

DAFTAR PUSTAKA

- Abao Jr.E.B., Bronson K.F., Wassmann R., and Singh U. 2000. Simultaneous RePPPOds of Methane and Nitrous Oxide Emission in Rice-Based Cropping Systems Under Rainfed Conditions. *Nutr. Cycl. Agroecosyst.* 58 : 131–139.
- Abdullah B., Prajitno K.S., Mudjisihono R. 2006. Keragaan beberapa genotipe padi menuju perbaikan mutu beras. Subang. Balai besar penelitian tanaman padi sukamandi. URL:https://www.academia.edu/14819915/3_Isi_ProSIDING_1_.pdf.
- Abelho M. 2016. Litter traits and decomposer complexity set the stage for a global decomposition model. *Funct. Ecol.* 30: 674–675
- Adachi M., Bekku Y.S., Kadir W.R., Okuda T., and Koizumi H. 2006. Differences in soil respiration between different tropical ecosystems. *Appl. Soil Ecol.* 34:258–265.
- Aiju D. and Mingxing W. 1996. Model for Methane Emission from Rice Fields and Its Application in Southern China (in Chinese). *Advance in Atmospheric Sciences.* 13 : 159–168.
- Alexandre M., Dubois P. 2000. Polymer-layered silicate nanocomposites: preparation. properties and uses of a new class of materials. Laboratory of Polymeric and Composite materials. University of mons-Hainaut. Belgium
- Alexander M. 1977. *Introducing to Soil Microbiology.* Second Ed. John Wiley and Sons. New York. 467p.
- Ali, R.I., N. Iqbal, M.U. Saleem, M. Akhtar. 2012. Efficacy of various organic manures and chemical fertilizers to improve paddy yield and economic returns of rice under rice-wheat cropping sequence. *Int. J. Agric. Appl. Sci.* 4:135–140.
- Al-Kaisi M.M., Xinhua Y., and Licht M.A. 2005. Soil carbon and nitrogen changes as affected by tillage system and crop biomass in a PPPOn-soybean rotation. *Applied Soil Ecology* (30) : 174–191.
- Anderson J.M. and Ingram J.S.I. 1993. Colorimetric determination of ammonium. *In: Tropical Soil Biology and Fertility : A Handbook of Methods* (Anderson J.M. & Ingram J.S.I. eds). CAB International. Wallingford. UK. pp. 73–74.
- Aoyama M., Angers D.A., N'Dayegamiye A., 1999. Particulate and mineral-associated organic matter in water-stable aggregates as affected by mineral fertilizer and manure application. *Can. J. Soil Sci.* 79. 295–302.
- Arsyad D.M. dan Sembiring H. 2003. Pengembangan tanaman kacang-kacangan di Nusa Tenggara Barat. *J. Litbang Pertanian* 22(1) : 9–15.
- Azkab M.H. 1999. Dekomposisi Lamun. *Oseana* Vol. XXIV. No. 4 : 11–20.
- Azri. 1999. Sifat Kering Tidak Balik Tanah Gambut dari Jambi dan Kalimantan Tengah. Analisis Berdasarkan Kadar Air Kritis. Kemasaman Total Gugus Dungsional COOH dan OH-fenolat. Tesis. Program Pasca Sarjana. IPB. Bogor. 245 Hlm.
- Bachelet D. and Neue H.U. 1993. Methane Emissions from Wetland Rice Areas of Asia. *Chemosphere.* 26 : 219–237.
- Badan Pusat Statistik 2009 Indonesia Dalam Angka 2009 Jakarta BPS
- Baggs E.M., Rees R.M., Smith K.A., and Vinten A.J.A. 2000. Nitrous oxide emission from soils after inPPPOporating crop residues. *Soil Use Manage.* 16: 82–87.
- Bakken L. and Dorsch P. 2007. Nitrous oxide emission and global warming. *In: Nitrogen in the Environment: Sourcess. Problems. and Management.* (J.L. Hatfields and J.L. Follet. eds). Elsevier. Inc. pp. 383–397.

- Bakshi M. and Varma A. 2011. Soil enzyme : The state-of-art. *In* Sukhla. G. and Varma. A. (Ed). Soil Enzymology. Soil Biology 22. Springer-Verlag Berlin Heidelberg. 391 pp.
- Balittanah. 2005. Petunjuk Teknis Analisis Kimia Tanah. Tanaman. Air dan Pupuk. Badan Litbang Pertanian. Departemen Pertanian. Bogor. 313 Halaman.
- Barchi M.F. 2006. Gambut: Agroekosistem dan Transformasi Karbon. Gadjah Mada University Press. Yogyakarta. 196 Halaman.
- Barlocher F. 2005. Chapter 6 Leaf Moss Estimated by Litter Bag Technique (Methods to Study Litter Decomposition. a Practical Guide). Springer. Netherlands.
- Berg B., and Mcclaugherty C. 2008. Plant Litter. Springer Berlin.
- Berg P., Klemetsson L., and Rosswall T. 1982. Inhibitory effect of low partial pressures of acetylene on nitrification. *Soil Biol. Biochem.* 14 : 301–303.
- Bharati K., Mohanty S. R., Singh D.P., Rao V.R., and Adhya T.K. 2000. Influence of inPPPOporation or dual cropping of Azolla on methane emission from a flooded alluvial soil planted to rice in eastern India. *Agri. Eco. Environ.* 79 : 73–83.
- Bhatia A., Pathak H., and Aggarwal P.K. 2004. Inventory of Methane and Nitrous Oxide Emissions from Agricultural Soils of India and Their Global Warming Potential. *Curent Science* 87 (3) : 317–324.
- Birkeland P.W. 1984. Soil and Geomorphology. Oxford University Press. New York. Oxford. 372 p.
- Boeckx P. and Cleemput O.V. 1996. Flux estimates from soil methanogenesis and methanotrophy : landfills. rice paddles. natural wetlands and aerobic soils. *Environ. Monitoring Assessment.* 42:189–207.
- Bollman A. and Conrad R. 1998. Influence of O₂ availability on NO and N₂O release by nitrification and denitrification in soils. *Global Change Biol.* 4: 387–396.
- Bothe H. and Ferguson S.J. 2007. *Biology of Nitrogen Cycles.* Elsevier.
- Bouwman A.F. 1990. Exchange of greenhouse gases between terrestrial ecosystems and the atmosphere. *In* Bouwman A. F. (ed.) *Soils and the greenhouse effects.* John Wiley & Sons. Chichester. New York. Brisbane. Toronto. Singapore.
- Brentrup F., Kusters J., Lammel J., and Kuhlmann H. 2000. Methods to estimate on field nitrogen emissions from crop production as an input to LCA studies in the agricultural sector. *Int. J. Life Cycle Assessment.* 5 : 349–357.
- Bu R., Lu J., Ren T., Liu B., Li X., and Cong R. 2015. Particulate Organic Matter Affects Soil Nitrogen Mineralization under Two Crop Rotation Systems. *PLoS ONE* 10(12): 1–17. e0143835. doi:10.1371/journal.pone.0143835
- Budiati Z.A. 2010. Akumulasi dan Tingkat Dekomposisi Bahan Organik di Bawah Tegakan Cemara Udang di Pantai Kuwaru. Yogyakarta. Skripsi Fakultas Kehutanan UGM.
- Cataldo D.A., Haroon M., Schrader L.E., and Young V. 1975. Rapid colorimetric determination of nitrate in plant tissue by nitration of salicylic acid. *Commun. Soil Sci. Plant Anal.* 6: 71–80.
- Cavigelli M.A. and Robertson G.P. 2001. Role of denitrifier diversity in rates of nitrous oxide consumption in a terrestrial ecosystem. *Soil. Biol. Biochem.* 33: 297–310.
- Cavigelli M.A. and Robertson G.P. 2000. The functional significance of denitrifier community composition in a terrestrial ecosystem. *Ecol.* 81: 1402–1414.
- Chan A.S.K. and Parkin T.B. 2000. Evaluation of potential inhibitors of methanogenesis and methane oxidation in a landfill cover soil. *Soil Biol. Biochem.* 32: 1581–1590.
- Changseng L.I. 2007. Quantifying greenhouse gas emission from soils : scientific basis and modelling approach. *Soil Sci. and Plant Nutr.* 53: 344352.

