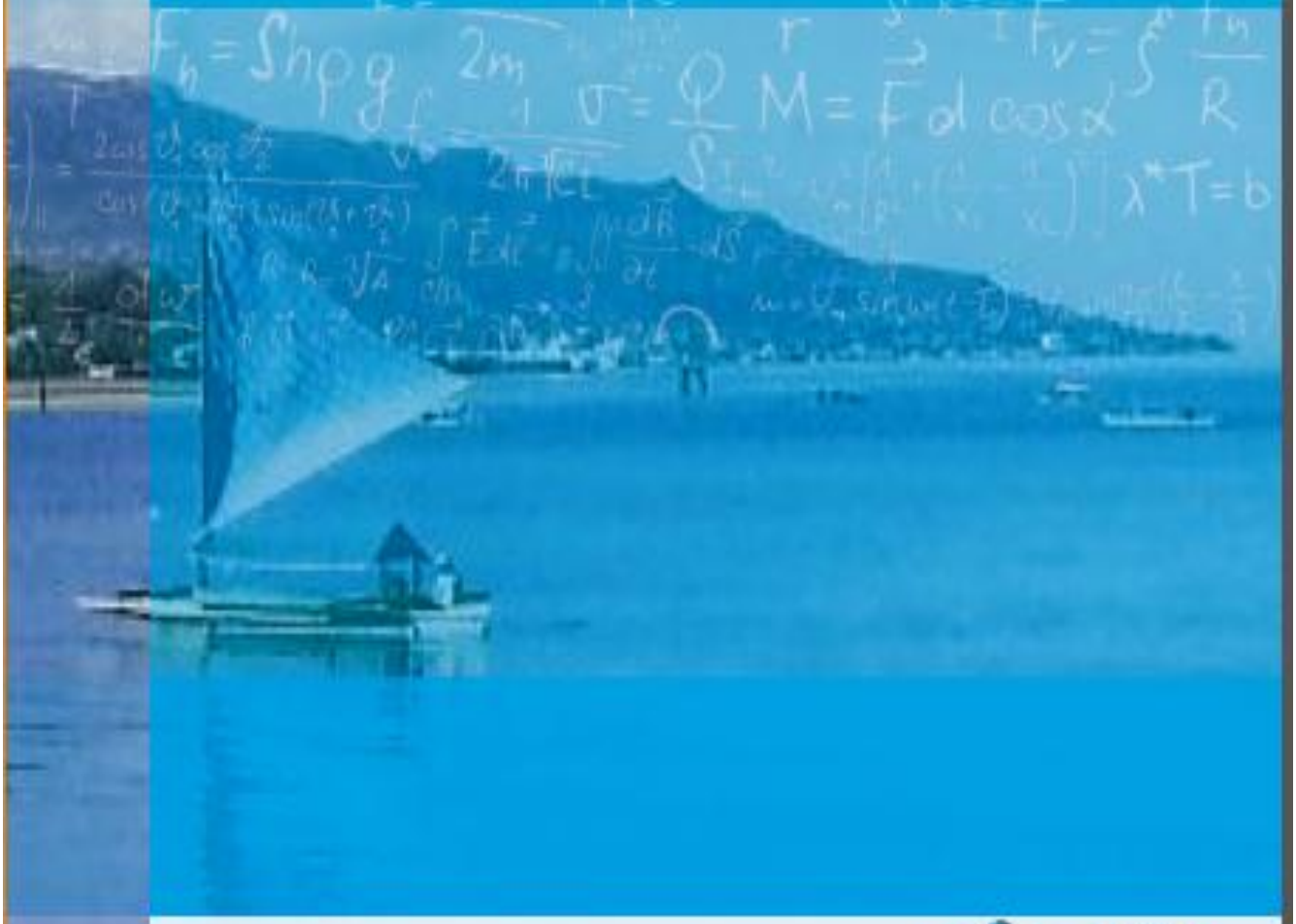
Basic Science
for Sustainable Marine Development

PROCEEDING
INTERNATIONAL SEMINAR 2015

Ambon, 3-4 June 2015



Organized by
Faculty of Mathematics and Natural Sciences
Pattimura University

PROCEEDINGS

1st International Seminar of Basic Science, FMIPA Unpatti - Ambon
June, 3rd – 4th 2015

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Welcoming Address by The Organizing Committee

The honorable, the rector of Pattimura University

The honorable, the vice rector of academic affair, Pattimura University

The honorable, the vice rector of administration and financial affair, Pattimura University

The honorable, the vice rector of planning, cooperation and information affair, Pattimura University

The honorable, all the deans in Pattimura University

The honorable, the key note speakers and other guests.

