DAFTAR PUSTAKA

Abbott, W.S. 1925. A Method of Computing the Effectiveness of An Insecticide. Journal of Economic Entomology 18:256-267.

Afzal, M.B., N. Abbas & S.A. Shad. 2015. Inheritance, Realized Heritability and Biochemical Mechanism of Acetamiprid Resistance in The Cotton Mealybug, *Phenacoccus solenopsis* Tinsley (Homoptera: Pseudococcidae). Pesticide Biochemistry and Physiology 122: 44-49.

Ahmad, M., A. H. Sayyed, M. A. Saleem & M. Ahmad. 2008. Evidence for Field Evolved Resistance to Newer Insecticides in *Spodoptera litura* (Lepidoptera: Noctuidae) from Pakistan. Crop Protection 27:1367-1372.

Ahmad, M. & M. I. Arif. 2009. Resistance of Pakistani Field Populations of Spotted Bollworm *Earias vittella* (Lepidoptera: Noctuidae) to Pyrethroid, Organophosphorus and New Chemical Insecticides. Pest Management Science 65:433-439.

Ahmad, M. & M.I. Arif. 2010. Resistance of Beet Armyworm *Spodoptera exigua* (Lepidoptera: Noctuidae) to Endosulfan, Organophosphorus and Pyrethroid Insecticides in Pakistan. Crop Protection 29:1428-1433.

Ahmad, M. & R. Mehmood. 2015. Monitoring of Resistance to New Chemistry Insecticides in *Spodoptera litura* (Lepidoptera: Noctuidae) in Pakistan. Journal of Economic Entomology 108:1279-1288.

Ahmad, M. & S. Gull. 2017. Susceptibility of Armyworm *Spodoptera litura* (Lepidoptera: Noctuidae) to Novel Insecticides in Pakistan. The Canadian Entomologist 149:649-66.

Ahmad, M., A. Farid & M. Saeed. 2018. Resistance to New Insecticides and Their Synergism in *Spodoptera exigua* (Lepidoptera: Noctuidae) from Pakistan. Crop Protection 107:79-86.

Aldosari, S. A., T. F. Watson, S. Sivasupramaniam & A. A. Osman. 1996. Susceptibility of Field Populations of Beet Armyworm (Lepidoptera: Noctuidae) to Cyfluthrin, Methomyl and Profenofos and Selection for Resistance to Cyfluthrin. Journal of Economic Entomology 89:1359-1363.

Arulkumar, G, S. Manisegaran, R. Nalini & M. Mathialagan. 2017. Seasonable Abundance of Beet Armyworm *Spodoptera exigua* (Hubner) Infesting Onion with Weather Factors in Madurai District of Tamil Nadu. Journal of Entomology and Zoology Studies 5:1157-1162.

Bacci, L., A. L. Crespo, T. L. Galvan., E. J. Pereira., M. C. Picanço, G. A. Silva & M. Chediak . 2007. Toxicity of Insecticides to the Sweetpotato Whitefly (Hemiptera: Aleyrodidae) and Its Natural Enemies. Pest Management Science 63:699-706.

Brewer, M.J. & J.T. Trumble. 1989. Field Monitoring for Insecticide Resistance in Beet Armyworm (Lepidoptera: Noctuidae). Journal of Economic Entomology 82:1520-1526.

Brewer, M.J. & J. T. Trumble. 1991. Inheritance and Fitness Consequences of Resistance to Fenvalerate in *Spodoptera exigua* (Lepidoptera: Noctuidae). Journal of Economic Entomology 84:1638-1644.

Bourguet, D., A. Genissel & M. Raymond. 2000. Insecticide Resistance and Dominance Levels. Journal of Economic Entomololy 93:1588-1595.

Busvine, J.R. 1971. A Critical Review of The Techniques for Testing Insecticides. London: Common-wealth Agriculture Bureaux. 208 p.

Cao, G.C. & Z. J. Han. 2006. Tebufenozide Resistance Selected in *Plutella xylostella* and Its Cross-Resistance and Fitness cost. Pest Management Science 62:746-751.

Che, W., T. Shi, Y. Wu & Y. Yang. 2013. Insecticide Resistance Status of Field Populations of *Spodoptera exigua* (Lepidoptera: Noctuidae) from China. Journal of Economic Entomology106:1855-1862.

