oyster mushroom is a mineral source well, the main mineral content is K, Na, P, Ca, and Fe, oyster mushrooms too efficacious to reduce cholesterol levels, prevent diabetes, and play a role as anti-cancer (Cahyana and Mucrodji, 1999). In this day and age many people have cultivated mushrooms white oysters, white oyster mushroom cultivation besides adding to the economy of the farmer, it turns out that white oyster mushrooms are beneficial to the body because there are many contains vitamins and amino acids. enough white oyster mushroom cultivation easy does not require media that is difficult enough with the main media namely sawdust.

White oyster mushroom (*Pleurotus ostreatus*) is one type of mushroom consumption is quite popular with the community and also useful for the body because of high nutritious and low fat. White oyster mushrooms are included in the group Basidiomycetes, which is a group of white rot fungi that are characterized by the growth of white mycelium pales on the entire growing media (Sumarsih, 2010). White oyster mushroom is a type of wood mushroom that has higher nutrient content than other types of woody mushrooms. White oyster mushrooms contain protein, fat, phosphorus, iron, thiamin and riboflavin is higher than other types of mushrooms (Djarajah and Abbas, 2001).

White oyster mushrooms (*Pleurotus ostreatus*) are currently quite popular and much loved by people in the world, besides delicious, it also feels full of nutrient content, high protein, and low fat. Every 100 g of dried mushrooms contains 7.8-17.72 g of protein, 1-2.3 g of fat, 5.6-8.7 g of crude fiber, Ca 21 mg, Fe 32 mg, 0.21 mg thiamin, riboflavin 7.09 mg, and 57.6-81.8 g carbohydrates, with 328-367 kcal of energy. This mushroom has the ability to improve metabolism and regulate autonomic nerve function. In addition, it is also for the treatment of hepatitis, digestion, duodenum, and stomach. A source of food with high protein content known by the community is soybeans which are processed into tempeh or tofu (Ginting, et al., 2013). But recently the soybean has increased price, in response to this, the community needs other alternatives. When viewed from the protein content, oyster mushrooms can be another choice as a protein source needed by the body. According to Parjimo and Agus Andoko (2013) protein content of oyster mushrooms every 100g by 27% while the protein in soybean tempe is 18.3% every 100g (Muchtadi, 2010).

Oyster mushrooms include perishable foods, such as types other vegetables. A few days after harvest, the quality of the oyster mushroom drops with fast to not be consumed. Changes in the quality of oyster mushrooms, among others withered, the color becomes brown, soft and tastes change, in Indonesia mushroom preservation of commercial food has not been done much, in the supermarket, mushrooms are usually stored in cold temperatures, namely 15-200C. At this temperature, mushrooms can only survive (still suitable for consumption) for 3-5 days, though has been packed with polyethylene plastic (Ardiansyah et al., 2014).

In the research, Netty mentioned the process of making mushroom powder oysters are considered quite important optima, because oyster mushrooms have the potential as nutraceutical and in his research mention the results of nutritional analysis on white oyster mushrooms (100 g) indicating that crude fiber (3.44% b / b), protein (3.15% b / b), glutamic acid (0.94% b / b) is relatively high. Carbohydrates (0.63% b / b), fat (0.10% b / b), relatively low (Netty, 2004). The temperature and drying times are right for the manufacturing process White oyster mushroom flour is 60 ° C with 11 hours drying time. Results of

analysis of protein and water levels from a combination of temperature 60 ° C for a long time drying 11 hours, obtained protein content of 16.95% and water content amounting to 13.15%. These results are in accordance with the Indonesian National Standards for flour that meets the standard protein content of 7% and the water content of 14.5% (Gea, 2014). In the Hapsari study, the soaking material was influential real water content, fat, crude fiber and amylographic properties of banana flour. The soaking material did not significantly affect the receptivity of banana flour cholesterol. The use of calcium carbonate (CaCO₃) soaking material has time and the thermalization temperature and viscosity of banana flour are lower than sodium metabisulfite (NaS₂O₅) (Hapsari, 2012).

METHODOLOGY

Oyster mushroom cultivation is very suitable for tropical regions such as Indonesia. The investment needed to start the cultivation of oyster mushrooms is quite cheap and can be done gradually. The hardest part is making baglog, a planting medium that has been inoculated with mushroom seeds. The Latin name of the oyster mushroom is *Pleurotus ostreatus*, including in the Basidiomycota group. Oyster mushrooms are called because the shape of the crown resembles oyster skin. Semicircular white. In the wild, white oyster mushrooms are commonly found in decayed logs. Maybe because of that, oyster mushrooms are often called wood mushrooms.

There are two main activities in the cultivation of oyster mushrooms. The first step is to make the planting media and inoculate the mushroom seeds into the growing media. So that the media overgrown with white mycelium like cotton. The second stage is to grow the mycelium into a fruiting body. For newcomers, usually, start cultivation activities by growing baglog into fruit flesh. While procurement, baglog that is ready to grow is obtained by buying from another party. Then after the cultivation effort developed and the volume was large, I just tried to make baglog myself.

PREPARATION OF OYSTER MUSHROOM PLANTING

Before planting, the things that support the cultivation of oyster mushrooms must be available, including home baglog, baglog shelves, oyster mushroom seeds, and cultivation equipment. (Can you see articles Preparation Oyster Mushroom Cultivation). Keep the oyster mushroom cultivation using certified seed that can be purchased from other farmers or the local agricultural bureau. Equipment oyster mushroom cultivation is quite simple, affordable prices, we can capitalize even kitchen appliances.

To optimize the results in the cultivation of oyster mushrooms in the lowlands can be done with the modification to the media material and measuring, ie, by adding or reducing the dose of each ingredient of the general standard. In a small-scale business, experiments in determining the dose of media

materials are very important in order to obtain the right dose. This is because the fungus is cultivated in different growing environments necessarily require nutrients and different media depending on local environmental conditions. Up to now, there is no standard media composition for oyster mushroom cultivation in the lowlands so that farmers modify the media and the environment based on the experience and condition of each.

As the oyster mushroom growing medium, sawdust serves as a provider of nutrients for fungi. The wood used should hardwood sawdust for the kind of great potential for increasing crop yields oyster mushrooms. This is because the hardwood contains a lot of cellulose needed by the fungus. The types of hardwood that can be used as a medium for oyster mushroom growing among others wood village, and mahogany. To get the sawdust farmers must get it in place sawmill. Before being used as a medium usually powder timber to be composted first in order to break down into simpler compounds that are easily digested by the fungus. Sawdust composting process is done by closed using a plastic or a tarp for 1-2 days. Composting takes place with both a temperature rise of about 50 degrees C.

STERILIZATION MATERIAL

Before being mixed with other media, assault and bran sterilized timber beforehand using the oven for 6-8 hours at a temperature of 100 degrees C. In addition to the reduced sterilization of microorganisms that cause contradictive also less water content in sawdust. Thus, the media becomes drier. Both materials are mixed and given then approximately 50-60 % water until the dough becomes smooth and can be clenched. Waterworks in the absorption of nutrients by the mycelium. Water used to clean water to reduce the risk of contamination of other organisms in the media. In the media into the plastic, the media should be completely solid so many mushrooms can be generated. So make sure that the ingredients have been pretty solid in plastic by means of pressing the dough until completely solid, then the top ring mounted PVC bag and then a plastic bag closed with cotton stoppers and secured with rubber.

