

DAFTAR PUSTAKA

- Agarie, S., Agata, W., Uchida, H., Kubota, F., and Kaufman, P.B. 1996. Function of silica bodies in the epidermal system of rice (*Oryza sativa* L.): testing the window hypothesis. *JXB*, 47(298) : 655-660.
- Agarie, S., Hanaoka, N., Ueno, O., Miyazaki, A., Kubota, F., Agata, W., and Kaufman, P.B. 1998. Effects of silicon on tolerance to water deficit and heat stress in rice plants (*Oryza sativa* L.): Monitored by electrolyte leakage. *Plant Prod. Sci.*, 1:2, 96-103.
- Ahmad, P., Jaleel, C.A., Salem, M.A., Nabi, G., and Sharma, S. 2010. Roles of enzymatic and non-enzymatic antioxidants in plants during abiotic stress. *Crit. Rev. Biotechnol.* 2010, 30, 161–175.
- Ahmad, S.T. and Haddad, R. 2011. Study of silicon effects on antioxidant enzyme activities and osmotic adjustment of wheat under drought stress. *Czech J. Genet. Plant Breed.*, 47 (1): 17–27.
- Ahmad, A., Afzal, M., Ahmad, A.U.H., and Tahir, M. 2013. Effect of foliar application of silicon on yield and quality of rice (*Oryza sativa* L.). *Cercetări Agronomice în Moldova*, 3 : 21-28.
- Almeselmani, M., Abdullah, F., Hareri, F., Naaesan, M., Ammar, M.A., Kanbar, O.Z., and Saud, Abd. 2011. Effect of drought on different physiological characters and yield component in different Syrian durum wheat varieties. *J. Agric. Sci.* 3: 127-133.
- Anjum, S.A., Farrukh, M.S., Wang, L., Faisal, B.M., and Asif, S. 2012. Protective role of glycinebetaine in maize against drought-induced lipid peroxidation by enhancing capacity of antioxidative system. *Australian journal of Crop Science*, 6 : 576-583.
- Aroka, R. 2012. *Plant responses to drought stress*. New York : Springer.
- Arjenaki, F.G., Jabbari, R., and Morshed, A. 2012. Evaluation of drought stress on relative water content, chlorophyll content and mineral elements of wheat (*Triticum aestivum* L.) varieties. *IJACS*.
- Asada, K. 1999. The water-water cycle in chloroplasts: scavenging of active oxygens and dissipation of excess photons. *A. Rev. Plant Physiol. Plant Mol. Biol.* 50 : 601-639.
- Asch, F., Dingkuhn, M., Sow, A., and Audebert, A., 2004. Drought-induced changes in rooting patterns and assimilate partitioning between root and shoot in upland rice. *Field Crops Res.*, 93: 223–236.
- Asraf, M. and Harris, P.J.C. 2013. Photosynthesis under stressful environments: An overview. *Photosynthetica*, 51 (2): 163-190.

- Babu, R.C., Pathan, M.S., Blum, A. and Nguyen, T.H. 1999. Comparison of measurement methods of osmotic adjustment in rice cultivars. *Crop Sci.* 39:150–158.
- Backer, H., Frank, O., De Angells, B., and Feingold, S.1980. Plasma tocopherol in man at various times after ingesting free or ocetylaned tocopherol. *Nutrition Reports International*, 21: 531-536.
- Badshah, M.A., Tu, N., Zou, Y., Ibrahim, M., Wang, K. 2014. Yield and tillering response of super hybrid rice *Liangyoupeijiu* to tillage and establishment methods. *The crop journal*, 2 : 79 – 86.
- Bajji, M., Kinet, J-M., and Lutts, S. 2001. The use of the electrolyte leakage method for assessing cell membrane stability as a water stress tolerance test in durum wheat. *Plant Growth Regulation*, 00: 1–10.
- Baloch, M.S., Awan, I.U., and Hassan, G. 2006. Growth and yield of rice as affected by transplanting dates and seedlings per hill under high temperature of Dera Ismail Khan, Pakistan. *J Zhejiang Univ SCIENCE B*, 7(7): 572-579.
- Bandruska, H., and Gniazdowska-Skoczek, H. 1995. Cell membrane stability in two barley genotype under water stress condition. *Acta Soc. Bot. Pol.*, 64 : 29-32.
- Barnabas, B., Jäger, K. And Fehér, A. 2008. The effect of drought and heat stress on reproductive processes in cereals. *Plant, Cell and Environment*, 31: 11–38.
- Bartoli, C.G, Simontacchi, M, Tambussi, E., and Beltrano, J. 1999. Drought and watering-dependent oxidative stress: effect on antioxidant content in *Triticum aestivum* L. leaves. *Journal of Experimental Botany*, 50:375–383.
- Blum, A., Zhang, J., and Nguyen, H.T. 1999. Consistent differences among wheat cultivars in osmotic adjustment and their relationship to plant production. *Field Crops Res*, 64:287–291.
- Bouman, B.A.M, Lampayan, R.M. and Toung, T.P. 2007. *Water Management in Irrigated Rice: Coping with Water Scarcity*. Los Baños, Philippines : International Rice Research Institute.
