

The Effect of Hatching Media on Hatching Capacity and Stadium Nymph in Cricket *Gryllus mitratus*

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ABSTRACT

Cricket is one of potential animals that can be used as food sources, such as human food and feed of domestic animal because of its high protein content. Cricket can be produced by laying eggs after the process of fertilization. Cricket do not incubate its own eggs, but the incubation can take place in loose soil, sand, sock, cotton, and newspaper with the humidity of 70%-80%. The aim of this study was to know the effect of hatching media on hatching capacity and stadium nymph I in cricket *Gryllus mitratus*. The study was conducted in a room of the Pandu house, Beringin Raya Village, Muara Bangkahulu Subdistrict, Bengkulu District from August until September, 2005. A number of the eggs of cricket *Gryllus mitratus* used in the study were 320 eggs with 4 replications of which each replication consisted of 20 eggs. Parameters measured were the first hatching body weight (mg), hatching ability (%), hatching weight (mg), hatching period (day), nymph period (day), the first nymph weight (mg), temperature and humidity of the chamber. The results showed that the hatchery of cricket eggs by using some hatching media were significantly different ($P < 0.05$) on hatching ability and nymph I period. The average of hatching ability by the sand (70.00%) was not significantly different to that by the loose soil (73.75%) and combined treatments (71.25%), but it was significantly different ($P < 0.05$) to that by the sock (86.25). The nymph I period by the sock was longer than the others. In conclusion the sock was better to be used as hatching media of cricket eggs but it was not used for growing offspring of cricket.

Key words: cricket eggs, hatching media, hatching ability, and stadium nymph I.

INTRODUCTION

The cricket is a category as the pest of agriculture plant, because it is destroy of plant especially young leaf not only in farm but also rice cultivation (Rahman, 2002). Until now, there are 123 species of cricket is cultivated and it was difficult to differentiate between species because of almost the same (Paimin *et al.*, 1999).

Widyaningrum (2001), naturally, the cricket can be mating with many times (multi mating) with different male in species class. And then, fertility of female can increase in different male. The cricket is reproduction with lay eggs, it was become after mating. In observation, there are many technical for incubation of cricket egg. In tradition livestock Kebun Tebeng, Bengkulu District, the incubation of cricket eggs with paper as a media incubation. Besides this, livestock in Simpang Skip, Bengkulu District used cotton and paper for incubation.

The cricket is not incubation alone, but it's need loose soil with humidity 70% - 80%.

Widyaningrum (2001), state that male of cricket look for place of web and loose for lay eggs until many time. In generally, the male of cricket lay eggs in loose within 5 -15 mm (Kumala, 1999).

Base on the this information, It is important to research the effect of hatching media on hatching capacity and stadium nymph I in cricket *Gryllus mitratus*. The purpose of this research was to observe to influence hatchery media; sand, soil, combined sand and soil and web sock.

MATERIALS AND METHODS

The study was conducted in room of the Pandu house, Beringin Raya Village, Muara Bangkahulu Subdistrict, Bengkulu District from August until September, 2005.

The materials used in the study were box as a incubation, hand sprayer, hygrometer, soil tester, analytic scales, lux and filter. The eggs of cricket *Gryllus Mitratus* used in the study were 320 eggs, sand, soil, loose soil, sock.

Stage of Study

1. The collective of eggs; this eggs came from of the livestock of cricket in Bengkulu District. This egg was selected good eggs, fresh, and clean.
2. The supplying of materials and incubation. The sand used of this research was river sand. This sand was washing before using. After drying, it was set in tray with thick of 2 cm. The soil was used of black color in surface of soil. This soil was washing before using. After drying, it was set in tray with thick of 2 cm. For mixture of sand and soil, in ratio 1:1, it was set in tray with thick of 2 cm. Beside this, The sock was also set in tray with thick of 2 cm. This humidity was incubation to endure about 60% - 80%. The tray was set in plywood with measure 10 x 15 cm with high of tray 8 cm.

Variable that Measure

- a. First eggs weight; it was obtain from the weighing oh eggs before incubation.
- b. Hatching capacity; it was calculated the total of hatch egg divide total of sample eggs and time of 100%.
- c. Hatching weight; the first weight of hatching.
- d. Hatching period; it was calculate from the lay eggs until hatching.
- e. Nymph periode (day); It was calculate from hatching until it was change of skin.
- f. The first nymph weight; It was calculate with the first weight after it was change skin.
- g. Temperature and humidity; it was obtain from temperature (°C) and humidity (%) in the morning and afternoon.