CABI. 2018. *Spodoptera exigua* (Beet Armyworm) Datasheet. Crop Protection Compendium. https://www.cabi.org/cpc/datasheet/29808. Diakses pada 10 Januari 2019.

Capinera, J. L. 1999. Beet Armyworm, *Spodoptera exigua* (Hübner) (Insecta: Lepidoptera: Noctuidae). UF/IFAS Extension. 4p.

CIE, 1972. Distribution Maps of Pests. Map No. 302. Common Wealth Institute of Entomology, London, United Kingdom.

Creswell, J. W. 2014. Research Design: Qualitative, Quantitative, and Mixed Methods Approaches. Fourth Edition. SAGE Publications Ltd. California. 342p.

De Putter, H., W. Adiyoga and J. Sugiharto. 2017. Effect of Pesticide Mixing on Control of Anthracnose and *Spodoptera exigua* in Shallot. *VegIMPACT Report 38.* Wageningen University & Research, The Netherlands.

Diptaningsari, D., Y. A. Trisyono, A. Purwantoro & A. Wijonarko. 2019. Inheritance and Realized Heritability of Resistance to Imidacloprid in the Brown Planthopper, *Nilaparvata lugens* (Hemiptera: Delphacidae), From Indonesia. Journal of Economic Entomology 112:1831-1837.

Finney, D.J. 1971. Probit Analysis, 3rd edition. Cambridge University Press. London. 333p.

Fogel, M. N., M. I. Schneider, N. Desneux, B. González & A. E. Ronco. 2013. Impact of The Neonicotinoid Acetamiprid on Immature Stages of The Predator *Eriopis connexa* (Coleoptera: Coccinellidae). Ecotoxicology 22:1063–1071.

Georghiou, G. P. & C. E. Taylor. 1977. Genetic and Biological Influences in The Evolution of Insecticides Resistance. Journal of Economic Entomology 70:319-323.

Georghiou, G. P. & R. B. Mellon. 1983. Pesticide Resistance in Time and Space. *In* G. P Georghiou and T. Saito [eds.], Pest Resistance to Pesticides. Plenum Press, New York. 46 p.

Georghiou, G. P. & C. E. Taylor. 1986. Factors Influencing The Evolution of Resistance. In: E.H. Glass, P.L. Adkisson, G.A. Carison, B.A. Croft, D. E Davis, J. W. Eckert, G.P. Gorghiu, W. B. Jackson, H. M. LeBaron, B. R. Levin, F. W. Plapp Jr., R.T. Roush, H. D. Sisler (Eds.). Pesticides Resistance: Strategies and Tactics for Management. National Academy Press. Washington. 157-169.

Georghiou, G. P. 1983. Management of Resistance in Arthropods, pp. 769-792. In G.P. Georghiou and T. Saito (eds), Pest Resistance to Pesticides: Challenges and Prospects. Plenum Press. New York.

Goodell, P. B., L. D. Godfrey, E.E Grafton-Cardwell, N. Toscano & S. D. Wright. 2001. Insecticide and Miticides Resistance Management in San Joaquin Valley Cotton for 2001. The Regents of The University of California, Division of Agriculture and Natural Resources. California. 23 p.

Gunning, R.V. & G. D. Moores. 2002. Chlorfenapyr Resistance in *Helicoverpa armigera* in Australia. In: Proceedings British Crop Protection Conference, Vol. 2, Pests and Diseases. Brighten, United Kingdom, pp. 793–798.

Huffman, R., T. Fuchs, J. Benedict, R. Parker, S. Sparks, J. Norman., J. Leser., A. Knutson, R. Minzenmayer & R. Frisbie. 1996. Management Guidelines for The Beet Armyworm on Cotton. Texas Agricultural Extentsion Service. The Texas A&M University System.

Ishtiaq, M. & M.A. Saleem. 2011. Generating Susceptible Strain and Resistance Status of Field Populations of *Spodoptera exigua* (Lepidoptera: Noctuidae) Against Some Conventional and New Chemistry Insecticides in Pakistan. Journal of Economic Entomology 104:1343-1348.