- Badan Pusat Statistik. 2015. Luas Panen, Produktivitas dan Produksi Tanaman Pangan Menurut Provinsi. (<http://www.bps.go.id/site/>). Diakses 10 Juni 2015.
- Bates, B.C., Kundzewicz, Z.W., Wu, S. and Palutikof, J.P. 2008. Climate Change and Water. *Technical Paper of the Intergovernmental Panel on Climate Change*. Geneva: IPCC Secretariat.
- Boo, Y.C. and Jung, J. 1999. Water deficit-induced oxidative stress and antioxidative defenses in rice plants. *J. Plant Physiol*, 155:255–261.

- Botwright-Acuna, T.L., Lafitte, H.R., and Wade, L.J. 2008. Genotype and environment interactions for grain yield of upland rice backcross lines in diverse hydrological environments. *Field Crops Research*, 108(2) : 117-125.
- Bouman, B.A.M, Lampayan, R.M. and Toung, T.P. 2007. *Water Management in Irrigated Rice: Coping with Water Scarcity*. Los Baños, Philippines : International Rice Research Institute.
- Bouman, B.A.M. 2009. How much water does rice use?. *Rice Today*, 8(2) : 22-29.
- Bunnag, S. and Pongthai, P. 2013. Selection of rice (*Oryza sativa* L.) cultivars tolerant to drought stress at the vegetative stage under field conditions. *Am J. Plant Sci*, 4(9): 1701–1708.
- Bustami, Sufardi dan Bachtiar. 2012. Serapan hara dan efisiensi pemupukan fosfat serta pertumbuhan padi varietas lokal. *Jurnal Manajemen Sumberdaya Lahan*. 1 (2): 159-170.
- Cabuslay, G.S., Ito, O., and Alejal, A.A. 2002. Physiological evaluation of responses of rice (*Oryza sativa* L.) to water deficit. *Plant Sci*, 163(4): 815–827.
- Caretto S, Paradiso A, D’Amico L, De Gara L. 2002. Ascorbate and glutathione metabolism in two sunflower cell lines of differing alpha-tocopherol biosynthetic capability. *Plant Physiol Bioche*, 40: 509–513.
- Cha-um, S., Yooyongwech, S., and Supaibulwatana, K. 2010. Water deficit stress in the reproductive stage of four indica rice (*Oryza sativa* L.) genotypes. *Pak J Bot*, 42(5): 3387–3398.
- Collins, N.C., Tardieu, F., and Tuberosa, R. 2008. Quantitative trait loci and crop performance under abiotic stress : where do we stand?. *PlantPhysiol*. 147: 469–486.
- Comas, L.H., Becker, S.R., Cruz, V.M.V., Byrne, P.F., and Dierig, D.A. 2013. Root traits contributing to plant productivity under drought. *Front Plant Sci*. 4: 442.
- Cottenie, A. 1980. Soil and plant testing as a basis of fertilizer recommendations. *FAO Soils Bull*. 38/2. FAO, Rome.
- Darmawan, Kyuma, K., Saleh, A., Subagyo, A., Masunaga, T., and Wakatsuki, T. 2006. Effect of long-term intensive rice cultivation on the available silica content of sawah soils: Java Island, Indonesia. *Soil Sci. Plant Nutr.*, 52: 745-753.
- Davey, M.W., Stals, E., Panis, B., Keulemans, J., and Swennen, R.L. 2005. High-throughput determination of malondialdehyde in plant tissues. *Anal Biochem.*, 347(2):201-207.
- De Datta, S. K. 1981. Principles and practices of rice production. New York: John Wiley and Sons. 618 p.

- Ding TP, Zhou JX, Wan DF, Chen ZY, Wang CY, Zhang F. 2008. Silicon isotope fractionation in bamboo and its significance to the biogeochemical cycle of silicon. *Geo.Cos Acta*. 72:1381-1395.
- Direktorat Jenderal Tanaman Pangan. 2014. *Laporan Tahunan Direktorat Jenderal Tanaman Pangan Tahun 2013*. Jakarta : Kementerian Pertanian, Ditjen Tanaman Pangan.
- Epstein E. 1999. Silicon : Annu. Rev. Plant Physiol. *Plant Mol. Biol*, 50: 641-664.
- Espinoza, A., Martín, A., López-Climent, M., Ruiz-Lara, S., Gómez-Cadenas, A., and Casaretto, J.A. 2013. Engineered drought-induced biosynthesis of α -tocopherol alleviates stress-induced leaf damage in tobacco. *J Plant Physiol*, 170(14):1285-1294.
- Fageria, N.K., Slaton, N.A., and Baligar,V.C. 2003. Nutrient management for improving low land rice productivity and sustainability. *Adv.Agron*. 80: 63–152.
- Faize, M., Burgos, L., Faize, L., Piqueras, A., Nicolas, E., Barba-Espin, G., Clemente-Moreno, M.J., Alcobendas, R., Artlip, T., and Hernandez, J.A. 2011. Involvement of cytosolic ascorbate peroxidase and Cu/Zn-superoxide dismutase for improved tolerance against drought stress. *J Exp Bot*, 62(8): 2599–2613.
