

DAFTAR PUSTAKA

- Abbas, A. K., A. H. Lichtman, and S. Pillai. 2007. Cellular and Molecular Immunology. 6th edition. Philadelphia, USA. Saunders Elsevier. Pp 329-345.
- Abdelkhalek, N.K., H.Z. Viola, and M.A.A. Yousef. 2008. Effect of Some Immunostimulants on Health Status and Disease Resistance of Nile Tilapia (*Oreochromis niloticus*). In: H. Elghobashy, K. Fitzsimmons and A.S. Diab (Eds.). Proceedings of The Eighth International Symposium on Tilapia in Aquaculture (ISTA 8). Cairo, Egypt, p. 10-88.
- Afrianto, I.E. dan I.E. Liviawaty. 1992. Pengendalian Hama dan Penyakit Ikan. Kanisius.
- Afrianto, I.E., M. Si, I.Z. Jamaris, dan S.P. Hendi. 2015. Penyakit Ikan. Penebar Swadaya Grup.
- Alamanda, I. E., N.S. Handajani, dan A. Budiharjo. 2007. Penggunaan Metode Hematologi dan Pengamatan Endoparasit Darah untuk Penetapan Kesehatan Lele Dumbo (*Clarias gariepinus*) di Kolam Budidaya Desa Mangkubumen Boyolali. Hemoglobin. 20:150.
- Ali, K.S., T. Annalakshmi, and B.X. Innocent. 2012. Immunostimulant Effect of Vitamin A in *Channa punctatus* Challenged with *Aeromonas hydrophila*: Haematological Evaluation.. Journal of Applied Pharmaceutical Science. 2: 11-12.
- Alifuddin, M. 2007. Immunostimulan on Aquatic Organisms. Jurnal Akuakultur Indonesia. 1(2): 87-92.
- Aly, S.M. 2013. A Review of Fish Disease in the Egyptian Aquaculture Sektor: Working Report.
- Amalia, R., Subandiyono, dan E. Arini. 2013. Pengaruh Penggunaan Papai terhadap Tingkat Pemanfaatan Protein Pakan dan Pertumbuhan Lele Dumbo (*Clarias gariepinus*). Journal of Aquaculture Management and Technology. 2: 136-143.
- Anggraini, R., D. Aliza, dan S. Mellisa. 2016. Identifikasi Bakteri *Aeromonas hydrophila* dengan Uji Mikrobiologi pada Lele Dumbo (*Clarias gariepinus*) yang Dibudidayakan di Kecamatan Baitussalam Kabupaten Aceh Besar. Jurnal Ilmiah Mahasiswa Kelautan Perikanan. Unsyiah. 1(2).
- Ashton, N. 2007, Physiology of Red and White Blood Cells. Anaesthesia and Intensive Care Medicine. 8: 203-208.
- Awad, E. and A. Awaad. 2017. Role of Medicinal Plants on Growth Performance and Immune Status in Fish. Fish & shellfish immunology. 67: 40-54.
- Azhar, F. 2013. Pengaruh Pemberian Probiotik dan Prebiotik terhadap Performan Juvenile Ikan Kerapu Bebek (*Comileptes altivelis*). Buletin Veteriner Udayana.
- Bagni, M., L. Archetti, M. Amadori, and G. Marino. 2000. Effect of Long-Term Oral Administration of An Immunostimulant Diet on Innate Immunity in Sea Bass (*Dicentrarchus labrax*). Zoonoses and Public Health. 47(10): 745-751.
- Ball, G.F.M. 1988. Fat-Soluble Vitamin Assays in Food Analysis. Elsevier Applied Science. University of California.
- Barman, D., P. Nen, S.C. Mandal, and V. Kumar. 2013. Immunostimulants for Aquaculture Health Management. J. Marine Sci. Res. Dev. 3(3).
- Bell K.L., V.J. Smith. 1993. In-Vitro Superoxide Production by Hyaline Cells of The Shore Crab (*Carcinus maenas* L.). Dev Comp Immunol. 17: 211.
- Benjamini, E., R. Coico, G. Sunshine. 2000. Immunology: A Short Course, Edisi Keempat, 20 - 21, Willey- Liss, Inc., Canada.