STERILIZATION BAGLOG

Baglog sterilization is done by inserting baglog to autoclave or heater/steamer with a temperature of 121 degrees C for 15 minutes. To change the use of an autoclave or steamer, can use a large capacity drum with or able to accommodate about 50 baglog and heated on a stove oil or can also use the oven. Indeed, sterilization baglog use drum takes longer, which is about 8 hours but is considered savings. After the sterilization process is completed, baglog then cooled, by turning off the sterilizer and let the temperature go down little by little. After the cooling process, then planting seedlings mushroom.

Planting and Maintenance of Oyster Mushrooms

One of the critical success oyster mushroom cultivation is cleanliness in the process of cultivation, good cleanliness of the place, the tool, as well as workers. This is because cleanliness is absolute must be met. For that, a place for planting should be cleaned first with a broom, floor and walls are cleaned with disinfectant. The tools used for planting should also be sterilized using alcohol and heated over a candle flame. In addition, during the planting of the workers also ideally using a mask. It aims to minimize contamination.

In the oyster mushroom cultivation things must also be considered is to keep the room temperature and humidity in order to remain at the required standards. If the weather is dry, hot or windy, it will affect the temperature and humidity in the mushroom house so that the water quickly evaporates. If so, watering frequency should be increased.

If the temperature is too high and the humidity is less, can make the body fungus is difficult to grow or not grow.

Therefore, also set air circulation inside kumbung so the fungus does not quickly wither and die. Circulation arrangements can be made by partially closing circulation holes when the wind was strong. Circulation can be opened all when the wind is in the normal speed. However, the important thing is not to mushroom lacked fresh air.

Pest Control Disease in Raising Oyster Mushroom

In addition to maintenance baglog, the oyster mushroom cultivation is also necessary treatments to prevent or control pests and diseases that may strike the oyster mushroom. Pests and diseases that attack the oyster mushroom are certainly influenced by environmental or fungus itself. So between the cultivation of the one and the other, pest attack is likely to vary.

HAMA DISEASE MUSHROOM OYSTER

Caterpillar

The caterpillars are pests most commonly found in oyster mushroom cultivation. There are three factors causing the emergence of these pests are factors moisture, dirt from the rest of the base/tubers or stems mold and mildew are not harvested, as well as the unsanitary environment.

Caterpillar pests arise when excessive air humidity. Therefore, caterpillar pests are common during the rainy season. Prevention is the best solution to overcome these pests is to regulate air circulation. You do this by opening circulation holes and temporarily halted watering process.

The base of the mushroom left in the harvesting baglog can cause small animals like ladybugs. Ladybug is the primary cause of caterpillar pests. While the mushrooms are harvested not likely because the fungus does not appear out so missed when harvesting and become rotten. This led to the emergence of caterpillars. Preferably, when harvesting baglog has confirmed it clean so that there is no base or stem and fungi that are not harvested.

Caterpillars may arise because of the house mushroom house or around kumbung. For example their cattle sheds or plant around the house kumbung. To prevent and overcome caterpillar pests, cleaning of the house and around the house mushroom house by spraying formalin.

ANTS, SPIDERS, AND KLEKET (A TYPE OF MOLLUSC)

Mechanically pest ants and spiders can be resolved by dismantling the nest and doused with kerosene. While the Chemish these pests can be controlled by spraying insecticides. This method is the last way and tries to avoid using insecticides if the attack is not severe because mushroom products are organic products. Advantage if the eradication of insect pests is done by mechanical means, among others, can cut costs during the treatment and also environmentally friendly. Meanwhile, pest baglog often found in the mouth. To control it is done by mechanical means, which is picked by hand.

Growth of Fungus or Other Mushroom

Another fungus that often interferes with oyster mushroom is *Mucor* sp., *Rhizopus* sp., *Penicillium* sp., And *Aspergillus* sp. on a substrate or baglog. The attack fungi are pathogenic mycelium is marked by the emergence of black, yellow, green, and the emergence of slime on the substrate. The resulting mycelium-mycelium oyster mushroom growth stunted growth or even not at all. This disease can be caused by environmental and media-making equipment during planting less clean or because the environment is a too moist mushroom house. To cope with this disease, the environment, and equipment at the time of making media and plantings need to be kept clean. Humidity in kumbung also arranged so as not to overdo it. This disease can attack baglog that have been opened or still closed.

If baglog already attacked it must immediately be destroyed in a way removed from kumbung then burned.

stalk Aft

This disease is a physiological disease characterized by an elongated mushroom stalk with a small mushroom body can not be fully developed. Elongated stalk diseases caused by excess CO₂ as a result of the air vents is less than perfect. To avoid this disease should be carried out in kumbung ventilation settings as optimally as possible.

Harvest and Post-Harvest

Harvesting is a farming activity that always awaited by businesses. To obtain optimal results, the planting during harvest and post-harvest should be done well.

Time and How to Harvest Mushroom

The oyster mushroom cultivation including the types of plants that have a fairly quick harvest. Oyster mushroom harvest can be done within a period of 40 days after seeding or after fruiting body growing up, which is about 2-3 weeks after fruiting bodies are formed. The development of fruiting bodies of oyster mushrooms maximum marked also by sharpening the edge of the mushroom. Criteria mushrooms eligible to be harvested is a fungus that is large enough and trimmed pointy but not yet in full bloom or not ruptured. Mushrooms with this condition will not be damaged if it is harvested. There are several requirements that must be met when the product is marketed, eg, uniformity of weight and size of the oyster mushroom.

Post-Harvest Handling Oyster Mushrooms

Handling is done after harvesting the oyster mushroom aims to create the end result is a good quality in accordance with market demand. Here are some steps that oyster mushrooms produced products of good quality.

Sorting

Mushrooms are harvested must be immediately washed with clean water, then his body parts were separated from base. Washing and separation process is important because if, during the cultivation process farmers use pesticides, namely those that the pesticide will settle on the base and still allow the residue contained in the body of the fruit.

Once believed to be clean, the sorting process is done to group oyster mushroom by shape and size. It aims to obtain results that are uniform so that will attract consumers when marketed.

Packaging and Transport of Oyster Mushroom Harvest

Packaging of fresh oyster mushrooms typically uses airtight plastic. The less air in the plastic, the more durable the oyster mushroom to be stored. However, ideally with airtight plastic storage can only maintain freshness oyster mushrooms for 2-4 days. Therefore, in order that fresh oyster mushrooms sold are in good condition, the process of transporting / transport should not be too long from the packaging process. Had transportation distance far enough, should be equipped with means of transport refrigerated room.

Choosing Oyster Mushroom Seeds

If you buy quality oyster mushroom seeds from other people, you also cannot fully trust them. You should still pay attention to the following things to avoid things you don't want. Check the BER (biological ratio) value of the seed.

For oyster mushrooms usually, have about 75% BER. The well-known institutions that I meant above are agencies that already have certificates or are legalized by the government. Mycelium grows fully and evenly. Check the expiration date again. Consult with those who have successfully cultivated oyster mushrooms. Of course, this is not easy, because you must at least be familiar with them. Oyster mushroom entrepreneurs who are already successful will certainly not easily share the recipe for their success with people they don't know who might later become their competitors.