Experiment Design

The Experiment design used Completely Randomized Design (CRD) with four treatments and four replications. Each the replication consists of 20 eggs. The treatment were T1; sand, T2; soil, T3 mixture sand and soil, and T4; web sock The data were be obtain to test with statistic. It was difference that was result of analysis of variance, and then it was the test with Duncan’s Multiple Range Test (DMRT).

RESULTS AND DISCUSSION

The First Egg Weight of Cricket *Gryllus mitratus*

The average first eggs weight *Gryllus mitratus* is describe in Table 1. The result of analysis of variance indicate that first eggs weight of crickets *Gryllus mitratus* were not significant different (P>0.05).

The result of this research indicated that the average of first eggs weight of cricket eggs *Gryllus mitratus* 0.9474 mg - 0.9505 mg. Widiyaningrum (2001), the average of first eggs weight of cricket 0.6 mg - 0.8 mg. It was more high, because this egg was selected such as this measure; good and large.

Table 1. The Average of The First Eggs Weight of Cricket Eggs *Gryllus mitratus*

Replicati on	First weight of cricket eggs (mg)			
	T1	T2	T3	T4
1	0.9510	0.9480	0.9480	0.9435
2	0.9445	0.9585	0.9520	0.9475
3	0.9480	0.9465	0.9435	0.9470
4	0.9520	0.9490	0.9495	0.9515
Totally	3.7965	3.8020	3.7930	3.7893
Average	0.9491 ^{ns}	0.9505 ^{ns}	0.9483 ^{ns}	0.9474 ^{ns}
SD	0.0030	0.0054	0.0036	0.0033

Note: Superskip is different in the same row of indicate the very significant different (P<0.01). T1= sand, T2= soil. T3=mixture sand and soil. T4=web sock.

The Effect of Hatching Media to Hatching Capacity Cricket *Gryllus mitratus*

The hatching capacity to hatching media; sand, soil, mixture sand and soil, and web sock is describe in Table 2. The result of analysis of variance indicate that the incubation of eggs of crickets *Gryllus mitratus* used media; sand, soil, mixture sand and soil, web sock were significant different (P<0.05) to hatching capacity cricket *Gryllus mitratus*. The average of hatching capacity used media; sand, soil, mixture sand and soil, web sock were 70.00% - 86.25%.

Result of the test with Duncan’s Multiple Range Test (DMRT) indicate that the average of hatching capacity with sand (70.00%) was not significant different (P<0.05) with soil (73.75), mixture soil and sand (71.25%), but it was significant different (P<0.05) with web sock (86.25%).

Table 2. The Average of Hatching Capacity of Cricket Eggs *Gryllus mitratus*

Replication	Hatching Capacity (%)			
	T1	T2	T3	T4
1	75	70	75	90
2	65	80	65	80
3	70	75	70	90
4	70	70	75	85
Totally	280	295	285	345
Average	70.00 ^b	73.75 ^b	71.25 ^b	86.25 ^a
SD	4.08	4.79	4.79	4.79

Note: Superscript is different in the same row of indicate the very significant different (P<0.01). T1= sand, T2= soil. T3= mixture sand and soil. T4=web sock.

The web sock was high of hatching capacity, because it was high humidity; 70.00%. Although, the less hatching capacity was sand, it was have less humidity (68.82%). Soenanto (1999), state that percentage of hatching is influence humidity, temperature in media, hatching box, male quality, and technical of incubation.

The Effect of Hatching Media to Hatching Weight

The average hatching weight *Gryllus mitratus* to media; sand, soil, mixture sand and soil, and web sock is describe in Table 3 below. The result of analysis of variance indicate that hatching weight of crickets *Gryllus mitratus* were significant different (P>0.05). This research indicated that the average hatching weight *Gryllus mitratus* to different media was 0.7478 mg – 0.7605mg.

Table 3. The Average of the Hatchery Weight of Cricket Eggs *Gryllus mitratus*

Replication	Hatching Weight (mg)			
	T1	T2	T3	T4
1	0.7646	0.7600	0.7573	0.7422
2	0.7538	0.7606	0.7471	0.7488
3	0.7621	0.7553	0.7507	0.7537
4	0.7600	0.7664	0.7600	0.7465
Totally	3.0405	3.0423	3.0151	2.9915
Average	0.7601 ^a	0.7605 ^a	0.7537 ^{ab}	0.7478 ^b
SD	0.0046	0.0046	0.0059	0.0048

Note: Superscript is different in the same row of indicate the very significant different (P<0.01). T1=sand, T2= soil. T3= mixture sand and soil. T4=web sock.