- Chen S., Zheng X., Wang D., Chen L., Xu C., and Zhang X. 2012. Effect of Long-Term Paddy-Uppland Yearly Rotations on Rice (*Oryzasativa*) Yield. Soil Properties. and Bacteria Community Diversity. The Scientific World Journal. Vol. 2012. article ID 279641. pp : 1–11. Doi:10.1100/2012/279641.
- Conrad R. 1989. Control of methane production in terrestrial ecosystems. Facultät für Biologie. Univerität Konstanz. Germany. In Andreae M.O. and Schimel D.S. (ed.) Exchange of trace gases between terrestrial ecosystems and the atmosphere. P : 39–58. John Wiley & Sons Ltd. Chichester. New York. Brisbane. Toronto. Singapore.
- Cornwell W.K., Cornelissen J.H.C., and Amatangelo K. 2008. Plant Species Traits are The Predominant Control on Litter Decomposition Rates Within Biomes Worldwide. *Ecol Lett.* 11 : 1065–1071.
- Cortons T.M., Bajita J. B., Grospe F.S., Pamplona R.R., Aziz J.C.A., Wassmann R., Lantin R.S., and Buendina L.V. 2000. Methane emission from irrigated and intensively managed rice fields in Central Luzon. Philippine. *Nutr. Cycl. Agroeco.* 58 : 37–53.
- Crow S.E. and Wieder R.K. 2005. Sources of CO₂ Emissions From a Northern Peatland : Root Respiration. Exudation and Decomposition. *Ecology.* 86 (7) : 1825–1834.
- Crutzen P. and Oppenheimer M. 2008. Learning about ozone depletion. *Climatic Change.* 89 : 143–145.
- Curtin D., Beare M.H., and Ramirez G.H. 2012. Temperature and moisture effects on microbial biomass and soil organic matter mineralization. *Soil Sci. Soc. Am. J.* 76 : 2055–2067.
- da Silva, C. F., Pereira, M. G., Gomes, J. H. G., Fontes, M. A., & da Silva, E. M. R. (2020). Enzyme activity, glomalin, and soil organic carbon in agroforestry systems. *Floresta e Ambiente*, 27(3). <https://doi.org/10.1590/2179-8087.071617>
- Davidson E.A. 1993. Soil water content and the ratio of nitrous oxide to nitric oxide emitted from soils. *Nutr. Cycl. Agroecosys.* 48 : 37–50.
- Davidson E.A. and Swank W.T. 1986. Environmental parameters regulating gaseous nitrogen losses from 2 forested ecosystems via nitrification and denitrification. *Appl. Environ. Microbiol.* 52 : 1287–1292.
- Davidson E.A., Swank W.T., and Perry T.O. 1986. Distinguishing between nitrification and denitrification as sources of gaseous nitrogen production in soil. *Appl. Environ. Microbiol.* 52: 1280–1286.
- Denman K.L., Brasseur A., Chidthaisong P., Ciais P., Cox P.M., Dickinson R.E., Hauglustaine D., Heinze C., Holland E., Jacob D., Lohmann U., Ramachandran S., da silva Dias P.L., Wofsy S.C., and Zhang X. 2007. Couplings between changes in the climate system and biochemistry. In: *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to The Fourth Assesment Report of the Intergovernmental Panel On Climate Change* (S. Solomon. D. Qin. M. Maning. Z. Chen. M. Marquis. K.B. Averyt. M. Tignor & H.L. Miller. eds).Cambridge University Press. Cambridge. United Kingdom
- Devanand A., Huang M., Ashfaq M., Barik B., and Ghosh S. 2019. Choice of Irrigation Water Management Practice Affects Indian Summer Monsoon Rainfall and Its Extremes. *Geophysical Research Letters.* 46(15): 9126–9135. <https://doi.org/10.1029/2019GL083875>
- Dobermann A. and Fairhurst T. 2000. Rice : Nutrient disorder and nutrient management. IRRI-Potash and Phosphate Institute. Los Banos. 203 pp.

- Donny D., Sunarminto B.H., dan Hanudin E. 2010. Dampak Perubahan Penggunaan Lahan Terhadap Emisi Gas CO₂ di Inceptisol KP4-UGM Kalitirto Kabupaten Sleman DIY. Tesis. Tidak Dipublikasikan. UGM. Yogyakarta. 130 hlm.
- Duxbury J.M., Harper L.A., and Mosier A.R. 1993. Contribution of agroecosystem to global climate change. *In: Agricultural Ecosystem Effects on Trace Gases and Global Climate Change* (L.A. Harper. A.R. Mosier. J.M. Duxbury & Roltson. D.E. eds). American Society of Agronomy. Inc.. Madison. Wisconsin. p : 1–18.
- Edmeades G.O., Banziger M., and Ribaut J.M. 2000. Maize improvement for drought-limited environments. *In: Physiological Bases for Maize Improvement* (M.E. Otegui & G.A. Slafer. eds). Food Products Press. New York. pp. 75–111.
- Ellert B.H. and Janzen H.H. 2008. Nitrous oxide, carbon dioxide and methane emissions from irrigated cropping systems as influenced by legumes, manure and fertilizer. *Canadian J. of Soil Sci.* pp : 207–217. <https://www.researchgate.net/publication/278967952>. DOI: 10.4141/CJSS06036
- Esmizade Z., Landi A., and Gilani A. 2010. Evaluating the amount of carbonic greenhouse gasses (GHGs) emission from rice paddies. *World Congress of Soil Science. Soil Solutions for a Changing World.* 1 – 6 August 2010. Brisbane. Australia. p : 68–70.
- FAO. 1990. *Guidelines for Soil Description*. 3rd Edition (Revised). Soil resources, management and conservation service. Land and Water Development Division. Food and Agriculture Organization of The United Nations. Rome.
- Feng J.F., Chen C.Q., Zhang Y., Song Z.W., Deng A.X., Zheng C.Y., Zhang W.J. 2013. Impacts of cropping practices on yield-scaled greenhouse gas emissions from rice fields in China: a meta-analysis. *Agric. Ecosyst. Environ.* 164. 220–228. <http://dx.doi.org/10.1016/j.agee.2012.10.009>.
- Fioretto A., Papa S., Sorrentino G., and Fuggi A. 2001. Decomposition of *Cistus Incanus* Leaf Litter in a Mediterranean Maquis Ecosystem : Mass Loss, Microbial Enzyme Activities and Nutrient Changes. *Soil Biology and Biochemistry.* 33 : 311–321.
- Firestone M.K. and Davidson E.A. 1989. Microbiological basis of NO and N₂O production and consumption in soil. *In: Exchange of Trace Gases between Terrestrial Ecosystems and the Atmosphere* (M.O. Andreae. & D.S. Schimel. eds). Wiley. Chichester. pp: 7–21.
- Firestone M.K. 1982. Biological denitrification. *In: Nitrogen Agricultural Soils* (F.J. Stevenson. ed). Agronomy Society of America. Madson.
- Firestone M.K., Firestone R.B., and Tiedje J.M. 1980. Nitrous oxide from soil denitrification : Factors controlling its biological production. *Science.* 208 : 749–751.
- Flessa H., Ruser R., Dorsch P., Kamp T., Jimenez M.A., Munich J.C., and Beese F. 2002. Integrated evaluation of greenhouse gas emissions (CO₂, CH₄, and N₂O) from two farming systems in southern Germany. *Agriculture, Ecosystems and Environment.* 91 : 175–189.
- Gabryszuk M., Barszczewski J., Kuźnicka E., and Sakowski T. 2020. Effect of long-term fertilization of the permanent dry meadow on the zinc content in soil and meadow sward. *Journal of Water and Land Development,* 47(1), 61–65.
- Gallardo A., and Merino J. 1993. Leaf decomposition in two mediterranean ecosystems of southwest Spain: influence os substrate quality. *Ecology.* 74: 152–161. [http://refhub.elsevier.com/S1550-7424\(20\)30071-3/sbref0015](http://refhub.elsevier.com/S1550-7424(20)30071-3/sbref0015)
- García-palacios P., Maestre F.T., Kattge J., and Wall D.H. 2013. Climate and litter quality differently modulate the effects of soil fauna on litter decomposition across biomes. *Ecology Letters.* 16: 1045–1053.