We have to thank The Almighty God for the blessings that allow this International seminar can be held today. This is the first seminar about MIPA Science in which the Faculty of MIPA Pattimura University becomes the host. The seminar under the title Basic Science for Sustainable Marine Development will be carried out on 3 June 2015 at Rectorate Building, the second floor. There are 250 participants from lecturers, research institute, students, and also there are 34 papers will be presented.

This International seminar is supported by the amazing people who always give financial as well as moral supports. My special thanks refer to the rector of Pattimura University, Prof. Dr. Thomas Pentury, M.Si, and the Dean of MIPA Faculty, Prof. Dr. Pieter Kakissina, M. Si. I also would like to express my deepest gratitude to Dr. Kotaro Ichikawa, the director of CSEAS Kyoto University, Prof. Bohari M. Yamin, University of Kebangsaan Malaysia, Prof. Dr. Budi Nurani Ruchjana (Prisident of Indonesian Mathematical Society/Indo-MS), Dr. Ir. A. Syailatua, M.Sc (Director of LIPI Ambon), and Hendry Ishak Elim, PhD as the key note speakers. We expect that this international seminar can give valuable information and contribution especially in developing basic science for sustainable marine development in the future.

Last but not least, we realize that as human we have weaknesses in holding this seminar, but personally I believe that there are pearls behind this seminar. Thank you very much.

Chairman

Dr. Netty Siahaya, M.Si.

Opening Remarks
By Dean of Mathematic and Natural Science Faculty

I express my deepest gratitude to The Almighty God for every single blessing He provides us especially in the process of holding the seminar until publishing the proceeding of International Seminar in celebrating the 17th anniversary of MIPA Faculty, Pattimura University. The theme of the anniversary is under the title Basic Science for Sustainable Marine Development. The reason of choosing this theme is that Maluku is one of five areas in Techno Park Marine in Indonesia. Furthermore, it is expected that this development can be means where the process of innovation, it is the conversion of science and technology into economic value can be worthwhile for public welfare especially coastal communities.

Having the second big variety of biological resources in the world, Indonesia is rich of its marine flora and fauna. These potential resources can be treated as high value products that demand by international market. Basic science of MIPA plays important role in developing the management of sustainable marine biological resources.

The scientific articles in this proceeding are the results of research and they are analyzed scientifically. It is expected that this proceeding can be valuable information in terms of developing science and technology for public welfare, especially people in Maluku.

My special thanks refer to all researchers and reviewers for your brilliant ideas in completing and publishing this proceeding. I also would like to express my gratefulness to the dies committee-anniversary of MIPA Faculty for your creativity and hard working in finishing this proceeding, God Bless you all.

Dean of Mathematic and Natural Science Faculty

Prof. Dr. Pieter Kakisina, M.Si.

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Chemical–Physics Composition Analysis of Pearl Seashells and Utilazation Possible as Import Nucleus Substitution

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ABSTRACT

Sea pearl farming has progressed well in Indonesia. In line with the seashells that are not used for further cultivation disposed of as waste. On the other hand nucleus used for the production of sea pearls (aquaculture) are imported. This research was conducted with the aim for studying the chemical-physics characteristics of several types of local seashells and utilization possible as import nucleus substitution. The testing of chemical-physics was conducted of the four (4) types of local seashells that *P. margaritifera*, *P. maxima*, *Pteria penguin* and *Tridacna sp* by comparison to the import nucleus. The chemical parameters are tested include: SiO_2, Al_2O_3, Fe_2O_3, TiO_2, CaO, Na_2O, K_2O, Count Incandescent, $CaCO_3$ and Mineral composition, while the physical parameters include: density, hardness, softening point and melting point. The results showed that *P. margaritifera* had significant difference for chemical parameters: SiO_2, Al_2O_3 and CaO. Especially for Al_2O_3 other than *P. margaritifera, P. maxima* also showed significant differences with the nucleus. As for the physical parameters had no significant difference. It can be concluded that *Pteria penguin* and *Tridacna sp* can be used as substitution for sea pearl production.

