B -16

BEHAVIOR STUDY OF *SING* DAN *CALL* ON MALE CRICKET

Gryllus mitratus

Yayan Sanjaya and Suhara

Biology Program Universitas Pendidikan Indonesia
Setiabudi Street No 229 Bandung 4015
e mail: yayansanjaya229@gmail.com

Abstract

Communication in cricket (*Grillus mitratus*) is one important things for animal adaptation. Sing and call production on male cricket is for female'stimuli. Ten male cricket which result sound of sing and call was recorded by tape recorder in 5 minute duration with three replication. The result showed that the range frequency was between 2 KHZ – 6 KHZ of male while range of intensity was between 42,3 - 81,5 dB, with 6 – 7 element per silable for call dan 11 – 50 elemen per silable for sing. The time shortest in one silable 0,5 second for sing and 0,24 second for *call*, while The time longest in one silable 1,6 second for sing and 0,32 second for *call*.
Key words: communication, cricket male, ceicket female, sing, call, frequency, Intensiity

INTRODUCTION

Communication is transmition of an information from one organism to another organism. Communication itself could influence other individuals in the same species for aggregation, warning and love communication. Therefore, the communication need a medium to acceptance signaling. In innate behavior, communication consists of a stimulus signal that straighly from other indivudial behavior, learning behavior is a complex activity. One way for communicating that is producing sound. Sound production play an important role in communication for some insect.

The main role of sound in insect communication is to facilitate mating behavior. Generally, the singing that produce by males that aims to attract females. These songs may cause females to respond a male voice. In mosquitoes, males will be attracted to females because of the sounds come from its wing vibration as well as on a number of other Diptera (Borror *et. al*, 1989). The difficulty in studying the insects are difficult to find the right description for the sound structure.

Human auditory apparatus is limited that can't hear the detil characters. Many of the insects, including some important voice for the insect itself, can not be heard by the human ear, and a particular insect (Borror et al, 1989; Vielliard, 2004).

Puspose

In this study learn about frequency, intensity and silable of male cricket whi by oscillogram

RESEARCH METHOD

The procedure was Recording was done on a cricket *G. mitratus* which has been in the acclimation and selected 10 individuals which given a code name GM01 - GM10. Recording process of 'Cricket Males' committed against one male cricket to female in one room,

Preparation. Acclimatization crickets by separately for each crickets as well as Male and female crickets for 1 week in a cage. Also prepared a box with 23 X 20 X 15 cm^3 that inside of each perifer is coated with foam - cardboard - foam in sequence

2. Stage Research

Recording sound the resulting sound of crickets will be recorded using a recorder with five minutes duration in 3 times. Place for Recording sound of crickets done in silent areas which has been drafted to facilitate the recording and reduce noise or bias noise, either from outside or echoes that come from cricket itself .

Analysis

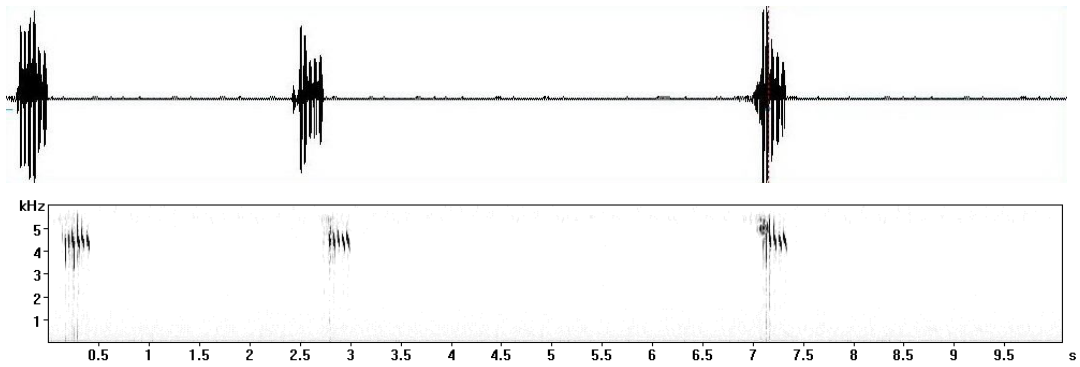
Analysis of sound have been recorded in the analysis with Avisoft-SASLab Light, PRAAT and Syrinx at any duration of five minutes, which is then analyzed to determine the high and low sounds (frequencies) and the structure of male voice.The data were analyzed with the searched high and low frequencies, the shortest and longest time for a syllable and sound structure and compared between the sounds produced either call or sing

