

DAFTAR PUSTAKA

- Abbasi, A.R., Sarvestani R., Nargesi B.M., Bagheri A. 2014. Drought stress-induced changes at physiological and biochemical levels in some common Vetch (*Vicia sativa* L.) genotypes. *Journal of Agricultural Science and Technology* 16(3):505-516.
- Ahmad, P., Sharma, S. 2008. Salt stress and phytobiochemical responses of plants. *Plant Soil Environ.* 54: 89-99.
- Ahn, C., Park U., Park, P.B. 2011. Increased salt and drought tolerance by D-Ononitol production in transgenic *Arabidopsis thaliana*. *Biochem Biophys Res Commun* 415: 669-674
- Anonim. 2010. Informasi perubahan normal curah hujan. Badan Meteorologi, Klimatologi dan Geofisika (BMKG). <https://www.bmkg.go.id/iklim/perubahan-normal-curah-hujan.bmkg> (diakses 16 November 2018).
- Anonim. 2011. The special report on managing risk of extreme events and disasters to advance climate change adaptation. Intergovernmental Panel on Climate Change (IPCC). <http://www.ipcc.ch/> (diakses 22 Maret 2018)
- Anonim. 2012. Identifikasi lahan kering potensial untuk pengembangan tanaman pangan. Badan Penelitian dan Pengembangan Pertanian (BPPP). <http://www.litbang.pertanian.go.id/buku/Lahan-Kering-Ketahan/BAB-V-3.pdf> (diakses tanggal 12 Agustus 2018)
- Anonim. 2013. Potensi lahan untuk pengembangan pertanian di NTT. Dinas Pertanian dan Perkebunan Provinsi Nusa Tenggara Timur. Kupang-Nusa Tenggara Timur.
- Anonim. 2018. FAOSTAT- Indonesian population and productivity. Food and Agriculture Organization (FAO) of The United States. <http://www.fao.org/faostat/en/#compare>.
- Aroca, R., 2012. *Plant response to drought Stress. From morphological to molecular features*. Springer. Granada
- Aroca R, Ruiz-Lozano J. 2012. Regulation of root water uptake under drought stress conditions. In: Aroca R, editor. *Plant response to drought stress- From morphological to molecular features*. Berlin: Springer. p. 113
- Ashraf, M., M.R. Foolad. 2007. Roles of glisin-betain and proline in improving plant abiotic stress resistance. *Environm Exp Bot.* 59: 206-216
- Ashraf, M., Akram, N.A., Al-Qurainy F., Foolad, M.R. 2011. Drought tolerance: roles of organic osmolytes, growth regulators and mineral nutrients. *Adv. Agron.* 111: 249-296.
- Ashraf MA, Iqbal, M., Rasheed, R., Hussain, I., Perveen, S., Mahmood, S. 2018. Dynamic proline metabolism: importance and regulation in water-limited environments. In: *Plant metabolism and regulation under environmental stress*. Elsevier Academic Press. Cambridge Massachusetts, pp 323-336.
- Atkin, O.K., Macherel, D. 2009. The crucial role of plants mitochondria in orchestrating drought tolerance. *Annals of Botany.* 103: 581-597.
- Bacelar, E.L.V.A., Correia, C.M., Moutinho-Pereira, J.M., Goncalves, B.M.C., Lopes, J.I., Tores-Pereira, J.M. 2004. Sclerophyll and leaf anatomical traits

- of five field-grown olive cultivars growing under drought conditions. *Tree Physiol* 24: 233-239.
- Bacelar, E.L.V.A., Moutinho-Pereira, J.M., Goncalves, B.M.C., Lopes, J.I., Correia, C.M. 2009. Physiological responses of different olive genotypes to drought conditions. *Acta Physiol. Plant.* 31(3): 611-621.
- Bacelar, E.L.V.A., Moutinho-Pereira, J.M., Goncalves, B.M.C., Brito, C.V.Q., Gomes-Laranjo, J., Ferreira, H.M.F., Correia, C.M. 2012. Water use strategies of plants under drought conditions. (ed: R. Aroca) *Plant responses to drought stress*. 6: 145-170.
- Bajji M., Kinet, J-M., Luuts, S. 2002. The use of the electrolyte leakage method for assessing cell membrane stability as a water stress tolerance test in durum wheat. *Plant Growth Regulation*. 36(1):61-70.
- Bartels, D., 2005. Dessication tolerance studied in resurrection plant *Craterostigma plantagineum*. *Integrativ Comp. Biol.* 45: 696-701.
- Basuki, T., Prajitno, D. 2014. *Kontribusi senyawa kompatibel ekstrak daun tumbuhan halofit sebagai anti-salinitas dalam amendemen fisiologis padi (*Oryza sativa* L.)*. Disertasi S3 Agronomi UGM.
- Bates, L.S., Waldran, R.P., Teare, I.D. 1973. Rapid determination of free proline for water stress studies. *Plant soil*. 39: 205.
- Bekka, S., Abrous-Belbachir O., Djebbar, R.. 2018. Effects of exogenous proline on the physiological characteristics of *Triticum aestivum* L. and *Lens culinaris* Medik. under drought stress. *Acta agriculturae Slovenica*. (111) 2: 477-491.
- Bhaskara G.B., Yang T., Verslues, P.E. 2015. Dynamic proline metabolism: importance and regulation in water limited environments. *Front Plant Sci*. 6: 484.
