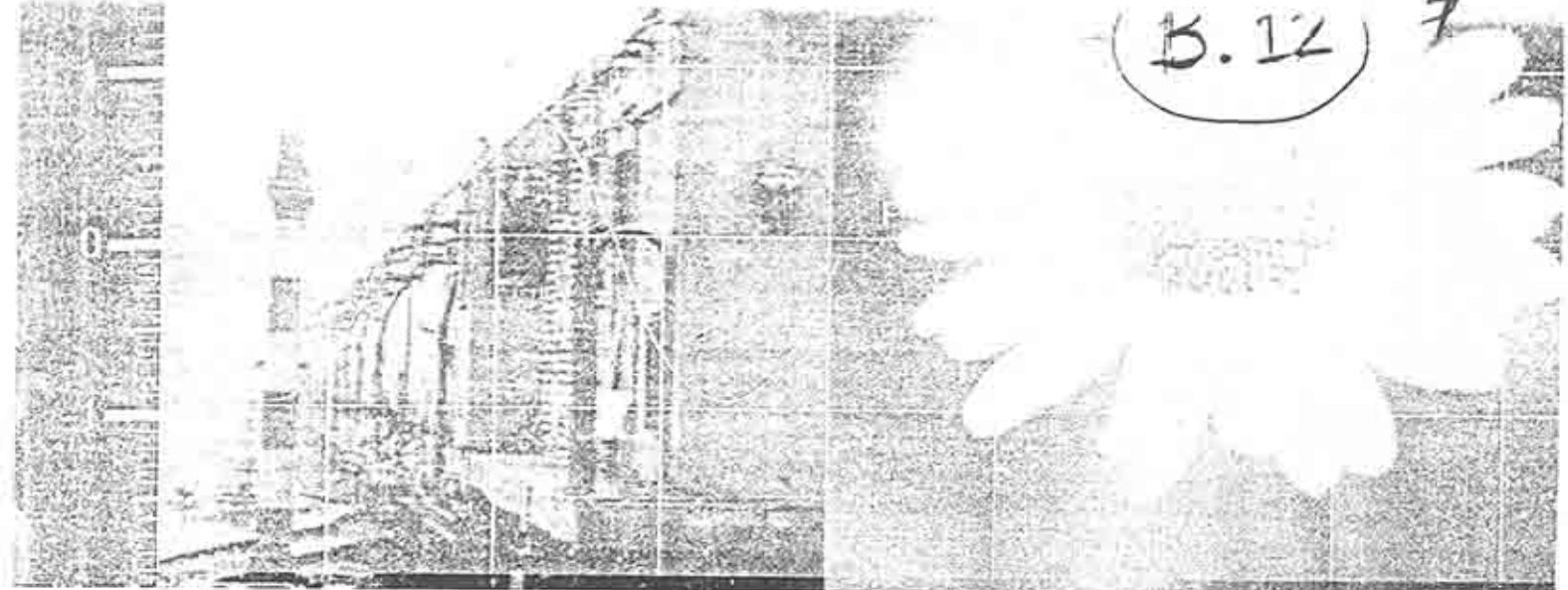


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**Proceeding of The International Seminar
on Natural Sciences
and Applied Natural Sciences**
Auditorium Kampus III UAD, February 17, 2007



Biology 12 (15).

Hosted by:
**EMIPA
Universitas Ahmad Dahlan
Yogyakarta**

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Yang bertanda tangan di bawah ini:

Nama : Prof. Dr. Nurfina Aznam, S.U., Apt.
NIP/NIDN : 130936803
Pangkat/Golongan : Pembina Utama Madya / IVe
Jabatan Fungsional : Guru Besar
Bidang Ilmu : Ilmu Farmasi
Unitkerja : Fakultas MIPA Universitas Negeri Yogyakarta

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a.n. Saudara tersebut di bawah ini:

Nama : Dra. Trikinasih Handayani, M.Si.
NIP/NIDN : 131473385
Pangkat / Gol : Penata Tk I / III/d
Jabatan Fungsional : Lektor
Bidang Ilmu : Pendidikan Biologi
Unitkerja : Fakultas Keguruan dan Ilmu Pendidikan

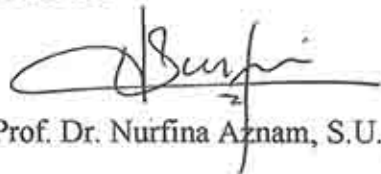
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Yogyakarta

Reviewer



Prof. Dr. Nurfina Aznam, S.U., Apt.