- Bi F., S.J. Mahmood, M. Arman, N. Taj, and S. Iqbal. 2007. Physicochemical Characterization and Ionic Studies of Sodium Alginate from *Sargassum terrarium* (Brown Algae). Physics and Chemistry of Liquids. 45(4): 453-461.

- Boyd, C.E. 1982. Water Quality Management for Pond Fish Culture. Elsevier Scientific Publishing Company. Amsterdam-Oxford. New York, p. 585.
- Brotowidjono, M.D. 1994. Zoologi Dasar. Jakarta: Erlangga.
- Cannon M.S., H.H. Mollenhauer, T.E. Eurell, and D.H. Lewis. 1980. Ultrastructural Localization of Peroxidase Activity in Neutrophil Leukocytes of *Ictalurus punctatus*. Canadian Journal of Zoology. 58(6): 39-43.
- Chang C.F., M.S. Su, H.Y. Chen, C.F. Lo, G.H. Kou, and I.C. Liao. 1999. Effect of Dietary β -1, 3-Glucan on Resistance to White Spot Syndrome Virus (WSSV) in Postlarval and Juvenile *Penaeus monodon*. Dis Aquat Organ. 36: 163.
- Chen Y. Y., J.C. Chen, Y.C. Lin, D.F. Putra, S. Kitikiew, C.C. Li, and S.T. Yeh. 2014. Shrimp That Have Received Carrageenan via Immersion and Diet Exhibit Immunocompetence in Phagocytosis Despite A Post-Plateau in Immune Parameters. Fish & Shellfish Immunology. 36(2): 352-366.
- Cheng A.C., C.W. Tu, Y.Y. Chen, F.H. Nan, and J.C. Chen. 2007. The Immunostimulatory Effects of Sodium Alginate and Iota-Carrageenan on Orange-Spotted Grouper (*Epinephelus coioides*) and Its Resistance Against *Vibrio alginolyticus*. Fish & Shellfish Immunology. 22(3): 197-205.
- Cheng W., C.H. Liu, C.M. Kuo, J.C. Chen. 2005. Dietary Administration of Sodium Alginate Enhances The Immune Ability of White Shrimp (*Litopenaeus vannamei*) and Its Resistance Against *Vibrio alginolyticus*. Fish & Shellfish Immunology. 18(1): 1-12.
- Chinabut, S., C. Limsuwan, P. Kitsawat. 1991. Histology of The Walking Catfish (*Clarias batrachus*). Departement of Fisheries Thailand. Thailand, p. 96.
- Chiu S.T., R.T. Tsai, J.P. Hsu, C.H. Liu, and W. Cheng. 2008. Dietary Sodium Alginate Administration to Enhance The Non-Specific Immune Responses, and Disease Resistance of The Juvenile Grouper (*Epinephelus fuscoguttatus*). Aquaculture. 277(1): 66-72.
- Cipriano, R.P., G.L. Bullock, S.W. Pyle. 1984. *Aeromonas hydrophila* and Motile *Aeromonad septicemias* of Fish: Fish Disease Leaflet 68, Fish and Wildlife Service. West Virginia, US, p. 20-23.
- Coston-Clements, L., L.R. Settle, D.E. Hoss, and F.A. Cross. 1991. Utilization of The Sargassum Habitat by Marine Invertebrates and Vertebrates. A Review: Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Southeast Fisheries Science Center, Beaufort Laboratory, US. 296.
- Dellman, H.D. dan E.M. Brown. 1989. Buku Teks Histologi Veteriner (alih bahasa: Hartono). UI Press, Jakarta.
- Dotta, G., J.I.A. de Andrade, E.L.T. Gonçalves, A. Brum, J.J. Mattos, M. Maraschin, and M.L. Martins. 2014. Leukocyte Phagocytosis and Lysozyme Activity in Nile Tilapia Fed Supplemented Diet with Natural Extracts of Propolis and *Aloe barbadensis*. Fish & Shellfish Immunology. 39(2): 280-284.
- Ellis, A.E. 1988. Fish Vaccination. Academic Press. San Diego. P : 255.
