

DAFTAR PUSTAKA

- Abalaka, S.E. 2013. Evaluation of haematology and biochemistry of *Clarias gariepinus* as biomarkers of environmental pollution in Tiga Dam Nigeria. *Brazilian Archives of Biology and technology* 56: 371–376.
- Afrianto, E. & E. Liviawaty. 2005. *Pakan Ikan*. Kanisius. Yogyakarta.
- Agbabiaka, L.A., F.N. Madubuike & B.U. Ekenyem. 2013. Haematology and serum characteristics of African Catfish (*Clarias gariepinus* B) feed graded levels on tigernut bases diet. *American Journal of Experimental Agriculture* 3: 988–995.
- Agrawal, S.S. and V.K. Singh. 1999. Immunomodulators : A Review of Studies on Indian Medicinal Plants and Synthetic Peptides Part I. Medicinal Plants. *PINSA B65*: 179-204.
- Akinyemi, A.A., S.O. Obasa, A.O. Agbon, F.I. Adeosun, W.O. Abdul & A.A. Idowu. Haematological parameters of infected an non-infected cultured *Clarias gariepinus* (Burchell, 1982) broodstock. *Journal of Science and Multidisciplinary Research* 4: 47–55.
- Alifudin, M. 2002. Imunostimulan pada Hewan Akuatik. *Akuakultur Indonesia*. 1:87-92.
- Almatsier, S. 2009. *Prinsip Dasar Ilmu Gizi*. PT Gramedia Pustaka Utama. Jakarta.
- Almendras, J.M.E. 2001. Immunity and Biological Method of Disease Prevention and Control. Agriculture Departement Southeast Asian Fisheries Development Center. Philippines. 111-136.
- An Ullman's Encyclopedia. 1998. *Industrial Organic Chemicals*. Vol. 7. Wiley-VCH. New York. 3993-4002.
- Anderson, D.P. & A.K. Swicki. 1993. Basic haematology and serology for fish health programs. paper presented in Second Symposium on Disease in Asian Culture Aquatic Animal Health and The Environment. Phucket. Thailand. pp. 185–202.
- Anderson, D.P. & A.K. Swicki. 1994. *Simplified Assays for Measuring Non Specific Defens Mechanisms in Fish*. Fisheries Society Publisher. Washington. USA.
- Anderson. 1992. Immunostimulants, ajduvants and vaccine carrier in fish.: application to aquaculture. *Ann. Rev. Fish Dis*. 2: 281–307.
- Anggadiredja, J.T., A. Zalnika, H. Purwoto dan S. Istini. 2008. *Rumput Laut*. Cetakan I. Penerbit Swadaya. Jakarta.
- Anggadiredja, J.T., H. Purwanto dan S. Istini. 2008. *Rumput Laut*. Penebar Swadaya. Jakarta.
- Ariaty, L. 1991. Morfologi Darah Ikan Mas (*Cyprinus carpio*), Nila Merah (*Oreochromis sp.*) dan Lele Dumbo (*Clarias gariepinus*) dari Sukabumi. Skripsi. FPIK Institut Pertanian Bogor. Bogor.

- Aryulina, D., C. Muslim, S. Manaf, & E.W. Winarni. 2006. Biologi SMA dan MA untuk Kelas XI, Esis. Erlangga. Jakarta.
- Badan Standarisasi Nasional (BSN). 2004. SNI 06-6989.30-2005. Cara uji kadar amonia dengan spektrofotometer secara fenat.
- Baratawidjaja K.G. & I. Rengganis. 2010. Imunologi Dasar, Edisi Kedelapan. Badan Penerbit Fakultas Kedokteran Universitas Indonesia. Jakarta.
- Baratawidjaja, K. G. 2006. Imunologi Dasar, Edisi VII. Balai Penerbit Fakultas Kedokteran Universitas Indonesia. Jakarta.
- Baratawidjaja, K.G. & I. Rengganis. 2004. Imunologi Dasar, Edisi Keenam. Badan Penerbit Fakultas Kedokteran Universitas Indonesia. Jakarta.