B.12

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Natural Sciences
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**International Seminar on Natural Sciences
and Applied Natural Sciences**

**Auditorium Kampus III UAD, Yogyakarta
Saturday, February 17, 2007**



Proceeding

**Hosted by
Fakultas Matematika dan Ilmu Pengetahuan Alam
(Faculty of Mathematics and Natural Sciences)
Universitas Ahmad Dahlan**

Proceeding of The International Seminar on Natural Science and Applied Natural Sciences

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Preface

Assalamu'alikum warohmatullahi wabarokatuh.

Today there is a fact that many qualified researches conducted by researchers from universities have a few opportunities to be communicated in the forum like international seminars and also are rarely published in periodicals or journals though it is realized that they are significantly important not only for the development of science, technology, and industry but also for the teaching-staffs of higher educations themselves to improve their professions. Therefore an effort to provide a medium accommodating that demand needs appreciating.

In relation to the problem Faculty of Mathematics and Natural Sciences Ahmad Dahlan University Yogyakarta vigorously holds an International Seminar on Mathematics, Natural Sciences, and their Applications which is divided into two sessions-panel discussion, and parallel sessions comprising papers on biology, physics, mathematics, computer science, education mathematics and natural sciences, and their applications. It is hoped that this program can serve as a medium for sharing information and publishing the results of researches on that field either conducted by higher educations, research institutes, industries or observers. To fulfil that hope the committee tries to publish the proceeding of the seminar so that the results can become new beneficial references and be widely read by various circles of people for further studies and applications.

In addition, we also wish this program could become an important moment of meeting between higher educations and industries so that they could make some win-win cooperations especially directed to the sustainable civil-society development.

Finally, we realize that the success of the seminar depends very much on all people involving in it, accordingly we express our deep gratitude and high appreciation to those who have participated in the program.

Wassalamu'alaikum warohmatullahi wabarokatuh.

Dr. Hj. M. Dwi Suhartanti, M.Si.
Chief of The Organizing Committee

**SPEECH OF THE DEAN
MATHEMATICS AND NATURAL SCIENCES FACULTY**

Assalmu'alaikum Wr Wb

Bismillahirrohmanirohim

In the name of Allah, Most gracious Most merciful. I would like to say thanks to Allah that blesses us in the meeting on International Seminar of Natural Sciences and Applied Natural Sciences.

Allah is Most gracious has given us every things on the earth as well as in the sky for human living demands in the world, to gain successfully life in the beyond of hereafter. Human Living demands are different from one generation to next generation. We aware that human demands more complex in the future, there fore it needs higher technology that is more sophisticated. We are sure, it very depends on improving Mathematics and Natural sciences as its foundations.

Based on those reasons, this forum would be very important because this forum will give experiment results and the latest issues of Mathematics and Natural sciences improvement. Furthermore Mathematics and natural sciences education will be communicated. The communications between researchers to share experience will make improving in the next experiments and expand our knowledge. It will raise new ideas for other researchers to conduct the new experiments. Therefore the beneficial of all things were created by Allah for human demands would be more useful.

As a care taker, I would like to say " Well come to Faculty of Mathematics and Natural Sciences , Ahmad Dahlan University, thank you very much for all your attention and participation" I hope this seminar will be successful, Good luck for all of us.
Wassalamu'alaikum Wr Wb

Yogyakarta, February 17, 2007

Dean of Mathematics and Natural Sciences

Drs. Aris Thobirin, M.Si

**SPEECH OF THE RECTOR
AHMAD DAHLAN UNIVERSITY**

First of all, I would like to express my gratitude to all participants of this seminar in having a lot of spirit to make success of the seminar. Secondly, I would like to appreciate all the speakers, both from Indonesia and from abroad. Special thanks I would like to address to Prof. Mustafa Matdris and Prof. Ismail bin Mohammad from Malaysia and Prof Sukarti who will be presenting many important issues in the keynote speeches of the seminar.