- Ellis, A.E. 1993. Lysozyme Assays in Stolen et al. (Eds.). Techniques in Fish Immunology 1. Sos Publications, Fair Haven, NJ 07760. USA. p. 101—103.
- Ellis, A.E. 2001. Innate Host Defense Mechanisms of Fish Against Viruses and Bacteria. Developmental & Comparative Immunology. 25(8-9): 827-839.
- Felix, S., P. Robins, and A. Rajeev. 2004. Immune Enhancement Assessment of Dietary Incorporate Marine Alga (*Sargassum wightii*) (Phaeophyceae/Punctariales) in Tiger Shrimp (*Penaeus monodon*) (Crustacea/Penaeidae) through Prophenoloxidase (proPO) Systems.

- Fenoradosoa, T.A., G. Ali, C. Delattre, C. Laroche, E. Petit, A. Wadouachi, and P. Michaud. 2010. Extraction and Characterization of an Alginate from the Brown Seaweed (*Sargassum Turbinarioides* Grunow). *Journal of Applied Phycology*. 22(2): 131–137.
- Fernández-Díaz, C., O. Coste, and E.J. Malta. 2017. Polymer Chitosan Nanoparticles Functionalized with *Ulva ohnoi* Extracts Boost In Vitro Ulvan Immunostimulant Effect in *Solea senegalensis* Macrophages. *Algal Research*. 26: 135-142.
- Fertah, M. 2017. Chapter 2- Isolation and Characterization of Alginate from Seaweed. A₂-Venkatesan. Jayachandran. In: S. Anil and S.K. Kim (Eds.). *Seaweed Polysaccharides*. Elsevier, pp: 11–26.
- Friskawan, I. 2001. Daya Kerja Anti Bakterial Lipopolisakarida (LPS) asal Dinding Sel Bakteri *Vibrio harvey* terhadap Bakteri Lingkungan. Doctoral dissertation. Institut Pertanian Bogor.
- Fujaya, Y. 2004. Fisiologi Ikan: Dasar Pengembangan Teknologi Perikanan. Penerbit Rineka Cipta, Jakarta.
- Fujiki, K., H. Matsuyama and T. Yano. 1994. Protective Effect of Sodium Alginates Against Bacterial Infection in Common Carp (*Cyprinus carpio* L). *Journal of Fish Diseases*. 17(4): 349-355.
- Fujiki, K. and T. Yano. 1997. Effects of Sodium Alginate on The Non-Specific Defence System of The Common Carp (*Cyprinus carpio* L.). *Fish & Shellfish Immunology*. 7(6): 417-427.
- Ghiasi, F., S.S. Mirzargar, H. Badakhshan, and S. Shamsi. 2010. Effects Of Low Concentration of Cadmium on The Level of Lysozyme in Serum, Leukocyte Count and Phagocytic Index in *Cyprinus carpio* Under The Wintering Conditions. *J. Fish. Aquat. Sci.* 5: 113–119.
- Gopalakannan, A., and V. Arul. 2006. Immunomodulatory Effects of Dietary Intake of Chitin, Chitosan and Levamisole on The Immune System of *Cyprinus carpio* and Control of *Aeromonas hydrophila* Infection in Ponds. *Aquaculture*. 255(1-4): 179-187.
- Handayani, L., dan A. Isnansetyo. 2016. Peningkatan Pertahanan Nonspesifik Seluler Lele Dumbo (*Clarias sp.*) dengan Pemberian Na-Alginat dari *Sargassum sp.* dan Multivitamin. Skripsi. Universitas Gadjah Mada.
- Harikrishnan, R., C. Balasundaram, and M.S. Heo. 2011. Impact of Plant Products on Innate and Adaptive Immune System of Cultured Finfish and Shellfish. *Aquaculture*. 317(1-4): 1-15.
- Herberman, R.B., and J.R. Ortaldo. 1981. Natural Killer Cells: Their Role in Defenses Against Disease. *Science*. 214(4516): 24-30.
- Hilman R.S. and K.A. Ault. 2002. Hematology in Clinical Practce. A Guide to Diagnosis and Management. 4th ed. New York: McGraw-Hill; p.51-61.