- Biller, J.D., L.S. Takahashi, F. Pilarski, F.A. Sebastiao & R.C. Urbinati. 2013. Serum bactericidal activity as indicator of innate immunity in pacu *Piaractus mesopotamicus* (Holmberg, 1887). *Medicine Veterinary Zootechnology* 65(6): 1745–1751.
- Boaden, P.J.S. 1995. *Sargassum*. *Journal of Marine Biological Association of United Kingdom*. 63: 799-811.
- Boyd, C.E. 1998. Water quality for pond aquaculture. Research and Development Series No. 43. International Center for Aquaculture and Aquatic Environment, Alabama Agricultural Experiment Station, Auburn University. Alabama.
- Bricknell I, & R.A. Dalmo. 2005. The use of immunostimulants in fish larval aquaculture. *Fish Shellfish Immunol* 19: 457-472.
- Buentello, J. A., M. R. Becerril, M. D. J. R. Geraldo, and F. D. J. A. Valle. 2007. Effects of Dietary Arginine on Hematological Parameters and Innate Immune Function of Channel Catfish. *Journal of Aquatic Animal Health*. 19:195-203.
- Cavalier-Smith, T. and E.E. Chao. 2006. Phylogeny and megasystematics of phagotrophic heterokonts (Kingdom Chromista). *Journal of Molecular Evolution*. 62: 388–420.
- Chapman, V.J. and D.J. Chapman. 1980. *Seaweed and Their Uses*. Third Edition. Chapman and Hall.
- Cheng W., C. H. Liu, S.T. Yeh, J.C. Chen. 2004. The immune stimulatory effect of sodium alginate on the white shrimp *Litopenaeus vannamei* and its resistance against *Vibrio alginolyticus*. *Fish & Shellfish Immunology* 17:41-51.
- Combs, G.F., 1998. *The Vitamins Fundamental Aspects in Nutrition and Health*. Second Ed. Academic Press. California.USA. 107-153.
- Cook, M.T., P.J. Hayball, W. Hutchinson, B.F. Nowak & J.D. Hayball. 2003. Administration of a commercial immunostimulan preparation, EcoActiva as a feed supplement enhances macrophage respiratory burst and the growth rate of snaper (*Pagurus auratus*, Sparidae (Bloch and Schneider) in winter. *Fish and Shellfish Immunology* 14: 333–345.

- Dewoto, H.R. 2007. Vitamin dan Mineral dalam Farmakologi dan Terapi. Edisi kelima. Departemen Farakologi dan Terapi Fakultas Kedokteran Universitas Indonesia. Percetakan Gaya Baru. Jakarta.
- Draget, K.I & C. Taylor. 2011. Chemical, physical and biological properties of alginates and their biomedical implications. *Food Hydrocolloids* 25:251–256.
- Esteban, M.A. 2012. Review article: An verview of the Immunological Defenses in Fish Skin. *International Scholarly Research Network Immunology*. 1-29.
- Frank, S.A. 2002. *Immunology and Evolution of Infectious Diseases*. Princeton University Press. United Kingdom.
- Fujaya, Y. 2004. *Fisiologi Ikan*. Rineka Cipta. Jakarta.
- Gabrielsen, B.O & E. Austreng. 1998. Growth, Product quality and immune status of Atlantic salmon, *Salmo salar.*, fed wet feed with alginate. *Aquaculture Reseach*. 29 : 397-401.
- Gomez, R.G. & J.L. Balcazar. 2007. A review on the interactions between gut microbiota and innate immunity of fish. *Immunology Medicine Microbiology* 52: 145–154.
- Habte-Tsion, H., X. Ge, B. Liu, J. Xie, M. Ren, Q. Zhou, L. Miao, L. Pan & R. Chen. 2015. A deficiency or an excess of dietary threonine level affects weight gain, enzyme activity, immune response and immune-related gene expression in juvenile blunt snout bream (*Megalobrama amblycephala*). *Fish and Shellfish Immunology* 42: 439–446.
- Hanif, A., V. Bakopoulos & G.J. Dimitriadis. 2004. Maternal transfer of humoral specific and non-specific immune parameters to sea bream (*Sparus aurata*) larvae. *Fish and Shellfish Immunology* 17: 411–435.
