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HASIL PENILAIAN SEJAWAT SEBIDANG ATAU *PEER REVIEW*
KARYA ILMIAH : JURNAL ILMIAH

Judul Jurnal Ilmiah (Artikel)	:	Utilization of Biogas as Carbon Dioxide Provider for Spirulina platensis Culture		
Jumlah Penulis	:	4 orang (Siswo Sumardiono, Budiyono, Iqbal Syaichurrozi and **Setia Budi Sasongko**)		
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Semarang, Agustus 2020
Reviewer 2

Prof. Dr. Istadi, S.T., M.T.
NIP. 197103011997021001

Utilization of biogas as carbon dioxide provider for Spirulina platensis culture

S Sumardiono, IS Budiyono… - Current Research Journal …, 2014 - academia.edu

The purpose of this study was to study the effect of biogas utilization as CO2 provider to S. platensis growth rate. Two scenarios of culture was conducted in this study ie, Run 1= culture was supplied using air continuously and Run 2= culture was supplied intermittently using biogas and air. The results showed that growth rate of S. platensis in Run 1 and Run 2 was 0.21* 10-3 and 0.39* 10-3/min, respectively. pH culture tend to decrease when supplied by biogas continuously. Kinetic model of S. platensis growth was modeled through modified …

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Research Article

Utilization of Biogas as Carbon Dioxide Provider for *Spirulina platensis* Culture

Siswo Sumardiono, Budiyono, Iqbal Syaichurrozi and Setia Budi Sasongko
Department of Chemical Engineering, University of Diponegoro, Postal Code 50239, Semarang, Indonesia

Abstract: The purpose of this study was to study the effect of biogas utilization as CO_2 provider to *S. platensis* growth rate. Two scenarios of culture was conducted in this study i.e., Run 1 = culture was supplied using air continuously and Run 2 = culture was supplied intermittently using biogas and air. The results showed that growth rate of *S. platensis* in Run 1 and Run 2 was $0.21*10^{-3}$ and $0.39*10^{-3}$/min, respectively. pH culture tend to decrease when supplied by biogas continuously. Kinetic model of *S. platensis* growth was modeled through modified Gompertz equation. The kinetic constants of Gompertz equation were obtained as follows: A (maximum value of OD_{680} reached), μ (maximum specific growth rate), λ (lag time) for Run 1 and Run 2 were 0.663; $0.459*10^{-3}$/min; 1454.9 min and 0.744; $0.588*10^{-3}$/min; 1024.5 min, respectively

Keywords: Biogas, CO_2, growth rate, kinetic model, *spirulina*

INTRODUCTION

Biomass of *Spirulina* contains fitonutrient and functional nutrient in large amount that have positive effect to human health (Henrikson, 2009). Naturally, *Spirulina* has low cholesterol, low fat and low calorie. In addition, *Spirulina* contains 9 important vitamins and 14 minerals that are bond with amino acid. Therefore, *Spirulina* can be assimilated easily by human body (Tietze, 2004). Based on that, *Spirulina*is one of the potential food sources in the future time.

Spirulina needs inorganic carbon (CO_2) for photosynthetic process. In the process of photosynthesis, *Spirulina* converts inorganic carbon (CO_2) into organic carbon with the help of light energy. Source of inorganic carbon can be obtained from synthetic nutrient such as $NaHCO_3$ (Hadiyanto and Hartanto, 2012; Cheunbarn and Peerapornpisal, 2010). Besides that, compressed CO_2 gas also can be used as inorganic carbon source (Becker, 1994). In other hand, utilization of $NaHCO_3$ and compressed CO_2 gas requires relatively large cost (Becker, 1994). Therefore, some authors investigated to find CO_2provider that is economically and environmentally (Van Den Hende *et al*., 2012). There are flue gas from power plant (Brown, 1996; Ho *et al*., 2011; Jacob-Lopes *et al*., 2010) and biogas from anaerobic digestion (Kao *et al*., 2012a, b; Mann *et al*., 2009).