In addition to knowing the types of oyster mushrooms and how to choose quality seeds, you also need to understand the growing media for oyster mushrooms. There are several ingredients that can be used to become a planting medium. Some of these ingredients are mixed together with a composition that suits the needs of the oyster mushroom. For this, you should look for many references about the composition that is right for the type of oyster mushroom that you will cultivate. These materials are wood powder, rice bran, CaCo lime, and water. The ideal composition should produce a planting medium which, if held, does not produce water, but if the disease do not break.

Learn Oyster Mushroom Cultivation

Okay, let's learn together about oyster mushroom cultivation and its prospects for business in the future. In Indonesia, there are a variety of edible mushrooms, you also know there are many types of mushrooms offered in supermarkets. But among the types of mushrooms, oyster mushrooms can be said to be one of the most beautiful mushrooms. Some even say that this oyster mushroom is the king of mushrooms in Indonesia.

This is due to the large public interest in consuming oyster mushrooms. Many dishes with oyster mushroom mixture are also delicious. Even in big cities, the potential of oyster mushrooms in dominating the food market can no longer be underestimated. How not, there is a countless number of crispy mushroom traders who use oyster mushrooms as one of the main ingredients. As if - oyster mushrooms have become a snack of 500 meters, which means that every 500 meters can be found traders of oyster mushrooms which are processed into snacks.

The high interest of Indonesians in oyster mushrooms makes oyster mushrooms one of the most sought-after food ingredients. Moreover, many food businesses that use oyster mushrooms are now using a franchise system. That means the business will be increasingly mushrooming, expanding to various regions. The areas that most often have oyster mushroom snacks are Mall, campus/school environment and food court.

How? Increasingly interested in cultivating oyster mushrooms? Yep, some people are also tempted by the prospects of this business, most of them also do it with tools and places as simple as at home. As long as it is diligent and resilient, this business can become a land of money for you.

However, you should not rush into starting this business, because the most important thing is to enrich your knowledge first. Knowing the correct stages will minimize failure in business right? Maybe you've heard or read the opinion that cultivating oyster mushrooms is easy and can go straight as I wrote above. But you can remember that instant noodles need time to cook. Starting from reading cooking instructions, unwrapping, mixing spices, boiling water and the like. Easy things like cooking Instant Noodles also need to be studied, especially if the things you do concern your business and your future.

CONCLUSION

Alternative materials that can be used to replace the sawdust is a wide variety of grounds, such as coffee grounds, paper pulp, bagasse and dregs of tea. However, based on the experience of the oyster mushroom farmers in the lowlands, a good medium to use fixed sawdust.

Media in the form of bran/corn bran and flour serve as a substrate and a producer of calories for mold growth.

Before buying bran and corn flour, you should first make sure these materials are new. If using materials that have long feared has happened fermentation which can result in the growth of unwanted fungi types. Based on the research results, the use of bran or corn teung delivers quality results for the same

mushroom nutrient content of the two materials are similar. However, the use of bran is considered more efficient because it can cut costs and tend to be easy because many used as fodder. Limestone (CaCO_3) serves as a source of minerals and pH regulator. Ca content in the lime can neutralize the acid released mycelium fungus that can cause the pH of the media to be low.

Containers used to put the media mix is heat resistant clear plastic bag (PE 0,002) measuring 20 cm x 30 cm. The composition of seedling media is sawdust 100 kg; 10 kg of maize flour; fine bran or bran 10 kg; 0.5 kg of compost; limestone (CaCO_3) 0.5 kg; and 50-60 % water. There are two things to consider before planting seedlings mushroom, namely sterilization and sterilization material baglog.

REFERENCES

- Ardiansyah, R. A. (2016). *Design of an electronic narrator on assistant robot for blind people*. In *MATEC Web of Conferences* (Vol. 42, p. 03013). EDP Sciences.
- Cahyana, M., & Mucrodji, M. Bakrun. 1999. *Pembibitan, Pembudidayaan dan Analisis Usaha Budidaya Jamur Tiram*. Jakarta: Penebar Swadaya.
- Djarajah, N. M., & Djarajah, I. A. S. (2001). *Budi Daya Jamur Kuping, Pembibitan Dan Pemeliharaan*. Kanisius.
- Gea-Izquierdo, G., Viguera, B., Cabrera, M., & Cañellas, I. (2014). *Drought induced decline could portend widespread pine mortality at the xeric ecotone in managed mediterranean pine-oak woodlands*. *Forest Ecology and Management*, 320, 70-82. <https://doi.org/10.1016/j.foreco.2014.02.025>
- Ginting, H., Naring, G., van der Veld, W. M., Srisayekti, W., & Becker, E. S. (2013). *Validating the Beck Depression Inventory-II in Indonesia's general population and coronary heart disease patients*. *International Journal of Clinical and Health Psychology*, 13(3), 235-242. [https://doi.org/10.1016/S1697-2600\(13\)70028-0](https://doi.org/10.1016/S1697-2600(13)70028-0)
- Hapsari, W. A., Umesh, A., Iwamura, M., Tomala, M., Gyula, B., & Sebire, B. (2012). *Minimization of drive tests solution in 3GPP*. *IEEE Communications Magazine*, 50(6), 28-36.
- Muchtadi, T. R., & Ayustaningwarno, F. (2010). *Teknologi proses pengolahan pangan*. Alfabeta. Bandung, 246.
- Parjimo, H., & Andoko, A. (2013). *Budi Daya Jamur (Jamur Kuping, Jamur Tiram, Jamur Merang)*. AgroMedia.
- Sumarni, M., & Wahyuni, S. (2006). *Metodologi penelitian bisnis*. Yogyakarta: CV. Andi Offset.
- Sumarsih, S. (2010). *Untung besar usaha binit jamur tiram*. PT Niaga Swadaya.

Chemical Contents of Hydroponic Plants

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ABSTRACT

The world is increasingly sophisticated with technologies that help humans in the move, even in terms of compliance with food, but it is still in line with the development of technology that is the growing amount of human birth, so the lack of area for fulfillment in terms of planting of food crops, but the land is mostly reserved residential land, and even more we see this village, which is clearing land to grow crops other than basic foodstuffs, but only to enrich themselves. How do we as human beings who still want to meet the food needs facing arable land diminishing modern era is farming no longer have to use the soil of various methods of planting can be used for those who want to pursue her, one of which is farming hydroponic, hydroponics itself is a means farming without soil media when faced with the problems faced in the world in terms of food production, hydroponic gardening system offers a promising solution. In poor countries where soil or climate inhospitable to agriculture, hydroponics offers a means to grow crops with ease. also in areas where the soil has lost its nutrients or fertile land is hard to come by, hydroponics can be an ideal alternative to farming.

Keywords---hydroponic type, hydroponics plant material, meaning hydroponics, vegetables, water.

INTRODUCTION

As I explained above hydroponic plant is a plant that does not use soil media as the main ingredient, but in exchange for use of the water and some of his other additional media, in general hydroponic plant is usually a type of vegetables which grow age is not too long so plants (Atwood, 2017; Babu, 2016; Dai, 2006). Hydroponics is suitable to make our business area, especially our hobby farm but is limited by land is expensive (land) and a long time, hydroponic plant is present to overcome it all so we could garden anywhere and anytime can behind the house, as well as front of house for hydroponic crops other than as a business area can also be made as a home decoration because of its orderly in this article I will discuss a few points in between, the material is needed in starting a business, engineering hydroponics in general, some of the advantages and disadvantages her, and that last how this hydroponic crop prospects in the business world, the purpose of writing this article other than as a duty, also to open our insight that the world of agriculture was also made in the promising business area.