RESULT AND DISCUSSION

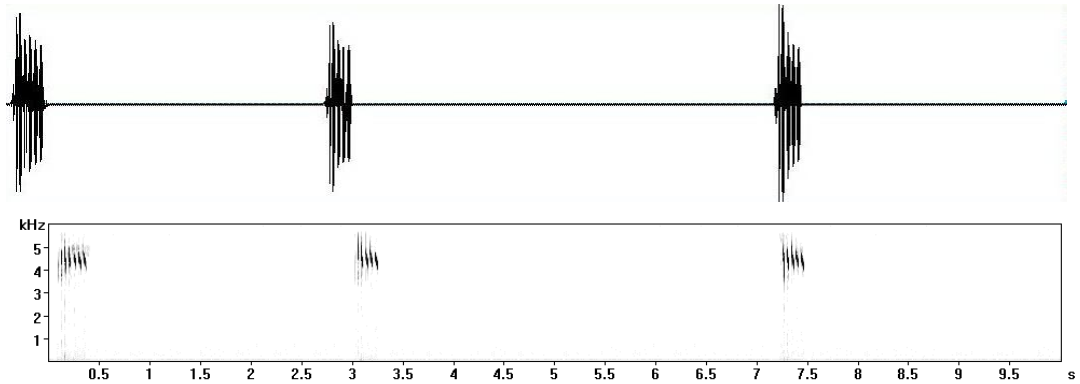
Type of sound, sound structure, low noise high male crickets can be seen from the data the following results; Voice data obtained were analyzed by using Avisoft-SASLab Light, PRAAT and Syrinx. From oscilogram and call sound spectrogram obtained, can be known high-low sound and how the structure of the sound produced (Table 1)

Table 1. *Call* Analize on male *G. mitratus*

Cricket	**Frequency (kHz)**	**Intensity (dB)**	**Length of Syllabi (s)**	**Element Total in one Syllabi**
GM 01	2,0 – 6	43,3 – 80,2	0,26 – 0,30	6-7
GM 02	2,0 – 6	43,3 – 79,0	0,25 – 0,30	6-7
GM 03	2,2 – 6	44,7 – 81,0	0,24 – 0,30	6-7
GM 04	2,0 – 6	42,9 – 81,5	0,24 – 0,29	6-7
GM 05	2,0 – 6	42,3 – 80,6	0,25 – 0,28	6-7
GM 06	2,0 – 6	43,0 – 81,5	0,24 – 0,29	6-7
GM 07	2,0 – 6	42,9 – 81,0	0,25 – 0,29	6-7
GM 08	2,2 – 6	42,8 – 81,0	0,25 – 0,30	6-7
GM 09	2,1 – 6	43,0 – 81,5	0,24 – 0,28	6-7
GM 10	2,0 – 6	43,0 – 80,8	0,24 – 0,32	6-7
Average	2,05 – 6	43,1 – 80,7	0,246 – 0,295	6-7
	2,0 – 6		0,25 – 0,30	6-7



(GM01)



(GM10)

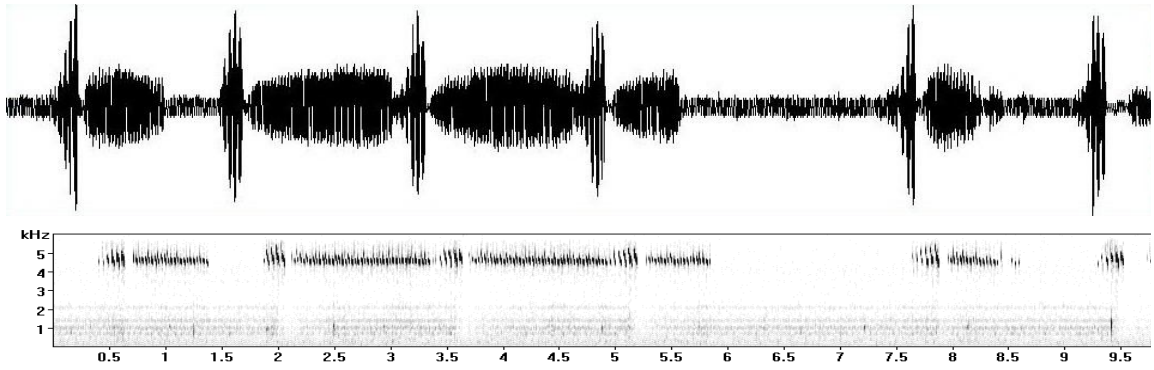
Figure 1. *Oscillogram* dan *Spectogram call G. Mitratus* on 26 – 27^{o}C, GM01 dan GM10.