At present, utilization biogas as CO_2 provider becomes the interesting study by authors. This concept has some advantages, which are:

- Purification of biogas, so that the heating value of biogas is up
- Cultivation of microalgae, because microalgae will uptake CO_2 from biogas to photosynthetic process and produce biomass
- Reduction in the cost of nutrient synthetic needs

Some authors studied cultivation microalgae using biogas as CO_2 provider. Kao *et al*. (2012b) used biogas that contained 20±2% CO_2 for *Chlorella sp.* culture with variation of light intensity which was at cloudy and at sunny day. Kao *et al*. (2012a) used biogas that contained 20±1% CO_2 for *Chlorella sp.* culture with variation flow rate of biogas which was 0.05; 0.1; 0.2; 0.3 vvm. Mann *et al*. (2009) used biogas that contained 42% CO_2 for *Chlorella vulgaris* with variation of light intensity which was 35; 60; 100 μmol/m^2.s. Douškova *et al*. (2010) investigated the potential of biogas as CO_2 provider for *Chlorella vulgaris*.

From information above, cultivation of *Spirulina* using biogas as CO_2 provider did not conducted yet by the other authors. Therefore, in this study, authors investigated the effect of aeration using biogas to growth rate and pH profile of culture. In view of *Spirulina* has big potential to be food source in the future time, this study was important to do.

MATERIALS AND METHODS

Preparation of microalgae. Microalgae used was *Spirulina platensis* obtained from the collection of C-BIORE University of Diponegoro, Indonesia. *S.*

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Research Article

A Checklist of the Phytoplankton Flora of a Southern Nigerian Lotic Ecosystem

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[2]Department of Plant Biology and Biotechnology, University of Benin,
[3]Department of Basic Sciences (Microbiology Option), Benson Idahosa University, Benin City, Nigeria

Abstract: This study presents a first compilation of phytoplankton species composition of a stretch of fresh and brackish water ecosystem in Southern Nigeria. Samples collection spanned a period of sixteen months (January 2003 to April 2004). Phytoplankton samples were collected monthly in the open water using plankton net of 55 µm mesh size towed horizontally for about five minutes. The net hauls were transferred into 200 mL properly labelled plastic containers and immediately preserved with 4% formation solution. Samples were examined and illustrations made with a Leitz Orthoplan Research Microscope equipped with a tracing and measuring devices at the phycology laboratory in University of Benin, Benin City. A seasonal pattern of phytoplankton variation was observed with a hundred and 154 phytoplankton species recorded. The taxa recorded belong to four divisions namely: Bacillariophyceae (diatoms), Cyanophyceae (blue-green algae), Euglenophyceae (euglenoids) and Chlorophyceae (green algae). The Diatoms were the predominant group and account for 79% of total species composition. Others are Chlorophyceae 19.77%; Cyanophyceae 1% and Euglenophyceae, 0.23%. The brackish water stations recorded relatively higher number of species and number of individuals of each species than the freshwater stations. An array of floristically diverse phytoplankton was observed with notable common and cosmopolitan diatom species like *Coscinodiscus* and *Nitschia* spp in abundance.

Keywords: Brackishwater, freshwater, Nigeria, Osse River, phytoplankton, taxa

INTRODUCTION

The term plankton refers to any small biota (usually microscopic) living in the water adrift in the water column and incapable of maintaining its position and at the mercy of currents. Phytoplankton (algae) such as diatoms, grow in the presence of sunlight and nutrients such as nitrogen and phosphorus. They are mostly unicellular, filamentous or aggregate of cells and form the base of the trophic structure in the aquatic food chain. Some of these plants are in turn grazed upon by zooplankton, which is dominated by small crustaceans such as copepods, shrimps and their larvae. The amount of phytoplankton in the water column reflects the influence of a number of environmental factors and processes (Suthers and Rissik, 2009). Some phytoplankton species may be considered as villains-producing red tides or toxic algae-but there are only a few species responsible. Most phytoplankton is enormously beneficial, such as those used in the aquaculture industry (Suthers and Rissik, 2009). Phytoplankton has immense values as they play a vital role in aquaculture feed since they form the primary food producer. The great fishing grounds of the seas are found in where algae are found in abundance. As the most sensitive organisms, they serve as indicators of water quality with their ability to detect even the subtle changes taking place in their ambient environment (Sithik *et al*., 2009).