METHOD

In writing this article I take a lot from the internet, because of time constraints so it can not undergo direct research into the field, and if there are many errors in the writing request in understandable and hopefully this article useful.

DISCUSSION

Hydroponics Latin hydro = water ponos = work is a method of farming without the use of soil media, but by using mineral nutrient solution or other material containing nutrients such as coconut fiber, mineral fiber, sand, broken bricks, sawdust, etc. others as a substitute for soil media (Ding et al., 2006; Fennell et al., 2015; Fox et al., 2004).

Hydroponic plants can be done on a small scale at home as a hobby or on a large scale for commercial purposes, some plants are often grown hydroponically, are vegetables such as broccoli, cabbage, kailan, spinach, kale, tomatoes, onions, even strawberry, etc. Plants thus often become the primary choice of vegetarians who are very concerned the murder of a plant if there are living beings, mixed with chemical elements, environmental conservation, and afforestation (Giglioli-Guivarc'h, 2013; Gribble et al., 2009; Hazeltine et al., 2003).

Some of the ingredients are in need

Media hydroponics is good to have a neutral pH or between 5.5 -6.5. Also, the media should be porous and may retain moisture used media can be divided into two stages of plant growth by:

a. Media for the nursery or nurseries

The nursery can be used for media in the form of fine sand, husk charcoal or Rockwool. Fine sand is often used because it is easy to obtain and inexpensive, but less able to retain water and there are no nutrients in it.

The medium used is a mixture of rice husk and sawdust or coconut coir dust (Hosseinzadeh et al., 2019; Kitaya et al., 2001; Klass, 1998).

b. Media for mature plants

Media for mature plants is almost the same as the media for seedlings, namely sand a bit rough, husk, rock wool and other media ideal is husk advantage is the cleanliness and sterility of the media is guaranteed free of dirt and organisms that can disrupt such as worms, fleas and so that can live in the sand. Rice husk is lighter yet more easily destroyed, its use can only be for the two-time usage rang husks can be purchased in stores or make your own farm (Kyaw et al., 2017; Levine et al., 2003; Nilsson et al., 2011).

Selection of seed is very important because crop productivity depends on the selected seed excellence check the seed package labels, namely the expiration date, and a growing percentage of seed purity.

Selection of the commodity to be planted carefully calculated regarding pricing and marketing. Examples of exclusive vegetables that have a selling value above the average are recent tomato, cucumber japan, Parika, lettuce, melons, and others.

Hydroponics Aquaculture Equipment

Container seedlings can use plastic pots, small polybag, plastic tubs, seedling trays, or wooden boxes. Containergrown plants commonly used polybag 30-40 cm with enough holes to drain excess water when watering. Some of the ingredients are in need:

1. Tissue paper / wet newspapers to keep moisture
2. Sand sieve to sift the media for seedlings
3. Handsprayer for watering
4. spoon media mixer
5. Tweezers to collect the seeds from the container seedlings
6. Polybag size 5 kg for planting transplant
7. Flax yarn (as used builder) to tie the plant.

Technique hydroponic

There are two main techniques in hydroponic cultivation. The first to use the solution and the only one using the media. The method using a solution does not require harsh media for root growth, with just enough mineral nutrient solution. Examples of how the technique commonly used solution is a static solution technique and solution techniques flow (Song et al., 2011; Tako et al., 2001; Tikhomirov et al., 2003). As for the technique of media is dependent on the type of media used, can be a coconut fiber, mineral fiber, sand, broken bricks, sawdust, etc. as a substitute for soil media regardless of the technique used, most places bailout hydroponics made of plastic , but other materials can also be used including concrete tanks, glass, steel, wood and other solid materials the shelter must be kept away from light to prevent algae growth in the water that has been in the nutritious Excess plant hydroponic

- a. Saving land, hydroponics is suitable for places that only have limited land area live in cities certainly is in the house/apartment is also limited by the hydroponic method is for the sun to illuminate a limited area that we can still grow crops. One effort to utilize the land as optimal as possible is with hydroponics viticulture, namely hydroponics system to grow plants vertically.
- b. Freedom to choose one, hydroponics is suitably carried out in areas with poor soils. Because hydroponics does not use soil as a growing medium, then we can cultivate his land again, although its structure is sandy and barren.
- c. Yields more, hydroponic produce lower yields than conventional methods (by land) in the same area.

d. Saving water, the more water-efficient hydroponics. Despite its name hydroponics but make no mistake, this method is even more water-efficient than conventional methods. In the conventional method, water is thrown to the ground to be absorbed and disappear. While the method of hydroponics, water is lost only water absorbed by plants and evaporated into the air and fewer in number.

e. Environmentally friendly, reduce the pollution of chemical substances into the soil. The hydroponic method does not use soil so it does not contaminate the soil and if forced to dispose of used any nutrients, hydroponic nutrient residue from almost nothing. In contrast to conventional methods which fertilizer residue will continue to accumulate in the soil and ultimately destroy the fertility of the soil.

DISADVANTAGES OF HYDROPONIC PLANTS

Nutrisi a special, special nutrients hydroponics and growing media are still hard to find. we should be searching and shopping online a couple of growing media such as hydration, Rockwool, and vermiculite are still imported, so a bit hard to find and the price is relatively more expensive (Toro-Labbé, 2006; Yongsheng et al., 2011).

Large capital required initial capital is relatively higher for hydroponics. Actually, if we are creative, hydroponics can be cheaper because we can take advantage of second-hand goods as a place to grow crops such as beverage bottles mineral, former jerry cans, Styrofoam place fruits, etc. But as soon as we want to create a bigger hydroponic garden, especially with running water system, of course, we need more complete equipment such as PVC / gutters, water pump, air pump, etc.

Treatment is difficult, hydroponics requires precision and patience. Changes in nutrient levels and pH greatly affects plant growth. If we are not careful and painstaking, will be immediately visible growth of plants that are not optimal.

The outlook on the world of business

Speaking about the efforts in the field of hydroponics is inseparable from Mr. Bob Sadino services which can be regarded as the first to introduce a system of hydroponic vegetable farming in Indonesia.

Hydroponic vegetables

introduced by Bob Sadino in supermarket Kemchick in about 90s, now hydroponics vegetable can be purchased at several well-known supermarket vegetable prices hydroponic fitted with a 4 to 5 times more expensive than ordinary vegetable prices in traditional markets. But because the hydroponic vegetables free from pesticide use, the process of planting until harvest that had high hygiene, fresher, and better packaging, so that the hydroponic vegetables are sold in some supermarkets are always

quickly sold out. With the increasing public awareness of the vegetarian movement in addressing the issue of global warming, of course, demand for vegetables and fruits that come from environmentally friendly process would be a major demand in the list of their consumption, because of limited supplies, and a higher demand for vegetable types of hydroponic so business opportunities that are environmentally friendly is quite good for hailed by employers on a large scale, including opportunities to export to neighboring markets where demand is very high.

CONCLUSION

Hydroponics is a method of farming without the use of soil media, but by using mineral nutrient solution or other material containing nutrients such as coconut fiber, mineral fiber, sand, broken bricks, sawdust, and other media as a substitute for soil. There are two main techniques in hydroponic cultivation. The first to use the solution and the only one using the media. Some Important Factors To Look nutrient solution, media, and oxygen. Prospects using hydroponic cultivation technique is very good indeed if the technique is appropriate and properly executed, due to higher demand for high-quality vegetables that are among us today.