- Farooq, M.A., Saqib, F.A., and Akhtar, J. 2015. Silicon-mediated oxidative stress tolerance and genetic variability in rice (*Oryza sativa* L.) grown under combined stress of salinity and boron toxicity. *Turk J Agric For*, 39 : 1-12.
- Faruq, G., Nezhadahmadi, A., and Prodhan, Z.A. 2013. Review Article : Drought Tolerance in Wheat. *The ScientificWorld Journal*, 2013 : 1-13.
- Foyer, C.H. and Noctor, G. 2005. Redox homeostis and antioxidant signaling: a metabolic interface between stress perception and physiological responses. *Plant Cell*, 17 : 1866-1875.
- Galfati, I., Bilal, E., Sassi, A.B., Abdallah, H., and Zaier, A. 2011. Accumulation of heavy metals in native plants growing near the phosphate treatment industry, Tunisia. *Carpathian Journal of Earth and Environmental Sciences*, 6(2) : 85 – 100.
- Gao, X., Zou, C., Wang, L., and Zhang, F. 2004. Silicon improves water use efficiency in maize plants. *J Plant Nutr*, 27:1457–1470.
- Gao, X., Zou, C., Wang, L., and Zhang, F. 2006. Silicon decreases transpiration rate and conductance from stomata of maize plants. *J Plant Nutr*. 29:1637-1647
- Gascho, G.J. 2001. *Silicon sources for agriculture*. In: Datnoff LE,Snyder GH, Korndorfer GH (eds) *Silicon in agriculture*. Studies in plant science, 8. Elsevier, Amsterdam, pp 197–207.
- Gerami, M., Fallah, A., and Khatamimoghadam, M. 2012. Study of potassium and sodium silicate on the morphological and chlorophyll content on the rice

- plant in pot experiment (*Oryza sativa* L.). *Inter. J. Agri. Crop. Sci.* 4(10): 658-661.
- Ghildyal, del Rio, L.A. and Allain, P. 2009. *Reactive Oxygen Species in Plant Signaling*. New York: Springer.
- Gill, S. S., and Tuteja, N. 2010. Reactive oxygen species and antioxidant machinery in abiotic stress tolerance in crop plants. *Plant Physiology and Biochemistry*, 48 : 909-930.
- Gomez, K.A. and Gomez, A.G. 1995. Prosedur statistik untuk penelitian pertanian. *Terjemahan*. UI Press.
- Gong, H.J., Zhu, X.Y., Chen, K.M., Wang, S.M., and Zhang, C.L. 2005. Silicon alleviates oxidative damage of wheat plants in pots under drought. *Plant Science*, 169: 313-321.
- Goufo, P., and Trindade, H. 2014. Rice antioxidants: phenolic acids, flavonoids, anthocyanins, proanthocyanidins, tocopherols, tocotrienols, γ -oryzanol, and phytic acid. *Food Sci Nutr.* 2(2): 75–104.
- Gowda, V.R.P., Henry, A., Yamauchi, A., Shashidhar, H.E., and Serraj, R. 2011. Root biology and genetic improvement for drought avoidance in rice. *Field Crops Res.* 122: 1–13.
- Gunes, A., Pilbeam, D.J., Inal, A., Bagci, E.G. and Coban S. 2007. Influence of silicon on antioxidant mechanisms and lipid peroxidation in chickpea (*Cicer arietinum* L.) cultivars under drought stress. *Journal of Plant Interactions*, 2 (2) : 105-113.
- Gunes, A., Pilbeam, D.J., Inal, A., and Coban, S. 2008. Influence of silicon on sunflower cultivars under drought stress. I: growth, antioxidant mechanisms, and lipid peroxidation. *Commun Soil Sci Plant Anal*, 39:1885–1903.
- Guntzer, F., Keller, C., and Meunier, J-D. 2012. Benefits of plant silicon for crops: a review. *Agron Sustain Dev*, 32: 201–213.
- Guo, W., Hou, Y.L., Wang, S.G., and Zhu, Y.G. 2005. Effect of silicate on the growth and arsenate uptake by rice (*Oryza sativa* L.) seedlings in solution culture. *Plant Soil*. 272: 173–181.
- Guo, Z., Ou, W., Lu, S., and Zhong, Q. 2006. Differential responses of antioxidative system to chilling and drought in four rice cultivars differ in sensitivity. *Plant Physiology and Biochemistry*, 44: 828–836.
- Ha, P.T.T. 2014. Physiological responses of rice seedlings under drought stress. *J Sci Devel.*, 12(5): 635–640.
- Haider, Z., Razaq, A., Mehboob, A., Rehman, S., Iqbal, A., Hussain, A., Saeed, U., Naveed, N.T., Zia, S., Mahmood, Z., and Mehmood, K. 2013. Comparison of associations among yield and yield components in rice

- (*Oryza sativa* L.) under simulated drought stress condition using multivariate statistics. *IJSER*, 4(8): 329-340.