- Boboy, W., Y.F. da Lopes. 2017. Hasil padi gogo lokal-NTT di bawah kondisi defisit air. *Jurnal P2M Politani Kupang*. 17 (2): 105-114.
- Bray, E.A., Bailey-Serres, J. and Weretilnyk, E. 2000. Responses to abiotic stress. Biochemistry & molecular biology of plants. In: Gruissem, W. and Jones, R., Eds., *American Society of Plant Physiologists*, Rockville, 1158-1203.
- Bunnag, S., 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.
- Cabello, J.V., Lodeyro A.F., Zurbriggen M.D. 2013. Novel perspectives for the engineering of abiotic stress tolerance in plants. *Curr. Opin Biotechnol.* 26:62-70.
- Cal AJ, Snciangco M, Rebolledo MC, Luquet D, Torres RO, McNally KL, Henry A. 2018. Leaf morphology, rather than plant water status, underlies genetic variation of rice leaf rolling under drought. *Plant Cell Environ*. 42:1532–1544
- Centritto M, Lauteru, M., Monteverdi, M.C., Serraj, R. 2009. Leaf gas exchange, carbon isotope discrimination, and grain yield in contrasting rice genotypes subjected to water deficits during the reproductive stage. *J Exp Bot*. 60(8): 2235-2339.
- Chaves, M.M., Costa, J.M., Saibo, N.J.M. 2011. Recent advance in photosynthesis under drought and salinity. *Adv Bot Res*. 57: 49-104.

- Chen, T.H., Murata, N. 2011. Glycinebetaine protects plants against abiotic stress: mechanisms and biotechnological applications. *Plant Cell Environ.* 34:1–20
- Chen, H., Xiong, L. 2012. Genome-wide transcriptional reprogramming under drought stress. *Journal of Plant Response to Drought Stress* 11: 273-289.
- Chen, J., Cao, Y., Zhang, Z., Wang, S., Wu, J., Wang, L. 2016. Cloning of the *OAT* gene and the correlation between its expression and drought tolerance in *Phaseolus vulgaris* L. *Journal of Integrative Agriculture*. 15(5): 973-986.
- Chuang-Guan, L., Zhou, X., Chen, D., Li, L., Li, J., Chen, Y. 2014. Natural variation of leaf thickness and its association to yield traits in indica rice. *Journal of Integrative Agriculture*. 13(2): 316-325.
- Conlin, L.K., Nelson, H.C.M. 2007. The natural osmolyte trehalose is a positive regulator of the heat-induced activity of yeast heat shock transcription factor. *Mol. Cell. Biol.* 27: 1505-1515.
- Connor, D.J. 2005. Adaptation of olive (*Olea europaea* L.) to water-limited environments. *Aust J Agric Res.* 56: 1181-1189.
- Davies, W.J., Wilkinson, S. 2012. Understanding and exploiting plant hormone biology to enhance crop production under water scarcity. *Plant Responses to Drought Stress-From Morphological to Molecular Features*. 1(10) 259-270.
- Dien, D.C., Yamakawa, T., Mochizuki, T., Htwe, A.Z. 2017. Dry weight accumulation, root plasticity, and stomatal conductance in rice (*Oryza sativa* L.) varieties under drought stress and re-watering conditions. *Am. J. Plant Sci.* 8: 3189–3206.
- Dorthe, J. 2000. *Casuarina equisetifolia* seed leaflet. 14:2020. University of Copenhagen.
- Elevarth, S., Martin, B. 2010. Spectrophotometric assays for antioxidant enzymes in plants. In *Plant Stress Tolerance-Methods in Molecular Biology*. Sunkar R (ed). Springer Science+ Business Media. 639: 273-290
- Fahramand, M., Mahmood, M., Keykha, A., Noori, M., Rigi, K. 2014. Influence of abiotic stress on proline, photosynthetic enzymes and growth. *Int Res J Appl Basic Sci.* 8(3): 257-265.
- Fang, Y., You, J., Xie, K., Xie, W., Xiong, L. 2008. Systematic sequence analysis and identification of tissue-specific or stress-responsive genes of NAC transcription factor family in rice. *Mol Genet Genomics.* 280:547–563.
- Fang, Y.J., L.Z. Xiong. 2015. General mechanisms of drought response and their application in drought resistance improvement in plants. *Cell. Mol. Life Sci.* 72: 377-403.
- Farahani, A., Lebaschi, H., Hussein, M., Hussein, S.A., Reza, V.A., Jahanfar, D. 2013. Effects of arbuscular mycorrhizal fungi, different levels of phosphorus and drought stress on water use efficiency, relative water content and proline accumulation rate of Coriander (*Coriandrum sativum* L.). *J Med Plants Res* 2 (6): 125-131.
- Farooq, M., Hussain, M., Wahid, A., Siddique, K.H.M. 2012. Drought stress in plants: An overview. (ed: R. Aroca) *Plant responses to drought stress*. Springer-Verlag. Berlin. 2012. pp.1-33.
- Filippou, P., Bouchagier, P., Skotti, E., Fotopoulos, V. 2014. Proline and reactive oxygen/ nitrogen species metabolism is involved in the tolerant response of

- the invasive plant species *Ailanthus altissima* to drought and salinity. *Environmental Exp. Bot.* 97: 1-10.
- Foyer, C.H., Noctor, G. 2003. Redox sensing and signaling associated with reactive oxygen species in chloroplasts, peroxisomes and mitochondria. *Physiol Plant.* 119 (3): 355-364.
