

DAFTAR PUSTAKA

- Aidil, D., I. Zulfahmi., dan Muliari. 2016. Pengaruh Suhu terhadap Derajat Penetasan Telur dan Perkembangan Larva Ikan Lele Sangkuriang (*Clarias gariepinus* var. sangkuriang). Jurnal Edukasi dan Sains Biologi. 5 (1): 30-33.
- Alminana, C., and C. Cuello. 2015. What Is New in the Cryopreservation of Embryos. Animal Reproduction. 12 (3): 418-427.
- Anpe, J.A., K.V. Absalom., L.E. Igoche., P.C. Ofojekwu., and B.S. Audu. 2017. The Embryonic Development Of *Clarias gariepinus* Fertilized Eggs Subjected To Different Water Temperature Interval In An Indoor Hatchery In Jos. International Journal Of Fisheries And Aquatic Studies. 5 (3): 39-44 .
- Ardhardiansyah., U. Subhan., A. Yustiati. 2017. Embriogenesis dan Karakteristik Larva Persilangan Ikan Patin Siam (*Pangasius hypophthalmus*) Jantan dengan Ikan Baung (*Hemibagrus nemurus*) Betina. Jurnal Perikanan dan Kelautan. 8 (2): 17-27.
- Ardyanti, R., D.D. Nindarwi., L.A. Sari., dan P.D.W, Sari. 2017. Manajemen Pemberian Lele Mutiara (*Clarias sp.*) dengan Aplikasi Probiotik di Unit Pelayanan Teknis Pengembangan Teknologi Perikanan Budidaya (UPT PTPB) Kepanjen, Malang, Jawa Timur. Journal of Aquaculture and Fish Health. 7 (2): 84-89.
- Ariantie, O.S., T.L. Yusuf., D. Sajuthi., and R.I, Arifiantini. 2013. Pengaruh Krioprotektan Gliserol dan Dimethylformamida dalam Pembekuan Semen Kambing Peranakan Etawah Menggunakan Pengencer Tris Modifikasi. Jurnal Ilmu Ternak dan Veteriner. 18 (4): 239-250.
- Asraf, A., Z.A. Muchlisin., and M.N. Siti-Azizah. 2013. Removal of Eggs Adhesiveness of African Catfish (*Clarias gariepinus*) Different Concentration of Urea Solution. Aceh International Journal of Science and Technology. 2 (3): 94-97.
- Beirao, J., V. Robles., M.P. Herraez., C. Sarasquete., M.T. Dinis., and E. Cabita. 2006. Cryoprtection Microinjection Toxicity and Chilling Sensitivity in Gilthead Seabream (*Sparus aurata*) Embryos. Aquaculture. 261 (3): 897-903.
- Bozkurt, Y., and L. Yavas. 2016. Cryopreservation of Nile Tilapia (*Oreochromis niloticus*) Sperm. Cryopreservation in Eukaryotes. pp. 75-90.
- Cabrita, E., V. Robles., O. Chereguini., J.C. Wallace., and M. P. Herraez. 2003. Effect of Different Cryoprotectant And Vitrificant Solution On Hatching

- Rate of Turbot Embryos (*Scophthalmus maximus*). *Cryobiology*. 47 (3): 204-213.
- Cabrita, E., V. Robles., J. C. Wallace., M. C. Sarasquete., M. P. Herraez. 2006. Preliminary Studies on the Cryopreservation of Gilthead Seabream (*Sparus aurata*) Embryos. *Aquaculture*. 251 (2-4): 245-255.
- Cao, Y. X., Q. Xing., L. Li., L. Cong., Z. G. Zhang., Z. I. Wei., P. Zhou. 2009. Comparison of Survival and Embryonic Development in Human Oocyte Cryopreserved by Slow Freezing and Vitrification, Fertility and Sterility. *American Society for Reproductive Medicine*. 92 (4): 1306-1311.
- Costa, S.R., F.M.S. de Souza., J.A. Senhorini., R. Verissimo-Silveira., and A. Ninhaus-Silveira. 2017. Effects of Cryoprotectants and Low Temperatures on Hatching and Abnormal Embryo Development of *Prochilodus lineatus* (Characiformes: Prochilodontidae). *Neotropical Ichthyology*. 15 (3): 1-10.
- Diwan, A.D., S. Ayyappan., K.K. Lal and W.S. Lakra. 2010. Cryopreservation of Fish Gametes and Embryos. *Indian Journal of Animal Science*. 80 (4): 109-124.
- Eka. S. H., A. T. Mukti., W. H. Satyantini., and A. S. Mubarak. 2020. Preliminary Study: the Effect of Cryopreservation on the Gastrula-staged Embryo of Africa Cathfish (*Clarias gariepinus*). *Earth and Environmental Science*. 441 (1): 1-6.
- El-Shahat, K.H., and A.M. Hammam. 2014. Effect of Different Types of Cryoprotectants on Developmental Capacity of Vitrified-thawed Immature Buffalo Oocytes. *Animal Reproduction*. 11 (4): .543-548.
- Fonseca, J.F., R.I.T.P. Batista., J.M.G. Souza-Fabjan., M.E.F. Oliveira., F.Z. Brandao., and J.H.M. Viana. 2018. Freezing Goat Embryos at Different Development Stage and Quality Using Ethylene Glycol and A Slow Cooling Rate. *Arquivo Brasileiro de Medicina Veterinaria Zootecnia*. 70 (5): 1489-1496.
- Fornari., D.C., R.P. Ribeiro., D.P. Streit Jr., L. Vargas., N.M.L. Barrero., and G.V. De Moraes. 2010. Freezing Injuries in the Embryos of *Piaractus mesopotamicus*. *Zygote*. 19 (4) : 345-350.
- Gurruchaga, H., L. Saenz del Burgo., R.M. Hernandez., G. Orive., C. Selden., B. Fuller., J. Ciriza., J.L. Pedraz. 2018. Advances in the Slow Freezing Cryopreservation of Microencapsulated Cells. *Journal of Controlled Release*. pp.119-138.
- Hauptmann, A., K. Podgoršek., D. Kuzman., S. Srcic., G. Hoelzl., and T. Loerting. 2018. Impact of Buffer, Protein Concentration and Sucrose