- Hamanishi, E.T., Thomas, B.R., and Campbell, M.M. 2012. Drought induces alterations in the stomatal development program in *Populus*. *J Exp Bot*. 63(13): 4959–4971.
- Hanamaratti, N.G. and Salimath, P.M. 2012. Association of flowering delay under stress and drought tolerance in upland rice (*Oryza sativa* L.), *Internat. J. Forestry & Crop Improv.*, 3 (2) : 99-104.
- Hattori, T., Inanaga, S., Tanimoto, E., Lux, A., Luxová, M., and Sugimoto, Y. 2003. Silicon-induced changes in viscoelastic properties of *Sorghum* root cell walls. *Plant and Cell Physiology*, 44 (7): 743–749.
- Hattori, T., Inanaga, S., Araki, H., An, P., Morita, S., Luxová, M., and Lux, A. 2005. Application of silicon enhanced drought tolerance in *Sorghum bicolor*. *Physiol Plant*, 123: 459–466.
- Hasathanasombut, S., Ntui, V., Supaibulwatana, K., Mii, M., and Nakamura, I. 2010. Expression of Indica rice *OsBADH1* gene under salinity stress in transgenic tobacco. *Plant Biotechnol Rep*, 4: 75-83.
- Henriet, C., Draye, X., Oppitz, I., Swennen, R., Delvaux B (2006) Effects, distribution and uptake of silicon in banana (*Musa* spp.) under controlled conditions. *Plant Soil*, 287:359–374.
- Henry, A., Gowda, V.R.P., Torres, R.O., McNally, K.L., and Serraj, R. 2011. Variation in root system architecture and drought response in rice (*Oryza sativa*): phenotyping of the *Oryza*SNP panel in rainfed lowland fields. *Field Crops Research*, 120: 205–214.
- Hodson, M.J. and Sangster.A.G. 1988. Observations on the distribution of mineral elements in the leaf of wheat (*Triticum aestivum* L.) with particular reference to silicon. *Annals of Botany*, 62, 463-471.
- Hu, H., Zhang, J., Wang, H., Li, R., Pan, F., Wu, J., Feng, Y., Ying, Y., and Liu, Q. 2013. Effect of silicate supplementation on the alleviation of arsenite toxicity in 93-11 (*Oryza sativa* L. indica). *Environ Sci Pollut Res Int*. 20(12) : 8579-8589.
- Husnain, Wakatsuki, T., Setyorini, D., Hermansah, Sato, K., and Masunaga, T. 2008: Silica availability in soils and river water in two watersheds on Java Island, Indonesia. *Soil Sci. Plant Nutr.*, 54:916-927.
- IPCC (Intergovernmental Panel on Climate Change). 2007. *Fourth assesment report of the intergovernmental panel on climate change : The impact, adaptation, and vulnerability (Working Group III)*. U.K : Cambridge Univerity Press.
- Janislampi, K.W. 2012. Effect of silicon on plant growth and drought stress tolerance. *Thesis*. Logan : Utah State Universtiy.

- Ji, K.X., Wang, Y.Y., Sun, W.N., Lou, Q.J., Mei, H.W., Shen, S.H., and Chen, H. 2012. Drought-responsive mechanisms in rice genotypes with contrasting drought tolerance during reproductive stage. *J Plant Physiol*, 169(4): 336–344.
- Kaya, C., Tuna, L., and Higgs, D. 2006. Effect of silicon on plant growth and mineral nutrition of maize grown under water-stress conditions. *J. Plant Nutr.* 29:1469-1480.
- Kamoshita, A., Rodriguez, R., Yamauchi, A., and Wade, L. 2004. Genotypic variation in response of rainfed lowland to prolonged drought and re-watering. *Plant Production Science*, 7(4) : 406-420.
- Khadri, M., Tejera, N.A., and Lluch, C. 2006. Alleviation of salt stress in common bean (*Phaseolus vulgaris*) by exogenous abscisic acid supply. *J Plant Growth Regul*, 25: 110–119.
- Khan, N. and Naqvi, F. N. 2011. Effect of water stress in bread wheat hexaploids. *Current Research Journal of Biological Sciences*, 3 (5): 487–498.
- Khosroshahi, M., Ershadi, A., and Imani, A. 2014. Morphological changes in response to drought stress in cultivated and wild almond species. *IJHST*, 1 (1): 79-92.
- Komiya, R., Ikegami, A., Tamaki, S., Yokoi, S., and Shimamoto, K. 2008. Hd3a and RFT1 are essential for flowering in rice. *Development*, 135(4): 767-774.
- Kondo, M., Pablico, P.P., Aragones, D.V., Agbisit, R., Abe, J., and Morita, S. 2003. Genotypic and environmental variations in root morphology in rice genotypes under upland field conditions. *Plant Soil*, 255: 189–200.
- Kristamtini dan H. Purwaningsih. 2009. Potensi Pengembangan Beras Merah sebagai Plasma Nutfah Yogyakarta. *Jurnal Litbang Pertanian*. 28(3): 88-95.
- Kristamtini dan Prajitno, A.L. 2009. Karakteristik Padi Beras Merah Segreg Varietas Unggul Lokal Gunungkidul. *Jurnal Ilmu-Ilmu Pertanian*. 5(1) : 45-51.