From *oscilogram* dan *spectrogram sing* from male cricket can be seen sound structure of male cricket (Table 2). PRAAT can be used to determine the minimum and maximum sound intensity sing or call. The intensity of the sound on the type of voice call between the sample by sample eat it does not have much range. The intensity of the lowest call 42.3 dB 81.5 dB being the highest intensity of the overall average intensity obtained from 43.1 to 80.7 dB. In contrast to the average singing voice from 48.3 to 77.8 dB, 47.0 dB with low intensity and high intensity of 79.2 dB.The difference in the intensity of the sound samples can be caused by the uncontrolled probe distance or mic recorder with crickets that will be recorded. Distance and inversely proportional to the light intensity, the greater the distance the smaller the light intensity. Although at the beginning of the current recording Placement crickets, and made to bear on a 10 cm distance is always on, but crickets move, and the possibility of crickets to approach or avoid the mic still unavoidable.

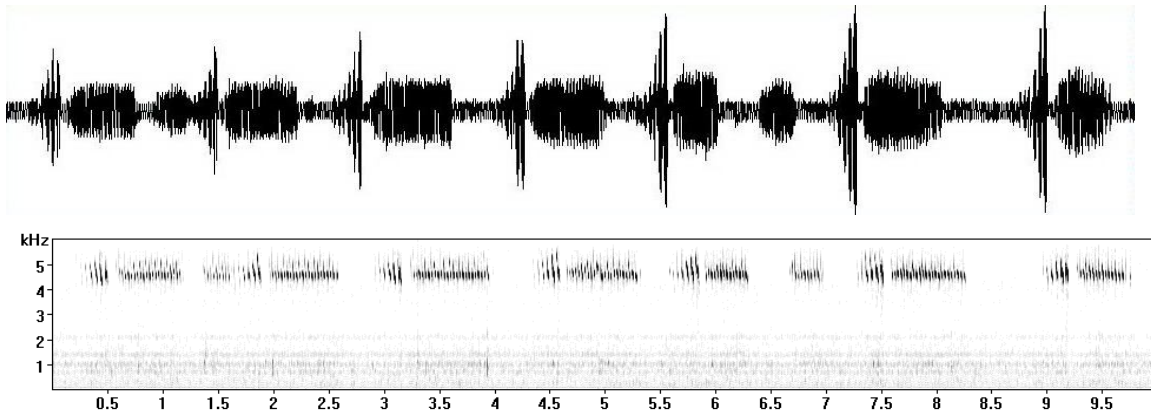
Table 2. *Sing* analysis on Male *G. mitratus*

Cricket	**Frequency (kHz)**	**Intensity (dB)**	**Length of Syllabi (s)**	**Element Total in one Syllabi**
GM 01	2,0 – 6	47.0 – 77,8	0,7 – 1,6	11 – 49
GM 02	2,0 – 6	48,3 – 78,5	0,6 – 1,2	18 – 37
GM 03	2,2 – 6	47,3 – 77,8	0,7 – 1,5	19 – 42
GM 04	2,1 – 6	51,2 – 75,9	0,5 – 1,1	15 – 35
GM 05	2,0 – 6	47,5 – 77,8	0,5 – 1,6	12 – 50

GM 06	2,0 – 6	47,4 – 78,5	0,6 – 1,3	17 – 39
GM 07	2,0 – 6	48,8 – 76,5	0,6 – 1,2	13 – 35
GM 08	2,1 – 6	49,4 – 79,2	0,5 – 0,7	12 – 22
GM 09	2,0 – 6	47,4 – 78,5	0,5 – 1,2	15 – 38
GM 10	2,0 – 6	49,9 – 77,8	0,6 – 1,1	19 – 30
Average	2,04 – 6	48,3 – 77,8	0,58 – 1,25	15,1 – 37,7
	2,0 – 6		0,6 – 1,3	15 – 38



(GM01)



(GM10)

Figure 2 . *Oscillogram* and *Spectogram sing* male *G. mitratus.* On 26 – 27^{o}C, from jGM01 dan GM10.