Ishtiaq, M., A. Mushtaq & A.M. Razaq. 2012. Monitoring of Resistance in *Spodoptera exigua* (Lepidoptera: Noctuidae) from Four Districts of The Southern Punjab, Pakistan, to Four Conventional and Six New Chemistry Insecticides. Crop Protection 33:13-20.

Ishtiaq, M., M. Razaq, M.A. Saleem, F. Anjum, M. N. Ane, A.M. Raza & D.J. Wright. 2014. Stability, Cross-resistance and Fitness Costs of Resistance to Emamectin Benzoate in A-Reselected Field Population of The Beet Armyworm, *Spodoptera exigua* (Lepidoptera: Noctuidae). Crop Protection 65:227-231.

Jan, M.T., N. Abbas, S.A. Shad & M. A. Saleem. 2015. Resistance to Organophosphate, Pyrethroid and Biorational Insecticides in Populations of Spotted Bollworm, *Earias vittella* (Fabricius) (Lepidoptera: Noctuidae), in Pakistan. Crop Protection 78:247-252.

Jia, B., Y. Liu, Y.C. Zhu, X. Liu, C. Gao & J. Shen. 2009. Inheritance, Fitness Cost and Mechanism of Resistance to Tebufenozide in *Spodoptera exigua* (Hübner) (Lepidoptera: Noctuidae). Pest Management Science 65:996-1002.

Kementerian Pertanian. 1992. Pedoman Pengenalan dan Pengendalian Hama Bawang Merah. Direktorat Perlindungan Tanaman. Direktorat Jendral Pertanian Tanaman Pangan Kementerian Pertanian Republik Indonesia. Jakarta. 21 p.

Kementerian Pertanian. 2003. Peta Penyebaran OPT Tanaman Sayuran. Direktorat Perlindungan Hortikultura Kementerian Pertanian Republik Indonesia. Jakarta. 45 p.

Kementerian Pertanian. 2011. Pestisida Pertanian dan Kehutanan. Pusat Perizinan dan Investasi Sekretariat Jendral Kementerian Pertanian Republik Indonesia. 682 p.

Kementerian Pertanian. 2014. Pestisida Pertanian dan Kehutanan. Pusat Perizinan dan Investasi Sekretariat Jendral Kementerian Pertanian Republik Indonesia.1002p.

Kementerian Pertanian. 2016. Pestisida Pertanian dan Kehutanan. Direktorat Jendral Prasarana dan Sarana Pertanian Kementerian Pertanian Republik Indonesia. 1096 p.

Kementerian Pertanian. 2018. Sistem Informasi Pestisida. Direktorat Jendral Prasarana dan Sarana Pertanian Kementerian Pertanian Republik Indonesia. http://pestisida.id/simpes_app/. Diakses pada 12 April 2018.

Kerns, D. L., J. C. Palumbo & T. Tellez. 1998. Resistance of Field Strains of Beet Armyworm (Lepidoptera: Noctuidae) from Arizona and California to Carbamate Insecticides. Journal of Economic Entomology 91:1038-1043.

Khan, H., N. Abbas, S.A. Shad & M.B. Afzal. 2014. Genetics and Realized Heritability of Resistance to Imidacloprid in A Poultry Population of House Fly, *Musca Domestica* L. (Diptera: Muscidae) From Pakistan. Pesticide Biochemistry and Physiology 114:38-43.

Koster, W. G. 1990. Exploratory Survey on: Shallot in Rice-Based Cropping Systems in Brebes. Buletin Penelitian Hortikultura 18:19-30.

Lai, T. & J. Su. 2011. Assessment of Resistance Risk in *Spodoptera exigua* (Hübner) (Lepidoptera: Noctuidae) to Chlorantraniliprole. Pest Management Science 67:1468-1472.

Leeuwen, T., V. S. Pottelberge & L. Tirry. 2005. Comparative Acaricide Susceptibility and Detoxifying Enzyme Activities in Field-Collected Resistant and Susceptible Strains of *Tetranychus urticae.* Pest Management Science 61:499-507.

Li, R.J., K. Y. Wang & X. M. Xia. 2005. Resistance Selection by Meilingmycin and Chlorfenapyr and Activity Changes of Detoxitated Enzymes in *Tetranychus urticae.* Acta Phytophylacica Sinica 32:309-313.