- Kumar, S., Dwivedi, S.K., Singh, S.S., Bhatt, B.P., Mehta, P., Elanchezhian, R., Singh, V.P., and Singh, O.N. 2014. Morpho-physiological traits associated with reproductive stage drought tolerance of rice (*Oryza sativa* L.) genotypes under rain-fed condition of eastern Indo-Gangetic Plain. *Ind J Plant Physiol*, 19(2): 87–93.
- Labudda, M. 2013. Lipid peroxidation as biochemical markers for oxidative stress during drought. An effective tools for plant breeding. E-wydawnictwo, Poland.
- Lafitte, H. R., Price, A. H., and Courtois, B. 2004. Yield response to water deficit in an upland rice mapping population: Associations among traits and genetic markers. *Theor.Appl. Genet.* 109: 1237–1246

- Li, Y., Wang, Z., Sun, X., and Tang, K. 2008. The Current Opinions on the Functions of Tocopherol Based on the Genetic Manipulation of Tocopherol Biosynthesis in Plants. *Journal of Integrative Plant Biology*, 50: 1057–1069.
- Li, M., Tang, D., Wang, K.J., Wu, X.R., Lu, L.L., Yu, H.X., Gu, M.H., Yan, C.J., and Cheng, Z.K. 2011. Mutations in the F-box gene *LARGER PANICLE* improve the panicle architecture and enhance the grain yield in rice. *Plant Biotechnology J*, 9:1002–1013
- Li, X.M., Zhang, L.H., and Li, Y. 2012. Preconditioning alters antioxidative enzyme responses in rice seedlings to water stress. *Proc Environ Sci*, 11: 1346–1351.
- Li, Y., Wang, G., Yu, H., Guo, W., Wei, D. and Yan, X. 2013. Effects of extracted Si from rice hull ash on rice seed germination and growth. Pages 180-185.
- Liang, Y.C., Chen, Q., Liu, Q., Zhang, W.H., and Ding, R.X. 2004. Exogenous silicon (Si) increases antioxidant enzyme activity and reduces lipid peroxidation in roots of salt-stressed barley (*Hordeum vulgare* L.). *Journal of Plant Physiology*. 160:1157-1164.
- Liang, Y., Wanchun, S., Zhu, Y.G., and Christie, P. 2006. Mechanisms of silicon-mediated alleviation of abiotic stresses in higher plants: A review. *Environmental Pollution*, XX : 1-7.
- Lisko, K.A., John, F.H., Gregory, C.P., and Belefant-Millerc, H. 2013. Ontogenetic changes in vitamin C in selected rice varieties. *Plant Physiol Biochem*, 66: 41–46.
- Liu Y., Fiskum G., and Schubert D. 2002. Generation of reactive oxygen species by mitochondrial electron transport chain. *J. Neurochem.*, 80: 780–787.
- Liu, J.X., Liao, D.Q., Oane, R., Estenor, L., Yang, X.E., Li, Z.C., and Bennett, J. 2006. Genetic variation in the sensitivity of anther dehiscence to drought stress in rice. *Field Crops Research*. 97: 87-100.
- Lum, M.S., Hanafi, M.M., Rafii, Y.M., and Akmar, A.S.N. 2014. Effect of drought stress on growth, proline and antioxidant enzyme activities of upland rice. *The Journal of Animal & Plant Sciences*, 24(5): 1487-149.
- Lux, A., Luxová, M., Morita, S., Abe, J., and Inanaga, S. 1999. Endodermal silicification in developing seminal roots of lowland and upland cultivars of rice (*Oryza sativa* L.). *Can. J. Bot.*, 77: 955–960.
- Lux, A., Luxová, M., Hattori, T., Inanaga, S., and Sugimoto, Y.. 2002. Silicification in sorghum (*Sorghum bicolor*) cultivars with different drought tolerance. *Physiologia Plantarum*, 115: 87–92.
- Ma, J.F. and Takahashi, E. 2002. Soil, fertiliser, and plant silicon research in Japan. Elsevier, Amsterdam.
- Ma, J.F. 2004. Role of silicon in enhancing the resistance of plants to biotic and abiotic stresses. *Soil Sci. Plant Nutr.* 50:2004–2012.

- Ma, J.F. and N. Yamaji. 2006. Silicon uptake and accumulation in higher plants. *Trends Plant Sci.* 11:392-397.
- Maisura, Chozin, M.A., Lubis, I., and Ehara, H. 2014. Some physiological character responses of rice under drought conditions in a paddy system. *J Int Soc Southeast Asian Agric Sci*, 20(1): 104-114.
- Meena, V. D., Dotaniya, M. L., Coumar, V., Rajendiran, S., Ajay, Kundu, A., and Rao, A.S. 2014. A Case for Silicon Fertilization to Improve Crop Yields in Tropical Soils. *Proc. Natl. Acad. Sci.*, 84(3):505-518.