- Hirsch J.G., and Z.A. Cohn. 1964. Digestive and Autolytic Functions of Lysosomes in Phagocytic Cells. *Federal Proceedings*. 23:1023-5.
- Huang, X., H. Zhou, and H. Zhang. 2006. The Effect of *Sargassum fusiforme* Polysaccharide Extracts on Vibriosis Resistance and Immune Activity of The Shrimp (*Fenneropenaeus chinensis*). *Fish & Shellfish Immunology*. 20 (5): 750-757.
- Husni, A., Subaryono, Y. Pranoto, Tazwir, Ustadi. 2012. Pengembangan Metode Ekstraksi Alginat dari Rumput Laut *Sargassum sp.* Sebagai Bahan Pengental. *Agriculture Technology*. 32: 1-8.
- Ilyas, S., E. Setiadi, F. Cholik, R. Arifudin, Krismono, dan Wahyu. 1992. Pedoman Teknis Pembenihan Lele Dumbo (*Clarias gariepinus*): Seri Pengembangan Hasil Penelitian Perikanan. Badan Penelitian Dan Pengembangan Pertanian.

- Jadhav, V.S., S.I. Khan, M.M. Girkar, and M.J. Gitte. 2006. The Role of Immunostimulants in Fish and Shrimp Aquaculture. *Aquaculture Asia*. 11(3): 24.
- Jasaputra, D. K. 2003. Gangguan Sistem Imun pada Anak Autistik. *Maranatha Journal of Medicine and Health*, 2(2).
- Johnny, F., dan D. Roza. 2002. Pengaruh Penyuntikan Immunostimulan Peptidoglikan terhadap Peningkatan Tanggap Kebal Non-Spesifik Ikan Kerapu Macan (*Epinephelus fuscoguttatus*). Laporan Penelitian Balai Besar Riset Perikanan Budidaya Laut. Gondol.
- Johnny, F., Zafran, D. Roza, dan I.N.A. Giri. 2002. Pengaruh Vitamin C dalam Pakan terhadap Perubahan Hemositologi Ikan Kerapu Bebek (*Cromileptes altivelis*). *Jurnal Aquaculture Indonesia*. 3(1): 27-34.
- Kawashima, T., M. Katsura, N. Ikuko, N. Takahisa, O. Akio. 2012. A Sulfated Polysaccharide (Fucoidan) Enhances The Immunomodulatory Effects of Lactic Acid Bacteria. *Int. J. Mol. Med*. 29: 447-453.
- Kloareg, B. and R.S. Quatrano. 1988. Structure of The Cell Walls of Marine Algae and Ecophysiological Functions of The Matrix Polysaccharides. *Oceanography and Marine Biology Annual Review*. 26: 259-315.
- Klontz, G.W. 1994. *Fish Hematology*. p. 121-131.
- Kottelat, M., A.J. Whitten, S.N. Kartikasari, and S. Wirjoatmojo. 1993. *Freshwater of Western Indonesia and Sulawesi*. London: Periplus Edition.
- Kudus, K., I. Grasian, S. Madasamy, and A. John. 2017. Immunomodulatory Effect of Alginic Acid from Brown Seaweed *Sargassum wightii* on Disease Resistance in *Panaeus monodon*.
- Kumar, P., Y. Prasad, A.K. Patra, R. Ranjan, D. Swarup, R.C. Patra, and P. Satya. 2009. Ascorbic Acid (Garlic Extract) and Taurine Alleviate Cadmium-Induced Oxidative Stress in The Freshwater Catfish (*Clarias batrachus*). *Sci. Total Environ*. 407: 5024-5030.
- Kusmardi, S.K., dan D. Wulandari. 2006. Pengaruh Pemberian Ekstrak Etanol Daun Johar (*Cassia Siamea* Lamk.) terhadap Peningkatan Aktivitas dan Kapasitas Fagositosis Sel Makrofag. *Makara Seri Kesehatan UI*. 10(2): 89-93.
- Laily, N. 2006. Identifikasi Jenis-Jenis Ikan Teleostei yang Tertangkap Nelayan di Wilayah Perairan Pesisir Kota Semarang. Doctoral Dissertation. Universitas Negeri Semarang.