Li, X., M.A. Schuler & M. R. Berenbaum. 2007. Molecular Mechanisms of Metabolic Resistance to Synthetic and Natural Xenobiotics. Annual Review of Entomology 52:231-253.

Liu, Y.J. & J.L. Shen. 2003. Biochemical mechanism and genetics of resistance to lambda-cyhalothrin in the beet armyworm, *Spodoptera exigua*, and the relative fitness of the resistance strain. Acta Entomologica Sinica 46:567-572.

Liu, Y, X. Li, C. Zhou, F. Liu & W. Mu. 2016. Toxicity of Nine Insecticides on Four Natural Enemies of *Spodoptera exigua.* Scientific Reports. doi:10.1038/srep39060.

Marqon, P. C. R. G., L. J. Young, K. L. Steffey & B. D. Siegfried. 1999. Baseline Succeptible of Eroupean Corn Borrer (Lepidoptera: Crambidae) to *Bacillus thuringiensis* Toxin. Journal of Economic Entomology 92 : 279-285.

Matsumura, F. 1985. Toxicology of Insecticides. Second Edtion. Plenum Press. New York and London. 598 p.

Metcalf, C. L. & W. P. Flint. 1962. Destructive and Useful Insects Their Habits and Control. McGraw-Hill Book. Company. Inc. New Delhi.

Metcalf, R. L. 1986. The Ecology of Insecticides and The Chemical Control of Insect. Di dalam: Kogan, M (eds). Ecological Theory and Integrated Pest Management Practice. New York: John Wiley & Son. 251-294 pp.

Moekasan, T. K. & R. S. Basuki. 2007. Status Resistensi *Spodoptera exigua* Hubn. Pada Tanaman Bawang Merah Asal Kabupaten Cirebon, Brebes dan Tegal terhadap Insektisida yang Umum Digunakan Petani di Daerah Tersebut. Jurnal Hortikultura 17:343-354.

Moekasan, T. K. 1998. Status Resistensi Ulat Bawang *Spodoptera exigua* Hubn. Strain Brebes terhadap Beberapa Jenis Insektisida. Jurnal Hortikultura 7:913-918.

Moekasan, T.K., W. Setiawati, F. Hasan, R. Runa, & A. Somantri. 2013. Penetapan Ambang Pengendalian *Spodoptera exigua* pada Tanaman Bawang Merah Menggunakan Feromonoid Seks. *Jurnal Hortikultura*. 23: 80-90.

Moulton, J. K., D. A. Pepper, R. K. Jansson & T. J. Dennehy. 2002. Pro-active Management of Beet Armyworm (Lepidoptera: Noctuidae) Resistance to Tebufenozide and Methoxyfenozide: Baseline Monitoring, Risk Assessment and Isolation of Resistance. Journal of Economic Entomology 95:414-424.

Moulton J, D.A. Pepper & T.J. Dennehy. 2002. Beet armyworm (*Spodoptera exigua*) Resistance to Spinosad. Pest Management Science 56:842–848.

Moulton, J.K., D.A. Pepper & T.J. Dennehy. 2000. Beet Armyworm (*Spodoptera exigua*) Resistance to Spinosad. Pest Management Science 56:842-848.

Nusyirwan, 2013. Studi Musuh Alami (*Spodoptera exigua* Hbn) pada Agroekosistem Tanaman Bawang Merah. *Pertanian Terapan*. 13: 33-37.

Osorio, A., A.M. Martínez, M.I. Schneider, O. Díaz, J.L. Corrales, M.C Avilés,, G. Smagghe & S. Pinedal. 2008. Monitoring of Beet Armyworm Resistance to Spinosad and Methoxyfenozide in Mexico. Pest Management Science 64:1001-1007.

Preetha, G., J. Stanley, S. Suresh & R. Samiyappan. 2010. Risk assessment of insecticides used in rice on miridbug, *Cyrtorhinus lividipennis* Reuter, the important predator of brown planthopper, *Nilaparvata lugens* (Stal). *Chemosphere* 80:498-503.

Pu, X., Y. Yang, S. Wu & Y. Wu. 2010. Characterisation of Abamectin Resistance in A Fieldevolved Multiresistant Population of *Plutella xylostella*. Pest Management Science 66:371-378.