- Hasdianah, H.R., P. Dewi, Peristiowati, S. Iman. 2014. *Imunologi Diagnosis dan Teknik Biologi Molekuler*. Cetakan Pertama. Nuha Medika. Yogyakarta.
- Hernandez, A.J., A. Romero, R.G. Stegmaier, P. Dantagnan. 2015. The effects of supplemented diets with a phytopharmaceutical preparation from herbal and macroalgal origin on disease resistance in rainbow trout against *Piscirickettsia salmonis*. *Journal of Aquaculture*. 109-117.
- Hernandez, L.H.H., S. Teshima & S. Koshio. 2007. Effects of vitamin A on growth, serum anti-bacterial activity and transaminase activities in the juvenile Japanese flounder, *Paralichthys olivaceus*. *Aquaculture* 262: 444–450.
- Isnansetyo, A. 2006. Petunjuk praktikum evaluasi pertahanan nonspesifik ikan. Departemen Perikanan. Fakultas Pertanian. Universitas Gadjah Mada. Yogyakarta.
- Isnansetyo, A., A. Fikriyah, N. Kasanah, Murwantoko. 2015. Non-specific immune potentiating activity of fucoidan from a tropical brown algae (Phaeophyceae), *Sargassum cristaefolium* in tilapia (*Oreochromis niloticus*). *Aquaculture Int*.

- Isnansetyo, A., H.M. Irpani, T.A. Wulansari, and N. Kasanah. 2014. Oral Administration of alginate from A Tropical Brown Seaweed, *Sargassum* sp. to Enhance Non-Specific Defence in Walking Catfish (*Clarias* sp.). *Aquacultura Indonesiana*. 2:49-55.
- Jain, N.C. 1986. *Scalms Veterinary Hematology*. Fourth Edition. Lea and Febringer. Philadelphia. USA.
- Kaminska, S. A., G. Matysik, W. M. Kosior, H. Donica, I. Sowa. 2009. Thin-Layer Chromatography of Sugars in Plant Material. Departement of Chemistry Medical University of Lublin. Polandia.
- Khairuman, and K. Amri. 2002. *Budidaya lele lokal secara intensif*. Agromedia Pustaka, Jakarta.
- Kim, K.W., S.S. Kim., S. Khosravi., S. Rahimnejad and K.Y. Lee. 2014. Evaluation of *Sargassum fusiforme* and *Ecklonia cava* as dietary additives for Olive floundes (*Paralichthys olivacues*). *Turkish Journal of Fisheries and Aquatic Science*. 14:321-330.
- Kiron, Viswanath. 2012. Fish Immune System and Its Nutritiopnal Modulation for Preventive Health Care. *Journal Animal Feed Science and Technology* 173 :111-133.
- Kordi, M. Ghufran H. 2013. *Budidaya Ikan Konsumsi di Air Tawar*. Lily Publisher. Yogyakarta.
- Kordi, M.G.H. 2010. *Budidaya Ikan Lele di Kolam Terpal*. Lily Publisher. Yogyakarta.
- Kumari, J and P.K. Sahoo. 2006. Dietary b-glucan Potentiates Innate immunity and Disease Resistance of Asian Catfish (*Clarias batrachus*). *Journal of Fish Diseases*. 29: 95-101.
- Lamid, A. 1995. Vitamin E sebagai antioksidan. *Media Litbangkes*. 5(1):14-16.
- Lee, K. Y., D. J. Mooney. 2012. Alginate : Properties and Biomedical Application. *Prog. Polym. Sci*. 37: 106-126.
- Li, B., F. Lu., X. Wei and R. Zhao. 2008. Fucoidan: structure and bioactivity. *Review Molecules*, 13: 1671-1695.
- Lin, B.Y.N. 2011. Phenology of *Sargassum* species at Teluk Kemang, Port Dickson, Malaysia. (Thesis). The Degree Master of Science at University Tunku Abdul Rahman. Malaysia.
- Mackie, W. 1971. Semi-quantitative Estimation of the Composition of Alginates by Infra-red Spectroscopy. *Carbohydrate Research*. 20(2): 413-415.