Figure 3. The most frequent oscilogram sing pattern

Results *G. mitratus* sound when compared with the results of other studies, such as research and Musta Iorgu the idea in 2008 that examines seven crickets in Romania. Overall jangkir Cliring or *G. mitratus* has a frequency of 2-6 kHz, the intensity of 42.3 to 81.5 dB, seen from *G. mitratus* including low frequency, and Musta Iorgu (2008) results show *Pellucens oechantus* frequency produces a frequency 2-8 kHz, and The highest frequency generated *Modicogryllus* frontal 2-16 kHz. Iorgu and Musta (2008) also examined Gryllus campestris is a genus with *G. mitratus. G. campestris* produce sound call with frequency 4-12 kHz, 3-5 elements per syllable, not too much different from G. mitratus who have 6-7 elements per syllable.

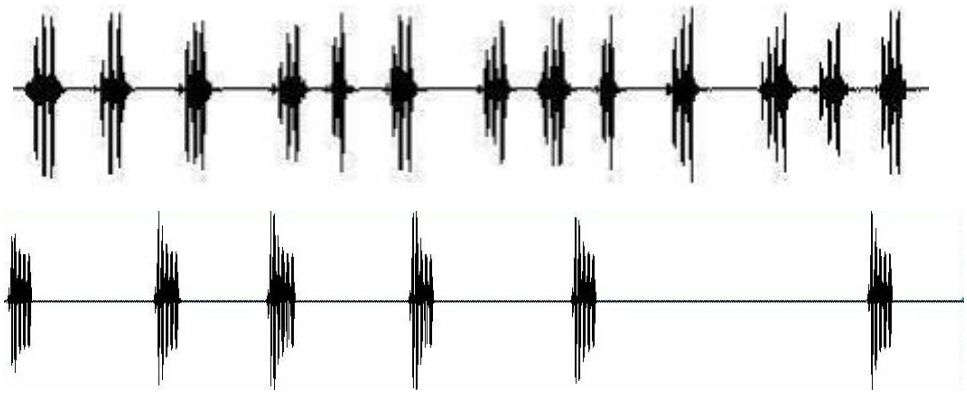


Figure 4. *Oscilogram G. campestris* (uppermost), *Oscilogram G. mitratus* (down),

Sound which is also a communication tool for *G. mitratus* have an important role in the process of mating behavior and the behavior of others. There is some sort of action and reaction between males and females. When the male crickets will give voice they will lift the wings mengerakannya, opening and closing like a pulsing. Sometimes wing continues appointed although not make a sound, such as attention to the position of getting around. The wing is moved again after a while, or immediately closed.

Figure 5. Male cricket when its producing a sound

Female crickets react to the sound of crickets males if both wiiling to have mating.. According to Mc Farland male crickets (1993) make a sound to attract females. At the time of female crickets crickets came males, female crickets moving wings and produce subtle vibrations but his voice was low or low intensity.

Figure 6. Cricket female when producing a sound

CONCLUSION AND SUGGESTION

It can be male cricket producing sound on 2 kHz is the lowest frequency sound and 6 kHz is the highest sound frequency voice. Lowest and highest intensity sequentially from 42.3 to 81.5 dB, with 6-7 elements persilabel to sound the call and 11-50 elements per syllable for singing voice. Shortest time to one syllable is 0.5 seconds to sing and 0.24 seconds for the call. Currently the longest time a syllable in G. mitratus is 1.6 seconds to sing and 0.32 seconds for the call.Female crickets react or respond male crickets sound produced by approaching the source of the sound, vibrate at the same time the female cicada wings.

REFERENCES

Anggaraswatie, S. (2005). *Karakteristik Reproduksi Jangkrik Jerman (Gryllus sp.) yang Diberi Pakan Konsentrat dengan Daun Singkong dan Daun Pepaya.* Departemen Ilmu Produksi dan Teknologi Peternakan. Fakultas Peternakan. Institut Pertanian Bogor.