- Fu, Y., Ma, H., Chen, S., Gu, T., Gong, J. 2018. Control of proline accumulation under drought via a novel pathway comprising the histone methylase *CAU1* and the transcription factor *ANAC055*. *Journal of Experimental Botany.* 69(3): 579–588.
- Fukuda, A., Nakamura, A., Tagiri, A., Tanaka, H., Miyao, A., Hirochika, H., Tanaka, Y. 2004. Function, intracellular localization and the importance in salt tolerance of a vacuolar Na⁺/H⁺ antiporter from rice. *Plant Cell Physiol.* 45: 146-159.
- Galvani, A. 2007. The challenge of the food sufficiency through salt tolerance crops. *Rev Environmental Science Biotechnology.* 6: 3-16.
- Gechev T, Van Breusegem, F., Stone, J., Denev, I., Laloi, C. 2006. Reactive oxygen species as signals that modulate plant stress responses and programmed cell death. *Bioessays.* 28:1091–1101.
- Gigon, A., Matos, A.R., Laffray, D., Zuily-Fodil, Y., Pham-Thi, A.T. 2004. Effect of drought stress on lipid metabolism in the leaves of *Arabidopsis thaliana* (ecotype Columbia). *Ann. Bot* 94: 345-351.
- Gill S.S., Tuteja, N. 2010. Polyamines and abiotic stress tolerance in plants. *Plant Signal Behav.* 5: 26-33.
- Gimeno J., Gadea, J., Forment, J. 2009. Shared the novel molecular response of mandarin to drought. *Plant mol. Biol.* 70: 403-420.
- Grondin, A., Mauleon, R., Vadez, V., Henry, A., 2016. Root aquaporins contribute to whole plant water fluxes under drought stress in rice (*Oryza sativa* L.). *Plant Cell Environ.* 39: 347–365.
- Gu, J.F., Yin, X.Y., Struik, P.C., Stomph, T.J., Wang, H.Q. 2012. Using chromosome introgression lines to map quantitative trait loci for photosynthesis parameters in rice (*Oryza sativa*) leaves under drought and well-watered field condition. *J.Exp Bot.* 63: 455-469.
- Guerfel, M., Baccouri, O., Boujnah, D., Chaibi, W., Zarrouk, M. 2009. Impacts of water stress on gas exchange, water relations, chlorophyll content and leaf structure in the two main Tunisian olive (*Olea europaea* L.) cultivars. *Sci Hortic.* 119: 257-263.
- Guo, M., Zhang, X., Liu, J., Liu, H., Zhao, X. 2020. *OsPRODH* negatively regulates thermotolerance in rice by modulating proline metabolism and reactive oxygen species scavenging. *Rice.* 13:61–65.
- Hameed, M., Batool, S., Naz, N., Nawaz, T., Ashraf, M. 2012. Leaf structural modifications for drought tolerance in some differentially adapted ecotypes of blue panic (*Panicum antidotale* Retz.). *Acta Physiol Plant.* 34:1479–1491
- Harborne, J.B. 1984. *Phytochemical methods: A guide to modern technique of plant analysis.* 2nd ed. London: Chapman and Hall.
- Hare, P.D., Cress, W.A., Van-Staden, J. 1998. Dissecting the roles of osmolytes accumulation during stress. *Plant cell Environment.* 21: 535- 553.

- Hayat, S., Hayat, Q., Alyemeni, M.N., Wani, A.S., Pichtel, J., Ahmad, A. 2012. Role of proline under changing environments: a review. *Plant Signal Behav.* 7(11):1456–1466 .
- Hodge, A., 2004. The plastic plant: root responses to heterogeneous supplies of nutrients. *New Phytol.* 162: 9–24.
- Hodges, D.M., DeLong, J.M., Forney, C.F., Prange, R.K. 1999. Improving the thiobarbituric acid-reactive-substances assay for estimating lipid peroxidation in plant tissues containing anthocyanin and other interfering compounds. *Planta.* 207:604- 611.
- Hosang, E.Y., Basuki, T., Hanggongu, K., Pohan, A. 2014. Evaluasi diversitas spesies tanaman pada lahan ladang di provinsi Nusa Tenggara Timur untuk mendukung ketahanan pangan: Studi kasus kabupaten Belu, Malaka, Timor Tengah Utara, Timor Tengah Selatan, dan Kupang. *Prosiding Seminar Nasional Pertanian.* P: 25-39
- Hosang, E.Y., Bombo, Y., Basuki, T. 2016. Keragaman plasma nutfah padi gogo lokal Sumba Barat Daya provinsi Nusa Tenggara Timur. *Bul. Plasma Nutfah.* 22(2): 93-100
- Hur, J., Jung, K.H., Lee, C.H., An, D. 2004. Stress-inducible *OsP5CS2* gene is essential for salt and cold tolerance in rice. *Plant Science.* 167: 417-426
- Irwanto, 2006. Penggunaan tanaman actinorizal *Casuarina equisetifolia* L. pada rehabilitasi lahan alang-alang dengan sistem agroforestri. <http://etd.repository.ugm.ac.id>.
- Jagesh, K., Tiwari, A.D., Munshi, R.K., Raghu, N., Pandey, A., Bhat, A.K.S. 2010. Effect of salt stress in cucumber: Na^+ - K^+ ratio, osmolyte concentration, phenols and chlorophyll content. *Acta Physiol Plant.* 32: 103-114.
- Jain, M. 2013. Emerging role of metabolic pathway in abiotic stress tolerance. *J. Plant Physiology.* 1: 108.