Qayyum, M.A., W. Wakil, M. J. Arif, S. T. Sahi, N. A. Saeed & D. A. Russell. 2015. Multiple Resistances against Formulated Organophosphates, Pyrethroids, and Newer-chemistry Insecticides in Populations of *Helicoverpa armigera* (Lepidoptera: Noctuidae) from Pakistan. Journal of Economic Entomology 108:286-293.

Rauf, A. 1999. Dinamika Populasi *Spodoptera exigua* Hubner (Lepidoptera: Noctuidae) pada Pertanaman Bawang Merah di Dataran Rendah. Buletin Hama dan Penyakit Tumbuhan 11:39-47.

Saeed, Q, F. Ahmad, N. Iqbal & S. M. Zaka. 2019. Chemical Control of Polyphagous Pests on Their Auxiliary Hosts Can Minimize Insecticide Resistance: A Case Study of *Spodoptera exigua* Hübner (Lepidoptera: Noctuidae) in Cotton Agroecosystem. Ecotoxicology and Environmental Safety 171:721-727.

Sasmito, E.E., Y.A. Trisyono & T. Harjaka. 2017. Impact of Abamectin on *Anagrus nilaparvatae*, An Egg Parasitoid of *Nilaparvata lugens*. Jurnal Perlindungan Tanam Indonesia 21:80-86.

Sayyed, A.H., M. Ahmad & M. A. Saleem. 2008. Cross-resistance and Genetics of Resistance to Indoxacarb in *Spodoptera litura* (Lepidoptera: Noctuidae). Journal of Economic Entomology 101:472-479.

Selby, T.P., G. P. Lahm, T.M. Stevenson, K.A. Hughes, D. Cordova, I.B. Annan, J.D. Barry, E.A. Benner, M.J. Currie & T.F. Pahutski. 2013. Discovery of Cyantraniliprole, A Potent and Selective Anthranilic Diamide Ryanodine Receptor Activator with Cross-spectrum Insecticidal Activity. Bioorganic & Medicinal Chemistry Letters 23:6341–6345.

Sertkaya, E., A. Bayram & S. Kornosor. 2004. Egg and Larval Parasitoids of The Beet Armyworm *Spodoptera exigua* on Maize in Turkey. Phytoparasitica 32:305–312.

Siqueira, H.A.A., R.N.C. Guedes, D. B. Fragoso & L. C. Magalhaes. 2001. Abamectin resistance and synergism in Brazilian populations of *Tuta absoluta* (Meyrick) (Lepidoptera: Gelechiidae). Intern. Jornal of Pest Management 47:247-251.

Shad, S.A., A.H. Sayyed & M.A. Saleem. 2010. Cross-resistance, Mode of Inheritance and Stability of Resistance to Emamectin in *Spodoptera litura* (Lepidoptera: Noctuidae). Pest Management Science 66:839-846.

Shad, S.A., A.H. Sayyed, S. Fazal, M. A. Saleem, S. M. Zaka & M. Ali. 2012. Field Evolved Resistance to Carbamates, Organophosphates, Pyrethroids and New Chemistry Insecticides in *Spodoptera litura* Fab. (Lepidoptera: Noctuidae). Journal of Pesticide Science 85:153-162

Soderlund, D. M., J. N. Sanborn & P. W. Lee. 1983. Metabolism or Pyrethrins and Pyrethroids in Insects, pp. 401-435. In D. H. Hulson and T. R. Robert.s reds.J, Progress in pesticide biochemistry, vol. 3. Wiley, New York, 729 pp.

Su, J & X-X. Sun. 2014. High Level of Metaflumizone Resistance and Multiple Insecticide Resistance in Field Populations of *Spodoptera exigua* (Lepidoptera: Noctuidae) in Guangdong Province, China. Crop Protection 61:58-63.

Tong, H., Q. Su, X. Zhou & L. Bai. 2013. Field Resistance of *Spodoptera litura* (Lepidoptera: Noctuidae) to Organophosphates, Pyrethroids, Carbamates and Four Newer Chemistry Insecticides in Hunan, China. Journal of Pesticide Science 86:599-609.