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REFERENCES

- Atwood, J. L. (2017). *Comprehensive supramolecular chemistry II*. Elsevier.
- Babu, S. (2016). *Advances in chemical mechanical planarization (CMP)*. Woodhead Publishing.
- Dai, L. (Ed.). (2006). *Carbon nanotechnology: recent developments in chemistry, physics, materials science and device applications*. Elsevier.
- Ding, S., Liang, T., Zhang, C., Yan, J., & Zhang, Z. (2006). *RETRACTED: Effects of organic ligands on fractionation of rare earth elements (REEs) in hydroponic plants: An application to the determination of binding capacities by humic acid for modeling*.
- Fennell, P., & Anthony, B. (Eds.). (2015). *Calcium and chemical looping technology for Power Generation and Carbon Dioxide (CO₂) Capture*. Elsevier.
- Fox, P. F., McSweeney, P. L., Cogan, T. M., & Guinee, T. P. (Eds.). (2004). *Cheese: Chemistry, Physics and Microbiology, Volume 1: General Aspects*. Elsevier.
- Giglioli-Guivarc'h, N. (2013). *New Light on Alkaloid Biosynthesis and Future Prospects (Vol. 68)*. Academic Press.
- Gribble, G. W., & Joule, J. (Eds.). (2009). *Progress in heterocyclic chemistry (Vol. 21)*. Elsevier.
- Hazeltine, B., & Bull, C. (Eds.). (2003). *Fieldguide to appropriate technology*. Elsevier.
- Hosseinzadeh, S., Testai, D., BKheet, M., De Graeve, J., Roccaro, P., & Van Hulle, S. (2019). *Degradation of root exudates in closed hydroponic systems using UV/H₂O₂: Kinetic investigation, reaction pathways and cost analysis*. *Science of The Total Environment*, 687, 479-487.

- Kitaya, Y., Kawai, M., Tsuruyama, J., Takahashi, H., Tani, A., Goto, E., ... & Kiyota, M. (2001). *The effect of gravity on surface temperature and net photosynthetic rate of plant leaves*. *Advances in Space Research*, 28(4), 659-664.
- Klass, D. L. (1998). *Biomass for renewable energy, fuels, and chemicals*. Elsevier.
- Kyaw, T. Y., & Ng, A. K. (2017). *Smart aquaponics system for urban farming*. *Energy Procedia*, 143, 342-347.
- Levine, L. H., Kagie, H. R., & Garland, J. L. (2003). *Biodegradation pathway of an anionic surfactant (Igepon TC- 42) during recycling waste water through plant hydroponics for advanced life support during long-duration space missions*. *Advances in Space Research*, 31(1), 249-253.
- Nilsson, A., Pettersson, L. G., & Norskov, J. (Eds.). (2011). *Chemical bonding at surfaces and interfaces*. Elsevier.
- Song, W., Chen, X., Yan, M., & Deng, Q. (2011). *Absorption and oxidation of arsenite by Pteris vittata roots and its kinetics*. *Procedia Engineering*, 18, 72-77.
- Tako, Y., Arai, R., Otsubo, K., & Nitta, K. (2001). *Application of crop gas exchange and transpiration data obtained with CEEF to global change problem*. *Advances in Space Research*, 27(9), 1541-1545.
- Tikhomirov, A. A., Ushakova, S. A., Gribovskaya, I. A., Tirranen, L. S., Manukovsky, N. S., Zolotukhin, I. G., ... & Lasseur, C. (2003). *Light intensity and production parameters of phytocenoses cultivated on soil-like substrate under controlled environment conditions*. *Advances in Space Research*, 31(7), 1775-1780.
- Toro-Labbé, A. (2006). *Theoretical aspects of chemical reactivity (Vol. 19)*. Elsevier.
- Yongsheng, W., Qihui, L., & Qian, T. (2011). *Effect of Pb on growth, accumulation and quality component of tea plant*. *Procedia Engineering*, 18, 214-219.

Is Good Craft Matter Increasing Ingka Quality?

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ABSTRACT

The purpose of this paper to describe the material on such crafts ingka ingka definition, types ingka, advantages and disadvantages ingka usage, application usage ingka, and the last goal of the use ingka. In addition, I also have a very large goal is to introduce this ingka craft to the crowd that grew ingka users and that child domestic work do not lose competitiveness with foreign products so that local entrepreneurs to develop business in the world market. From my explanation I can conclude that the craft ingka his function was not inferior to foreign products may ingka is superior in its application because it can be used in all activities and more practical in use.

Keywords---application, domestic, entrepreneur, inferior, ingka.

INTRODUCTION

The term ingka is creativity that made by someone somewhere who take advantage of the surrounding material so that the material with their idea and have it be the selling price and the value of art. Crafts ingka is an innovation that is full (Ball, 1990; Benedict et al., 2012; Craft et al., 1988). The ideas and serves its purpose very big influence in the present era. Ingka no one knows who first made but ingka from the beginning until now existing in the community despite the way and the results of each area is different.

Ingka has so many benefits that are biased in use by consumers because ingka it is a product that has many benefits in every activity of society everyday like ingka widely used for ritual paraphernalia such as weddings, religious ceremonies, to which many now that the bias we encounter is ingka widely used by food vendors wherever it ingka used to facilitate food and ingka chosen for it because ingka more practical use without having to wash after use like plates, because the principle of a trader and the buyer is wanted practical, fast, clean so between traders and buyers no problems and win-win (Durant et al., 2010; Eichholz et al., 1967; Esposti et al., 2017).

I discussed the matter about handicrafts ingka this so that the craft ingka biased develop better in comparing now so ingka could compete in the world especially now that Indonesia has joined MEA then anything can happen as long as there are businesses, craft ingka someday might be able to change the use of a plate or the like in this world.

The material I will discuss it further as to what ingka craft, craft ingka types, advantages and disadvantages of the use of ingka compared to other products, application usage, and more recently ingka what the main purpose of the appearance of this ingka craft.

DISCUSSION

Definition ingka

The term ingka is creativity that made by someone somewhere who take advantage of the surrounding material so that the material with their idea and have it be the selling price and the value of art. Crafts ingka is an innovation that is full of ideas and serves its purpose very big influence in the present era. Ingka no one knows who first made but ingka from the beginning until now existing in the community despite the way and the results of each area is different but the point ingka that have the same in any given area, and it was the main attraction craftsmen in each area to always put out his ideas in order to work a dream of every consumer and in order not to lose competitiveness because the model never changes.

Types of craft ingka

Each region and the results someone must produce works of art vary, although of the same material but each craftsman must have certain ideas to make work more attractive to consumers. Starting from the moment that a lot of the types of existing ingka like in my area have a name ingka Ajengan, ingka bowl, ingka tray, oval ingka and many others. But every blood may have ingka same type but different in name only. In each model ingka it may only be distinguished from the shape and size alone example like ingka oval size relatively similar to the others but shape oblong or oval (Hollinshead, 2004; Nordmann, 2014; O Craft et al., 2011), in addition ingka round nare same shape but its size is relatively larger than the other ingka. For the area, I have a physical form like this

a. ingka

oval Ingka have a form like this ingka ingka usually not round but oval (oval). The average size usual for diameter 30-50 cm.



b. ingka eat

This ingka shape exactly once with the dishes that we often use daily from the shape and size. The Average size is often made that a diameter of 28-35 cm.