- Jeong, J., Kim, Y., Baek, K., Jung, H., Ha, S., Do, C., Kim, M. 2010. Root-specific expression of *OsNAC10* improves drought tolerance and grain yield in rice under field drought conditions. *Plant Physiol.* 153:185– 197.
- Jimenez, S., Dridi, J., Gutierrez, D., Moret, D., Irigoyen, J.J., Moreno, M.A., Gogorcena, Y. 2013. Physiology, biochemical and molecular responses of four *Prunus* rootstocks submitted to drought stress. *Tree Physiology.* 00: 1-15
- Jones., H.G., Flowers, T.J., Jones, M.B. 2002. *Plant under stress- biochemistry, physiology and ecology and their application to plant improvement.* Cambridge University Press. Cambridge. P: 1-31.
- Kadam, N.N., Yin, X., Bindrabab, P.S., Struik, P.C., Jagadish, K.S.V. 2014. Does morphological and anatomical plasticity during the vegetative stage make wheat more tolerant of water deficit stress than rice? *Plant Physiol.* 167:1389-1401.
- Kalsoon, U., Bennett, I.J., Boyce, M.C. 2016. A review of extraction and analysis: methods for studying osmoregulations in plants. *Journal of Chrom. Sep Tech* 7:315.
- Kano-Nakata, M., Nakamura, T., Mitsuya, S., Yamauchi, A., 2019. Plasticity in root system architecture of rice genotypes exhibited under different soil water

- distributions in soil profile. *Plant Prod. Sci.* 22: 501–509.
- Kano, M., Inukai, Y., Kitano, H., Yamauchi, A., 2011. Root plasticity as the key root trait for adaptation to various intensities of drought stress in rice. *Plant Soil*. 342: 117–128.
- Kantar, M., Lucas, S.J., Budal, H. 2011. Drought stress: Molecular genetics and genomics approaches. *Adv in Botanical Research*. 57: 445-475.
- Karaba, A., Dixit, S., Greco, R., Aharoni, A., Trijatmiko, K.R., Marsch-Martinez, N., Krishana, A., Nataraja, K.N., Udayakumar, M., Pereira, A. 2007. Improvement of water use efficiency in rice by expression of *HARDY*, an *Arabidopsis* drought and salt tolerance gene. *Proc Natl Acad Sci USA*. 104:15270–15275
- Karl, T.R., Melillo, J.M., Peterson, T.C. 2009. *Global climate change impacts in the United States*. Cambridge University Press. Cambridge. P: 17-21.
- Kato, Y., Collard, B.C.Y., Septiningsih, E.M., Ismail, A.M. 2014. Physiological analysis of traits associated with tolerance of long-term partial submergence in rice. *AoB Plants*.
- Kim, Y.C., Glick, B.R., Bashan, Y., Ryu, C.M. 2012. Enhancement of plant drought tolerance by microbes. *Plant Response to Drought Stress*. 15: 383-395
- Koyro, H.W., Ahmad, P., Geissler, N. 2012. Abiotic stress responses in plants: An overview. (In: Ahmad P, M.N.V. Prasad) (eds) *Environment adaptation and stress tolerance of plants in the era of climate change*. Springer. New York, P: 1-28.
- Kulkarni, M., Soolanayakanahally, R., Ogawa, S., Uga, Y., Selvaraj, M.G., Kagale, S. 2017. Drought response in wheat: Key genes and regulatory mechanisms controlling root system architecture and transpiration efficiency. *Front. Chem.* 5: 1–13.
- Kumar, S., Dwivedi, S.K., Singh, S.S., Jha, S.K., Lekshmy, S., Elanchenzhian, R., Singh, O.N., Bhatt, B.P. 2014. Identification of drought tolerance rice genotypes by analysing drought tolerance indices and morpho-physiological traits. *SABRAO Journal of Breeding and Genetics*. 46 (2): 217-230.
- Laffite, H.R., Yongsheng, G., Yan, S., Li, Z.K. 2007. Whole plants responses, key process, and adaptation to drought stress: The case of rice. *J Exp Bot.* 58: 169-175.
- Lalel, H.J.D., Abidin, Z., Jutomo, L., 2009. Sifat fisiko kimia beras merah gogo lokal Ende. *Jurnal Teknologi dan Industri Pangan*. 20:109-116.
- Lang, F., 2007. Mechanism and significance of cell volume regulation. *J. Am Coll Nutr.* 26: 613S-623S.
- Lata, C., Muthamilarasan, M., Prasad, M. 2015. Drought stress responses and signal transduction in plants. (In: Pandey GK, editors) *Elucidation of abiotic stress signaling in plants*. New York: Springer. p. 195–225.
- Lauteri, M., Haworth, M., Serraj, R., Monteverdi, M. C., Centritto, M. 2014. Photosynthetic diffusional constraints affect yield in drought stressed rice cultivars during flowering. *PloS One*. doi.org/10.1371/journal.pone.0117631.
- Lehmann, S., Funck, D., Szabados, L., Rentsch, D. 2010. Proline metabolism and transport in plant development. *Amino Acids*. 39:949–962.