- García-Palacios P., Mckie B.G., Handa I.T., Frainer A., and Hättenschwiler S. 2016. The importance of litter traits and decomposers for litter decomposition: a comparison of aquatic and terrestrial ecosystems within and across biomes. *Functional Ecology*. 30: 819–829.
- Ghazali M.F., Wikantika K., Harto A.B., and Kondoh A. 2020. Generating soil salinity, soil moisture, soil pH from satellite imagery and its analysis. *Information Processing in Agriculture*, 7(2): 294–306. <https://doi.org/10.1016/j.inpa.2019.08.003>
- Gholinejad B., and Jaffari H.J. 2020. Effect of environmental traits and grazing intensities on plant community distribution (case study: Saral Rangelands, Iran). *Journal of Rangeland Science*, 10(2): 162–171.
- Giraud G. 2013. The World Market of Fragrant Rice, Main Issues and Perspectives. *International Food and Agribusiness Management Review*. 16(2): 1–20
- Golabi M.H., Galsim F.P., Endale D., Tareyama S.A., and Iyekar C. 2021. Agronomic value of composted organic waste application on porous soils of northern guam. *Malaysian Journal of Soil Science*, 25(April), 143–160.
- Goncalves J.L.M. and Carlyle J.C. 1994. Modelling the influence of moisture and temperature on net nitrogen mineralization in forested sandy soil. *Soil Biol. Biochem.* 26 : 1557–1564.
- Govaerts B., Mezzalama M., Sayre K.D., Crossa J., Lichter K., Troch V., Vanherck K., PPPOte P.D., and Deckers J. 2008. Longterm consequences of tillage. residue management. and crop rotation on selected soil micro-flora groups in the subtropical highlands. *Applied Soil Ecology* 38 : 197–210.
- Graca M.A.S. 2005. *Methods to Study Litter Decomposition*. Published by Springer. AA Dodrecht. The Netherland.
- Granger J. and Ward B.B. 2003. Accumulation of nitrogen oxides in copper limited culture of denitrifying bacteria. *Limnol. Oceanol.* 48: 3–13.
- Grayston S.J., Vaughan D., and Jones D. 1996. Rhizosphere carbon flow in trees. *In* Comparison with annual plants : The importance of root exudation and its pact on microbial activity and nutrient availability. *Applied Soil Ecology*. Vol. 5 : 29–56.
- Guo L.B. and Sims R.E.H. 1999. Litter Decomposition and Nutrient Release via Litter Decomposition in New Zealand Eucalypt Short Rotation Forests. *Jurnal Agriculture. Ecosystems and Environment*. 75 : 133–140.
- Gutierrez J., Atulba S.L., Kim G., Kim P.J. 2014. Importance of rice root oxidation potential as a regulator of CH₄ production under waterlogged conditions. *Biology and Fertility of Soils*. 50(5) :861–868.
- Hadi M. 2005. Teknik berkebun kelapa sawit. Adicita Karya Nusa. Yogyakarta. 176 p.
- Hambali A. dan Lubis I. 2015. Evaluasi produktivitas beberapa varietas padi. *Bul.Agrohorti* (3) 2: 137–145.
- Hairiah K. dan Rahayu S. 2007. Pengukuran Karbon Tersimpan di Berbagai Macam Penggunaan Lahan. Bogor : World Agroforestry Centre – ICRAF. SEA Reional Office. University of Brawijaya. Indonesia. 77 p.
- Halvorson A.D., Grosso S.J.D., and Reule C.A. 2008. Nitrogen. Tillage. and Crop Rotation Effects on Nitrous Oxide Emissions from Irrigated Cropping Systems. *J. Environ. Qual.* 37 : 1337–1344. doi:10.2134/jeq2007.0268.
- Hao Q., Jiang C., Chai X., Huang Z., Fan Z., Xie D., He X. 2016. Drainage. no-tillage and crop rotation decreases annual cumulative emissions of methane and nitrous oxide from a rice field in Southwest China. *Agriculture. Ecosystems and Environment*. 233 : 270–281. <http://dx.doi.org/10.1016/j.agee.2016.09.026>

- Hardjowigeno S. dan Rayes M.L. 2005. Tanah sawah karakteristik, kondisi dan permasalahan tanah sawah di Indonesia. Cetakan pertama. Bayumedia Publishing. Malang. Jawa Timur.
- Harisuseno D., and Cahya E.N. 2020. Determination of soil infiltration rate equation based on soil properties using multiple linear regression. *Journal of Water and Land Development*, 47(1), 77–88. <https://doi.org/10.24425/jwld.2020.135034>
- Haryanto T.A.D. 2005. Perbedaan Kandungan 2,acetyl-1-pyrrolin dan Hasil Biji Empat Kultivar Padi Pada Dua Lokasi Tanam. *Pembangunan Pedesaan*. 5(1):50–53.
- Haynes R.J. 2000. Labile organic matter as an indicator of organic matter quality in arable and apstoral soil in New Zealand. *Soil Biology and Biochemistry*. Vol. 32 : 211–219.
- He Y., Lehndorft E., Amelung W., Wassmann R., and Alberto Ma.C. 2017. Drainage and Leaching Losses of Nitrogen and Dissolved Organic Carbon after Introducing Maize into a Continuous Paddy-rice Crop Rotation. *Agriculture. Ecosystems and Environment* 249 (2017) 91–100. <http://dx.doi.org/10.1016/j.agee.2017.08.021>.
- Hergoualc'h K. and Verchot L.V. 2011. Stocks and Fluxes of Carbon Associated with Land Use Change in Southeast Asia Tropical Pearlands : a Review. *Global Biogeochemical Cycles*. 25 : 1–13.
- Hidayat A., Djaenudin D., Subardjo H., dan Subardja D. 2004. Petunjuk teknis pengamatan tanah. Balai Penelitian Tanah. Balai Besar Litbang Sumber Daya Lahan Pertanian. Badan Penelitian dan Pengembangan Pertanian. Departemen Pertanian. Bogor.
- Hirano T., Segah H., Kusin K., Limin S., Takahashi H., and Osaki M. 2009. Effects on Disturbances on Carbon Balance of Tropical Peat Swamp Forest. *Global Change Biology*. 18 : 3410–3422.
- Hobbie S.E. 1996. Temperature and Plant Species Control Over Litter Decompositioan in Alaska Tundra. *Ecol Monogr*. 66 : 503–522.
- Hooijer A., Page S., Canadell J.G., Kwadijk J., Wösten H., and Jauhiainen J. 2010. Current and future CO₂ emissions from drained peatland in Southeast Asia. *Biogeosciences*. 7 : 1505–1514.
- Hossain M.Z., Akter F., and Kibria K.Q. 2019. Effects of organic amendments and incubation time on the amelioration of saline soils. *Malaysian Journal of Soil Science*, 23: 99–108.
- Hou A.X., Chen G.X., Wang Z.P., van Cleemput O., and Patrick Jr. W.H. 2000. Methane and nitrous oxide emissions from a rice field in relation to soil redox and microbiological processes. *Soil Sci. Soc. Am. J.* 64 : 2180–2186.
- Hu A., Angerer J., Duan Y., Xu L., Chang S., Chen X., and Hou F. 2020. Effects of terrain on litter decomposition and nutrient release in typical steppe os Eastern Gansu Loess Plateau. *Rangeland Ecology & Management*. 73: 611–618. <https://doi.org/10.1016/j.rama.2020.06.004>.
- Hu A., Duan Y., Xu L., Chang S., Chen X., Hou J. 2021. Litter decomposes slowly on shaded steep slope and sunny gentle slope in a typical steppe ecoregion. *Ecology and Evolution*. 11: 2461–2470. DOI: 10.1002/ece3.6933.
- Hu Z., and Ma R. 2021. Distribution and characteristic of nitrite-dependent anaerobic methane oxidation bacteria by comparative analysis of wastewater treatment plants and agriculture fields in northern China. *PeerJ*, 4(December). <https://doi.org/10.7287/peerj.preprints.2421>
- Hu X.K., Su F., Ju X.T., Gao B., Oenema O., Christie P., Huang B.X., Jiang R.F., and Zhang F.S. 2013. Greenhouse gas emissions from a wheat-maize double cropping system with different nitrogen fertilization regimes. *Environ. Pollut.* 176 : 198–207.

- Huang T., Gao B., Christie P., and Ju X. 2013. Net global warming potential and greenhouse gas intensity in a double-cropping cereal rotation as affected by nitrogen and straw management. *Biogeosciences*. 10 : 7.897–7.911. doi:10.5194/bg-10-7897-2013.
- Huang Y., Zou J.W., Zheng X.H., Wang Y.S., and Xu X.K. 2004. Nitrous oxide emissions as influenced by amendment of plant residues with different C : N ratios. *Soil Biol. Biochem.* 36 : 973–981.
- Husin Y.A., Murdiyarto D., Khalil M.A.K., Rasmussen R.A., Shearer M.J., Sabiham S., Sunar A., and Adijuwana H. 1995. Methane Flux from Indonesian Wetland Rice: The Effects of Water Management and Rice Variety. *Chemosphere*. Vol. 31. No. 4. p : 3153–3180.
- Hutchinson G.L. and Davidson E.A. 1993. Processes for production and consumption of gaseous nitrogen oxides in soil. In: *Agricultural Ecosystem Effects on Trace Gases and Global Climate Change* (L.A. Harper. A.R. Mosier. J.M. Duxbury & D.E. Rolston. eds). Spec Publishers. Madison. pp. 79–93.
- Hutchinson G.L. and Mosier A.R. 1981. Improved soil cover method for field measurement of nitrous oxide fluxes. *Soil Sci. Soc. Am. J.* 45 : 311–316.
- Hynes R. and Knowles R. 1978. Inhibition by acetylene of ammonia oxidation in *Nitrosomonas europaea*. *FEMS Microbiol. Lett.* 3 : 19–21.
- Ikawati. 2007. Usia bumi tinggal seabad lagi?. *Kompas*. p. 44.
- Inubushi K., Furukawa Y., Hadi A., Purnomo E., and Tsuruta H. 2001. Methane emission from rice cultivation. *Agriculture: Rice Cultivation*. Chapter 4.3. OECD Paris-France.
- IPCC (Intergovernmental Panel on Climate Change). 2007. *Climate change 2007. Forth assessment report : Synthesis Report*. Geneva : IPCC. 2007. www.ipcc.ch
- IPCC. 2005. *Special Report on CO₂ Capture and Storage*. Cambridge University Press. Cambridge. UK 431 pp.
- Irawan B. 2004. *Dinamika produktivitas dan kualitas budidaya padi sawah Dalam Ekonomi Padi dan Beras Indonesia* Badan Litbang Pertanian. Deptan. Jakarta. 435 hal.
- Jain M.C., Kumar S., Wassmann R., Mitra S., Singh S.D., Singh J.P., Singh R., Yadav A.K., and Gupta S. 2000. Methane emission from irrigated rice fields in Northern India. *New Delhi. Nutr. Cycl. Agroeco.* 58 : 75–83.
- Janzen H.H., Campbell C.A., Izzaualde R.C., Ellert B.H., Juma N., and McGill W.B. 1998. Management effects on soil C storage on Canadian prairies. *Soil and Tillage Research*. Vol. 47 : 181–195.
- Janzen H.H. 2004. Soil carbon dilemma : Shall we hoard it or use it ? *Soil Biology and Biochemistry*. Vol. 38 : 419–424.
- Jiang C.S., Wang Y.S., Zheng X.H., Zhu B., Huang Y., Hao Q.J. 2006. Methane and nitrous oxide emissions from three paddy rice based cultivation systems in Southwest China. *Adv. Atmos. Sci.* 23 (3). 415–424.
- Jianwen Z., Yao H., Lianggang Z., Xunhua Z., and Yuesi W. 2004. Carbon Dioxide. Methane. and Nitrous Oxide Emissions from a Rice-Wheat Rotation as Affected by Crop Residue InPPPOperation and Temperature. *Advances in Atmospheric Sciences*. 21 (5) : 691–698.
- Jiao S., Yang Y., Xu Y., Zhang J., and Lu Y. 2020. Balance between community assembly processes mediates species coexistence in agricultural soil microbiomes across eastern China. *ISME Journal*, 14(1), 202–216. <https://doi.org/10.1038/s41396-019-0522-9>
- Juliano B.O. 1994. *Criteria and Test for Rice Grain Quality*. In : *Rice Chemistry and Technology* (B.O. Juliano, ed., 1994). St. Paul, Minnesota: American Association of Cereal Chemists.