- Addition on the Aggregation and Particle Formation during Freezing and Thawing. *Pharmaceutical Research.* 35(5): 101.
- Hong, N.T., N.T. Nhung., N.T. Uoc., N.T. Thanh., N.T. Hiep., N.V. Linh., N.V. Hanh., P.V. Khanh., H.T.N. Nga., T.V. Thuong., and B.X. Nguyen. 2013. Effect of Combinations of Sucrose and Cryoprotectants on the Survival of Catfish Embryos (*Pangasidae hypophthalmus*). *Journal of Agricultural Science and Technology.* (3): 887-892.
- Ikpeme, E.V., O.U. Udensi., M.C. Okolo., F.U. Ogban., N.G. Ufford., E.U. Odo., and B.O. Asuquo. 2016. Genetic Relatedness of *Clarias gariepinus* (L.) from Cultured and Wild Populations Using Multivariate Analyses. *Asian Journal Animal Science.*, 10 (2): 131-138.
- Irawan, H., V. Vuthiphandchai., and S, Nimrat. 2010. The Effect of Extenders, Cryoprotectants and Cryopreservation Methods on Common Carp (*Cyprinus carpio*) Sperm. *Animal Reproduction Science.* 122 (3-4): 236-243.
- Iswanto, B., R. Suprapto., H. Marnis., dan Imron. 2016. Performa Reporduksi Ikan Lele Mutiara (*Clarias gariepinus*). *Media Akuakultur.* 11 (1) : 1-9.
- Jang, T.H., S.C. Park., J.H. Yang., J.Y. Kim., J.H. Seok., U.S. Park., C.W. Choi., and S.R. Lee. 2017. Cryopreservation and its Clinical Applications. *Integrative Medicine Research.* 6 (1): 12-18.
- Kasai, M. 2002. Advances in the Cryopreservation of Mammalian Oocytes and Embryos: Development of Ultrarapid Vitrification. *Reproduction Medicine and Biology.* 1 (1): 1-9.
- Keivanloo, S., M. Sudagar., and M. Mazadarani. 2019. Evaluating the Suitability of Cryopreservation Solution for Common Carp (*Cyprinus carpio*) Embryos Stored at -2°C. *Iranian Journal of Fisheris Sciences.* 18 (4): 1036-1045.
- Kostaman, T., dan A.R, Setioko. 2011. Perkembangan Penelitian Teknik Kriopreservasi untuk Penyimpanan Semen Unggas. *Wartozoa.* 21 (3): 145-152.
- Kresna, A., W. Widjiyati., and T. Damayanti. 2019. Cryoprotectant Combination Ethylene Glycol and Propanediol on Mice Blatocyst Viability Post Vitrification. *Journal of Physics.* 1146 (1): 1-6.
- Kurbanov. A., and B. Kamilov. 2017. Maturation of African catfish, *Clarias gariepinus*, in Condition of Seasonal Climate of Uzbekistan. *International Journal of Fisheries and Aquatic Studies.* 5 (2): 236-239.
- Lopes, D.S.T., E.A. Sanhes., R.Y. Okawara., and R. Elizabeth. 2019. Chilling Sensitivity of *Steindachneridion parahybae* (Siluriformes: Pimelodidae)