- Li, X., Liu, F. 2016. Drought stress memory and drought stress tolerance in plants: biochemical and molecular basis. (In: Hossain, M., Wani, S., Bhattacharjee, S., Burritt, D., Tran, L., editors). *Drought stress tolerance in plants Vol 1*. Switzerland: Springer. p. 17–44
- Lima, J.M., Nath, M., Dokku, P., Raman, K.V., Kulkarni, K.P., Vishwakarma, C., Sahoo, S.P., Mohapatra, U.B., Amitha-Mithra, S.V., Chinnusamy, V., Robin, S., Sarla, N., Seshashayee, M., Singh, K., Singh, A.K., Singh, N.K., Sharma, R.P., Mohapatra, T. 2015. Physiological, anatomical and transcriptional alterations in a rice mutant leading to enhanced water stress tolerance. *AoB Plants*. 7: 1–19
- Liu, S., Zheng, L., Xue, Y., Zhang, Q., Wang, L., Shou, H. 2010. Overexpression of *OsCPI* and *OsNHX1* increases tolerance to drought and salinity in rice. *J Plant Biol*. 55: 444-452.
- Livak, K.J., Schmittgen, T.D. 2001. Analysis of relative gene expression data using real-time quantitative PCR and the 2(-Delta Delta C(T)) Method. *Methods*. 25(4):402-8.
- Londo, J.P., Chian, Y.C., Hung, K.H., Chiang, T.Y., Schaal, B.A. 2006. Phylogeography of Asian wild rice, *Oryza rufipogon*, reveals multiple independent domestications of cultivated rice, *Oryza sativa*. *Proceedings of the National Academy of Sciences*. 103, 9578–9583.
- Lotkowska, M.E., Tohge, T., Fernie, A.R., Xue, G.P., Balazadeh, S., Mueller-Roeber, B. 2015. The *Arabidopsis* transcription factor *MYB112* promotes anthocyanin formation during salinity and under high light stress. *Plant Physiol*. 169 (3):1862-1880.
- Lum, M.S., Hanafi, M.M., Rafii, Y.M., Akmar, A.S.N. 2014. Effect of drought stress on growth, proline, antioxidant enzyme activity of upland rice. *J Anim Plant Sci*. 24(5): 1487-1493.
- Maisura, M.A. Chozin, I., Lubis, A., Junaedinand, H., Ehara. 2014. Some physiological character responses of rice under drought conditions in a paddy system. *J Int Southeast Asian Agric Sci*. 20(1): 104-114.
- Makbul, S., Guler, N.S., Durmus, N., Guven, S. 2011. Changes in anatomical and physiological parameters of soybean under drought stress. *Turk J Bot*. 35: 369-377.
- Marklund, S., Marklund, G. 1974. Involvement of the superoxide anion radical in the autoxidation of pyrogallol and a convenient assay for superoxide dismutase. *Eur J Biochem*. 47: 469-474.
- Martinez, V.J., Poyatos, R., Aguade, D., Retana, J., Mencuccini, M. 2014. A new look of water transport regulation in plants. *New Phytol*. 204: 105-115.
- Mattoo, A., Upadhyay, R., Rudrabhatla, S. 2015. Abiotic stress in crops: candidate genes, osmolytes, polyamines, and biotechnological intervention. (In: Pandey G, editor). *Elucidation of abiotic stress signaling in plants*. New York: Springer. p. 415–437.
- McMaster, G.S., Wilhelm, W.W. 2003. Phenological response of wheat and barley to water and temperature: improving simulation models. *J Agr Sci*. 141: 129-147.

- Micco, V.D., Aronne, G. 2012. Morpho-anatomical traits for plant adaptation to drought. (In Aroca R. ed.). *Plant responses to drought stress*. Springer-Verlag Berlin Heidelberg. Pp: 38-60.
- Mitler, R. 2002. Oxidative stress, antioxidants and stress tolerance. *Trends Plant Sci.* 7(9): 405–410.
- Mullan, D., Pietragalla, J. 2012. Leaf relative water content. (In: Pietragalla, J., Mullan, D., Reynolds, M., eds). *Physiological breeding II: A field guide to wheat phenotyping*. Mexico: *CIMMYT*. p. 25–27.
- Munns, R. 2011. Plant adaptaton to aalt and water stress: Differences and commonalities. *Advance in Bot. Research*. 57: 1-32.
- Nakashima, K., Tran, L.S., Van-Nguyen, D., Fujita, M., Maruyama, K., Todaka, D., Ito, Y., Hayashi, N., Shinozaki, K., Yamaguchi-Shinozaki, K . 2007. Functional analysis of a *NAC* -type transcription factor *OsNAC6* involved in abiotic and biotic stress responsive gene expression in rice. *Plant J.* 51:617–630.
- Neumann, P.M. 2011. Recent advances in understanding the regulation of whole-plant growth inhibition by salinity, drought and colloid stress. *Adv Bot Res.* 57: 33-48.
- Ngumbi, E., Kloepper, J. 2016. Bacterial-mediated drought tolerance: Current and future prospects. *Applied Soil Ecology* 105: 109-125.
- Olmos, E., Sanchez-Blanco, M.J., Fernandez, T., Alarcon, J.J. 2007. Subcellular effects of drought stress in *Rosmarinus officinalis*. *Plant Biol.* 9: 77-84
- Onesa, M.A., Muir, C.D., Molins, A., Galmes, J. 2020. Stomatal anatomy coordinates leaf size with Rubisco kinetics in the *Balearic limonium*. *AoB Plants*. 12 (1): 1-11.
- Orwa, C., Mutua, A. , Kindt, R. , Jamnadass, R., Simons, A.. 2009. Agroforestree Database:a tree reference and selection guide version 4.0 (<http://www.worldagroforestry.org/af/treedb/>).
