RINGKASAN

RENI APRIYANI, Fakultas Biologi Program Studi S2 Biologi, Universitas Jenderal Soedirman, Keberhasilan Ginogenesis Ikan Tawes (*Barbonymus gonionotus* Blkr.) Pada Dua Dosis Iradiasi UV (λ 254 nm) Dengan Kejut Panas 40^0C, Pembimbing I : Dra Yulia Sistina, M.Sc.Stud, Ph.D, Pembiming 2 : Dr. Suhestri Suryaningsih, MS.

Ginogenesis merupakan bioteknologi reproduksi untuk mendapatkan keturunan dengan material genetis hanya dari betinanya saja, diperoleh dengan tiga tahap, yaitu (1) inaktivasi materi genetik jantan pada spermatozoa, (2) fertilisasi menggunakan spermatozoon yang materi genetiknya sudah inaktif, dari tahap satu, sehingga zigot yang dihasilkan akan haploid karena dari materi genetis telur saja, dan (3) diploidisasi zigot. Kelebihan individu ginogenesis diantaranya adalah sifat homozigositas terutama yang mitoginogensis, dimana di aplikasi pertanian individu homozigot dikenal memiliki sifat unggul atau disebut bibit unggul.

Tujuan penelitian adalah menguji efektivitas dosis inaktivasi spermatozoa ikan tawes (*Barbonymus gonionotus* Blkr.) dengan menggunakan sinar UV lampu TL 15 Watt panjang gelombang 254 nm pada jarak 15 cm dengan lama waktu berbeda yaitu 1 menit atau dosis 1983 J/m^2 atau 2 menit atau dosis 3966,96 J/m^2 untuk merusak matrial genetik jantan ikan tawes dengan parameter larva abnormal (haploid) sebagai uji hipotesis dan larva normal (diploid) untuk efektivitas diploidisasi dengan kejut panas temperatur 40^0C selama 60 detik pada waktu berbeda yaitu 10 atau 15 menit pasca fertilisasi, sebagai perlakuan mitoginogenesis tawes.

Penelitian dilaksanakan di Labolatorium Fisiologi Hewan, Fakultas Biologi, Universitas Jenderal Soedirman. Materi penelitian yang digunakan adalah *milt* dan telur ikan tawes (*Barbonymus gonionotus* Blkr.). Rancangan penelitian adalah RAL (Rancangan Acak Lengkap) dengan 7 perlakuan, yaitu: Kontrol positif *milt* encer tanpa iradiasi UV difertilisasi tanpa kejut panas; kontrol negatif1 *milt* encer diiradiasi dosis 1983 J/m^2 UV, difertilisasi tanpa kejut panas; kontrol negatif2 *milt* encer diiradiasi dosis 3966,96 J/m^2 UV difertlisasi tanpa kejut panas; Ginogenesis1 irradiasi dosis 1983 J/m^2 UV kemudian difertlisasi lalu zigot pada 10 menit dari fertlisasi dikejut panas 40^0C selama 60 detik; Ginogenesis2 iradiasi dosis 1983 J/m^2 UV kemudian difertlisasi, lalu zigot pada 15 menit dari fertilisasi dikejut panas 40^0C selama 60 detik; Ginogenesis3 iradiasi dosis 3966,96 J/m^2 UV kemudian difertilisasi lalu zigot pada 10 menit dari fertilisasi dikejut panas 40^0C selama 60 detik; Ginogenesis4 iradiasi dosis 3966,96 J/m^2 UV kemudian difertilisasi lalu zigot pada 15 menit dari fertilisasi dikejut panas 40^0C selama 60 detik. Tiap perlakuan diulang 3 kali. Diamati variabel berupa fertilitas, penetasan, morfologi larva tawes, dan kelangsungan hidup larva tawes umur 28 hari. Data kuatitatif dianalisis menggunakan *Analisis of Varian* (ANOVA) dan dilanjutkan uji lanjut untuk yang signifikan; data kualitatif dinalisis secara deskriptif.

Hasil penelitian menunjukkan bahwa data fertilitas, data penetasan dan data kelangsungan hidup yang terbukti homogen (p>0,05), menunjukkan bahwa ketujuh perlakuan secara statistik fertilitas, penetasan, dan kelangsungan hidupnya tidak nyata (p>0,05) antar pelakuan. Artinya rerata penetasan perlakuan kontrol positif sama dengan perlakuan kontrol negatif1 (UV1'), kontrol negatif2 (UV2'),

ginogenesis1 (UV 1’ HS 10’), ginogenesis2 (UV 1’ HS 15’), ginogenesis3 (UV 2’ HS 10’), atau dengan ginogenesis4 (UV 2’ HS 15’). Data persentase morfologi larva abnormal tawes menunjukkan bahwa perlakuan yang dicobakan memberikan pengaruh yang sangat nyata (P<0,01). Artinya perlakuan ginogenesis menentukan morfologi abnormal larva ikan tawes perlakuan.