Keywords: composition, seashells, import nucleus

INTRODUCTION

Pearl cultivation has been well developed in Indonesia, even the companies can be encountered in almost all ocean of Indonesia, especially in Eastern Indonesia. Indonesia is a producer of South Sea Pearl (The Queen of Pearls) in the world with 43% of the world's supply. The Indonesian pearl export destinations are Japan, Hong Kong, Australia, South Korea, Thailand, Switzerland, India, New Zealand and France. (Anonymous, 2013). If the pearl Indonesia continue to be developed properly, Indonesia could become a supplier of valuable jewelry was 50% in the global market. Currently, the production of pearl Indonesia around 16 tonnes per year (Anonymous, 2007).

Along with that there is also an increase in demand for pearl shell with a size that is considered safe to be maintained further. For the entrepreneurs who are engaged in pearl farming is collecting the natural parent of several Indonesian waters in large quantities to obtain seeds to be used as a pearl. Parent-natural stem used in seeding mostly obtained from the waters of eastern Indonesia (Sumbawa, Lombok, Aru Islands, Maluku and Raja Ampat Islands). This business has a promising prospect and can be done by the community. This is supported by the necessary labor, land (sea) for the cultivation is still available and it is possible to be developed, in terms of availability of cultivation area, as well as the need for ancillary equipment cultured pearls. Researches that support these activities are done by

Hamzah (2013), about the sticking power of pearl mussel larvae on the collector with a stocking position and different depths. Wardana, et al. (2014), conducts research on seed oyster pearl profile of the results of a controlled breeding, using natural parent. In Fachri (2013) ; Taufiq (2007), the types of pearl oysters that produce pearls are the best types of Sea Shells: *Pinctada maxima*, *Pinctada margaritifera, Pictada fucata* and *Pictada penguin*. Accordingly, the cultivation of Pinctada maxima in several areas such as: Lampung, East Java, Bali, West Nusa Tenggara, East NusaTenggara, North Sulawesi, Central Sulawesi, Southeast Sulawesi, Maluku, North Maluku and Papua. In addition to types of shellfish *Pinctada maxima*, the other pearl shell that can be cultivated in Indonesia is *Pinctada margaritifera, Pinctada fucata*, *Pinctada lentigines* and *Pteria penguin*. While this type of clamshell Kima (giant clams) is one of the protected marine animals throughout the world, including in Indonesia. In 1987 the Indonesian government through the Ministry of Forestry decree No. 12 / Kpts / II / 1987 were reinforced by Government Regulation No. 7 of 1999 to enter the seven types of clams that live in Indonesia becomes protected animals (Ambariyanto, 2007). However, utilization is still ongoing. This can be seen in many places, especially in coastal areas are still many shells - shells (shells) both scattered clams on the beach, because the meat is taken for consumption. However, clam shells have been cultivated in Indonesia and is one commodity exports from Bali Buleleng regency (Anonymous,2013). Indonesia is the central area of the spread of giant clams in the world. Research concerning clam population and the problem carried out by Setiawan (2013) and Miswandi, et al. (2013). Indonesia is the central area of the spread of giant clams in the world.

In pearl cultivation problems faced to date is the nucleus that is used for the production of sea water pearls (aquaculture) are imported. On the other hand the type of local seashells enough available to produce nucleus which is expected to be used as the nucleus of import substitution. As a first step would be to learn the specific properties of chemical-physics of several types of local shells that will be compared with the nucleus of imports .

Thus the purpose of this research is to study chemical-physics characteristics of several types of local seashells and utilization posible import nucleus substitution.

METHODS

Material

Raw materials used in this study came from four (4) types of shells, namely: *Pinctada margaritifera, Pinctada maxima, Pteria penguin* and *Tridacna sp*. As a comparative material used imported nucleus. While the chemicals used in the testing is a chemical that is used for laboratory testing.

Tools

- One unit of process tools (tool grinding, cutting, sanding and polesh)
- One unit of laboratory equipment for chemical and physical testing

Procedures

- Stages of cleaning shells: clamshell grinded rough exterior, then cut square. After the box-shaped cut, poleshed seashells, for subsequent laboratory testing.
- Laboratory testing consists of chemical parameters, including: SiO_2, Al_2O_3, Fe_2O_3, TiO_2, CaO, Na_2O, K_2O, Count Incandescent, $CaCO_3$dan Mineral composition, whereas the physical parameters include: density, hardness, softening point and melting point.