Natural science is the science that is basically needed by everyone. It is very close to all phenomena about life and all activities of human being. Moreover, everyone who would be mastery in advance technology needs natural science. How aircraft could fly, boats and ships could float, power engine could pull thousand tons of wagons, green leaves could make sugar from water and carbon dioxide could only be explained if we understand natural science. Even I would like to address attention of all participants on the some natural disaster happened in Indonesia in the last couple years. Both the reason and how to overcome the demolishing effect of tsunami in Aceh, earthquake in Yogyakarta and Central Java, flood in Jakarta are also only could be explained if we understand the natural science.

In the other hand, a lot of people do not realize that they need the natural science. Special case in Indonesia, many study programs offering the natural sciences do not significantly attract new students to join. Even in secondary schools, physics, biology and mathematics, three fields representing the natural sciences are the most unfavorable subject among the pupils. Therefore, this seminar in the natural science takes the significance in opening new horizon saying that we need the natural science because of its role in so many disciplines of scientific world.

At last, I hope that the seminar would benefit to all the participants.

Yogyakarta, February 17, 2007

Rector of Ahmad Dahlan University,

Prof. Dr. Sugiyanto, Pharmacist

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DISTRIBUTION PATTERN AND ABUNDANCE GASTROPODS IN GAJAHWONG RIVER CROSSING BANTUL DISTRICT YOGYAKARTA

Trikinasih Handayani

Biology Education .FKIP. Ahmad Dahlan University. Yogyakarta

Campus III.Jl.Prof.Dr.Soepomo,SH, Yogyakarta 55164

Phone (0274)381523. Fax (0274)564604, 381523

ABSTRACT

The aims of this study is to find out abundance and distribution pattern of gastropods in Gajahwong river crossing Bantul district Yogyakarta.

The method used to collecting datas gastropods is plotless method. To know data analysis the distribution pattern of gastropods using Hopkins formula, whereas to know the abundance of gastropods use density estimation suitable with Diggle's formula.

The result of the research shows that distribution pattern almost all of gastropods species in Gajahwong river crossing Bantul district Yogyakarta there are *Anentome helena*, *Brotia testudinaria*, *Pomacea caniculata*, *Lymnaea rubiginosa*, *Brotia costula*, *Thiara scabra*, *Melanooides granifera* and *Melanooides tuberculata* is clumped, except two station observation of species *Brotia costula* and *Melanooides granifera* is random pattern, and also one station observation of species *Anentome helena* is regularly. The highest abundance of gastropods species is *Lymnaea rubiginosa* (2,378 individu/m² ± 0,01), respectively *Melanooides granifera* (1,942 individu/m² ± 0,01), *Brotia testudinaria* (0,758 individu/m² ± 0,03), *Brotia costula* (0,700 individu/m² ± 0,03), *Thiara scabra* (0,675 individu/m² ± 0,01), *Anentome helena* (0,559 individu/m² ± 0,108), *Melanooides tuberculata* (0,187 individu/m² ± 0,01) and *Pomacea caniculata* (0,135 individu/m² ± 0,067).

Key words : distribution pattern, abundance, gastropods

INTRODUCTION

Gajahwong river is one of three river crossing Yogyakarta city. The others are Winongo river and Code river. Water resource of Gajahwong comes from Sardonoarjo village, Ngaglik, Sleman empties into Pleret, Bantul. The length of Gajahwong river is about 62.39 Km and it crossing resettlement population (Anonim, 2000). The length of Gajahwong river crossing Bantul district is 5.4 Km. The upstream of Gajahwong river crossing Bantul district is in Singosaren and the downstream is in Pleret. The type of Gajahwong habitation is lotic. Gajahwong river are capitalized by industrial factory as their place to throw waste.