Secara keseluruhan dapat disimpulan bahwa, keempat perlakuan mitoginogenesis yang diujikan efektif menghasilkan larva mitoginogenesis ikan tawes walaupun efektifitasnya masih tergolong rendah. Efektivitas perlakuan dibuktikan dari signifikansi data morfologi larva abnormal dariklompok kontrol negatif membuktikan efektivitas dosis inaktivasi genetis jantan dan morfologi larva normal hasil perlakuan ginogenesis membuktikan efektivitas diploidisasi kejut panas tidak berbeda dari morfologi kontrol positif.

Kata kunci: mitoginogenesis, ikan tawes (*Barbonymus gonionotus* Blkr.), iradiasi UV, kejut panas, larva abnormal

SUMMARY

RENI APRIYANI, Graduate Courses in Biology, Faculty of Biology, Jenderal Soedirman University, Gynogenetic Succes for Silver Barb (*Barbonymus gonionotus* Blkr.) by Two Doses of UV irradiation (of λ 254 nm) Followed by Heat Shock 40^0C, Supervisior : Dra. Yulia Sistina, M.Sc.Stud., Ph.D., Co-supervisior: Dr. Suhestri Suryaningsih, M.S.

Gynogenesis is a reproductive biotechnology to get offspring with genetic material from the female only. Three stages of the gynogenesis methods, namely (1) inactivation of the male genetic material from spermatozoa, (2) fertilization using genetic material inactivated spermatozoon, resulted in haploid zygote with abnormal appearace of larvae due to having female genetic material only, and (3) zygote diploidization. Mitogynogenesis individu has benefits due to its homozygosity of their genome, which farmers consider a homozigote individu as the best parental for breeding.

The aims of this study are (1) to assess the effectiveness of UV doses inactivation for spermatozoa of silver barb (*Barbonymus gonionotus* Blkr.) using UV light TL, 15 Watt, 254 nm wave length, at a 15 cm distance for different irradiation time of 60 seconds or the UV dose of 1983 J/m^2 or 120 seconds or the UV dose of 3966.96 J/m^2 in order to damage the male genetic material as then will be indicated by abnormal appearance of the larvae, (2) to assess the effectiveness of diploidization of the mitogynogenesis applied heat shock at 40^0C for 60 seconds at two different times of 10 or 15 minutes from fertilization time, in order to get normal morphological larvae from mitogynogenesis as for positive control normal diploid larvae.

Study was conducted at the Laboratory of Animal Physiology, Faculty of Biology, University of Jenderal Soedirman. The research material were fresh diluted milt and fresh eggs from silver barb (*Barbonymus gonionotus* Blkr.). The study design was Completely Randomized Design with 7 treatments, namely: Positive controls: fertilized fresh eggs with diluted milt without UV irradiation no heat shock; control negative1: fertilization fresh egg with diluted milt irradiated with dose of 1983 J/m^2 UV no heat shock; control negative2: fertilization of fresh egg with diluted milt dose of 3966.96 J/m^2 UV no heat shock; Ginogenesis1: fertilization of fresh eggs with diluted milt dose of 1983 J/m^2 UV irradiation, then zygote heat shocked at 10 minutes from fertilization time in 40^0C for 60 seconds; Ginogenesis2: fertilization fresh eggs with diluted milt dose of 1983 J/m^2 UV irradiation, then zygote heat shocked at 15 minutes from fertilization time in 40^0C for 60 seconds; Ginogenesis3: fertilization of fresh eggs with diluted milt dose of 3966,96 J/m^2 UV irradiation, then zygote heat shocked at 10 minutes from fertilization time in 40^0C for 60 seconds; Ginogenesis4: fertilization of fresh eggs with diluted milt dose of 3966,96 J/m^2 UV irradiation, then zygote heat shocked at 15 minutes from fertilization time in 40^0C for 60 seconds. Each treatment was replicated three times. Observed variables were fertility rate, hatching rate, morphology larvae, and survival rate at day 28^{th}. Quantitative data were analyzed using analysis of variants (ANOVA) and continued to HSD test for those resulted in significant data. Qualitative data was analyzed by descriptive analysis.

Results showed that fertility, hatching and fry survival rate statistically has no significant difference (p>0.05) among treatments. Those proven homogeneous data of fertility, hatching, and survival rate proven that all treatments gave similar

results, means that the average hatching rate from positive control, similar to the control treatment negatif1 (UV1'), control negatif2 (UV2'), ginogenesis1 (UV 1' HS 10'), ginogenesis2 (UV 1' HS 15'), ginogenesis3 (UV 2' HS 10'), ginogenesis4 (UV 2' HS 15'). However, average data of percentage of abnormal morphology treated larvae showed highly significant different (P<0.01) among treatments, meaning that mitogynogenesis procedure determine or resulted in normal larvae as compared to negative control group with abnormal morphology of larvae.

As conclution mitogynogenesis treatments effectively resulted in normal gynogenesis larvae, although consider very low effectiveness. The effectiveness of treatments proven from the abnormal morphology larvae data from negative control and normal morphology larvae from mitogynogenesis treatment as well as larvae from the positive control normal diploid larvae.

Keywords: mitogynogenesis, Silver barb, UV irradiation, heat shock, abnormal larvae.