- Magnadottir, B. 2006. Innate immunity of fish (overview). *Fish and Shellfish Immunology* 20: 137–151.
- Magnadottir, Bergijot. 2010. Immunological Control of Fish Disease. *Marine Biotechnology*. 12: 367-379.
- Mahyuddin, K. 2007. *Panduan lengkap agribisnis lele*. Penebar Swadaya, Jakarta.

- Mahyuddin, K. 2008. Panduan Lengkap Agribisnis Lele. Penebar Swadaya. Jakarta.
- Mattio L., C. E. Payri. 2010. Assessment of Five Markers as Potential Barcodes for Identifying *Sargassum* subgenus *Sargassum* species (Phaeophyceae, Fucales). *Cryptogamie Algol.* 31: 467-485.
- Megayana, Y., S. Subekti, M. A. Alamsjah. 2011. Study of Alginate Content and Seaweed Chlorophyll *Sargassum* sp. at Different Harvesting Times. *Journal of Aquaculture and Fish Health.* 1: 10-19.
- Miles, R.D., and F.A Chapman. 2007. The Concept of Ideal Protein in Formulation of Agriculture Feeds. <http://edis.ifas.ufl.edu>.
- Mirshafiey, A., B. H. A. Rehm. 2009. Alginate and Its Comonomer Mannuronic Acid: Medical Relevance as Drug. Dalam B.H.A Rehm (Ed). *Alginates: Biology and Application.* P. 229-260. Springer-Verlag. Berlin.
- Mulyanto. 1992. Lingkungan Hidup untuk Ikan. Departemen Pendidikan dan Kebudayaan. Jakarta.
- Murugaian, P., V. Ramamurthy, N. Karmegam. 2008. Effect of temperature on the behavioural and physiological responses of catfish, *Mystus gulio* (Hamilton). *Journal of Applied Science Research* 4(11): 1454–1457.
- Murwani, R. 2010. Protein dan Asam Nukleat. Universitas Diponegoro Press. Semarang.
- Najiyati, S. 2003. Memelihara Lele Dumbo di Kolam Taman. Penebar Swadaya. Jakarta.
- National Research Council. 1993. Nutrient Requirements of Fish. National Academy. Press. Washington.
- Nguyen, L. and D. A. Davis. 2016. Comparison of crystalline lysine and intact lysine used as a supplement in practical diets of channel catfish (*Ictalurus punctatus*) and Nile tilapia (*Oreochromis niloticus*). *Aquaculture.* 464:331-339.
- Pan, F.Y., L. Feng, W. D. Jiang, J. Jiang, P. Wu, S.Y. Kuang, L. Tang, W. N. Tang, Y. A. Zhang, Z. Y. Liu. 2016. Methionine hydroxy analogue enhanced fish immunity via modulation of NF-kB, TOR, MLCK, MAPKs and Nrf2 signaling in young grass carp (*Ctenopharyngodon idella*). *Fish & Shellfish Immunology.* 56: 208-228.
- Parera, H.A.A.C. & A. Pathiratne. 2008. Enhancement of immune responses in Indian Carp, *Catla catla*, following administration of levamisole by immersion. *Diseases in Asian Aquaculture VI.* Manila: 129–142.
- Pawar.S.N., K.J. Edgar 2012. Alginate derivatization: A review of chemistry, properties and applications. *Biomaterials.* 33: 3279-3305.
- Poedjiadi, A. & Supriyanti, T. 2009. Dasar-Dasar Biokimia. Edisi Revisi. Universitas Indonesia Press. Jakarta.
- Poedjiadi, A. 1994. Dasar-Dasar Biokimia. UI-Press. Jakarta.

- Pramesti, A. R. 2012. Absorbent dressing sponge berbasis alginat-kitosan berkurkumin untuk luka derajat eksudat sedang-besar. Skripsi Universitas Airlangga.
- Rachmat, R. Rasyid, A., dan Murtiningsih, T. 1999. Karakterisasi Polisakarida Agar dari *Gracilaria sp.* dan *Gelidium sp.* Prosiding. Pra Kipnas VII Forum Komunikasi Ikatan Fisiologi Indonesia. Puspitek. Serpong.