- O'Toole, J.C., Bland, W.L., 1987. Genotypic variation in crop plant root systems. *Adv. Agron.* 41: 91–145
- Oukarroum, A., Madidi, S.E., Schansker, G., Strasser, R.J. 2007. Probing the responses of barley cultivars (*Hordeum vulgare* L.) by chlorophyll a fluorescence OLKJIP under drought stress and re-watering. *Environmental and Experimental Botany*. 60: 438–446.
- Ouyang, W., Struik, P.C., Yin, X., Yang, J. 2017. Stomatal conductance, mesophyll conductance and transpiration efficiency in relation to leaf anatomy in rice and wheat genotypes under drought. *Journal of Experimental Botany*. 68 (18): 5191-5206.
- Pandey, V., Shukla, A. 2015. Acclimation and tolerance strategies of rice under drought stress. *Rice Science*. 22(4): 147-161.
- Passioura, J.B. 1997. Drought and drought tolerance. *Plant Growth Regulation*. 20: 79-83.
- Phule, A.S., Barbadikar, K.M., Madhav, M.S., Subrahmanyam, D., Senguttuvel, P., Babu, M.B.B.P., Kumar, P.A. 2019. Studies on root anatomy, morphology and physiology of rice grown under aerobic and anaerobic conditions. *Physiol. Mol. Biol. Plants*. 25: 197–205.

- Puranik, S., Sahul, P.P., Srivastava, P.S., Prasad, M. 2012. *NAC* proteins: regulation and role in stress tolerance. *Trends Plant Sci.* 17:369–381.
- Purushothaman, R., Zaman-Allah, M., Mallikarjuna, N., Pannirselvam, R., Krishnamurthy, L., Laxmipathi-Gowda, C.L. 2013. Root anatomical traits and their possible contribution to drought tolerance in grain legumes. *Plant Prod. Sci.* 16: 1–8.
- Qin, F., Kakimoto, M., Sakuma, Y., Maruyama, K., Osakabe, Tran, L., Shinozaki, K., Yamaguchi-Shinozaki, K. 2007. Regulation and functional analysis of *ZmDREB2A* in response to drought and heat stresses in *Zea mays* L. *Plant J.* 50:54–69.
- Qiu, D., Xiao, J., Xie, W.B., Cheng, H.T., Li, X.H., Wang, S.P. 2009. Exploring transcriptional signaling mediated by *OsWRKY13*, a potential regulator of multiple physiological processes in rice. *BMC Plant Biol.* 9:74 .
- Rachmawati, D., Maryani, Masruroh, U., Monika, N.L.G.M. 2018. The effectivity of rice Husk ash in enhancing drought tolerance on different rice cultivars. *AIP Conference Proceedings* 020010.
- Ranganayakulu, Y.S., Veeranagamallaiah, G., Sudhakar, C., 2013. Effect of salt stress on smolyte accumulation in two groundnut cultivars (*Arachnis hypogaea* L.)with contrasting salt tolerance . *Afr J. Plant. Sci.* 12: 586-592.
- Raye, R., Tran, H.D., Xuan, T.D., Khank, T.D. 2018. Imposed water deficit after anthesis for the improvement of macronutrients, quality, phytochemical, and antioxidants in rice grain. *Sustainability.* 10: 4843.
- Refli, Muljopawiro, S., Dewi, K., Rachmawati, D. 2014. Expression analysis of antioxidant genes in response to drought stress in the flag leaf of two Indonesian rice cultivars. *Indonesian Journal of Biotechnology.* 19: 43-55
- Refli, Purwestri, Y.A. 2016. The response of antioxidant genes in rice (*Oryza sativa* L.) seedling Cv. Cempo Ireng under drought and salinity stresses. *AIP Conference Proceedings* 1744
- Riaz, A., Younis, A., Taj, A.R., Karim, A., Tariq, U., Munir, S., Riaz, S.2013. Effect of drought stress on growth and flowering of marigold (*Tagetes erecta* L.) *Pak. J. Bot.* 45(1): 123-131.
- Riechmann, J., Ratcliffe, O. 2000. A genomic perspective on plant transcription factors. *Curr Opin Plant Biol.* 3(5):423–434.
- Saito, K., Suzuki, T., Ishikita, H. 2018. Absorption-energy calculations of chlorophyll a and b with an explicit solvent model. *J Photochemistry and Photobiology.* 358: 422-431.
- Sakamoto, A., Murata, N. 2002. The role of glycine betaine in the protection of plants from stress: Clues from transgenic plants. *Plant Cell Environment* 25: 163-171.
- Salsinha, Y.C.F., Indradewa, D., Purwestri, Y.A., Rachmawati, D. 2020. Selection of drought-tolerant local rice cultivars from East Nusa Tenggara, Indonesia during begetative stage. *Biodiversitas.* 21(1): 170-178.
- Salsinha, Y.C.F., Indradewa, D., Purwestri, Y.A., Rachmawati, D. 2021a. Physiological and oxidative defense responses of local rice cultivars “Nusa Tenggara Timur-Indonesia” during vegetative drought stress. *Aus J Crop Sci.* 15(03):394-400 (2021).

- Salsinha, Y.C.F., Maryani, Indradewa, D., Purwestri, Y.A., Rachmawati, D. 2021b. Morphological and anatomical characteristics of Indonesian rice roots from East Nusa Tenggara contribute to drought tolerance. *Asian J Agric Biol.* 2021 (1) : 1–11. doi:10.35495/ajab.2020.05.304.