- Kanakidau M., Keller M., Melillo J.M., and Zavarria G.A. 1989. Trace gas exchange and the chemical and physical climate. critical interactions. *In* : Exchange of Trace Gases between Terrestrial Ecosystems and the Atmosphere (Andrea M.O. and Schimel D.S. eds). John Wiley & Sons Ltd. Chichester. pp. 303–320.
- Karama S. 2001. Pertanian organik Indonesia kini dan nanti. Makalah Seminar. Disajikan pada Seminar Penggunaan Cendawan Mikoriza dalam Sistem Pertanian Organik dan Rehabilitasi Lahan Kritis. UNPAD Bandung.
- Katsvairo T., Cox W.J., and van Es H. 2002. Tillage and rotation effects on soil physical characteristics. *Agron. J.*94 : 299–304.
- Kennedy A.C., Stubbs T.L., and Schillinger W.F. 2004. Soil and Crop Management Effects on Soil Microbiology. *In* : Magdoff. F.. and Weil. R. R. editor. Soil Organic Matter in Sustainable Agriculture. (US) : CRC Press.
- Khosa M.K., Sidhu B.S., and Benbi D.K. 2010. Effect of organic materials and rice cultivars on methane emission from rice field. *Journal of Environmental Biology.* 31 : 281–285.
- Kimura S.D., Melling L., and Goh K.J. 2012. Influence of Soil Agregate Size on Greenhouse Gas Emission and Uptake Rate from Tropical Peat Soil in Forest and Different Oil Palm Development. *Geoderma.* 185 – 186 : 1–5.
- Kimura M., Murase J., and Lu Y. 2004. Carbon Cycling in Rice Field Ecosystems in The Context of Input. Decomposition and Translocation of Organic Materials and The Fates of Their Ends Product (CO₂ dan CH₄). *Soil Biology and Biochemistry.* 36 : 1399–1416.
- Knorr W. 2009. Is the airborne fraction of anthropogenic CO₂ emissions increasing? *Geophysics. Res. Lett.* 36 : 21–30.
- Knowles R. 1982. Denitrification. *Microbiological Reviews.* 46 : 43–70.
- Ko J.Y. and Kang H.W. 2000. The effect of cultural practices on methane emission from rice fields. *Nutr. Cycl. Agroeco.* 58 : 311–314.
- Kusumaningrum H.P., Yuwono T., Rustini S., dan Silitonga T.S. 2015. Padi Lokal Pulau Jawa : Suatu Antisipasi Perubahan Iklim. UNDIP dan Balitbangtan Pertanian. 102 hlm.
- Kusyakov Y. 2006. Source of CO₂ efflux soil and review of partitioning methods. *Soil Biol. Biochem.* 38 : 425–448.
- Kyne R., Holling P., Jansen N.H., and Cooke D.R. 2013. Supergene and Hypogene Halloysite in a Porphyry-Epithermal Environment at Cerro la Mina. Chiapas. Mexico. *Economic Geology* August 2013v. 108 no. 5 p. 1147–1161
- Kyuma K. 2004. Paddy Soil Science. Kyoto University Press. Japan.
- Lal R. 2001. World cropland soil as a source or sink for atmospheric carbon. *In* Spark D.I. Ed Advance in agronomy. California USA. Academic Press. p : 145–191.
- Lal R. 2002. Why carbon sequestration in agriculture soils. *Nutrient Cycling in Agroecosystems.* Vol. 61 : 1–6.
- Lal R. 2004. Agricultural activities and the global carbon cycles. *Nutrient Cycling in Agroecosystems.* Vol. 70 : 103–116.
- Lambert H., Chapin III F.S., and Pons T. 1998. *Plant Physiological Ecology.* Springer-Verlag. New York.
- Las I., Setyanto P., Nugroho K., Mulyani A., dan Agus F. 2011. Perubahan Iklim dan Pengelolaan Lahan Gambut Berkelanjutan. Balitbangtan Pertanian. Indonesia Climate Change Trust Fund (ICCTF). Bappenas. Bogor. 21 pp.
- Las I., Subagyo K., dan Setyanto A. P. 2006. Isu dan pengelolaan lingkungan dalam revitalisasi pertanian. *Jurnal Litbang Pertanian.* 25 : 106–113.
- Las, I., Widiarta, I.N., Suprihatno, B. 2004. Perkembangan varietas dalam perpadian nasional. Dalam: Makarim, A.K., editor. *Inovasi Pertanian Tanaman Pangan.* Bogor. Pusat Penelitian dan Pengembangan Tanaman Pangan. hlm 1–25.

- Le Mer J. and Roger P. 2001. Production, oxidation, emission and consumption of methane by soils: A review. *Eur. J. Soil Biol.* 37 : 25–50.
- Letey J., Valoras N., Focht D.D., and Ryden J.C. 1981. Nitrous oxide production and reduction during denitrification as affected by redox potential. *Soil Sci. Soc. Am. J.* 45 : 727–730.
- Li C. 2007. Quantifying green house gas emission from soils: Scientific basis and modeling approach. *Jap. Soil Sci. Plant Nutr.* 53 : 344–352.
- Li J., Chen H., and Zhang C. 2020. Impacts of climate change on key soil ecosystem services and interactions in Central Asia. *Ecological Indicators*, 116(May), 106490. <https://doi.org/10.1016/j.ecolind.2020.106490>
- Liu C., Wang K., and Zheng X. 2012. Responses of N₂O and CH₄ fluxes to fertilizer nitrogen addition rates in an irrigated wheat-maize cropping system in northern China. *Biogeosciences*. 9 : 839 – 850. doi:10.5194/bg-9-839-2012.
- Liu Y., Wan K., Tao Y., Li Z., Zhang G., Li S., and Chen F. 2013. Carbon Dioxide Flux from Rice Paddy Soils in Central China: Effects of Intermittent Flooding and Draining Cycles. *Journal Pone*. 0056562. February 20. doi: 10.1371.
- Liu Y., Wang L., He R., Chen Y., Xu Z., Tan B., Zhang L., Xiao J., Zhu P., Chen L., Guo L., and Zhang J. 2019. Higher soil fauna abundance accelerates litter carbon release across an alpine forest-tundra ecotone. *Nature. Scientific reports*. 9:10561. <https://doi.org/10.1038/s41598-019-47072-0>.
- Loretta T., Nastri A., and Baldoni G. 2016. Long-term effects of crop rotation, manure fertilization on carbon sequestration and soil fertility. *European Journal of Agronomy*. 74 : 47–55.
- Lu Y., Arah J.R.M., Wassmann R., and Neue H.U. 2000. Simulation of methane production in anaerobic rice soils by a simple two-pool model. *Nutr. Cycl. Agroecosyst.* 58 : 277–283.
- Lubis S. 2007. Preparasi bentonit terpillar alumina dari bentonit alam dan pemanfaatannya sebagai katalis pada reaksi dehidrasi etanol, 1-propanol serta 2-propanol. *Jurnal Rekayasa Kimia dan Lingkungan*. 6(2): 77–81.
- Luo Y. and Zhou X. 2006. *Soil Respiration and The Environment*. Academic Press. Elsevier. p.
- Ma Y.C., Kong X.W., Yang B., Zhang X.L., Yan X.Y., Yang J.C., and Xiong Z.Q. 2013. Net global warming potential and greenhouse gas intensity of annual rice-wheat rotations with integrated soil-crop system management. *Agr. Ecosyst. Environ.* 164 : 209–219.
- Magdoff F. and Weil R.R. 2004. *Soil Organic Matter Management Strategies*. in : Magdoff F. Weil R.R. editor. *Soil Organic Matter in Sustainable Agriculture*. Boca Raton (US) : CRC Pr.
- Makarim A.K., Pasaribu D., Zaini Z., dan Las I. 2005. Analisis dan sintesis pengembangan model pengelolaan tanaman terpadu padi sawah. *Balai Penelitian Tanaman Padi*. 18 halaman. ISBN 979-540-023-1.
- Manoharachary C. and Mukerji K.G. 2006. *Rizosphere Biology – an Overview*. p : 1 – 15. In : Mukerji. K.G., Manoharachary C., Singh J. (Eds). *Microbial Activity in The Rizosphere*. *Soil Biology*. Vol. 7. Springer-Verlag Berlin. Heidelberg.
- Mariott E.E. and Wander M.M. 2006. Total and labile soil organic matter in conventional and organic farming system. *Soil Sci.Soc.Am.J.* Vol. 70 : 950–959.
- Mateus R. 2014. Peranan legum penutup tanah tropis dalam meningkatkan simpanan karbon organik dan kualitas tanah serta hasil jagung (*zea mays* L.) di lahan kering. Disertasi. Program Doktor. Prodi Ilmu Pertanian. Pascasarjana. UDAYANA. Denpasar. 193 hal. Non publikasi.