Trisyono, Y. A. 2004. Resistensi Serangga dan Tungau terhadap Insektisida dan Akarisida. Perkembangan dan Mekanisme. Makalah disampaikan pada Seminar Nasional Manajemen Resistensi Pestisda dalam Penerapan Pengelolaan Hama Terpadu 24-25 Februari 2004 Yogyakarta.

Ueno, T. 2015. Beet Armyworm *Spodoptera exigua* (Lepidoptera: Noctuidae): A Major Pest of Welsh Onion in Vietnam. Journal of Agriculture and Environmental Sciences 4:181:185.

Ullah, S., R. M. Shah & S. A. Shad. 2016. Genetics, Realized Heritability and Possible Mechanism of Chlorfenapyr Resistance in *Oxycarenus hyalinipennis* (Lygaeidae: Hemiptera). Pesticide Biochemistry and Physiology 133:91-96.

Wang, Y. R. Yu, X. Zhao, L. Chen, C. Wu, T. Cang & Q. Wang. *2012.* Susceptibility of Adult *Trichogramma nubilale* (Hymenoptera: Trichogrammatidae) to Selected Insecticides with Different Modes of Action. Crop Protection 34:76–82.

Wang, X., R. Wang, Y. Yang, S. Wu, A. O. O'Reilly & Y. Wu. 2016. A Point Mutation in The Glutamate-gated Chloride Channel of *Plutella xylostella* is Associated with Resistance to Abamectin. Insect Molecular Biology 25:116-125.

Wang, Y.H., S.G. Wu, Y.C. Zhu, J.C. Feng, Y. Liu, X.P. Zhao, Q. Wang, Z.L.X.P. Bo & J.L. Shen. 2009. Dynamics of Imidacloprid Resistance and Cross-resistance in The Brown Planthopper, *Nilaparvata lugens*. Pest Managagement Science 131: 20-29.

Wang, X., X. Xiang, H. Yu, S. Liu, Y. Yin, P. Cui, Y. Wu, J. Yang, C. Jiang & Q. Yang. 2018. Monitoring and Biochemical Characterization of Beta-cypermethrin Resistance in *Spodoptera exigua* (Lepidoptera: Noctuidae) in Sichuan Province, China. Pesticide Biochemistry and Physiology 146:71-79.

Wibisono, I. I., Y. A. Trisyono dan E. Martono. 2007. Evaluasi Resistensi terhadap Metoksifenosida pada *Spodoptera exigua* di Jawa. Jurnal Perlindungan Tanaman Indonesia 13:127-135.

Wu, Q.J., W. J. Zhang, Y. J. Zhang, B. Y. Xu & G. R. Zhu. 2002. Abamectin Resistance Selection and Its Cross-resistance Revealed in Diamondback Moth, *Plutella xylostella* L. Acta Phytophylacica Sinica 29:239–243.

Xia, Y., Y. Lu, J. Shen, X. Gao, H. Qiu & J. Li. 2014. Resistance Monitoring for Eight Insecticides in *Plutella xylostella* in Central China. Crop Protection 63:131-137.

Zhang, P., M. Gao, W. Mu, C. Zhou & X. H. Li. 2014. Resistant Levels of *Spodoptera exigua* to Eight Various Insecticides in Shandong, China. Journal of Pesticide Science 39:7-13.

Zhang, S., X. Zhang, J. Shen, K. Mao, H. You & J. Li. 2016. Susceptibility of Field Populations of The Diamondback Moth, *Plutella xylostella*, to a Selection of Insecticides in Central China. Pesticide Biochemistry and Physiology 132:38-46.

Zhou, C., Y. Liu, W. Yu, Z. Deng, M. Gao, F. Liu & W. Mu. 2011. Resistance of *Spodoptera exigua* to Ten Insecticides in Shandong, China. Phytoparasitica 39:315-324.

Zuo, Y., H. Ma, W. Lu, X. Wang, S. Wu, R. Nauen, Y. Wu & Y. Yang. 2019. Identification of The Ryanodine Receptor Mutation I4743M and Its Contribution to Diamide Insecticide Resistance in *Spodoptera exigua* (Lepidoptera: Noctuidae). Insect Science. doi:10.1111/17447917.12695.