**c. ingka Ajengan**

Ingka this one is rather different in size that is smaller than the others but ingka ingka resembles a previous meal. The average size of the usual made-diameter 18-25 cm.

**d. ingka bokor**

This ingka has a different shape from that we discussed earlier is shaped like a bowl that we usually encounter days. Average size commonly made is 25-40 cm in diameter.



e. Ingka jaje (cake)

Ingka has a size as ingka Ajengan but shapes like ingka bowl. The average size commonly made is between 18-25 cm.

**f. ingka nare**

Ingka has the most different forms with ingka we discussed previously that the largest size. Average size commonly made is between 40-60 cm.

**g. ingka tray**

Ingka have a shape like a tray that is ingka with longer legs than customarily, ingka usual form in which such ingka create oval, eat, bowl. The average size commonly made is 30-50 cm.



h. Accessories ingka/saab

Saab is complementary accessories from ingka which serves as a cover ingka the average size of which is made is dependent on ingka were made but saab smaller size of about 5 cm of the large ingka.



ADVANTAGES AND DISADVANTAGES

Of the many users ingka now there may be some people who already give their opinions about the current ingka famous craft, like what is the use ingka advantages and disadvantages in comparison with products of a more modern that are circulating on the market. Lots of bias we get the advantages of the use of ingka compared with the use of modern products, for example, we can love and appreciate the products in the country in order to craftsmen such bias is still running to expand its business to be known abroad, there are also advantages such as ingka it does easily broken, the price is relatively cheap, and has a value of traditional art. Besides crafts ingka has some flaws as any product whatsoever that says the most perfect certainly has its drawbacks and as ingka discount also shortcomings in the way the physical care that is relatively difficult and complicated, ordering in large quantities may take a relatively long time because of a clash with the constraints of materials and power, for the material's still directly in the search on the tree and the seasons do not always have stock material (Patchett, 2014; Suarmawan et al., 2016). And in terms of manpower craftsmen still completely manual for the process may take longer if booking with the number of lots.

APPLICATION OF THE USE INGKA

Of the many enthusiasts as possible to craft a new ingka know this craft will ask questions first, ingka it is used for anything. This may be nature crafts ingka flexible once or commonly in use in all events, unlike modern stuff that looks just perfect for one type of event but ingka usual course is applicable in all events eg weddings, religious ceremonies and much more. And now in the public ingka have started mushrooming and demand by the people just look at a food stall or restaurant has many uses ingka to be a container or food because it is practical without having to wash once in life only need to replace the base course and ingka was used because it has elements of his art also has a unique and specific when using ingka.

PURPOSE OF USE INGKA

From the development of more modern era is that craftsmen local are less competitive with modern products, certainly, all the craftsmen have a great motivation for the business as to maintain the craft ingka extinction or so craft ingka expanding to keep commonly known a lot of people and used in all activities.

CONCLUSION

I can conclude that ingka is an artwork done by someone who has a good idea until the results were creating a piece of art and have a sale value in the market. From this discussion, I can determine the types of existing ingka though not all because ingka it's actually the same in every region but in name only in the dressing according to their languages, so it seems there are many types ingka when only kind.

Any goods or services definitely have advantages and also disadvantages and crafts ingka also has a lot of advantages and disadvantages as advantages ingka like, have elements of art, the price is relatively cheap, can be used in all the activities and many more advantages. Besides shortage ingka as a relatively difficult treatment regimen, booking with a large amount may take a long time due to hitting the material and energy due to its complete manual. Crafts ingka created first certainly has a specific purpose for its creators and that his work can be used in all the activities for the current application ingka usually used for means a place for religious ceremonies, weddings, or that now many we meet are their application in the shop or restaurant food all over the place. Starting from that we can know that ingka it already has many fans.

From the description of the craft ingka author had many expectations precious for everyone, especially those who pursue the craft ingka that his work is always in use and always in the hearts of consumers, in addition, the goal that we love and appreciate the products local in developing ingka craft business in order to be marketed overseas.

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REFERENCES

- Ball, D. L. (1990). *With an Eye on the Mathematical Horizon: Dilemmas of Teaching Elementary School Mathematics*. Craft Paper 90-3.
- Benedict, C., Brooks, S. J., Kullberg, J., Burgos, J., Kempton, M. J., Nordenskjöld, R., ... & Johansson, L. (2012). Impaired insulin sensitivity as indexed by the HOMA score is associated with deficits in verbal fluency and temporal lobe gray matter volume in the elderly. *Diabetes care*, 35(3), 488-494.
- Craft, C. B., Broome, S. W., Seneca, E. D., & Showers, W. J. (1988). Estimating sources of soil organic matter in natural and transplanted estuarine marshes using stable isotopes of carbon and nitrogen. *Estuarine, Coastal and Shelf Science*, 26(6), 633-641.
- Durant, S. M., Craft, M. E., Foley, C., Hampson, K., Lobora, A. L., Msuha, M., ... & Pettorelli, N. (2010). Does size matter? An investigation of habitat use across a carnivore assemblage in the Serengeti, Tanzania. *Journal of animal ecology*, 79(5), 1012-1022.
- Eichholz, G. G., Craft, T. F., & Galli, A. N. (1967). Trace element fractionation by suspended matter in water. *Geochimica et Cosmochimica Acta*, 31(5), 737-745.
- Esposti, R., Fastigi, M., & Viganò, E. (2017). Italian craft beer revolution: do spatial factors matter?. *Journal of Small Business and Enterprise Development*, 24(3), 503-527.
- Hollinshead, K. (2004). *A primer in ontological craft: The creative capture of people and places through qualitative research*. In *Qualitative research in tourism* (pp. 81-84). Routledge.
- Nordmann, A. (2014). Responsible innovation, the art and craft of anticipation. *Journal of Responsible Innovation*, 1(1), 87-98.
- O Craft, R., MRebecca, A., Flahive, C., J Casey, W., Dueck, A., & L Harold, K. (2011). Does size matter? Technical considerations of a regenerative tissue matrix for use in reconstructive surgery. *Canadian Journal of Plastic Surgery*, 19(2), 51-52.
- Patchett, M. (2014). *Witnessing craft: Employing video ethnography to attend to the more-than-human craft practices of taxidermy*. In *Video Methods* (pp. 81-104). Routledge.
- Suarmawan, K. A., Suharsono, N., & Suwena, K. R. (2016). Analisis Faktor-Faktor yang Mempengaruhi Keberhasilan Usaha Mikro dan Kecil (Studi pada Usaha Kerajinan Ingka di Desa Bulian, Kec. Kubutambahan). *Jurnal Pendidikan Ekonomi Undiksha*, 5(1).

Brain System Influences on Teaching-Learning Process

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ABSTRACT

This research shows how the brain system influences the teaching-learning process and the stimuli, that must be applied in the classroom to generate significant learning in the students, the methodology used was the bibliographic review in which some criteria have been referenced. The contributions of authors, the inductive and deductive since the criteria of the cited authors have been analyzed, the objective of the work was to demonstrate the incidence of the correct functioning of the brain in the educational process.

Keywords---brain, learning, metacognition, motivation, neuroscience.

INTRODUCTION

Since its inception, man studied naturally, and in accordance with what nature provided him, over time science studies the brain, ways of learning and generating knowledge, the results of these studies have been taken into account. It has the purpose of obtaining positive results in the education system. It is important to know how the brain learns, since it allows to have knowledge of the strategies that teachers must implement in the classroom in order to generate significant learning that allow students to solve problems in the environment where they operate.