- Schimel, J.P., Balser, T.C., Wellenstein, M. 2007. Microbial stress response physiology and its implications for ecosystem function. *Ecology.* 88: 1386-1394.
- Serraj, R., Liu, D., He, H., Sellamuthu, R., Impa, S., Cairns, J., Dimayuga, G., Torres, R. 2008. Novel approaches for integration of physiology, genomics, and breeding for drought resistance improvement in rice. In: *Drydown FTSW Protocol*. Manila: IRRI.
- Sharma, P., Jha, A.B., Dubey, R.S., Pessarkli, M. 2012. Reactive oxygen species, oxidative damage, and antioxidative defense mechanism in plants under stressful conditions. *J Bot* 1-26.
- Shehab, G.G., Ahmed, O.K., El-Beltagi, H.S. 2010. Effects of various chemical agents for alleviation of drought stress in rice plants (*Oryza sativa* L.). *Not Bot Hort Agrobot Cluj-Napoca.* 38(1): 139-148.
- Shinde, S., Villamor, J.G., Lin, W., Sharma, S., Verslues, P. E. 2016. Proline coordination with fatty acid synthesis and redox metabolism of chloroplast and mitochondria. *Plant Physiol.* 176: 1074-1088
- Shinozaki K., Shinozaki, Y. 2000. Molecular response to dehydration and low temperature: differences and cross-talk between two stress signaling pathways. *Curr. Opin in Plant Biology.* 3: 217-223.
- Shlens, J. 2014. A Tutorial on Principal component analysis – *Google research. Mountain View.* 3.02: 1-12.
- Siddiqui, M.H., Al-Khaishany, M.Y., Al-Qutami, M.A., Al-Wahaibi, M.H., Grover, A., Ali, H.M., Al-Wahibi, M.S., Bukhari. 2015. N.A. 2015. Response of different genotypes of Faba Bean plant to drought stress. *Intl. J. Mol. Sci.* 16(5): 10214-10227.
- Singh, M., Kumar, J., Singh, S., Singh, V.P., Prasad, S.M. 2015. Roles of Osmoprotectants in improving salinity and droughttolerance in plants: a review. *Review of Environmental Science Biotechnology.*
- Singh, B., Redddy, K.R., Redona, E.D., Walker, T. 2017. Screening of rice cultivars for morpho-physiological responses to early season soil moisture stress. *Rice Science.* 24(5): 322-335.
- Siswanti, D.U., Rachmawati, D. 2011. Plant response and nitrat reductase activity in vivo on rice (*Oryza sativa* L.) cultivars IR64 to biofertilizer application and drought. *International conference on Biological Science:* 1-5
- Sopandie, D., 2013. *Fisiologi adaptasi tanaman- terhadap cekaman abiotik pada agroekosistem tropika*. IPB Press. Bogor. P: 6-9; 44-48; 158-164
- Sutikno. 2006. *Petunjuk praktikum mikroteknik tumbuhan. Lab Mikroteknik dan Embriologi Tumbuhan*. Fakultas Biologi Universitas Gadjah Mada Yogyakarta. P: 7-9, 17-18.
- Swapna, S., Shylaraj, K.S. 2017. Screening for osmotic stress responses in rice varieties under drought condition. *Rice Science.* 24 (5): 253-263.
- Szepesi, A., Szollosi, R. 2018. Mechanism of proline biosynthesis and role of

- proline metabolism enzymes under environmental stress in plants. In: *Plant metabolism and regulation under environmental stress*. Elsevier Academic Press, Cambridge Massachusetts, pp 337-353.
- Taiz, L., Zeiger, E. 2002. *Plant Physiology* 2nd ed. The Benjamin/Cummings Publisher. California.
- Takuji, S., Moore, G. 1997. *Oryza: From molecule to plant. An international journal on molecular biology, molecular genetics and biochemistry*. Springer. London. P:28-31.
- Thippeswamy, M., Chandraobulreddy, P., Sinial, B., Kumar, M.S., Sudhakar, C. 2010. Proline accumulation and the expression of Δ^1 -pyrroline-5-carboxylate synthetase in two safflower cultivars. *Biol Plant*. 54: 386-390.
- Tripathy, J.N., Zhang, J.X., Robin, S., Nguyen, T.T., Nguyen, H.T. 2000. QTLs for cell-membrane stability mapped in rice (*Oryza sativa* L.) under drought stress. *Theory App Genet*. 100(8): 1197-1202.
- Turkan, I. 2011. *Plant response to drought and salinity stress- development in a post-genomic era*. Vol 57. Elsevier. Boston: 410-415; 446-458.
- Usman M., Raheem, Z.F., Ahsan, T., Iqbal, A., Sarfaraz, Z.N., Haq, Z. 2013. Morphological, physiological, and biochemical attributes as indicators for drought tolerance in rice (*Oryza sativa* L.). *Eur J Biol Sci*. 5(1): 23-38.
- Vendruscolo, E.C.G., Schusterb, I., Pileggic, M., Scapimd, C.A., Molinarie, H.B.C., Marure, C.J., Vieira, L.G.E. 2007. Stress-induced synthesis of proline confers tolerance to water deficit in transgenic wheat. *J Plant Physiol*. 164: 1367—1376.
- Wan, L., Zhang, J., Zhang, H., Zhang, Z., Quan, R., Zhou, S., Hunag, R. 2011. Transcriptional activation of *OsDERF1* in *OsERF3* and *OsAP2* - 39 negatively modulates ethylene synthesis and drought tolerance in rice. *PLoS One*. doi: 10.1371/journal.pone.0025216.
