OPTIMIZATION OF ULTRAVIOLET IRRADIATION ON SPERM OF AFRICAN CATFISH (*Clarias gariepinus*) FOR GYNOGENESIS

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Optimization of ultraviolet irradiation on sperm of African catfish (Clarias gariepinus) for gynogenesis / Nora Faten Afifah Mohamad.

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OPTIMIZATION OF ULTRAVIOLET IRRADIATION ON SPERM OF AFRICAN CATFISH (*Clarias gariepinus*) FOR GYNOGENESIS

ABSTRACT

The study was conducted to induce gynogenesis in African catfish, *Clarias gariepinus* through optimized UV irradiation (254nm) on the sperms of *C. gariepinus* for the production of all female larvae. Diploid gynogenetic was accomplished by application of cold shock for suppression of second polar body in *C. gariepinus* eggs after fertilization with irradiated sperm at a constant temperature of $5^{O}C$ for 20 min, initiated 3 min after fertilization. The optimum UV dosage was determined by changing the distance and duration of exposure based on the results of the sperm motility experiment. Using haemocytometer, the number of sperms present varied from 6.55×10^{7} cells ml^{-1} to 3.55×10^{7} cells ml^{-1}. Irradiated sperm with more than 70% motility was used to activate the eggs of *C. gariepinus*. The hatching and survival rate of larvae from eggs fertilized with irradiated sperm at early development is relatively low compared to control group. Among the treated groups, two maximum hatching rates for gynogenetic larvae of 61.49 % and 62.28 % was obtained when the sperm exposed to UV light at a distance of 30cm for 2 min and 3 min respectively, whereas hatching percentage of control was 84.38%. After 10 days of rearing, the survival percentage of all treated groups was decreased. Survival rates of eggs fertilized with irradiated sperm at a distance of 30 cm for 2 min (50.49%) was found to be better than that of the irradiated sperm at a distance of 30 cm for 3 min (46.47%). Therefore, optimal distance and duration to produce diploid gygogenetic larvae was at 30 cm for 2 min. Using karyological examination, the present study revealed that gynogens had two sets of chromosomes (2n=56). Further studies are required to support this postulation, perhaps by using Commet assay for assessing DNA damage in *C. gariepinus* spermatozoa or sex biomarker to identify the sex ratio in the production of gynogenesis fish.

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PENGOPTIMUNAN SINARAN ULTRAUNGU PADA SPERMA IKAN KELI AFRIKA (*Clarias gariepinus*) UNTUK GYNOGENESIS.

ABSTRAK

Kajian ini dijalankan untuk mendorong proses gynogenesis terhadap keli Afrika, *Clarias gariepinus* melalui pengoptimunan sinaran UV (254nm) pada sperma *C. gariepinus* untuk menghasilkan semua larva betina. Diploid ginogenetik telah dicapai dengan aplikasi kejutan sejuk bagi penindasan kutub badan kedua dalam telur *C. gariepinus* selepas persenyawaan dengan sperma sinaran pada suhu malar 5^0C selama 20 minit, dimulakan 3 minit selepas persenyawaan. Sinaran UV yang optimum ditentukan oleh perubahan jarak dan tempoh pendedahan berdasarkan keputusan kajian motiliti sperma. Dengan menggunakan haemocytometer, bilangan sperma yang hadir berbeza dari 6.55×10^7 sel/ml – 3.55×10^7 sel/ml. Sperma dengan kadar hidup yang melebihi 70% digunakan untuk mengaktifkan telur *C. gariepinus*. Kadar penetasan dan kelansungan hidup larva gynogen pada peringkat awal kehidupan adalah rendah berbanding kawalan. Antara kumpulan yang dirawat, dua penetasan kadar maksimum bagi larva ginogenetik, 61.49% dan 62.28% telah diperolehi apabila sperma didedahkan kepada cahaya UV pada jarak 30cm masing-masing selama 2 minit dan 3 minit, manakala peratusan penetasan kawalan adalah 84.38%. Selepas 10 hari pemeliharaan, peratusan kadar hidup semua kumpulan yang dirawat telah menurun. Kadar hidup telur yang disenyawakan dengan sperma yang dikenakan sinaran UV pada jarak 30 cm selama 2 minit (50.49%) didapati lebih baik daripada sperma sinaran pada jarak 30 cm selama 3 minit (46.47%). Oleh itu, jarak dan tempoh optimum untuk menghasilkan larva diploid ginogenetik adalah pada 30 cm selama 2 minit. Dengan menggunakan karyogram, kajian ini menunjukkan bahawa gynogen mempunyai dua set kromosom (2n=56). Penelitian lebih lanjut diperlukan untuk menyokong postulasi ini, mungkin dengan menggunakan Commet assay untuk menilai kerosakan DNA dalam sperma *C. gariepinus* atau seks biomarker untuk mengenal pasti nisbah jantina dalam pengeluaran ikan ginogenesis.