- Oocytess in Different Cryoprotectans. Veterinary and Animal Science. 7 (4): 1-5.
- Mbalassa, M., M. Nshombo., M.E. Kateyo., L. Chapman., J. Efitre., and G, Bwanika. 2015. Identification of Migratory And Spawning Habitats of *Clarias gariepinus* (Burchell, 1822) in Lake Edward - Ishasha River watershed, Albertine Rift Valley, East Africa. International Journal of Fisheries and Aquatic Studies 2 (3): 128-138.
- Megbowon, I., H.A. Fashina-Bombata., M.M-A. Akinwale., A.M. Hammed., O.A. Okunade., and T.O. Mojekwu. 2013. Breeding Performance of *Clarias gariepinus* Obtained From Nigerian Waters. IOSR Journal of Agriculture and Veterinary Science. 6 (3): 6-9.
- Monte A.P.O., J.B.L. Filho., T.T.D.S. Souza., M.D.S. Miranda., L.C. Magalhaes., C.H.S.C. Barros., A.A.D.A. Silva., A.O. Santos., A.D.S.L. Guimarales., J.M.S. Costa., P.H.F.S. Sousa., D.M. Nogueira., M.F. Cordeiro., E.S.L. Junior. 2015. Addition of Sucrose on Cryoprotectant Solution of Vitrification Enhances the Quality of Dorper Sheep Embryos Produced in vivo. Semina: Ciencias Agrarias. 36 (2): 4257-4268.
- Moussa, M., S. Juan., Z. XueHong., and Z. Fanyi. 2014. Cryopreservation of Mammalian Oocytes and Embryos: Current Problems and Future Perspectives. Science Chine. 57 (9): 903-914.
- Olaniyi, W.A., and O.G, Omitogun. 2013. Stages in the Early and Larval Development of the African Catfish *Clarias gariepinus* (Teleostei, Clariidae). Zygote. 22 (3): 1-7.
- Ozturk, E. I., Bucak, N. M., Bodu, M., Baspinar, N., Celik, I., Shu, Z., Keskin, N., and Gao, D. 2019. Cryobiology and Cryopreservation of Sperm. IntechOpen. pp. 1-42.
- Patocka, J., and Z, Hon. 2010. Ethylene Glycol, Hazardous Substance in the Household. Acta Medica. 53 (1): 19-23.
- Pedro, B. P., E. Yokoyama., S. E. Zhu., N. Yoshida., D. M. Valdez Jr., M. Tanaka., K. Edashige., and M. Kasai. 2005. Permeability of Mouse Oocyte and Embryos at Various Development Stages to Five Cryoprotectants. Journal of Reproduction and Development. 51 (2). 235-246.
- Przystałowska1. H., D. Lipiński., and R, Słomski1. 2015. Biotechnological Conversion of Glycerol from Biofuels to 1,3-Propanediol Using *Escherichia coli*. Acta Biochimica Polonica. 62 (1): 23-34.
- Rawson, M. Lin, C., and T. Zhang. 2009. Cryopreservation of Zebrafish (*Danio rerio*) Blastomeres by Controlled Slow Cooling. CryoLetters. 30 (2): 132-141.

- Rimayanti. 2005. Pengaruh Proses Vitrifikasi dengan Krioprotektan Etilen Glikol Terhadap Daya Hidup Oosit Sapi. Media Kedokteran Hewan. 21 (1): 28-31.
- Rodriguez-Barreras, R., and C, Zapata-Arroyo., 2019. the First Record of the African catfish *Clarias gariepinus* (Burchell, 1822) in Puerto Rico. International Journal of Aquatic Science. 10 (2): 98-100.
- Setiawan, A. 2005. Viabilitas Spermatozoa Mencit (*Mus musculus L.*) Jantan Setelah Pemberian Ekstrak Kuda Laut (*Hippocampus kuda Bleeker*). Jurnal Penelitian Sains. 375 (17): 25-34.
- Setyono, B. 2009. Pengaruh Perbedaan Konsentrasi Bahan Pada Pengencer Sperma Ikan “Skim Kuning Telur” Terhadap Laju Fertilisasi, Laju Penetasan Dan Sintasan Ikan Mas (*Cyprinus Carpio L.*). Gamma. 5 (1): 1-12.
- Shaluei, F., M.R. Imanpoor., A. Shabani., M.H. Nasr-Esfahani. 2013. Effect of Different Concentrations of Permeable and Non-permeable Cryoprotectants on the Hatching Rate of Goldfish (*Carassius auratus*) Embryos. Asian Pacific Journal of Reproduction. 2 (3): 185-188.
- Sharifuddin, M. M., and M.N.S. Azizah. 2014. Preliminary Studies on Cryopreservation of Snakehead (*Channa striata*) Embryos. Cryobiology. 69 (1): 1-9.
- Sitio, M.H.F., D. Jubaedah., dan M. Syaifudin. 2017. Kelangsungan Hidup dan Pertumbuhan Benih Ikan Lele (*Clarias sp.*) pada Salinitas Media yang Berbeda, Jurnal Akuakultur Rawa Indonesia. 5 (1) : 83-96.
- Stachecki, J. J., and J. Cohen. 2004. An Overview of Oocyte Cryopreservation. Reproductive BioMedicine. 9 (2): 152-163.
- Sudagar, M., S. Keivanloo., and A. Hajibeglu. 2017. Effect of Different Permeable and Non-permeable Cryoprotectants on the Hatching Rate of Rainbow Trout (*Oncorhynchus mykiss*) Embryos. Aquaculture. 26 (1):1-10.
- Surnama A., O. Carman., M. Zairin., and A, Alimuddin. 2016. Interpopulation crossbreeding of farmed and wild African catfish *Clarias gariepinus* (Burchell 1822) in Indonesia at the nursing stage. Aquat. Living Resour. 29 (303) : 1-8.
- Sutarjo, G.A. 2014. Pengaruh Konsntrasi Sukrosa dengan Krioprotektan Dimethyle Sulfoxide Terhadap Kualitas Telur Ikan Mas (*Cyprinus carpio linn.*) pada Proses Kriopreservasi. Jurnal Gamma. 9 (2): 20-30.