- Latifi, A.M., E. Sadegh Nejad, and H. Babavalian. 2015. Comparison of Extraction Different Methods of Sodium Alginate from Brown Alga (*Sargassum sp.*) Localized in The Southern of Iran. *Journal of Applied Biotechnology Reports*. 2(2).
- Lee, K.Y., and D.J. Mooney. 2012. Alginate: Properties and Biomedical Applications. *Progress in Polymer Science*. 37(1): 106-126.
- Lee, P.P., Y.H. Lin, M.C. Chen, and W. Cheng. 2017. Dietary Administration of Sodium Alginate Ameliorated Stress and Promoted Immune Resistance of Grouper (*Epinephelus coioides*) Under Cold Stress. *Fish & Shellfish Immunology*. 65: 127-135.
- Lestari, A. 2011. Prevalensi Ektoparasit Protozoa *Trichodina sp.* pada Lele Dumbo (*Clarias gariepinus*) di Desa Ngabetan Kecamatan Cerme Kabupaten Gresik. Doctoral Dissertation. Universitas Airlangga.
- Lovell, T. 1934. *Nutrition and Feeding of Fish*. van Nostrand Reinhold. New York.
- Magnadottir, B. 2010. Immunological Control of Fish Diseases. *Journal of Marine Biotechnology*. 12: 361-379.
- Mastan, S.A. 2015. Use of Immunostimulants in Aquaculture Disease Management. *Int. J. Fish Aquat. Stud*. 2: 277-280.

- Mohammed, A., R. Bissoon, E. Bajnath, K. Mohammed, T. Lee, M. Bissram, and K. Ward. 2018. Multistage Extraction and Purification of Waste *Sargassum natans* to Produce Sodium Alginate: An Optimization Approach. *Carbohydrate Polymers*. 198: 109-118.
- Morgan, J.D. and G.K. Iwana. 1997. Measurement of Stressed State in The Fied. *In: Iwama, G.K., A.D. Pickering, J.P. Sumpter, and C.B. Schreck (Eds.). Fish Stress and Health in Aquaculture*. Cambridge, p. 247-278.
- Moyle, P.B., and J.J. Cech Jr. 1988. *Fishes; An Introduction to Ichthyology*. Prentice Hall, Inc. USA. p. 559.
- Munasir, Z. 2001. Respon Imun terhadap Infeksi Bakteri. *Sari Pediatri*. 2(4): 193-197.
- Natarajan, S.B., Y.S. Kim, J.W. Hwang, and P.J. Park. 2016. Immunomodulatory Properties of Shellfish Derivatives Associated with Human Health. *RSC Advances*. 6 (31): 26163-26177.
- Nitimulyo, K.H. dan Triyanto. 1990. Vaksinasi Monovalen dan Polivalen Vaksin untuk Mengatasi Serangan *Aeromonas hydrophila* pada Lele (*Clarias sp.*). *Jurnal Ilmu Pertanian (Agricultural Science)*, 4: 447-464.
- Otterlei, M., K. Østgård, G. Skjåk-Bræk, O. Smidsrød, P. Soon-Shion, T. Espevik. 1991. Induction of Cytokine Production from Human Monocytes Stimulated with Alginate. *J. Immunother*. 10: 286-291.
- Pan, S., L. Jiang, and S. Wu. 2018. Stimulating Effects of Polysaccharide from *Angelica sinensis* on The Nonspecific Immunity of White Shrimps (*Litopenaeus vannamei*). *Fish & Shellfish Immunology*. 74: 170-174.
- Pansing, J., G. Gerung, C. Sondak, B. Wagey, M. Ompi, dan K. Kondoy. 2017. Morfologi *Sargassum sp.* di Kepulauan Raja Ampat Papua Barat. *Jurnal Pesisir dan Laut Tropis*. 1(1): 13-17.
- Papageorgiou, S.K., E.P. Kouvelos, E.P. Favvas, A.A. Sapolidis, G.E. Romanos, and F.K. Katsaros. 2010. Metal–Carboxylate Interactions in Metal–Alginate Complexes Studied with FTIR Spectroscopy. *Carbohydrate Research*. 345(4): 469–473.