- Wang, B.S., Luttge, U., Rataj, R. 2001. Effects of salt treatment and osmotic stress on V-ATPase and V-Ppase in leaves of the halophyte *Suaeda salsa*. *J Exp Bot*. 52: 2355 -2365.
- Wang, F., Xu, X., Zou, B., Guo, Z., Li, Z., Zhu, W. 2013. Biomass accumulation and carbon sequestration in four different aged *Casuarina equisetifolia* coastal shelterbelt plantations in South China. *PLoS ONE*. 8(10): e77449.doi:10.1371/journal.pone. 0077449
- Wang, X., Samo, N., Li, L., Wang, M., Qadir, M., Jiang, K., Qin, J., Rasul, F., Yang, G., Hu, Y. 2019. Root distribution and its impacts on the drought tolerance capacity of hybrid rice in the Sichuan Basin area of China. *Agronomy*. 9(2):1–13. doi:10.3390/agronomy9020079.
- Wani, S.H., Gosal, S.S. 2011. Introduction of OsglyII gene into Indica rice through particles bombardement for increased salinity tolerance. *Biol.Plant*. 55:536-540.
- Weiste, C., Iven, T., Fischer, U., Onate-Sanchez, L., Droge-Laser, W. 2007. In planta ORFeome analysis by large-scale over-expression of GATEWAY-compatible cDNA clones: screening of ERF transcription factors involved in abiotic stress defense. *Plant J*. 52:382–390.
- Xiong, L., Schumaker, K., Zhu, J. 2002. Cell signaling during cold, drought, and

- salt stress. *Plant Cell*:165–183.
- Xu, Z., Zhou, G. 2008. Responses of leaf stomatal density to water status and its relationship with photosynthesis in a grass. *J Exp Bot*. 59: 3317-3325.
- Xu, P., Ali, A., Han, B., Wu, X. 2018. Current advanced in molecular basis and mechanism regulation leaf morphology in rice. *Front Plant Sci*. 9:1528.
- Yadav, R.S., Hash, C.T., Bidinger, F.R., Devos, K.M., Howarth, C.J. 2004. Genomic regions associated with grain yield and aspects of post-flowering drought tolerance in pearl millet across environments and tester background. *Euphytica*. 136: 265-277.
- Yamada, M., Morishita, H., Urano, K., Shiozaki, N., Yamaguchi-Shinozaki, K., Shinozaki, K., Yoshida, Y. 2005. Effects of free proline accumulation in petunias under drought stress. *Journal of Exp. Bot*. 56 (417): 1975-1981.
- Yamane, K., Hayakawa, K., Kawasaki, M., Taniguchi, M., Miyake, H., 2003. Bundle sheath chloroplasts of rice are more sensitive to drought stress than mesophyll chloroplasts. *J. Plant Physiol*. 160: 1319–1327.
- Yang, X., Liang, Z., Lu, C. 2005. Genetic engineering of the biosynthesis of glycinebetaine enhances photosynthesis against high temperature stress in transgenic tobacco plants. *Plant Physiol*. 138:2299–2309 .
- Yang, A., Dai, X., Zhang, W.H. 2012. A *R2R3*-type *MYB* gene, *OsMYB2* , is involved in salt, cold, and dehydration tolerance in rice. *J Exp Bot*. 63:2541–2556.
- Yang C, Zhang X, Li J, Bao M, Ni D, Seago, J.L. 2014. Anatomy and histochemistry of roots and shoots in wild rice (*Zizania latifolia* Griseb.). *J. Bot*. 2014:1-9.
- Yuehui, T., Xinxin B., Yuling Z., Qian W., Yaru G, Xuhui Y, Liqin Z, L Jia L, Jing Z, Wenlong H, Weihao L, Qingwei W, Chengkai J, Zhengkang L, Kun L. 2019. Overexpression of a *MYB* family gene, *OsMYB6*, increases drought and salinity stress tolerance in transgenic rice. *Fro.Plant Sci*. 10: 168
- Zagoto, A.D.P., Violita, V. 2019. Leaf anatomical modification in drought of rice varieties (*Oryza sativa* L.). *Section EKSakta: Berkala Ilmiah Bidang MIPA*, 20 (2): 42-45.
- Zarattini, M., Forlani, G. 2017. Toward unveiling the mechanisms for transcriptional regulation of proline biosynthesis in the plant cell response to biotic and abiotic stress conditions. *Fro Plant Sci*. 8 (927). doi: 10.3389/fpls.2017.00927.
- Zhang, H., Liu, W., Wan, L., Li, F., Dai, L., Li, D., Zhang, Z., Huang, R. 2010. Functional analyses of ethylene response factor *JERF3* with the aim of improving tolerance to drought and osmotic stress in transgenic rice. *Transgenic Res*. 19:809–818
- Zhang, L., Zhao, G., Jia, J., Liu, X., Kong, X. 2012. Molecular characterization of 60 isolated wheat *MYB* genes and analysis of their expression during abiotic stress. *J Exp Bot* 63:203–214
- Zhu, X.G., Long, S.P., Ort, D.R. 2008. What is the maximum efficiency with which photosynthesis can convert into biomass? *Current Opinion of Biotechnology*. 19: 153-159.

Zu, X., Lu, Y., Wang, Q., Chu, P., Miao, W., Wang, H., La, H. 2017. A new Method for evaluating the drought tolerance of upland rice cultivars. *The Crop Journal*. 5: 488-498.