Reports on phycological information in similar freshwater bodies are available in Kadiri and Opute (1989), Kadiri (1993), Kadiri and Opute (2003), Kadiri (2000b), Kadiri and Omozusi (2002), Kadiri (1996), Opute (2003, 1991), Kadiri (2002a), Opute (2000), Nwankwo (1998), Davies *et al*. (2008), Akoma (2007, 2008), Akoma and Opute (2010), Ekwu and Sikoki (2006), Adesalu and Nwankwo (2010), Uttah *et al*. (2008), Onyema *et al*. (2010), Mustapha (2010), Adejare and James (2010), Adesalu and Nwankwo (2008), Kadiri (2002b) and Nwankwo and Onyema (2003).

The study is important because it is a pioneer investigation of this nature in Osse River and therefore will contribute to the knowledge of phycological information in Nigeria.

Study area: The Osse River takes its source from the Akpata hills in Ekiti State, Nigeria (Fig. 1). It flows through Ovia North-East Local Government Area of Edo State and empties into the Benin River through the Gwato Creek which anddrains into the Atlantic Ocean at the Bight of Benin. The climate has the unique

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Research Article

The Effects of Step-by-Step Self-regulation on Controlling Study Behavior, Attitude to Study and Academic Achievement

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[2]Bu-Ali Sina University, Hamedan, Iran

Abstract: Using personal potential is one of the key elements in behavior modification and the purpose of this research was to study the effects of a new method in changing human attitude and behavior in school context. Following this goal, in current research the authors have tried to examine the role of Step-by-Step Self-Regulation on studying behavior control, attitude to study and students' academic achievement. The total sample size was 120 high school male students in Hamedan. The subjects were divided into two groups: experimental group and control group. Then step-by-step self-regulation method were taught and carried out for eight sessions over the experimental group. Researcher made questionnaires were used for gathering data on study behavior control and students' attitude to study and for evaluating students' academic achievement their scholastic scores were used. In testing research hypotheses, a multivariate three-way ANOVA and independent and paired t tests were used. Comparing experimental and control groups data show that applying step-by-step self-regulation improves the personal ability to control study behavior while it does not have any meaningful effect on attitudes to study and students' academic achievement.

Keywords: Achievement, attitude to study, step-by-step self-regulation, study behavior

INTRODUCTION

A problematic long term issue in the field of education and educational psychology is that what we should do to grow the students who are independent in learning activity, self-manager and self-directed, the students which can control their study behavior and are automotive learner with self-control ability in study (Jafari, 2011). So many different studies have been done on self-regulation, but most of them focus on the role of instructing cognitive and meta-cognitive strategies on independent learning activity. The main idea of current studies in self-regulation is that all strategies of self-regulation improve learning through helping students to refine their study behavior and compensate for their shortcomings (Poushahriari, 2011).

Based on these approaches, one of the reasons for students' academic performance is the presence of the teachers or other effective people like parents control on students' study behavior. So, whenever they are controlling and evaluating students' learning activities, their level of study is generally in an acceptable range, but when students are alone or are in the place which there isn't any supervisor for their learning activity, they don't study totally or the range of this behavior come so down. Some of the researchers connect this problem to the lack of self-regulation (Lanzberg, 2009). For controlling the study behavior, students should be aware that their attention is not distracted. They should make a habit in their study behavior, build and follow the study plan and adjust it to their inner energy levels. Students should be able to change their study behavior and activities. If the students do this, their study behavior is on their control, so they are self-regulated (Lemos, 1999).

In learning processes of the students, the ability to become a strategic learners and using self-control is an important component. These students typically are involved in the learning process and are responsible for their own learning. They can control and direct their learning process by using of cognitive and meta-cognitive strategies and achieve further progress in learning. A strategic learner is time manager and may ask themselves such questions: Do I study at a certain time? Is my studying place Ok? (Kamalinafar, 2006).

The importance of students' perceptions of their ability to planning and controlling the studying behavior, in which based on (Bandura, 2000) cognitive-social perspective (2000) refers to one's self perceptions, i.e., the one belief about his ability to perform the duties, is one of the most fundamental phenomena in controlling cognitive processes. This perception acts as a cognitive mediator and put the subjects through to review and judge about his/her abilities in doing something and therefore his works can

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