- Parelberg, A., A. Ronen, M. Hutoran, Y. Smith, and M. Kotler. 2005. Protection of Cultured *Cyprinus carpio* Disease by an Attenuated Virus Vaccine. *J. Vaccine*. 23: 3396-3403.
- Pawar, S.N., and K.J. Edgar. 2012. Alginate Derivatization; A Review of Chemistry Properties and Applications. *Biomaterials*. 33(11): 3279-3305.
- Peddie, S., J. Zou, and C.J. Secombes. 2002. Immunostimulation in The Rainbow Trout (*Oncorhynchus mykiss*) Following Intraperitoneal Administration of Ergosan. *Vet. Immunol. Immunopathol*. 86: 101–113.
- Puspasari, N. 2010. Efektivitas Ekstrak Rumput Laut (*Gracilaria verrucosa*) sebagai Immunostimulan untuk Pencegahan Infeksi Bakteri *Aeromonas hydrophila* pada Lele Dumbo (*Clarias sp.*).
- Rahman, A.N.A., A.A. Khalil, H.M. Abdallah, and M. El-Hady. 2018. The Effects of The Dietary Supplementation of *Echinacea purpurea* Extract and/or Vitamin C on The Intestinal Histomorphology, Phagocytic Activity, and Gene Expression of The Nile Tilapia. *Fish & Shellfish Immunology*. 82: 312-318.
- Rahmawati, S., dan A. Isnansetyo. 2016. Peningkatan Pertahanan Nonspesifik Humoral Lele Dumbo (*Clarias sp.*) dengan Pemberian Na-Alginat dari *Sargassum sp.* dan Multivitamin. Skripsi. Universitas Gadjah Mada.
- Regan, C.T. 1911. The Classification of The Teleostean Fishes of The Order Ostariophysi, Siluroidea. *Journal of Natural History*. 8(47): 553-557.

- Resita, D., W. Merdekawati, A.B. Susanto, dan L. Limantara. 2010. Kandungan dan Komposisi Pigmen *Sargassum sp.* pada Perairan Teluk Awur Jepara dengan Perlakuan Segar dan Kering. *Journal of Fisheries Sciences*. 12(1): 11-19.
- Reverter, M., N. Bontemps, D. Lecchini, B. Banaigs, and P. Sasal. 2014. Use of Plant Extracts in Fish Aquaculture as An Alternative to Chemotherapy; Current Status and Future Perspectives. *Aquaculture*. 433: 50-61.
- Rhein-Knudsen, N., M.T. Ale, F. Ajallouelian, and A.S. Meyer. 2017. Characterization of Alginates from Ghanaian Brown Seaweeds (*Sargassum spp.*) and *Padina spp.* *Food Hydrocolloids*; 71(Supplement C). 236–244.
- Riauwyat, M., dan H. Syawal. 2017. Gambaran Darah Ikan Nila (*Oreochromis niloticus*) di Kolam Budidaya di Kecamatan Marpoyan Damai Kota Pekanbaru. *Jurnal Perikanan dan Kelautan*. 21 (1): 1-6.
- Ringø, E., R.E. Olsen, J.L.G. Vecino, S. Wadsworth, and S.K. Song. 2012. Use of Immunostimulants and Nucleotides in Aquaculture: A Review. *J Mar Sci Res Dev*. 1: 104.
- Robinet, H.R. 1976. Effect of Sublethal Level of Ammonia on The Growth of Channel Catfish (*Ictalurus punctatus R.*). *Frog. Fish Culture*. 38 (1): 26-29.
- Rode, A. 2004. Isolation and Characterization of Bacterial Extracellular Polymeric Substances from Biofilms. Faculty of Science. University of Duisburg-Essen. Dissertation.
- Roitt, I., J. Brostoff, and D. Male. 1985. Cells Involved in The Immune Response. *Immunology*, 1-18.
- Rombout, J.H.W.M., H.B.T. Huttenhuis, S. Picchietti, and G. Scapigliati. 2005. Phylogeny and Ontogeny of Fish Leucocytes. *Fish Shellfish Immunol*. 19: 441–455.
- Romimohtarto, K., dan S. Juwana. 2001. *Biologi Laut*. Jakarta: Djambatan.