- McCarty G., Bremner J., and Schmidt E. 1991. Effects of phenolic acids on ammonia oxidation by terrestrial autotrophic nitrifying microorganisms. *FEMS. Microbiol. Ecol.* 85 : 345–349.
- McClaugherty C.A., and Berg B. 1987. Cellulose, lignin and nitrogen concentrations as rate regulating factors in late stages of forest litter decomposition. *Pedobiologia.* 30: 101–112.
- Meijide A., Garcia-Torres L., Arce A., and Vallejo A. 2009. Nitrogen oxide emissions affected by organic fertilization in a non-irrigated mediterranean barley field. *Agric. Ecosyst. Environ.* 106–115.
- Meiviana A., Sulistiowati D.R., dan Soejachmoen M.H. 2004. Bumi makin panas. ancaman perubahan iklim di Indonesia. Kementerian Lingkungan Hidup dan Yayasan Pelangi Indonesia. Jakarta. 61 hlm.
- Miah M.N.H., Yoshida T., Yamamoto Y., Nitta Y. 1996. Characteristics of dry matter production and partitioning of dry matter in yielding semi dwarf indica and japonicaindica hybrid rice varieties. *J.Crop Sci.* 65:672–685.
- Mikha M.M., Rice C.W. 2004. Tillage and manure effects on soil and aggregate associated carbon and nitrogen. *Soil Sci. Soc. Am. J.* 68, 809–816.
- Miller D.J. and Nicholas D.J.D. 1985. Characterization of a soluble cytochrome oxidase/nitrite reductase from *Nitrosomonas europaea*. *J. Gen. Microbiol.* 131 : 2851–2854.
- Minamikawa K. and Sakai N. 2006. The Effect of Water Management Based on Soil Redox Potential on Methane Emission from Two Kinds of Paddy Soils in Japan. *Agric. Ecosyst. Environ.* 107 : 397–407.
- Mindawati N. dan Pratiwi. 2008. Kajian Penetapan Daur Optimal Hutan Tanaman *Acacia mangium* ditinjau dari Kesuburan Tanah. *Jurnal Penelitian Hutan Tanaman.* Vol. V. No. 2 : 109–118.
- Mokaya R. and Jones W.I.J. 1995. *Catal.* 153:76-85
- Moore T.R., Trofymom J.A., Siltanen M., Prescott C., and CIDET Working Group. 2004. Patterns of Decomposition and Carbon, Nitrogen and Phosphorus Dynamic of Litter in Upland Forest and Peatland Sites in Central Canada. *Can. J. For. Res.* 35 : 133–142.
- Montgomery D.C. and Peck E.A. 1991. Introduction to linear regression analysis. Variable selection and model building. John Wiley and Sons. Inc.
- Mosier A.R., Halvorson A.D., Reule C.A., and Liu X.J. 2006. Net global warming potential and greenhouse gas intensity in irrigated cropping systems in northeastern Colorado. *J. Environ. Qual.* 35 : 1584–1598.
- Mosier A.R., Bronson K.F., Freney J.R., and Keerthisinghe D.G. 1994. Use Nitrification Inhibitors to Reduce Nitrous Oxide Emission from Urea Fertilized Soils. In *CH₄ and N₂O : Global Emissions and Controls from Rice Field and Other Agricultural and Industrial Sources.* NIAES. p : 187–196.
- Motschenbacher JM, Brye KR, Anders MM, Gbur EE, Slaton NA, Evans-White MA. 2014. Long-Term Crop Rotation, Tillage, and Fertility Effects on Soil Carbon and Nitrogen in Dry-Seeded, Delayed-Flood Rice Production Systems. *Intech.* <http://www.intechopen.com/books/co2-sequestration-and-valorization>. Chapter 5. Pp: 129 – 156. <http://dx.doi.org/10.5772/57064>.
- Moyano F.E., Vasilyeva N., Bouckaert L., Cook F., Craine J., Curiel Yuste J., Don A., Epron D., Formanek P., Franzluebbers A., Ilstedt U., Katterer T., Orchard V., Reichstein M., Rey A., Ruamps L., Subke J.A., Thomsen I.K., and Chenu C. 2012. The moisture response of soil heterotrophic respiration: interaction with soil properties. *Biogeosciences.* 9 : 1173–1182.
- Muamar S., Triyono A., Tusi dan Rosadi B. 2012. Analisis neraca air tanaman jagung (*Zea mays*) di Bandar Lampung. *J. Teknik Pertanian Lampung* 1(1) : 1–10.

- Murdiyarso D. 2003. CDM : Mekanisme Pembangunan Bersih. Wetland International. Institut Pertanian Bogor. Hlm : 1–5.
- Munch J.C. and Velthof G.L. 2007. Denitrification and Agriculture in Biology of Nitrogen Cycle. *In: Biology of the Nitrogen Cycle* (Bothe H., Ferguson S.J., and Newton W.E. eds). First Edition. Elsevier. Amsterdam. pp. 331–341
- Neider R. and Benbi D.K. 2008. Carbon and Nitrogen in Terrestrial Environment. Springer. Germany.
- Neue H.U., Becker-Heidmann P., and Scharpenseel H.W. 1990. Organic Matter Dynamics. Soil Properties and Cultural Practices in Ricelands and Their Relationship to Methane Production. p : 457–466. *In* Bouwman. A. F. (Ed). Soil and Greenhouse Effect. Wiley. Cjichester. UK.
- Neue H.U. 1993. Methane emission from rice fields: Wetland rice fields may make a major contribution to global warming. *BioScience*. 43(7): 466–473.
- Neue H.U. and Roger P.A. 1993. Rice Agriculture : Factors Controlling Emission. *in* M. A. K. Khalil (ed.). *Global Atmospheric Methane : Sources, Sinks and Role in Global Change*. NATO ASI Ser. I. Global Environmental Change. Vol. 13. Springer. Berlin Heidelberg New York. pp. 254–298.
- Neue H.U. and Sass R. 1994. Trace Gas Emission from Rice-fields. *in* R. Prinn (ed.). *Global Atmospheric-biospheric Chemistry*. Plenum Press. New York. pp. 119–148.
- Neue H.U., Wassmann R., and Lantin R.S. 1995. Mitigation Options for Methane Emissions from Rice Fields. p : 136–144 *in* Peng. S.. K. T. Ingram. H. U. Neue. L. H. Ziska (Eds). *Climate Change and Rice*. Springer – Intern. Rice Res. Institute.
- Nishita G. and Joshi N.C. 2010. Growth and yield response of chickpea (*Cicer arietinum*) to seed inoculation with *Rhizobium* sp. *Nat. Sci*. 8 : 232–236.
- NOSC. 2008. Panduan pelatihan SRI Organik. Nagrak Organic Center. Sukabumi.
- Olsen S.R. and Sommer L.E. 1982. Phosphorus. *Dalam: Page. A.L.. R.H. Miller and D.R. Keeney. (Eds). Methods of Soil Analysis. II. Chemical and microbiological properties*. ASA. Madison. Wisconsin. WI. 403–430 p.
- Opoku A., Chaves B., DeNeve S. 2014. Neem seed oil: A potent nitrification inhibitor to control nitrate leaching after inPPPOperation of crop residues. *Biological Agriculture and Horticulture*. 30(3) :145–152.
- Osono T. and Takeda H. 2006. Fungal Decomposition of *Abies* Needle and *Betula* Leaf Litter. *Jurnal Mycologia*. 98 : 172–179.
- Padmini O.S., Tohari, Prayitno D., dan Syukur A. 2008. Kombinasi Pupuk Organik-NPK dalam Rotasi Tanaman Berbasis Padi untuk Peningkatan Sifat Kimia Tanah dan Hasil Padi. *Ilmu Pertanian* 15(1) : 59–68.
- Pandey K.R., Shah S.C., and Becker M. 2008. Management of native soil nitrogen for reducing nitrous oxide emissions and higher rice production. *J. Agr. Environ*. 9 : 1–9.
- Parihar S.S. Effect of crop-establishment method, tillage, irrigation and nitrogen on production potential of rice (*Oryza sativa*)-wheat (*Triticum aestivum*) cropping system. *Indian J. Agron*. 49: 1–5.
- Park S., Perez T., Boering K.A., Trumbore S.E., Gil J., Marquina S., and Tyler S.C. 2011. Can N₂O stable isotopes and isotopomers be useful tools to characterize sources and microbial pathways of N₂O production and consumption in tropical soils? *Global Biogeochem. Cycl*. 25: 1001–1012.
- Parton W., Silver W.L., Burke I.C., Grassens L., Harmon M.E., Currie W.S., King J.Y., Adair E.C., Brandt L.A., Hart S.C., and Fasth B. 2007. Global-scale similarities in nitrogen release patterns during long-term decomposition. *Science*. 315: 361–364. 10.1126/science.1134853.