- Mittler, G., Uzuki, N., Cifti-ilmaz, S., and Mittler, R. 2009. Reactive Oxygen Species homeostasis and signaling during drought and salinity stresses. *Plant Cell Environmen.* 33: 453:467.
- Moldenhauer, K., Wilson, C.E., Counce, P., and Hardke, J. 2013. *Arkansas Rice Production Handbook*. Little Rock Arkansas : University of Arkansas Division of Agriculture.
- Mostajeran, A. and Rahimi-Eichi, V. 2009. Effects of drought stress on growth and yield of rice (*Oryza sativa* L.) cultivars and accumulation of proline and soluble sugars in sheath and blades of their different ages leaves. *American-Eurasian J. Agric. & Environ. Sci.*, 5 (2): 264-272.
- Müller, M., Hernández, I., Alegre, L., and Munné-Bosch, S. 2006. Enhanced α -tocopherol quinine levels and xanthophyll cycle de-epoxidation in rosemary plants exposed to water deficit during a Mediterranean winter. *J Plant Physiol.*, 163: 601-606.
- Munné-Bosch, S. and Alegre, L. 2002. Interplay between ascorbic acid and lipophilic antioxidant defences in chloroplasts of water-stressed Arabidopsis plants. *Crit. Rev. Plant Sci.* 21: 31-57.
- Munne-Bosch, S. and Alegre, L. 2003. Drought-induced changes in the redox state of tocopherol, ascorbate, and the diterpene carnosic acid in chloroplasts of *Labiatae* plants differing in carnosic acid contents. *Plant Physiol.*, 131 : 1816-1825.
- Munné-Bosch, S. 2005. The role of α -tocopherol in plant stress tolerance. *J. Plant Physiol*, 162 : 743-748.
- Murshe, R., Felicie L-L., and Sallanon, H. 2013. Effect of water stress on antioxydant systems and oxidative parameter in fruits of tomato (*Solanum lycopersicon* L, cv. Micro-tom). *Physiol Mol Biol Plants*, 19 (3) : 363-378.
- Ning, D., Song, A., Fan, F., Li, Z., and Liang, Y. 2014. Effects of Slag-Based Silicon Fertilizer on Rice Growth and Brown-Spot Resistance. *PLoS ONE* 9(7): 1-9.
- Pandey, V., and Shukla, A. 2015. Acclimation and tolerance strategies of rice under drought stress. *Rice Science*, 22 (4) : 1-15.

- Pane, H., Wihardjaka, A., and Fagi, A.M. 2009. *Menggali potensi produksi padi sawah tadah hujan*. Balai Besar Penelitian Tanaman Padi.
- Pantuwan, G., Fukai, S., Cooper, M., Rajatasereekul, S., and O'Toole, J.C. 2002. Yield responses of rice (*Oryza sativa* L.) genotypes to drought under rainfed lowlands: 2. Selection of drought resistant genotypes. *Field Crops Res*, 73(2/3): 169–180.
- Rahayu, A.Y. and Harjoso, T. 2010. Karakter agronomis dan fisiologis padi gogo yang ditanam pada media tanah bersekam pada kondisi air di bawah kapasitas lapang. *Akta Agrosia*, 13 (1): 40 – 49.
- Refli. 2015. Kajian Pertahanan Oksidatif Daun Padi (*Oryza sativa* L.) terhadap Stress Kekeringan selama Fase Pengisian Biji. *Disertasi*. Fakultas Biologi UGM.
- Ribeiro, C., Cambraia, J., Henrique, P., Peixoto, P., Meira, E., and Júnior, F. 2012. Antioxidant system response induced by aluminum in two rice cultivars. *Braz. J. Plant Physiol.*, 24(2): 107-116.
- Sairam, R. K. and Saxena, D. C. 2000. Oxidative stress and antioxidants in wheat genotypes: possible mechanism of water stress tolerance. *Journal of Agronomy and Crop Science*, 184: 55–61.
- Sahebi, M., Hanafi, M., Akmar, A.S.N., Rafii, M.Y., Azizi, P., Tengoua, F.F., Azwa, J.N.M, and Shabanimofrad, M. 2015. Importance of silicon and mechanisms of biosilica formation in plants. *Hindawi Publishing Corporation*, 2015 : 1-16.
- Sangster, A.G., Hodson, M. J. and Tubb, H. J.. 2001. Chapter 5 silicon deposition in higher plants. *Studies in Plant Science*, 8: 85–113.
- Saud, S., Li, X., Chen, Y., Zhang, L., Fahad, S., Hussain, S., Sadiq, A., and Chen, Y. 2014. Silicon application increases drought tolerance of kentucky bluegrass by improving plant water relations and morphophysiological functions. *The Scientific World Journal*, 2014 : 1-14.
- Seki, M., Kamei, A., Yamaguchi-Shinozaki, K., and Shinozaki, K. 2003. Molecular responses to drought, salinity and frost: Common and different paths for plant protection. *Curr Opin Biotechnol*, 14(2): 194–199.
- Selote, D.S. and Khanna-Chopra, R. 2004. Drought-induced spikelet sterility is associated with an inefficient antioxidant defence in rice panicles. *Physiologia Plantarum*, 121: 462–471.