Result of the test with Duncan’s Multiple Range Test (DMRT) indicate that the average of hatching weight with sand (0.7601 mg) was not

significant different (P<0.05) with soil (0.7605 mg), but it was significant different (P<0.05) with web sock (0.7478 mg). The average of hatching weight with mixture sand and soil (0.7537 mg) was not significant different (P<0.05) with web sock (0.7478 mg). It was observation that the high of hatching weight was sand (0.7605 mg). It is means that sock media decrease hatching weight.

Hatching Period of cricket eggs *Gryllus mitratus*

The Figure 1 in it was the first appearance the hatch of eggs in 5th day for all of treatments. In 5th day, web sock media was more hatch 6 eggs In 7th days the high hatch; sand 23 eggs, soil 22 eggs, mixture sand and soil 24 eggs, web sock 16 eggs. In 8th day, the hatching was decrease in each treatment. In 9th days, the hatch eggs almost the same for each treatment. In 10th days, the last hatch in the soil was 2 eggs. In conclusion, the eggs was start in hatch 5th days until 10th day. Arko (1990), state that the eggs start hatch in 7th day days until 10th day for *Testaceus*. It is not the same for each eggs for hatch, the eggs will be hatch in web soft cloth or cotton.

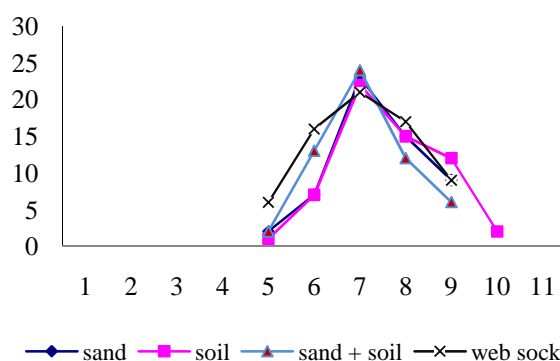


Figure 1. Hatching Period of Eggs Cricket *Gryllus mitratus*

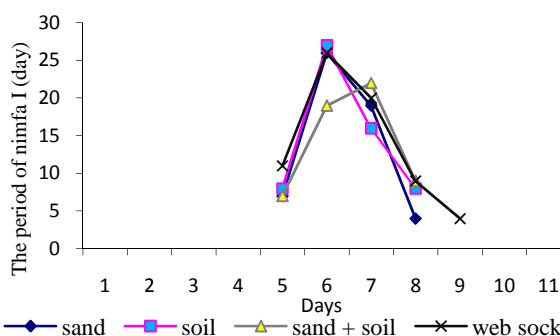


Figure 2. Period of Nimfa I Cricket *Gryllus mitratus*

The Effect of Hatching Media to Nymph Period

Figure 2 is describe that the nymph I stadium period of cricket *Gryllus mitratus* started in 5th day each treatments. In 5th day the offspring cricket became nymph of variation; the sand 7 offspring, soil 8 offspring, mixture sand and soil 7 offspring, and web sock 11 offspring. In 6th day was peak of offspring became nymph I; sand 26 offspring, soil 27 offspring. In 7th day was peak of offspring became nymph I in mixture sand and soil. In 7th day; sand, soil, and web sock, the development of offspring became nymph start decrease such as; sand 19 offspring, soil 16 offspring, web sock 20 offspring, mixture sand and soil 23 offspring. In 8th day, The last of 8 days was became to stadium nymph I in sand, , mixture sand and soil, however in the web sock was 9 th day. The range of time became nymph I was 5 day until 9 and 6th day was peak nymph that growth.

Paimin *et al.*, (1999) state that Development of nymph started the hatch eggs. In sand, soil, and mixture media more fast became compare with web sock, because this media was suitable with original habitat. Sridadi and Rachmanto (1999), state that The offspring of cricket of new hatch until day 20 was more sensitive to environment. If it was development, the housing cultivation must suitable with original habitat (Anonim, 1999).

Arko (1999), state that the nymph of cricket is metamorphosis change of skin (molting) until mature 5 - 6 times until the old about 7 days (is called nymph) and the cricket to change of skin is category vase nymph II (Paimin *et al.*, 1999).