- Pastor J. and Bockheim J.G. 1984. Distribution and Cycling of Nutrients in an Aspen-mixed-hardwood-spodooscool System in Northern Wisconsin. *Ecology*. 63 : 339–353.
- Patrick W.H. and Reddy C.N. 1978. Chemical Changes in Rice Soils. *In Soils and Rice*. International Rice Research Institute. Los Banos.
- PEACE. 2007. Indonesia dan Perubahan Iklim : Status Terkini dan Kebijakannya. Bank Dunia. DFID. PEACE. 84 pp.
- Pinnavaia T.J. 1983. *Science*. 220:3365
- Ponnamperuma F.A. 1985. Straw as Source of Plant Nutrients for Wetland Rice. p : 117–136 *in* : Organic Matter and Rice. Intern. Rice Res. Institute. Los Banos. Philippines.
- Prasetyo B.H., Sri Adiningsih J., Subagyono K., dan Simanungkalit R.D.M. 2004. Mineralogi. Kimia. Fisika. dan Biologi Tanah Sawah. p : 29 – 82 *dalam* Agus. F.. A. Adimihardja. S. Hardjowigeno. A. M. Fagi. W. Hartatik (Eds). Tanah Sawah dan Teknologi Pengelolaannya. Puslittanak. Bogor.
- Prihastuti. 2011. Struktur Komunitas Mikroba Tanah dan Implikasinya dalam mewujudkan sistem pertanian berkelanjutan. *Jurnal El-Hayah* 1(4) : 174–181.
- Puslitbangtan. 2016. Deskripsi varietas Unggul Tanaman Pangan 2010 – 2016. Kementan. Jakarta. 152 hlm.
- Raharjo P. dan Sarmili L. 2016. Keterdapatn mineral lempung smektit yang mempunyai sifat plastisitas tinggi di perairan Cirebon, Jawa Barat. *Jurnal Geologi Kelautan*. Vol. 14 (1) : 53–64.
- Rahn C.R., Bending G.D., Turner M.K., Lillywhite R.D. 2003. Management of N mineralization from crop residues of high N content using amendment materials of varying quality. *Soil Use Management* 19:193–200.
- Rashid M.F.M., and Majid A.H.A. 2020. Effect of different temperatures on the degradation rate and half-life of termiticides in tropical soils under laboratory condition. *Malaysian Journal of Soil Science*, 24(September), 33–48.
- Rayes M.L. 2000. Karakteristik, genesis dan klasifikasi tanah sawah berasal dari bahan vulkan Merapi. Disertasi Doktor. Program Pascasarjana, IPB. Bogor.
- Reddy K.R. and DeLaune R.D. 2008. Biogeochemistry of Wetlands. Science and Application. CRC Press. New York.
- Rezaee L., Moosavi A.A., Davatgar N., and Sepaskhah A.R. 2020. Soil quality indices of paddy soils in Guilan province of northern Iran: Spatial variability and their influential parameters. *Ecological Indicators*. 117. 106566. <https://doi.org/10.1016/j.ecolind.2020.106566>
- Ritchie G.A. and Nicholas D.J. 1974. The partial characterization of purified nitrite reductase and hydroxylamine oxidase from *Nitrosomonas europaea*. *Biochem. J.* 138 : 471–480.
- Robertson G.P., Paul E.A., and Harwood R.R. 2000. Greenhouse gases in intensive agriculture: Contributions of individual gases to the radiative forcing of the atmosphere. *Science*. 289 : 1922–1925.
- Rodeghiero M., Heinmeyer A., Schrupf M., and Bellamy. 2009. Determination of carbon stock and changes. *In* Kutsch W. L., Bahn M., and Heinmeyer A. (Ed). Soil carbon dynamics : An integrated Methodology. New York : Cambridge University Press.
- Rosmarkam A. dan Yuwono N.W. 2002. Ilmu Kesuburan Tanah. Kanisius. Yogyakarta. 224 hlm.
- Sainju U.M., Stevens W.B., Caesar-TonThat T., Liebig M.A. 2012. Soil Greenhouse Gas Emissions Affected by Irrigation, Tillage, Crop Rotation, and Nitrogen Fertilization. *Journal of Environmental Quality*. November. p : 1774–1785. DOI: 10.2134/jeq2012.0176 · Source: PubMed

- Sampanpanish P. 2012. Use of organic fertilizer on paddy fields to reduce greenhouse gases. *Science Asia*. 38: 323–330.
- Sano S., Yanai J., Kosaki T. 2006. Relationships between labile organic matter and nitrogen mineralization in Japanese agricultural soils with reference to land use and soil type. *Soil Science and Plant Nutrition* 52: 49–60.
- Saragih B. 2001. Keynote Address Ministers of Agriculture Government of Indonesia. 2nd National Workshop on Strengthening The Development and Use of Hybrid Rice in Indonesia p 1–10.
- Schütz H., Seiler W., and Rennenberg W. 1990. Soil and land use related sources and sinks of methane (CH₄) in the context of the global methane budget. In Bouwman. A. F. (ed.) *Soils and the Greenhouse Effects*. John Wiley & Sons. Chichester. New York. Brisbane. Toronto. Singapore.
- Schnitzer M. and Khan S.U. 1978. *Soil Organic Matter*. Amsterdam. Elsevier. Development in Soil Science. 318 pp.
- Setiawan E. 2009. Kearifan lokal pola tanam tumpangsari di Jawa Timur. *Agrovigor* 2(2) : 79–89.
- Setyanto P. dan Abubakar R. 2006. Evaluation of Methane Emission and Potential Mitigation from Flooded Rice Field. *Jurnal Litbang Pertanian*. 25 (4) : 139–148.
- Setyanto P. and Abubakar R. 2005. Methane emission from paddy field as influenced by different water regimes in Central Java. *Indonesian Journal of Agricultural Science* 6 (1) : 1–9.
- Setyanto P., Rosenani A.B., Khanif M.J., Fauziah C.I., and Boer R. 2004. The Effect of Rice Cultivars on Methane Emission from Irrigated Rice Field. *Indonesian J. Agri. Sci.* 5 (1) : 20–31.
- Shang Q.Y., Yang X.X., Gao C.M., Wu P.P., Liu J.J., Xu Y.C., Shen Q.R., Zou J.W., and Guo S.W. 2011. Net annual global warming potential and greenhouse gas intensity in Chinese double rice-cropping systems : a 3-year field measurement in longterm fertilizer experiments. *Global Change Biol.* 17 : 2196–2210.
- Sharma S. 2019. Correlating soil and urban planning for sustainable water cycle. *Journal of Water and Land Development*, 40(1), 137–148. <https://doi.org/10.2478/jwld-2019-0015>
- Shigematsu T., Tang Y., Kobayashi T., Kawaguchi H., Morimura S., Kida K. 2004. Effect of dilution rate on metabolic pathway shift between aceticlastic and nonaceticlastic methanogenesis in chemostat cultivation. *Appl Environ Microbiol* 70(7) : 4048–4052.
- Silva A.P., Babujia L.C., Matsumoto I.S., Guimaraes M.F., and Hungria M. 2013. Bacterial diversity under different tillage and crop rotation systems in an Oxisols of Southern Brazil. *The Open Agriculture Journal* 7(1) : 40–47.
- Simamora S. dan Salundik. 2006. *Meningkatkan Kualitas Kompos*. Agro Media Pustaka. Jakarta.
- Sitompul SM dan Guritno B 1995 *Analisis pertumbuhan tanaman Yogyakarta Gadjah Mada University Press* 412 hal
- Smeltekop H., Clay D.E., and Clay S.A. 2002. The impact of intercropping annual “soya” small middle on PPPOn production. *Agron. J.* 94 : 917–924.
- Smith K.A. and Conen F. 2004. Impacts of land management on fluxes of trace greenhouse gases. *Soil Use Manage.* 20 : 255–263.
- Snyder C.S., Bruulsema T.W., Jensen T.L., Fixen and P.E. 2009. Review of Greenhouse gas Emissions from crop production system and fertilizer management effects. *Agriculture, Ecosystem and Environment* 133 : 247–266.
- Sodhi G.P.S., Beri V., Benbi D.K. 2009. Soil aggregation and distribution of carbon and nitrogen in different fractions under long-term application of compost in rice–wheat system. *Soil Tillage Res.* 103: 412–418.