- Data obtained from chemistry or physics test results were processed using completely randomized design for a retrial is not the same, followed by a test of Least Significant Difference (LSD) (Bangun, 1980).

RESULTS AND DISCUSSION

Chemical Testing

Chemical test results for four (4) types of seashells by comparison nucleus of imports, can be seen in Table 1.

Parameter	Type Shells				Nuclei Import*
	P.margaritifera**	***P.maxima*****	***Pteria penguin****	***Tridacna sp*****	
SiO_2 (%)	0.82	0.77	0.77	0.18	0.44
Al_2O_3 (%)	1.01	0.90	0.33	0.67	0.35
Fe_20_3 (%)	Negative	Negative	Negative	Negative	Negative
TiO_2 (%)	Negative	Negative	Negative	Negative	Negative
CaO (%)	54.32	54.54	54.66	55.08	55.08
Na_20 (%)	0.73	0.75	0.71	0.77	0.79
K_2O (%)	Negative	Negative	Negative	Negative	Negative
Hit.Pijar	43.13	57.32	43.64	43.32	43.43
$CaCO_3$ (%)	97.44	97.48	97.55	98.32	98.42
Mineral composition	-Aroganite -Calcite	-Aroganite -Calcite	-Aroganite -Calcite	-Aroganite -Calcite	-Aroganite -Calcite

Description: * Two repetitions ** Four replications

Based on the analysis of variance was highly significant parameters are SiO_2, Al_2O_3 and the real effect is CaO, incandescent Calculate. But other parameters did not show any significant differences. Furthermore, to determine the types of local shells which show the difference with imports nucleus then continued with different test average of treatment in this test of Least Significant Difference (LSD). Based on LSD, seashells *P. maxima* highly significant for incandescent and count parameters were significantly different for the parameter Al203. While clamshell P.margaritifera significantly different for the parameter SiO_2, Al_2O_3 and CaO. Imports nucleus is made of a kind of freshwater mussels such as pig-toe shell (Tritogania), three oidge shell (Pleucobema) and washboard shell (Megalonais). This freshwater mussel is obtained from Tannesse river in America. Furthermore it is said, can be used as long as another party types have the same composition. (Anonymous, 1991; Norine, 1970). To produce round pearls in pearl oysters by taking a freshwater mussel shell sliced round shaped beads, wrapped in a mantle piece and inserted surgically into the body shells to be cultivated. After maintenance is about 3-5 years have included objects coated $CaCO_3$ (calcium carbonate) 1mm thick, the so-called "Nacre" and be pearls (Sutaman, 1993; Anonymous, 1984) Thus the shell *Pteria penguin* and *Tridacna sp* can be used as a substitute import nucleus, because it does not show any significant differences with an import nucleus.

Physical Testing

Chemical test results for four (4) types of seashells by comparison nucleus of imports, can be seen in Table 2.

Parameter	Type Shells				Nuclei Import *
	P.margaritifera**	P.maxima**	Pteria penguin*	Tridacna sp**	
Mohs Hardness Scale	3	3	3	3	3
Berat Jenis (gr/cm^3)	2.69	2.70	2.71	2.70	2.71
Melting Point (^0C)	1260–1410	1267.5–1407.5	1255–1405	1267.5–1405	1275–1405

Based on the analysis of variance did not look for differences in local seashells compared nucleus imports for each of the parameters tested. As such local shells can be used as a nucleus of import substitution. To produce round pearls in pearl oysters obtained by taking a freshwater mussel shells are sliced round shaped beads, wrapped in a mantle piece and inserted surgically into the body shells to be cultivated. After maintenance is about 3-5 years have included objects coated $CaCO_3$ 1 mm thick, the so-called "Nacre" and be pearls (Sutaman, 1993; Anonymous, 1984).

CONCLUSIONS

Based on the test results of chemical-physics at four (4) types of local shells by comparison nucleus of imports, it can be concluded that: types of local shells that can be used as substitution of import nucleus for the production of sea water pearls are *Pteria penguin* and *Tridacna sp*, as the result of a chemical or physical parameter testing showed no significant difference with the nucleus of imports.

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