- Rao, D.A., G. Subbarangiah, S. E. Padal. 2014. Habitat Influences the Seasonal Growth, Fruiting Behaviour in *Sargassum polycystum* C.Agardh at Visakhapatnam Coast India. International Journal of Pharmacy and Bioscience. 1: 1-10.
- Ridlo, A & R. Pramesti. 2009. Aplikasi ekstrak rumput laut sebagai agen imunostimulan sistem pertahanan non-spesifik pada udang (*Litopenaeus vannamei*). Jurnal Ilmu Kelautan. 14(3): 133-137.
- Ringo E., R.E Olsen., J.L.G Vecino, S. Wad Sworth and S.K Song. 2012. Use of immunostimulants and nucleotides in aquaculture : a review. Marine Science Research and Development. 2 : 2-22.
- Saanin, H. 1984. Taksonomi dan Kunci Identifikasi Ikan. Bina Cipta. Jakarta.
- Sakai, M. 1999. Current research status of fish immunostimulants. Aquaculture. 172: 63-92.
- Sakugawa, K., A. Ikeda, A. Takemura, H. Ono. 2004. Simplified Method for Estimation of Composition of Alginates by FTIR. Journal of Applied Polymer Science. 93(3): 1372-1377.
- Sapoetra, K dan Warsetyo. 2003. Ilmu gizi korelasi gizi kesehatan dan produktivitas kerja. Rineka Cipta. Jakarta.
- Sealey, W.M. & D.M. Galtin III. 2001. Overview of nutritional strategies affecting the health of marine fish. In: Nutrition and Fish Health. Food Products Press. New York.
- Sealey, W.M., J.T Davis and D.M Gatlin. 1997. Refinement of Vitamin Supplementation in Diets for Pond Raised Channel Catfish. Publication of Southern Regional Aquaculture Centre.
- Sediaoetama, A. D., 2009. Vitamin a in: ilmu gizi. Dian Rakyat. Jakarta.
- Shiau, S. & Y. Lin. 2006. Vitamin Requirements of Tilapia - A Review. Simposium International de Nutrition Acuicola VIII. 15-17 November. Universidad Autonoma de Neuvo Leon. Mexico.
- SIDATIK (Sistem Informasi Diseminasi Data dan Statistik Kelautan dan Perikanan). 2017. Produksi Perikanan Budidaya. <<http://statistik.kkp.go.id/sidatik-dev/2.php?x=3>>. Diakses 27 Januari 2018.
- SIDATIK (Sistem Informasi Diseminasi Data dan Statistik Kelautan dan Perikanan). 2017. Tingkat Konsumsi Ikan. <<http://statistik.kkp.go.id/sidatik-dev/2.php?x=8>> Diakses 27 Januari 2018.

- SIDATIK (Sistem Informasi Diseminasi Data dan Statistik Kelautan dan Perikanan). 2017. Produksi Perikanan Tangkap. <<http://statistik.kkp.go.id/sidatik-dev/2.php?x=2>>. Diakses 27 Januari 2018.
- Sudarmadji, S. 1989. Analisa Bahan Makanan dan Pertanian. Liberty. Yogyakarta.
- Sitompul, S. 1997. Komposisi asam-asam amino dari biji-bijian dan kacang-kacangan. Lokakarya Fungsional Non Peneliti. 98-102.
- Sitompul, S. 2004. Analisis asam amino dalam tepung ikan dan bungkil kedelai. Buletin Teknik Pertanian. 9(1):33-37.
- SNI 01-6484.5-2002. 2002. Ikan lele dumbo produksi kelas pembesaran di kolam.
- Srivastava, P. K & A. K. Pandey. 2015. Role of Immunostimulants in Immune Responses of Fish and Shellfish. Review. Biochemical. (1) :47-73.
- Tacon, A.G.J. 1987. The Nutrition And Feeding Of Farmed Fish And Shrimp - A Training Manual 1. The Essential Nutrients. Food and Agriculture Organization of The United Nations Brasilia, Brazil.