- Soil Survey Staff. 2014. Kunci Taksonomi Tanah. Edisi Ketiga. 2015. BBSDLP. Balitbangtan Pertanian. Kementan. 678 hal.
- Soemantri, I.H., M. Hasanah, S. Adisoemarno. M. Thohari, A. Nurhadi dan I.N. Orbani. 2005. Seri Mengenal Plasma Nutfah Tanaman Pangan. Komisi Nasional Plasma Nutfah. Badan Penelitian dan Pengembangan Pertanian.. Bogor: Departemen Pertanian.
- Soong J.L. Vandegehuchte M.L., Horton A.J., Nielsen U.N., Deneff K., Shaw E.A., Milano de Tomasel C., Parton W., Wall D.H., and Cotrufo M.F. 2016. Soil microarthropods support ecosystem productivity and soil C accrual: Evidence from a litter decomposition study in the tallgrass prairie. *Soil Biology & Biochemistry*. 92: 230–238.
- Sparks D.L. 1995. *Environmental Soil Chemistry*. Departement of Plant and Soil Sci. University of Delaware. Newark. Delaware. Academic Press Inc. 267 p.
- Srivastava A.K. and Rai M.K. 2012. Sugarcane production: impact of climate change and its mitigation. *Biodiversitas* 13(4): 214–227.
- Stevens R. J. and Laughlin R.J. 1998. Measurement of nitrous oxide and dinitrogen emissions from agricultural soils. *Nutr. Cycl. Agroecosyst.* 52 : 131–139.
- Stevenson F.J. 1994. *Humus chemistry. genesis. composition. reactions*. New York. John Wiley & Sons Inc. 443 pp.
- Subagyono K., Ai Dariah, Surmaini E., dan Kurnia U. 2004. Pengelolaan Air pada Tanah Sawah. p : 191 – 224 *dalam* Agus. F.. A. Adimihardja. S. Hardjowigeno. A. M. Fagi. W. Hartatik (Eds). *Tanah Sawah dan Teknologi Pengelolaannya*. Puslittanak. Bogor.
- Subardja D.S., Ritung S., Anda M., Sukarman, Suryani E, dan Subandiono R.E. 2014. Petunjuk Teknis Klasifikasi Tanah Nasional. BBSDLP. Edisi Pertama. Balitbangtan Pertanian. Bogor. 55 hal. ISBN 978-602-8977-85-2
- Sumarno. 2011. Perkembangan budi daya kedelai di lahan sawah. *IPTEK Tanaman Pangan* 6(2) : 139–151.
- Suprihati, Anas I., Murdiyarso D., Sabiham S., Djajakirana G. 2006. Fluks Metana dan Karakteristik Tanah pada Beberapa Macam Sistem Budidaya. *Bul. Agron.* 34(3) : 181–187.
- Suprihatno B., Dradjat A.A., Satoto, Baehaki, Widiarta I.N., Setyono A., Indrasari S.D., Lesmana O.S., Sembiring H. 2009. *Deskripsi Varietas Padi*. Subang. Balai Besar Penelitian Padi Sukamandi.
- Susilawati H.L. dan Kartikawati R. 2008. Petunjuk teknis menghitung total emisi CH₄ dengan pengambilan contoh terbatas. Balingtan. Departemen Pertanian. Jakenan. Pati
- Sutedjo M.M., Kartasapoetra A.G., Sastroatmodjo R.D.S. 1991. *Mikrobiologi Tanah*. Rineka Cipta. Jakarta. 447 hlm.
- Suter, Helen, Chen D., Li H., Edis R., and Walker C. 2010. Reducing N₂O emissions from nitrogen fertilisers with the nitrification inhibitor DMPP. 19th World congress of soil science. soil solutions for a changing world. 1-6 August 2010. Brisbane. Australia.
- Swift M.J., Heal O.M., and Anderson J.M. 1979. *Decomposition in Terrestrial Ecosystem*. Blackwell Oxford. UK.
- Syamsiyah J. dan Mujiyo. 2006. Studi reklamasi lahan sawah berkadar bahan organik rendah. Laporan Kegiatan. Kerjasama Dirjen PLA Deptan Indonesia – FP UNS Surakarta.
- Takai T., Matsuura S., Nishio T., Ohsumi A., Shiraiwa T., and Horie T. 2006. Rice yield potential is closely related to crop growth rate during late reproductive period. *Field Crops Res.* 96: 328–335.

- Taylor J.A., Brasseur G.P., Zimmerman P.R., and Cicerone R.J. 1993. A Study of Source and Sinks of Methyl Chloroform Using A Global Three Dimensional Lagrangian Tropospheric Tracer Transport Model. *J. Geophys. Res.* 96 : 3013–3044.
- Thirdyawati N.S., Sudaryono, dan Yulianti T. 2013. Pengaruh Rotasi Tanaman dan Agen Pengendali Hayati Terhadap Nematode Parasit Tanaman. *J. Biotropika* 1(5) : 211–215.
- Thormann M.N., Suzanne E.B., and Currah R.S. 2000. Comparison of Decomposition of Belowground and Aboveground Plant Litters in peatlands of Boreal Alberta. Canada. *Can. J. Bot.* 79 : 9–22.
- Thornton F.C. and Valente R.J. 1996. Soil emissions of nitric oxide and nitrous oxide from no-till PPPOn. *Soil. Sci. Soc. Amer. J.* 60 : 1127–1133.
- Tisdale S. I. and Nelson W.I. 1975. *Soil Fertility and Fertilizer*. Mc.Millan Publishing Company. New York. 754 pp.
- Tokuda S. and Hayatsu M. 2004. Nitrous oxide flux from a teafield amended with a large amount of nitrogen fertilizer and soil environmental factors controlling the flux. *Soil Sci. Plant Nutr.* 50 : 365–374.
- Toyoda S., Yano M., Nishimura S., Akiyama H., Hayakawa A., Koba K., Sudo S., Yagi K., Makabe A., Tobari Y., Ogawa N., Ohkouchi N., Yamada K., and Yoshida N. 2011. Characterization and production and consumption processes of N₂O emitted from temperate agricultural soils determined via isotopomer ratio analysis. *Global Biogeochem. Cycl.* 25: 2008–2020.
- Tripathi R., Nayak A.K., Bhattacharyya P., Shukla A.K., Shahid M., Raja R., Panda B.B., Mohanty S., Kumar A., and Thilagam V.K. 2014. Soil aggregation and distribution of carbon and nitrogen in different fractions after 41 years long-term fertilizer experiment in tropical rice–rice system. *Geoderma* 213: 280–286. <http://dx.doi.org/10.1016/j.geoderma.2013.08.031>
- Tuo Y., Yang C., and Shen F. 2020. Experimental study on the movement of heavy metal Zn in paddy soil under different irrigation quota of reclaimed water. *Scientific Reports*, 10(1), 1–9. <https://doi.org/10.1038/s41598-020-67777-x>
- USEPA. 2006. *Global Anthropogenic Non CO₂ GHG Emission : 1990 – 2020*. United States EPA. <http://www.epa.gov>.
- Utracki L., Kamal A.M.R. 2002. Clay Containing Polymeric Nanocomposite. *Halaman* 27. 43-67. UEA: *The Arabian Journal for Science and Engineering*
- Vishwakarma P., Dumont M.G., Bodrossy L., Stralis-Pavese N., Murrell J.C., and Dubey S.K. 2009. Ecological and Molecular Analyses of The Rhizospheric *Methanotroph* Community in Tropical Rice Soil: Effect of Crop Phenology and Landuse History. *Current Science* 96 (8). p : 1082–1089.
- Vitousek P.M., Cassman K., Cleveland C., Crews T., Field C.B., Grimm N.B., Howarth R.W., Marino R., Martinelli L., Rastetter E.B., and Spent J.I. 2002. Towards an ecological understanding of biological nitrogen fixation. *Biogeochem.* 58 : 1–45.
- Vogels G.D., Keltjens J.T., and Van der Drift C. 1988. Biochemistry of methane production. In Zehnder A. J. B. (ed.) *Biology of anaerobic organisms*. John Wiley & Sons. Chichester. New York. Brisbane. Toronto. Singapore.
- Wall D.H., Bradford M.A., John M.G.S., Trofymow J., Behan-Pelletier V., Bignell D.E., Dangerfield J.M., Parton W.J., Rusek J., Voigt W., Wolters V., Gardel H.Z., Ayuke O.I., Bohlen P.J., Brauman A., Flemming S., Henschel J.R., Johnson D.L., Jones T.H., Kovarova M., Kranabetter J.M., Kutny L., Lin K.C., Maryati M., Masse D., Pokarzhevskii A.P., Rahman H., Sabara M.G., Salamon J.A., Swift M.J., Varela A., Vasconcelos H.L., White D., and Zou X. 2008. Global decomposition experiment shows soil animal impacts on decomposition are climate-dependent. *Global Change Biology* 14: 2661.