The Effect of Hatching Media to The First Weight of Nymph I *Gryllus mitratus*

The average of the first weight of nymph I *Gryllus mitratus* used be hatching media of sand, soil, mixture sand and soil, web sock in presented in Table 4. The result of analysis of variance indicate that hatching media; sand, soil, mixture sand and soil were not significant different (P>0.05) to first weight of nymph I weight of crickets *Gryllus mitratus*.

The result of this research indicated that the average of weight of nimfa I 1.2568 mg- 1.2623 mg. Widiyaningrum (2001), state that the average of the first weight species *Gryllus bimaculatus* about 1.36 mg⁻¹ cricket, *Gryllus testaceus* dan *Gryllus mitratus* between 1.24 mg – 1.36 mg per

cricket. In this research, hatching media was not influence to weight of nymph I cricket. The weight of nymph I almost the same each treatment, because the first nymph I give the same feeding until the last nymph. Widiyaningrum (2001), the body weight growth of cricket was influence feeding and species.

Table 4. The Average of The First Weight of Nimfa I *Gryllus mitratus*

Replication	Weight of Nimfa I (mg)			
	T1	T2	T3	T4
1	1.2500	1.2575	1.2525	1.2650
2	1.2517	1.2636	1.2653	1.2536
3	1.2700	1.2671	1.2707	1.2600
4	1.2553	1.2507	1.2606	1.2557
Total	5.0227	5.0389	5.0492	5.0343
Average	1.2568 ^{ns}	1.2597 ^{ns}	1.2623 ^{ns}	1.2586 ^{ns}
SD	0.0091	0.0072	0.0077	0.0050

Note: Superscript is different in the same row of indicate the very significant different (P<0.01) T1= sand, T2= soil. T3= Mixture sand and soil. T4=Web sock.

The Temperature and Humidity of Chamber

The average temperature and humidity for each day is describe in Table 5. In Table 5, temperature in chamber for research was 26.00°C - 28.00°C, and humidity was 71% - 83%. Sukarno (1999), state that in Indonesia, local cricket is live in temperature between 20°C – 32°C with humidity 65% - 83%.It is to concert the temperature and humidity of chamber, because it is influence to hatching.

Table. 5 The Average of Temperature and Humidity in the Chamber

	Day temperature (°C)	Maximum temperature (°C)	Minimum temperature (°C)	Humidity (%)
Range	26.00-28.00	27-29	25-27	75-83
Average	27.55	28.11	26.11	76.22

The Temperature and Humidity of Hatching Media

The research of temperature and humidity of hatching media in describe in Table 6. In Table 6 was observed that the temperature and humidity of hatching media; 26.18°C – 26.39°C and 68.82% and 69.04%, respectelly.

Table. 6 The Average of Humidity and Temperature of Hatchery Media

Replication	Humidity and temperature of hatchery media			
	T1	T2	T3	T4
1	69.00/26.05	68.69/26.93	68.76/26.24	69.43/26.10
2	68.78/26.32	68.94/26.13	68.86/26.00	68.81/26.11
3	68.95/26.34	69.42/26.36	68.90/26.15	68.81/26.28
4	68.56/26.14	68.94/28.52	68.14/26.34	69.10/26.52
Totally	275.291/104.85	275.981/107.94	275.645/104.73	276.142/105.05
Rataan	68.823/26.21	68.995/26.39	68.911/26.18	69.036/26.26
SD	0.196/0.14	0.305/1.08	0.161/0.14	0.294/0.19

Note: T1=sand, T2=soil, T3=mixture sand and soil, T4=web sock.

The result of the temperature and humidity indicated that the temperature and humidity almost the same each treatments, because the watering relative the same; three times per days. In humidity, the web sock relative of high (69.04%) compare with sand (68.82%), soil (68.99%), and mixture sand and soil (68.91%). The average of media temperature in this research was 26.26°C, with range 26.18°C – 26.39°C. Sridadi and Rachmanto (1999), state that the humidity and temperature must be constant with humidity 65%-80% and temperature 26°C in order to good hatching. Beside this, The temperature in chamber of cultivation of cricket must be suitable, and then it was the same with original habitat; 23°C-26°C (Kumala L., 1999).

CONCLUSIONS

The using of many hatching media; sand, soil, mixture sand and soil, and sock can influence hatching capacity of eggs cricket *Gryllus mitratus*. The high of hatching media was web sock (86.25%). In the interval of time of stadium nymph I can be used in web sock media (9 day).

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