- Tizard, I, 2004. An Introduction to Veterinary Immunology. Philadelphia.
- Tizard, I. 1982. An Introduction on Veterinary Immunology. W. B. Saunders Company. Philadelphia.
- Triyanto, H.N. Kamiso, A. Isnansetyo. 1997. Pembuatan antigen murni untuk memproduksi polivalen antibody dan vaksin *Aeromonas hydrophila*. Laporan Penelitian Hibah Bersaing V/1 Perguruan Tinggi. Fakultas Pertanian UGM. Yogyakarta.
- Uribe, C., H. Folch, R. Enriquez & G. Morgan. 2011. Innate and adaptive immunity in teleost fish: A review. Veterinary Medicine 10: 486–503.
- Utami, D. T., B. P. Slamet, H. Sri, S. Ayi. 2013. Parameter hematologi ikan nila (*Oreochromis niloticus*) yang diberi vaksin DNA *Streptococcus iniae* dengan dosis yang berbeda. Journal of Aquaculture Management and Technology. 2 (4) :7–20.
- Uthayakumar, V., V. Ramasubramanian, D. Senthilkumar, P.R. Sreedevi & S. Munirasu. 2012. Specific and non specific immune response and disease resistance of solanum torvum leaf soluble fractions in freshwater carp *Cyprinus carpio*. International Research Journal of Pharmacy 3(6): 165–170.
- Wagner, H., 1985. Immunostimulants from Medicinal Plants. In Advances in Chinese Medicinal Materials Research (Eds.) H.M. Chang; H.W. 133 Yeung; W.W. Tso and A. Koo. World Scientific Publ. Co. Singa- pura : 159-170.
- Wandrey, C. 2005. Polyelectrolytes and Biopolimer. Materials Science and Engineering. Ecole Polytechnique Federale De Lausame. 1-37.
- Weber, M. & L.F de Beaufort. 1965. The fishes of the Indo-Australian Archipelago. E.J. Brill Ltd. Leiden. 7 : 13-168.

- Wilson, R. P. and J. E. Halver. 1986. Protein and amino acid requirements of fishes. Annual Reviews. 6:225-244.
- Wilson, R. P., O. W. Allen, E. H. Robinson, W. E. Poe. 1978. Tryptophan and threonine requirements of fingerling channel catfish. Journal Nutrition. 108(1) 595-599.
- Winarno, F.G. 1990. Kimia Pangan Dan Gizi. PT. Gramedia Pusaka Utama. Jakarta.
- Winarno, F.G. 1990. Teknologi Pengolahan Alginat. Badan Riset Kelautan dan Perikanan. Jakarta.
- www.Algabase.org Diakses 7 Oktober 2017.
- Yudiati, E., A. Isnansetyo, Murwantoko, Ayuningtyas, Triyanto, dan 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.
- Yudiati, E., G.W. Santosa., M.R. Tontowi., S. Sedjati., E. Supriyantini and M. Khakimah. 2018. Optimization of alginate alkaline extraction technology from *Sargassum polycystum* and its antioxidant properties. Earth and Environment 139 (1) : 1755-1315.
- Zaccone, P., Fehervari, Z., Jones, F.M., Sidobre, S., Kronenberg, M., Dunne, D.W., Cooke, A. 2003 *Schistosoma mansoni* Antigens Modulate the Activity of The Innate Immune response and Prevent Onset of Type 1 Diabetes. Journal of Immunology. 33: 1439-1449.
- Zaelanie, K., T. Susanto, B.W. Simon. 2001. Ekstraksi dan Pemurnian Alginat dari *Sargassum fillipendula*: Kajian dari Bagian Tanaman, Lama Ekstraksi dan Konsentrasi Isopropanol. Jurnal Teknologi Pertanian 2 (1): 13-15.
- Zakaria, F.R, Nurahman, Prangdimurti E, Tejasari. 2003. Antioxidant and Immunoenhancement Activities of Ginger (*Zingiber officinale* Roscoe) Extracts and Compounds in vitro and Vivo Mouse and Human System. Nutraceutical Foods. 8(1): 96-104.