- Rosenberg, H.R. 1945. *Chemistry and Physiology of The Vitamins*. Interscience Publishers, Inc. New York.
- Roza, D., dan F. Johnny. 2008. Aplikasi Bakterin sebagai Imunostimulan untuk Pencegahan Infeksi Viral Nervous Necrosis (VNN) pada Benih Ikan Kerapu Bebek (*Cromileptes altivelis*). *Jurnal Perikanan. Universitas Gadjah Mada*. 10(2): 139-148.
- Sakai, M. 1999. Current Research Status of Fish Immunostimulants. *Aquaculture*. 172: 63-92.
- Salinas, I., Y.A. Zhang, and J.O. Sunyer. 2011. Mucosal Immunoglobulins and B Cells of Teleost Fish. *Developmental and Comparative Immunology*. 35(12): 1346-1365.
- Schaperclaus, W. 1992. *Fish Diseases*. Vol I. A.A. Balkema. Rotterdam. p. 594.
- Secombes, C.J. 1996. The Nonspecific Immune System; Cellular Defences. *In: Iwama, G., and T. Nakanishi (Eds.). The Fish Immune System; Organism, Pathogen and Environment*. Academic Press. San Diego, California. p. 63-95.
- Selvaraj, V., K. Sampath, and V. Sekar. 2005. Administration of Yeast Glucan Enhances Survival and Some Non-Specific and Specific Immune Parameters in Carp (*Cyprinus carpio*) Infected With *Aeromonas hydrophila*. *Fish & Shellfish Immunology*. 19(4): 293-306.
- Sivagnanavelmurugan, M., S. Radhakrishnan, A. Palavesam, V. Arul, and G. Immanuel. 2018. Characterization of Alginic Acid Extracted from *Sargassum wightii* and Determination of Its Antiviral Activity on Shrimp *Penaeus monodon* Postlarvae Against White Spot Syndrome Virus. *International Journal of Current Research in Life Sciences*. 7(04): 1863-1872.
- Shigdar, S., A. Harford, and A.C. Ward. 2009. Cytochemical Characterisation of The Leucocytes and Thrombocytes from Murray Cod (*Maccullochella peelii peelii*, Mitchell). *Fish & Shellfish Immunology*. 26(5): 731-736.

- Skjermo, J., and Ø. Bergh. 2004. High-M Alginate Immunostimulation of Atlantic Halibut (*Hippoglossus hippoglossus* L.) Larvae Using *Artemia* for Delivery, Increases Resistance Against Vibriosis. *Aquaculture*. 238 (1-4): 107-113).
- SNI 01-2354,1-2006. 2006. Analisis Proksimat Pakan.
- SNI -01-2354,2-2006. 2006. Analisis Proksimat Pakan.
- SNI-01-2354,3-2006. 2006. Analisis Proksimat Pakan.
- SNI 01-2354,4-2006. 2006. Analisis Proksimat Pakan.
- SNI 6484.1-2014. 2014. Lele Dumbo (*Clarias* sp.).
- Stafford, J.L., K.K. Ellestad, K.E. Maggot, M. Belosevic, and B.G. Magor. 2003. A Toll-Like Receptor (TLR) Gene is Up-Regulated in Activated Goldfish Macrophages. *Dev. Comp. Immunol.* 27: 685–698.
- Stewart, M.B., D.T. Myat, M. Kuiper, R.J. Manning, S.R. Gray, and J.D. Orbell. 2017. A Structural Basis for The Amphiphilic Character of Alginates—Implications for Membrane Fouling. *Carbohydrate Polymers*. 164: 162-169.
- Sukiya. 2003. *Biologi Vertebrata*. Yogyakarta: Biologi FMIPA UNY.
- Soemadji. 1995. *Zoologi*. Jakarta: Depdikbud.
- Swain, P., and N.K. Nayak. 2009. Role of Maternally Derived Immunity in Fish. *Journal Fish and Shellfish Immunology*, 27: 89-99.
- Syahailatua, D.Y. 2009. Seleksi Bakteri Probiotik sebagai Stimulator Sistem Imun pada Udang Vaname (*Litopenaeus vannamei*).