Asep Sobari, A., Hindayana, A., Judawi, D., Priharyanto, D., Luther, C.G., Mangan, J., Supriati, J., Untung, K., Sianturi, M., Mundy, P. & Riyatno, MS. (2002). Musuh Alami, Hama dan Penyakit Tanaman The. *Proyek Pengendalian Hama Terpadu Perkebunan Rakyat Direktorat Perlindungan Perkebunan* Jakarta: Direktorat Jenderal Bina Produksi Perkebunan Departemen Pertanian

Borror, J. D., Triplehorn, A.C. & Johnson, F.N. (1989). *An Introduction to the Study of Insects. Sixth Edition.* Harcourt Brace College Publishers, Fort Worth, TX, USA.

Borror, J. D., Triplehorn, A.C. & Johnson, F.N. (1996) *Pengenalan Pelajaran Serangga*, Edisi keenam, terjemahan Partosoedjono, S. Yagyakarta; Gadjah Mada University Press.

Dambach, M & Gras, A. (1995). "Bioacoustics of a miniature cricket, *Cycloptilioides canariensis* (Orthoptera: Gryllidae: Mogoplistinae)". *The Journal Of Experimental* 198, 721-728.

Deputi Menegristek Bidang Pendayagunaan dan Pemasyarakatan Ilmu Pengetahuan dan Teknologi. (2000) *Budidaya ternak jangkrik Gryllus mitratus* Burm. http://www.ristek.go.id & http://iptek.apjii.or.id/budidaya%20peternakan/PEMD/Jangkrik.html

Farry, B.P. & Pudijastuti L.E. (1999). *Sukses Beternak Jangkrik.* Jakarta: Penebar Swadaya.

Fitri, L.L. (2008). "Panduan Analisa Suara Burung". Makalah pada Pelatihan Teknologi Spektogram untuk Analisis Suara Burung Berkicau. Bandung: Sekolah Ilmu & Teknologi Hayati ITB

Iorgu,T & Musta, G. (2008). " *Bioacoustic Studies On Some Cricket Species* (insecta:

orthoptera: Gryllidae) *from Romania*". Romania: University Ia

Maharani, E.S, (2005). *Performa Reproduksi Jangkrik Cliring (Gryllus mitratus) yang Mendapat Konsentrat dengan Daun Singkong (Manihot esculenta, Crantz) atau Daun Pepaya (Carica papaya)*. Departemen Ilmu dan Teknologi Peternakan. Fakultas Peternakan. Institut Pertenian Bogor.

McFarland, D. (1993). *Animal Behaviour, Psychobiology Ethology and Evolution*. Second edition. England: Longman Scientific and Technical. University of oxford.

Nazir, M. (1999). *Metode Penelitian*. Jakarta: Ghalia Indonesia

Rahmadi, C. (2002) "Tropika Keanekaragaman Fauna Gua, Gua Ngerong, Tuban Jawa Timur : tinjauan khusus pada Arthopoda" *ZOO INDONESIA-Jurnal Fauna*. Bidang Zoologi, Puslit Biologi-LIPI 2002

Rahmadi, C., Suhardjono, Y.R., Subagja, J. (2002). Komunitas Collembola Guano Kelelawar di Gua Lawa Nusakambangan Jawa tengah. *Biologi* 2(14): 861-875

Rahmadi, C. & Suhardjono, Y.R. (2003). Arthopoda Gua di Nusakambangan, Cilacap Jawa Tengah. Dalam Jamal, Y dkk.(penyunting). Laporan Teknik Proyek Inventarisasi dan Karakterisasi Sumber Daya Hayati. Pusat Penelitian Biologi LIPI

Rahmadi, C., Wowor, D., Suyanto, A., Lupiyaningdyah, P., Achmadi. S.A, Marwoto, M.R., Isnaningsih, Darmawan, Reina Prihandini, Nanang Supriatna, N., & Mulyadi. (2006). *Inventarisasi dan Karakterisasi Biota Karst Peg. Sewu dan Sulawesi*. Pusat Penelitian Biologi LIPI

Vielliard, J.M.E., Silva, M.L. & Suthers, R.A. (2004), Advances in Bioacoustics. Rio de Janeiro: *Anais da Academia Brasileira de Ciências* 76(2): I-IV