At present the traditionalist teaching method has been left behind, these paradigms have been changed by a social constructivist education in which the true protagonists of the classroom are the students who are looking for answers, they are reflexive, analytical, critical, experimental, humanist, teachers they become guides that encourage and motivate students through curiosity, and with the application of different technological tools and in this way they can develop cognitive skills.

The objective of the research is to determine how the correct functioning of the brain affects the teaching-learning process.

MATERIALS AND METHODS

The methodology used in the research was the literature review in which some criteria and contributions of authors were referenced in relation to the brain's role in the educational process, inductive and deductive method was also used that allowed obtaining valid reasoning according to the subject that was studied.

RESULTS AND DISCUSSIONS

The brain

The human being has manipulated by the brain because it is responsible for directing and controlling the actions that people perform. Desalle & Tattersall (2017), affirm that our brain governs almost all the actions undertaken. From the behavioral point of view, it is what makes each of us a unique individual. And together, the human brain, extraordinary and unprecedented, is what makes it possible for our species to be the psychologically complex entity, extremely characteristic and sometimes strange, that is, the brain allows us to think about analyzing, reasoning about certain circumstances or situations that they happen daily in life and therefore direct the behavior.

This shows that there is a complicated dependence and interdependence between the brain and the behavior. The brain can receive external and internal information that allows you to release the most appropriate behaviors at all times. Through the positive and negative experiences of the decisions that are often made the brain manages to learn and transform behavior. The knowledge acquired causes changes in the synaptic connections of the brain.

The functioning of the brain, can be seen as a machine that controls all the functions of the body although there are specific areas responsible for particular functions, no sector of the brain ever functions independently of the others; Each specific function concerns a whole number of “regions” that collaborate as parts of a neural network dedicated to that function (Woodhead & Oates, 2012; Mendoza et al., 2019; Vasquez et al., 2019).

Aparicio (2009), refers that the central nervous system is an extraordinarily complex structure that collects millions of stimuli per second that processes and memorizes continuously, adapting the body's responses to internal or external conditions. It consists of seven main parts: The anterior brain that is subdivided into two parts: the cerebral hemispheres and the Diencephalon, that is to say that each one of these parts controls functions of the human body as the senses the emotions the evocations as well as is responsible for responding to stimuli, process and interpret information.

PILLARS OF THE BRAIN

Woolhead & Oates (2012), report that the brain is composed of about 100 billion specialized cells called neurons.

Each neuron consists of four essential parts that perform functions, in addition the brain also works based on external stimuli that allow decisions to be made.

1) Dendrites: branched extensions of the neuron, which serve to receive the arrival of signals from other neurons.

2) Cellular body: fundamental part of the neuron, which serves to integrate all the information that arrives, adding the different signals.

3) Axon: Long fiber, along which electrical impulses are, transmitted ("action potentials").

4) Axon terminals: points that are at the end of the axon, through which the signal passes to another axon. In most of them the signal is transformed (electrical signals become chemical) in order to be transmitted to the next neuron.

Therefore, the brain, cerebellum, brainstem, pituitary gland and hypothalamus perform a teamwork, that is, without each other, it cannot function.

The brain as an engine of knowledge

Academic training in the individual allows obtaining greater and better possibilities of developing the brain to the fullest. According to Barrera & Donolo (2009), education and training in childhood offer intellectual stimuli necessary to develop the brain, since they allow the deployment of cognitive abilities and make learning viable.

Therefore, children's brains continually look for stimuli that help them explore knowing everything they have around, During the teaching-learning process, children are offered essential stimuli for the development of the potential of the brain, it is essential to take into account that from the age of three and 10 years is when you have to look for the best strategies to stimulate the Children's brain, as it generates more curiosity and this makes them want to explore the surrounding environment thus generating more knowledge, (Agillon & Piloza, 2013; Chávez et al., 2019; Suarez et al., 2019).

The state that the development of knowledge is related to the physiological evolution of the brain, and learning occurs through direct physical activity with the things that are around, according to what this author establishes the brain learns through stimuli that can be seen in the environment where students develop, that is, they learn by experiencing solutions to realities and problems. Teaching through stimulation or motivation allows the student to want to perform the multiple tasks that teachers propose to carry out in the classroom.

Jean Piaget; Paulo Freire, Ausubel are some of the precursors of theories that support an education based on constructivism, creativity, experimentation, an active critical education based on the resolution of problems that arise in the environment surrounding students, in the which should seek alternative solutions, and where students become protagonists of their own knowledge and the teacher is only a guide that will facilitate the teaching-learning process.

BECAUSE GOOD LEARNING

Habits are important Habits are behaviors that people learn by repetition. You have good and bad habits in relation to health, food and study, among others. Good habits, no doubt, help individuals achieve their goals as long as they are worked properly during the different stages of life (Hernández et al., 2012; Alava & Martinez, 2019; Reina, 2019).

Good habits in people facilitate the acquisition and consolidation of knowledge that will be useful for the resolution of knowledge, that is why each individual must comply with the schedule in the different activities that are carried out daily, also time must be planned, and study in an orderly, comfortable environment without any distractions Sleep can work as a cognitive process; each part of the brain can perform in the best possible way if it is rested.

Woodhead & Oates (2012), report that between childhood and adulthood, we spend more than a third of our life sleeping, while the body replenishes energy and the brain reprocesses the experiences accumulated during waking hours, that is the rested brain allows greater concentration reasoning, assimilation of self-reflection knowledge.

There is research that reveals that the brain stores, accumulates and remembers what has learned, and in the teaching-learning process, one must obtain significant and diverse results that would predominate with authentic effects for teachers and essentially for the student since the brain is like a sponge. That absorbs knowledge of the environment.

MOTIVATION AND LEARNING

Motivation is closely related to emotions because it reflects the extent to which an organism is prepared to act physically and mentally, in a focused manner, and the emotional response constitutes the way in which the brain evaluates whether or not to act on things approach them, if they are pleasant, or avoid them, if they are unpleasant (Moreno et al., 2018; Tuarez et al., 2019).

The methodological strategies implemented by the teacher allow the student to motivate himself or herself so that they can build their own knowledge, investigate, and discover how to solve them with problems that occur in their surroundings. The use and application of technology as a work tool for teachers facilitate student learning, so that meaningful and lasting learning has generated.

INTRINSIC AND EXTRINSIC MOTIVATION

Naranjo (2009), refers that in a different way, humanistic and cognitive perspectives emphasize the importance of intrinsic motivation in achieving objectives. Intrinsic motivation has based on internal factors, such as selfdetermination, curiosity, challenge and effort; on the contrary, extrinsic motivation includes external incentives, such as rewards and punishments, regarding these types of motivation. That certain people apply in their studies, because they want to get good grades or to avoid disapproval of the mother or father; that is to say, they are extrinsically motivated therefore, the teacher has a complex task that is to raise the self-esteem of the students.

The teacher has technological tools to facilitate the teaching-learning process because there are different ways to motivate students. The teacher must make the students part of the decision making process that will make Feel important, be enthusiastic, and must also propose challenges and encourage them to achieve the goals this is part of the stimuli that the brain requires for proper functioning.