- Shakoor, S.A., Bhat, M.A. and Mir, S.H. 2015. Phytoliths in Plants:A Review. *RRJBS*, 3 (3) : 1-15.
- Shao, H.B., Chu, L.Y., Shao, M.A., Jaleel, C.A., and Mi, H.M. 2008. Higher plant antioxidants and redox signaling under environmental stresses. *Comp Rend Biol*, 331: 433–441.

- Shen, Y., Jin, L., Xiao, P., Lu, Y., and Bao, J. 2009. Total phenolics, flavonoids, antioxidant capacity in rice grain and their relations to grain color, size and weight. *J. Cereal Sci.* 49:106–111.
- Shen, X., Zhou, Y., Duan, L., Eneji, A.E., and Li, J. 2010. Silicon effects on photosynthesis and antioxidant parameters of soybean seedlings under drought and ultraviolet-B radiation. *J Plant Physiol*, 167:1248–1252.
- Sing, S., Gupta, A.K., and Kaur, N. 2012. Differential responses of antioxidative defence system to long term field drought in wheat (*Triticum aestivum* L.) genotypes differing in drought tolerance. *Journal of agronomy and Crop science*, 198: 185-195.
- Singh, K. K., K. Singh, R. Singh, Y. Singh and C. S. Singh. 2006. Effect of level and time of silicon application on growth, yield and its uptake by rice (*Oryza sativa* L.), *The Indian Journal of Agricultural Science*, 76 (7).
- Smirnoff, N. 2000. Ascorbate biosynthesis and function in photoprotection. *Crit. Rev. Plant Sci*, 19: 267-290.
- Smirnoff, N. 2005. *Antioxidants and Reactive Oxygen Species in Plant*. UK: Blackwell Publishing.
- Sonobe, K., Hattori, T., An, P., Tsuji, W., Eneji, A.E., Kobayashi, S., Kawamura, Y., Tanaka, K., and Inanaga, S. 2011 Effect of silicon application on sorghum root responses to water stress. *J Plant Nutr*, 34:71–82.
- Sonobe, K., Hattori, T., and Tsuji, W. 2010. Effect of silicon application on sorghum root responses to water stress. *Journal of Plant Nutrition*. 34 : 71-82.
- Srivastava, R.K., Pandey, P., Rajpoot, R., Rani A., Gautam A., and Dubey, R.S. 2014. Exogenous application of calcium and silica alleviates cadmium toxicity by suppressing oxidative damage in rice seedlings. *Protoplasma*. 25 (4): 959-975.
- Suardi, D. 2002. Perakaran padi dalam hubungannya dengan toleransi tanaman terhadap kekeringan dan hasil. *Jurnal litbang pertanian*, 21 (3) : 100-108.
- Sumardi. 2010. Produktivitas Padi Sawah pada Kepadatan Populasi Berbeda. *JlPI*, 12 (1) : 49-54.
- Sun, P., Zhang, W. Wang, Y., He, Q., Shu, F.Liu, H., Wang, J., Yuan, L., and Deng,H. 2016. *OsGRF4* controls grain shape, panicle length and seed shattering in rice. *JIPB*, DOI: 10.1111/jipb.12473.
- Suwarto, Sutrisno, J., and Suryono. 2015. Utilization of rice husk ash from waste brick factory as silicate fertilizer source in improving quality of paddy (rice) on rainfed land. *Journal of Environment and Earth Science*, 5 (20) : 76-79.
- Swain, P., Anumalla, M., Prusty, S., Marndi, B.C., and Rao, G.J.N. 2014. Characterization of some Indian native land race rice accessions for drought tolerance at seedling stage. *Aust J Crop Sci*, 8(3): 324–331.

- Szarka, A., Balint, T., and Gabor, B. 2012. The ascorbate-glutathione- α -tocopherol triad in abiotic stress response. *Int. J. Mol. Sci.*, 13 : 4458-4483.
- Tateda, M. 2016. Production and effectiveness of amorphous silica fertilizer from rice husks using a sustainable local energy system. *Journal of Scientific Research and Reports*, 9(3): 1-12.
- Tubur, H.W., Chozin, M.A., Santosa, E., dan Junaedi, A. 2012. Respon Agronomi Varietas Padi terhadap Periode Kekeringan pada Sistem Sawah. *J. Agron. Indonesia*, 40 (3) : 167 – 173.
- Vergara, B.S. 1994. A Farmer's Pimer on Growing Rice. 2nd edition. The International Rice Research Institute. Los Banos. Philipines, 1-129 p.
- Walter, M., Marchesan, E., Massoni, P.F.S., Sartori, L.P., da Silva, G.M.S., and Ferreira, R.B. 2013. Antioxidant properties of rice grains with light brown, red and black pericarp colors and the effect of processing. *Food Res. Int.*, 50:698–703.
- Wang, F.Z., Wang, Q.B., Kwon, S.Y., Kwak, S.S., and Su, W.A. 2005. Enhanced drought tolerance of transgenic rice plants expressing a pea manganese superoxide dismutase. *J Plant Physiol*, 162(4): 465–472.