- Thangamani, R., P. Viji, and B. Govindarajan. 2015. A Review on Immunostimulant Effects in Fishes. *Acta Biomedica Scientia*. 2(1): 16-22.
- Ueda, I.K., M.I. Egami, W.S. Sasso, and E.R. Matushima. 2001. Cytochemical Aspects of The Peripheral Blood Cells of *Oreochromis niloticus*. In: Linnaeus. 1758. Cichlidae. Teleostei: Part II. *Brazilian Journal of Veterinary Research and Animal Science*. 38: 273-277.
- Uribe, C., H. Folch, R. Enriquez, G. Moran. 2011. Innate and Adaptive Immunity in Teleost Fish: A Review. *Vet. Med, Praha*. 56: 486–503.
- Van Doan, H., S.H. Hoseinifar, C. Faggio, C. Chitmanat, N.T. Mai, S. Jaturasitha, and E. Ringø. 2018. Effects of Corncob Derived Xylooligosaccharide on Innate Immune Response, Disease Resistance, and Growth Performance in Nile Tilapia (*Oreochromis niloticus*) Fingerlings. *Aquaculture*. 495: 786-793.
- Whyte, S.K. 2007. The Innate Immune Response of Finfish; A Review of Current Knowledge. *Fish and Shellfish Immunology*. 23: 1127-1151.
- Wu J., M. Bao, D. Ge, L. Huo, Z. Lv, C. Chi, Z. Liao, and H. Liu. 2017. The Expression of Superoxide Dismutase in *Mytilus coruscus* under Various Stressors. *Fish and Shellfish Immunology*.
- Yada, T. 2007. Growth Hormone and Fish Immune System. *General and Comparative Endocrinology*. 152(2-3): 353-358.
- Yangthong, M., N. Hutadilok-Towatana, J. Thawonsuwan, and W. Phromkunthong. 2016. An Aqueous Extract from *Sargassum* sp. Enhances The Immune Response and Resistance Against *Streptococcus iniae* in The Asian Sea Bass (*Lates calcarifer* Bloch). *Journal of Applied Phycology*. 28(6): 3587-3598.
- Yanuhar, U. 2011. Respon Imun Sel Interleukin-4 (Il-4) pada Ikan Kerapu Tikus (*Cromileptes altivelis*) yang Dipapar Protein Immunogenik *Vibrio harveyi*. *Jurnal Kelautan: Indonesian Journal of Marine Science and Technology*. 4(2): 126-134.
- Yaqoob, P., E.A. Newsholme, and P.C. Calder. 1994. Inhibition of Natural Killer Cell Activity by Dietary Lipids. *Immunology letters*. 41(2-3): 241-247.



- Yeh S.P., C.A. Chang, C.Y. Chang, C.H. Liu, and W. Cheng. 2008. Dietary Sodium Alginate Administration Affects Fingerling Growth and Resistance to *Streptococcus* sp. and Iridovirus, and Juvenile Non-Specific Immune Responses of The Orange-Spotted Grouper (*Epinephelus coioides*). *Fish & Shellfish Immunology*. 25(1): 19-27.
- Yudiati, E.A., A. Isnansetyo, Murwantoko, Ayuningtyas, Triyanto, and C.R. Handayani. 2016. Innate Immune-Stimulating and Immune Genes Up-Regulating Activities of Three Types of Alginate from *Sargassum siliquosum* in Pacific White Shrimp (*Litopenaeus vannamei*). *Fish & Shellfish Immunology*. 54: 46-53.
- Yuliawati, F. 2010. Efektivitas Ekstrak Meniran (*Phyllanthus niruri*) Sebagai Antibakteri Pada Ikan Patin (*Pangasianodon hypophthalmus*) yang Diinfeksi dengan *Aeromonas hydrophila*. Universitas Lampung. Skripsi.
- Zinkl, J.G., W.T. Cox, and C.S. Kono. 1991. Morphology and Cytochemistry of Leucocytes and Thrombocytes of Six Species of Fish. *Comparative Haematology International*. 1(1): 87-95.
- Zonneveld, N., E.A. Huisman, dan J.H. Boon. 1991. Prinsip-Prinsip Budidaya Ikan. PT. Gramedia Pustaka, Jakarta, p. 318.