TEACHING STRATEGIES IN TEACHING WORK

A strategy to prepare the brain for learning is motor stimulation, since when the body works well, the brain prepares to give rapid responses to the needs that arise, so exercise constant allows the generation of a substance that fosters the ability of neurons to connect with each other (Benavides & Flores, 2019).

The initial age the children must be stimulated to develop fine and gross motor skills. This will cause them to acquire skills and abilities that will be applied in the daily life, therefore the teacher of being in constant academic training, being investigative, stimulate self-learning, give an education based on values, and from these teachers organize the work to be done in the classroom to carry out the educational process properly. Table 1 shows the different reflections of the different authors related to the brain and learning.

Table 1 The different reflections of the different authors

Author	Theme	Year	Result
Barrera and Donolo	Neuroscience and its importance in the context of Learning	2009	Learning is achieved through intellectual stimuli developed by the brain
Aparicio	Neurosciences and transdisciplinarity in education	2009	The brain processes memorize continuously and evokes responses to stimuli.
Naranjo	Motivation: theoretical perspectives and some considerations of its importance in the educational field	2009	Intrinsic motivation is based on internal factors, such as self-determination, curiosity, challenge and effort, on the contrary extrinsic motivation includes external incentives
Woodhead and Oates	The brain in development	2012	The brain efficiently receives information whenever it is rested
Hernández, Rodríguez., And Vargas	. Study habits and motivation for Student learning in three engineering careers.	(2012).	Good habits, no doubt, help individuals to achieve their goals as long as they has worked properly during the different stages of life.
Agillon and Pilozo	Brain stimulation in integral childhood development	2013	The brain produces significant learning when it has contact. Direct with the situations that are in the environment.
Desalle, and Tattersall	Big Bangs, behaviors and beliefs	2017	It is human brain manages the behavior of people according to the knowledge that it has and allows to mediate in future behaviors.
Moreno, Rodríguez, and Rodríguez	The importance of emotion in learning	2018	Emotions are related to intrinsic and extrinsic motivation and in the classroom the teacher is the main promoter of motivation in students to generate meaningful learning in them.
Benavides, and Flores	The importance of emotions for neurodidactics	2019	The brain learns through stimulation to develop motor motor skills.

The authors mentioned in table one establish, the brain is the fundamental part of the human, being, this works according to the stimuli presented. In the environment where each person develops, the educational field the motivation in the students is indispensable so that the learning that is generated in them is significant and applicable, there are two types of motivations, the Intrinsic that is related to the motivation that comes from the same person, the desire for improvement, and achievement that each individual wants to reach, and the extrinsic motivation is one in which the teacher has the task of making students want to learn, this can be done through new methodology and with the application of technologies to ensure that students acquire knowledge that they can apply in everyday life, for the resolution Ution of the problems of society.

CONCLUSION

The brain is incredibly beautiful and powerful since the only organ that gives the possibility to improve behavior, is constantly evolving because it enters information in every second, it is the one that allows to organize, manage, plan, coordinate, movements, behaviors, ideas, knowledge.

The vocation that the teacher has in teaching the subject, the environment in the classroom the different innovative activities, motivation can influence in a positive way so that students develop their brain to the fullest.

Different methodological strategies, and the application of new technologies, creativity, and different stimuli will make each student participate actively in the teaching-learning process.

REFERENCES

- Agillon, Y., and Piloza, M. (2013). *Brain stimulation in the integral development of children. (Undergraduate thesis)*.
Miracle State University, Milagro, Ecuador. <http://repositorio.unemi.edu.ec/bitstream/123456789/1055/3/>
- Alava, E. E., & Martinez, M. E. M. (2019). *Impact of teaching-learning process for brain. International Journal of Health Sciences*, 3(1), 33-40. <https://doi.org/10.29332/ijhs.v3n1.304>
- Aparicio, X. (2009). *Neurosciences and transdisciplinarity in education. Journal University of Research and Academic Dialogue*, 5 (2), 2-5. <https://core.ac.uk/download/pdf/25787806.pdf>
- Barrera, M., and Donolo, D. (2009). *Neuroscience and its importance in the context of Learning. University Digital Magazine*, 10 (4), 1067-6079. <http://www.revista.unam.mx/vol.10/num4/art20/art20.pdf>
- Benavides, V., and Flores, R. (2019). *The importance of emotions for neurodidactics. Student Journal of Psychology*, 14 (1), 25-53. <https://revistas.ucr.ac.cr/index.php/wimblu/article/view/35935/36685>
- Chávez, E. J. M., Pibaque, W. L. D., Chávez, W. J. M., & López, M. M. L. (2019). *Learning problems on brain disorders. International Research Journal of Engineering, IT & Scientific Research*, 5(5), 8-15. <https://doi.org/10.21744/irjeis.v5n5.723>
- Desalle, R and Tattersall, I. (2017). *Big Bangs, behaviors and beliefs. Retrieved from http://www.elb oomeran.com/upload/ficheros/obras/el_cerebro_rus_web.pdf*
- Hernández, C., Rodríguez, And Vargas, A. (2012). *Study habits and motivation for student learning in three engineering careers. Journal of Higher Education*, 163 (3), 67-87. <http://www.redalyc.org/pdf/604/60425380005.pdf> <https://bernardvanleer.org/app/uploads/2016/03/El-cerebro-endesarrollo-0131.pdf> Student, Aspiring Magister, Pontifical Catholic University of Ecuador Manabí Headquarters Teaching, Master, Pontifical Catholic University of Ecuador Manabí Headquarters.
- Mendoza, L. R. M., Martinez, M. E. M., & Suarez, A. M. S. (2019). *The brain as a fundamental axis in learning process. International Research Journal of Engineering, IT & Scientific Research*, 5(4), 38-45. <https://doi.org/10.21744/irjeis.v5n4.689>
- Moreno, A., Rodríguez, J., and Rodríguez, I. (2018). *The importance of emotion in learning: Proposals to improve student motivation. University Pedagogy Notebook*. 15 (29). 3-11.. <https://cuaderno.pucmm.edu.do/index.php/cuadernodepedagogia/article/view/296/273>
- Naranjo, M. L. (2009). *Motivation: theoretical perspectives and some considerations of their importance in the educational field. Education Magazine* 33 (2), 153-170. <https://revistas.ucr.ac.cr/index.php/educacion/article/view/510/525>
- Reina, A. L. V. (2019). *The brain and learning on initial students. International Journal of Health Sciences*, 3(2), 38- 43. <https://doi.org/10.29332/ijhs.v3n2.329>
- Suarez, A. M. S., Martinez, M. E. M., & Mendoza, L. R. M. (2019). *Brain and learning. International Journal of Social Sciences and Humanities*, 3(2), 128-135. <https://doi.org/10.29332/ijssh.v3n2.302>
- Tuarez, M. A. V., Delgado, R. I. Z., Teran, O. V. T., & Martine, M. E. M. (2019). *The brain and its role on learning process. International Journal of Physical Sciences and Engineering*, 3(2), 27-33. <https://doi.org/10.29332/ijpse.v3n2.326>
- Vasquez, B. S. G., Martinez, C. J. B., Martinez, M. E. M., & Vasquez, M. A. I. (2019). *Brain and learning on adolescence stage. International Research Journal of Engineering, IT & Scientific Research*, 5(5), 1-7. <https://doi.org/10.21744/irjeis.v5n5.720>
- Woodhead, M., and Oates, J. (2012). *The developing brain*.

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