- Wang, Z., Xiao, Y., Chen, W., Tang, K., and Zhang, L. 2010. Increased vitamin C content accompanied by an enhanced recycling pathway confers oxidative stress tolerance in *Arabidopsis*. *JIPB*, 52 : 400 - 409.
- Wang, Y.X., Xiong, G.S., Hu, J., Jiang, L., Yu, H., Xu, J., Fang, Y.X., Zeng, L.J., Xu, E., Xu, J., Ye, W.J., Meng, X.B., Liu, R.F., Chen, H.Q., Jing, Y.H., Wang, Y.H., Zhu, X.D., Li, J.Y., and Qian, Q. 2015. Copy number variation at the *GL7* locus contributes to grain size diversity in rice. *Nat Genet*, 47: 944–948.
- Wasson, A.P., Richards, R.A., Chatrath, R., Misra, S.C., Prasad, S.V., and Rebetzke, G.J. 2012. Traits and selection strategies to improve root systems and water uptake in water-limited wheat crops. *J. Exp. Bot.* 63: 3485–3498.
- Wopereis, M.C.S., Kropff, M.J., Maligaya, A.R., and Tuong, T.P. 1999. Drought-stress responses of two lowland rice cultivars to soil water status. *Field Crops Research*, 46: 21-39.
- Wu, Q.S., Wan, X.-Y., Su, N., Cheng, Z.-J., Wang, J.-K., Lei, C.-L., Zhang, X., Jiang, L., Ma, J.F., and Wan, J.M. 2006. Genetic dissection of silicon uptake ability in rice (*Oryza sativa* L.). *Plant Science*, 171: 441–448.
- Yamaji, N., Mitatni, N., and Ma, J.F. 2008. A Transporter Regulating Silicon Distribution in Rice Shoots. *The Plant Cell*, 20: 1381–1389.
- Yang, J.C., Zhang, J.H., Wang, Z.Q., Xu, G.W. and Zhu, Q.S. 2004. Activities of key enzymes in sucrose-to-starch conversion in wheat grains subjected to water deficit during grain filling. *Plant physiology*, 135: 1621–1629.
- Yang, P.M., Huang, Q.C., Qin, G.Y., Zhao, S.P., and Zhou, J.G. 2014. Different drought-stress responses in photosynthesis and reactive oxygen

- metabolism between autotetraploid and diploid rice. *Photosynthetica*, 52(2): 193–202.
- Yang, J.C. and Zhang J.H. 2006. Grain filling of cereals under soil drying. *New Phytologist*, 169: 223–236.
- Yin, L., Shiwen, W., Jianye, L., Kiyoshi, T., and Mariko, O. 2013. Application of silicon improves salt tolerance through ameliorating osmotic and ionic stresses in the seedling of *Sorghum bicolor*. *Acta Physiol Plant*. 35:3099–3107.
- Yoshida, S., Forno, D.H., Cock, J.H., and Gomez, K.A. 1976. *Laboratory Manual for Physiological Studies of Rice 3rd Edition*. The International Rice Research Institute. Los Banos. Philipines.
- Yoshida, S. 1981. *Fundamentals of rice crop science*. The International Rice Research Institute. Los Banos. Philipines.
- Yuwono. 2004. *Kesuburan Tanah (TNH)*. Yogyakarta: Penerbit UGM Press.
- Y.Wang, MaoDi, D., XunGang, G., JinLong,W., Yunli, P., LiPing, G., and Tao, X. 2013. Analysis of interfering substances in the measurement of malondialdehyde content in plant leaves. *AJBB*, 9 (3): 235-242.
- Zain, N.A.M, Ismail, M.R., Mahmood, M.Puteh, A., and Ibrahim, M.H. 2014. Alleviation of water stress effects on MR220 rice by application of periodical water stress and potassium fertilization. *Molecules*, 19: 1795-1819.
- Zhang, K., Wang, J., Zhang, L., Rong, C., Zhao, F., Peng, T., Li, H., Cheng, D., Liu, X., Qin, H., Zhang, A., Tong, Y., and Wang, D. 2013. Association analysis of genomic loci important for grain weight control in elite common wheat varieties cultivated with variable water and fertiliser supply. *PLoS ONE*, 8(3): 1-17.
- Zhang, T. Yu, L-X., Zheng, P., Li, Y., Rivera, M., Main, D., Greene, S.L. 2015. Identification of Loci Associated with Drought Resistance Traits in Heterozygous Autotetraploid Alfalfa (*Medicago sativa* L.) Using Genome-Wide Association Studies with Genotyping by Sequencing. *PLoS ONE*, 10(9): 1-17.
- Zhu, T., Budworth, P., Chen, W., Provart, N., Chang, H.S., Guimil, S., Su, W., Estes, B., Zou, G., and Wang, X. 2003. Transcriptional control of nutrient partitioning during rice grain filling. *Plant Biotechnol J*. 1 : 59-70.
- Zollinger, N., Kjellgren, R., Cerny-Koenig, T., Kopp, K., and Koenig, R. 2006. Drought responses of six ornamental herbaceous perennials. *Sci Hortic*, 109: 267-274.