- Wang J., Pan X., Liu Y., Zhang X., Xiong Z. 2012. Effects of biochar amendment in two soils on greenhouse gas emissions and crop production. *Plant Soil* 360 : 287–298.
- Wang J.Y., Jia J. X., Xiong Z.Q., Khalil M.A.K., and Xing G.X. 2011. Water regime-nitrogen fertilizer straw in PPOperation interaction : Field study on nitrous oxide emissions from a rice agroecosystem in Nanjing. China. *Agriculture. Ecosystems and Environment*. 141 : 437–446.
- Wang W.N., Lu J.W., Ren T., Li X.K., Su W., Lu M.X. 2012. Evaluating regional mean optimal nitrogen rates in combination with indigenous nitrogen supply for rice production. *Field Crops Research* 137: 37–48.
- Wang Z.P., Delaune R.D., Masscheleyn P.H., and Patrick Jr W.H. 1993. Soil redox and pH effects on methane production in a flooded rice soil. *J. Soil Sci. Soc. Atm.* 57: 382–385.
- Wang Z.P., Lindau C.W., Delaune R.D., and Patrick Jr.W.H. 1992. Methane production from anaerobic soil amended with rice straw and nitrogen fertilizers. *J. Fertl. Research* 33: 115–121.
- Watanabe A., Kajiwara M., Yoshida S., Kimura M. 2000. Effect of planting density on methane emission from a rice paddy. *Environmental Science*. 13(2) : 223–227.
- Watanabe T., Hosen Y., Agbisit R., Llorca L., Fujita D., Asakwa S., and Kimura M. 2010. Changes in community structure and transcriptional activity of methanogenic archaea in a paddy field soil brought about by a watersaving practice-estimation by PCRDDGE and qPCR of 16S rDNA and 16S rRNA. In: *19th World Congress of Soil Science. Soil solutions for a changing world. August 2010. Brisbane. Australia.* pp. 1–6.
- Wang Z.P., Law R.M., and Pak B. 2010. A global model of carbon, nitrogen and phosphorus cycles for the terrestrial biosphere. *Biogeochem.* 7: 2261–2282.
- Waring and Schlesinger. 1985. *Forest Ecology Concept and Management*. Academic Press. Inc. Orlando. Pp.
- Watanabe I., Hashimoto T., and Shimoyama A. 1997. Methane-oxidizing activities and methanotrophic populations associated with wetland rice plants. *Bio. Fertl. Soils*. 24 : 261–265.
- Watanabe I., Takada G., Hashimoto T., and Inubushi K. 1995. Evaluation of alternative substrates for determining methane-oxidizing activities and methanotrophic populations in soils. *Bio. Fertl. Soils*. 20 : 101–106.
- Watanabe I. and Furusaka C. 1980. Microbial Ecology of Flooded Rice Soils. p : 125–168. In Alexander. M. (Ed). *Advances in Microbial Ecology*. 4. Plenum Publishing PPOperation.
- Wei H., Ma R., Zhang J., Zhou L., Liu Z., Fan Z., Yang J., Shan X., Xiang H. 2020. Quality dependence of litter decomposition and its carbon, nitrogen and phosphorus release under simulated acid rain treatments. *Environmental Science and Pollution Research*. 27: 19858–19868. <https://doi.org/10.1007/s11356-020-08423-x>.
- Wibowo A. 2009. Laju Dekomposisi Daun Empat Jenis Tumbuhan Pionir pada Lahan Bekas Tambang Batubara PT. Berau Coal Kalimantan Timur. Skripsi. Fakultas Kehutanan. UGM. Yogyakarta.
- Wihardjaka A. 2010. Emisi gas dinitrogen oksida dari tanah sawah tadah hujan yang diberi jerami padi dan bahan penghambat nitrifikasi. *Jurnal Biologi Indonesia Nomor 6 (2)* : 211–224.
- Wihardjaka A., Setyanto P., dan Makarim A.K. 1998. Pengaruh penggunaan bahan organik terhadap hasil padi dan emisi gas metana pada lahan sawah. Laporan Tahunan Loka Penelitian Tanaman Pangan. Jakenan.

- Wihardjaka A. 2012. Pengaruh Jerami Padi dan Bahan Penghambat Nitrifikasi terhadap Emisi Gas Rumah Kaca (Metana dan Dinitrogen Oksida) Pada Ekosistem Sawah Tadah Hujan Di Kabupaten Pati. Jawa Tengah. Disertasi. Universitas Gadjah Mada. 191 hlm.
- Winarso S. 2005. Dasar Kesehatan dan Kualitas Tanah. Gramedia. Yogyakarta. 269 hlm.
- Wrage N., Velthof G.L., Van Beusichem M.L., and Oenema O. 2001. Role of nitrifier denitrification in the production of nitrous oxide. *Soil Biol. Biochem.* 33 : 1723–1732.
- Xiong Z.X., Guang-Xi X., and Zhao-Liang, Z. 2007. Nitrous oxide and methane emissions as affected by water. soil and nitrogen.
- Xu H., Xia B., He E., Qiu R., Peijnenburg W.J.G.M., Qiu H., Zhao L., Xu X., and Cao X. 2021. Dynamic release and transformation of metallic copper colloids in flooded paddy soil: Role of soil reducible sulfate and temperature. *Journal of Hazardous Materials.* 402. 123462. <https://doi.org/10.1016/j.jhazmat.2020.123462>
- Yadav A.K., Yadava T.P., and Choudhury B.D. 1994. Path coefficient analysis of the association of physiological traits with grain yield and harvest index in green gram. *Indian Journal of Agricultural Sciences.* 49 : 86–90.
- Yagi K. and Minami K. 1990. Effect of organic matter application on methane emission from some Japanese paddy fields. *Soil Sci. Plant Nutr.* 36 : 599–610.
- Yagi K., Minami K., and Breitenbeck G.R. 1990. Emission and Production of Methane from Paddy Fields. *Transactions of The 14th International Congress of Soil Science. Vol. II. International Society of Soil Science. Kyoto.* p : 238–243.
- Yang Z.H., Singh B.R., Sitaula B.K. 2004. Soil organic carbon fractions under different land uses in Mardi watershed of Nepal. *Commun. Soil Sci. Plant Nutr.* 35: 615–629
- Yin F., Fu B.J., and Mao R.Z. 2007. Effects of nitrogen fertilizer application rates on nitrate nitrogen distribution in saline soil in the Hai River Basin, China. *Journal of Soils and Sediments* 7: 136–142.
- Yoshida T. 1978. Microbial Metabolism in Rice Soil. p : 445–463 *in* Soil and Rice. International Rice Research Institute. Los Banos. Philippines.
- Yoshinari T., Hynes R., and Knowles R. 1977. Acetylene inhibition of nitrous oxide reduction and measurement of denitrification and nitrogen fixation in soil. *Soil Biol. Biochem.* 9: 177–183.
- Zeigler R.S. 2005. Rice Research and Development : Supply. Demand. Water. Climate and Research Capacity. p. xiii – xxii *in* Sumarno. Suparyono. A. M. Fagi and M. O. Adnyana (Eds). Rice Industry. Culture and Environment. Book I. Indonesian Center for Rice Research.
- Zhao J., Cai Y., and Jia Z. 2020. The pH-based ecological coherence of active canonical methanotrophs in paddy soils. *Biogeosciences.* 17(6): 1451–1462. <https://doi.org/10.5194/bg-17-1451-2020>
- Zhu C., Ling N., Li L., Liu X., Dippold M.A., Zhang X., Guo S., Kuzyakov Y., and Shen Q. 2020. Compositional variations of active autotrophic bacteria in paddy soils with elevated CO₂ and temperature. *Soil Ecology Letters*, 2(4): 295–307. <https://doi.org/10.1007/s42832-020-0044-4>
- Zhu X., Burger M., Doane T.A., and Horwath W.R. 2013. Ammonia oxidation pathways and nitrifier denitrification are significant sources of N₂O and NO under low oxygen availability. *PNAS.* Vol. 110. No. 16 (April 16. 2013). pp. 6328–6333. <http://www.jstor.org/stable/42590419>. Diunduh tanggal 31 Agustus 2017.
- Zuberer D.A. 2008. Soil Microbiology. Texas University. USA.



UNIVERSITAS
GADJAH MADA

**FRAKSI KARBON DAN NITROGEN TANAH, SERTA EMISI GAS RUMAH KACA PADA BEBERAPA
POLA ROTASI TANAMAN DI
LAHAN SAWAH IRIGASI**

AGUS SUPRIHATIN, Dr. Ir. Benito Heru Purwanto, MP., M.Agr.

Universitas Gadjah Mada, 2021 | Diunduh dari <http://etd.repository.ugm.ac.id/>

Zhong R, Lee C, Zhou J, McCarthy RL, Ye ZH 2008 A battery of transcription factors involved in the regulation of secondary cell wall biosynthesis in Arabidopsis Plant Cell 20: 2763–2782. <https://doi.org/10.1105/tpc.108.061325> PMID: 18952777