- Tesfahun, A. 2018. Feeding biology of the African Catfish *Clarias gariepinus* (Burchell) in some of Ethiopian Lakes: A review. International Journal of Fauna and Biological Studies. 5 (1): 19-23.
- Uysal. O., T. Sevimli., S. Gunes., A, E. Sariboyaci. 2018. Cell and Tissue Culture: the Base of Biotechnology. Omics Technologies and Bio-Engineering. pp 391-429.
- Valdez Jr. D. M., A. Miyamoto., T. Hara., K. Edashige., and M. Kasai. 2005. Sensitivity to Chilling of Medaka (*Oryzias latipes*) Embryos at Various Developmental Stages. 2005. Theriogenology. 64 (1): 112-122.
- Velebil, J., J. Malat'ák., and J. Bradna. 2016. Mass Yield of Biochar from Hydrothermal Carbonization of sucrose. Czech Academy of Agricultural Science. 62 (4): 179-184.
- Wahjuningsih, S., dan S. Djati. 2013. Ultrastruktur Oosit Kambing Pasca Kriopreservasi dengan Metode Vitrifikasi. Jurnal kedokteran Hewan. 7(2) : 101-104.
- Widjiati., A.G. Ratri., dan M.Z, Arifin. 2011. Pengaruh Berbagai Konsentrasi Krioprotektan Propanediol pada Proses Vitrifikasi Terhadap Viabilitas Embrio Mencit Pasca Thawing. Veterinaria Medika. 4 (2): 101-104.
- Wijayanti, E. G., dan S. B. I. Simanjutak. 2006. Viabilitas Sperma Ikan Nilem (*Osteochilus hasselti* C.V) Setelah penyimpanan Jangka Pendek dalam Larutan Ringer. Jurnal Perikanan. 7(2): 207-214.
- Xiao, Z. Z., L. L. Zhang., X. Z., Xu., Q. H. Liu., J. Li., D. Y. Ma., S. H. Xu., Y. P. Xue., and Q. Z. Xue. 2008. Effect of Cryoprotectants on Hatching Rate of Red Seabream (*Pagrus major*) Embryos. Thriogenology. 70 (7): 1086-1092.
- Yusoff, M., B. N. Hassan., M Ikhwanuddin., S. Md. Sheriff., F. Hashim., S. Mustafa., and I. C. Chu Koh. 2018. Succesful Sperm Cryopreservation of the Brown-marbled Grouper, *Epinephelus fuscoguttatus* Using Propylene Glycol as Cryoprotectant. Cryobiology 81 (1): 1-6.
- Yusuf, K., S.A. Dada., and M.A. Abari. 2013. Length – Weight Relationship, Fecundity and Gonadal Development of The African Catfish (*Clarias gariepinus*) From Doma Dam, Nasarawa State, Nigeria. Production Agriculture and Technology Journal. 9 (1): 47-58.
- Zhang, Y. Z., S. C. Zhang., X. Z. Liu., Y. J. Xu., J. H. Hu., Y. Y. Xu., J. Li., and S. L. Chen. 2005. Toxicity and Protective Efficiency of Cryoprotectants to Flounder (*Paralichthys olivaceus*) Embryos. Thriogenology. 63 (3): 763-773.