The animals in Gajahwong river crossing Bantul district are water insects, gastropods, worms, crabs and shrimps. Those river has various substrat, such as sand, mud, pebble and stones (Anonim, 2000).

Based on Handayani's research (2005) says that the abundance of *Brotia costula* which is a kind of gastropods in Gajahwong river crossing Condong Catur village are 5.33 – 6.82 individu/m², whereas the distribution pattern is clumped. Furthermore, Handayani (2005) said that there are four kinds of gastropods found in Gajahwong river crossing Catur Tunggal village, Sleman, Yogyakarta. Those four kinds of gastropods are *Brotia costula* with density average 0.40 individu/m², *Brotia testudinaria* with density average 1.593 individu/m², *Melanooides tuberculata* with density average

0.235 individu/m² and *Melanoides granifera* with density average 0.685 individu/m², while the distribution pattern of all of those kinds of gastropods is clumped. Due to Djajasmita (1999) in some areas *Brotia costula* or Susuh bincul, usually can be eaten. Nevertheless, it also can be hospes intermedier for trematoda worm, *Paragonimus westermani* which can caused lungs inflammation. More over, Djajasmita (1999) also said that *Melanoides granifera* or Susuh bintil and *Melanoides tuberculata* or Susuh poleng, can be hospes intermedier for parasite trematoda worm, *Paragonimus westermani*, which is also can caused lungs inflammation.

There were no researches in the watershed of Gajahwong river crossing Bantul district before. Those watershed is continuation of the watershed of Gajahwong river crossing Yogyakarta city, that is why follow up researches about the kinds of gastropods especially about the distribution pattern and abundance are required. Hopefully, it can give more information about all kinds of gastropods in Gajahwong river from upstream to downstream. The results of the researches can give beginning information about possibilities those kinds of gastropods can be used as a bioindicator or biocensor for polluted water, in view of the watershed of Gajahwong river as a place to throw out family trashes and industrial waste.

MATERIALS AND METHODS

This research took place in Gajahwong river crossing Bantul district, Yogyakarta on June to August 2006.

The materials of the research are all kinds of gastropods in Gajahwong river crossing Bantul district. The abiotic conditions of the environment are the temperatures of water and air, humidity, pH, DO, dissolved CO₂, substrat, TSS, TDS, speed of water current, and Phosphat concentration. The method of collecting datas is plotless method, with measure :

1. For Point - to - Organism distances
2. For Organisms - to - nearest - neighbour distances (Krebs, 1998).

The data analysis to know the distribution pattern of all kinds of gastropods, using Hopkins formula (Krebs, 1998).

RESULTS AND DISCUSSION

Due to the result of the research, in the watershed of Gajahwong river crossing Bantul district there were found 8 kinds of gastropods. Its kinds abundance and distribution pattern can be shown at Table 1.

Table 1. Density Average and Distribution Pattern of all Kinds of Gastropods

No	Species	Density average \pm SE (individu/m ²)	Distribution pattern	Details
1	<i>Lymnaea rubiginosa</i>	2,378 \pm 0,01	clumped	
2	<i>Melanoides granifera</i>	1,942 \pm 0,01	clumped	2 St,random
3	<i>Brotia testudinaria</i>	0,758 \pm 0,03	clumped	
4	<i>Brotia costula</i>	0,700 \pm 0,03	clumped	2 St,random
5	<i>Thiara scabra</i>	0,675 \pm 0,01	clumped	
6	<i>Anentome helena</i>	0,559 \pm 0,10	clumped	1 St,regular
7	<i>Melanoides tuberculata</i>	0,187 \pm 0,01	clumped	
8	<i>Pomacea caniculata</i>	0,135 \pm 0,06	clumped	

From Table 1. above, 8 kinds of gastropods found in Gajahwong river crossing Bantul district are almost all kinds of clumped pattern (Hopkins index : about 0,7 – 1,0), except 2 observation stations (16 & 21) for *Brotia costula* has random distribution pattern (Hopkins index: between 0.4 – 0.69). *Melanoides granifera* at station 19 & 22 also has random distribution pattern. Whereas *Anentome helena* at station 12 has regular distribution pattern. According to Susanto (2000) clumped distribution pattern is a pattern that shows individuals always stay in groups and it rarely lives individually. Clumped distribution patterns are related to reproduction patterns, kind of substratum, food stock. Those assumptions are based on the habitation of most of gastropods which like muddy and stony substratum. Almost all of the observation stations has sandy and stony substratum, so that it will open up those kinds of gastropods has clumped distribution. Based on Nybakken (1982) the election of gastropods habitation depends on the food stock, like alga layer and detritus. Class gastropods has special characteristics that is radula teeth of alga layer consumer. The function of those teeth are to look for foods i.e. alga layer at the bottom of the water. Clumped distribution also related to its reproduction pattern. Reproduction pattern of gastropods started from egg to become mature snail through some steps, that is veliger hatching egg become larva. Veliger has planktonic characteristic its movement depends on water current. The current of Gajahwong river crossing Bantul district is slow, so those veliger tend to be close to its mother and caused its distribution pattern is clumped.

Some observation stations of the kinds of gastropods has random distribution pattern. According to Susanto (2000) random distribution pattern is a pattern that shows distributing individuals in some places and aggregated in another places. This distribution can be happen in homogenous habitations. At station 16 and 25 for *Brotia costula* has random distribution, this pattern happen because almost all of the observation area has the same conditions, i.e. stony and muddy substratum and the alga population is abundant, so that almost all of the surface of the substratum covered by alga. It also supported by higher phosphate concentration than another area. Moreover Barnes (1974) said that distribution pattern and abundance of florae and faunas in the river determined by physicochemical and biological factors, such as river morphology, speed of water current, substratum, temperatures, foods, competition and predation.

Based on the results of density calculation suitable with Diggle's formula 8 kinds of gastropods found in the research area there are the highest average density is *Lymnaea rubiginosa* ($2.378 \text{ individu/m}^2 \pm 0.01$) respectively *Melanooides granifera* ($1.942 \text{ individu/m}^2 \pm 0.01$), *Brotia testudinaria* ($0.758 \text{ individu/m}^2 \pm 0.038$), *Brotia costula* ($0.700 \text{ individu/m}^2 \pm 0.036$), *Thiara scabra* ($0.675 \text{ individu/m}^2 \pm 0.01$), *Anentome helena* ($0.559 \text{ individu/m}^2 \pm 0.108$), *Melancides tuberculata* ($0.187 \text{ individu/m}^2 \pm 0.01$) and *Pomacea caniculata* ($0.135 \text{ individu/m}^2 \pm 0.067$). The most abundant gastropods is *Lymnaea rubiginosa*. The most suitable area for living gastropods is the middle of Gajahwong watershed. Those area has abiotic environment condition i.e. water temperature $26.7 - 30 \text{ }^\circ\text{C}$, air temperature $26.8 - 30.2 \text{ }^\circ\text{C}$, humidity $47.4 - 67 \%$, speed of water current $0.18 - 0.73 \text{ m/s}$, pH $7.0 - 7.2$, DO $3.6 - 5.3 \text{ ppm}$, dissolved CO_2 $34.4 - 43 \text{ mg/l}$, TSS 12 mg/l , TDS 241 mg/l and Phospat 0.80 mg/l .

CONCLUSION

Distribution pattern of all kinds of gastropods in Gajahwong river crossing Bantul district Yogyakarta, such as *M.tuberculata*, *M.granifera*, *T.scabra*, *B.costula*, *B.testudinaria*, *L.rubiginosa*, *P.caniculata* and *A.helena* mostly is clumped, but in some areas there are random distribution and regular distribution. The highest abundance is *L.rubiginosa* ($2.378 \text{ individu/m}^2 \pm 0.01$) and the lowest is *P.caniculata* ($0.135 \text{ individu/m}^2 \pm 0.067$).

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