

DAFTAR PUSTAKA

- Alexieva, V., I. Sergief, S. Mapelli & E. Karanov. 2001. The effect of drought and ultraviolet radiation on growth. *Plant Cell and Environment* 24 : 1337-1344.
- Amang, B., P. Simatupang & A. Rachman. 1996. *Ekonomi Minyak Goreng di Indonesia*. IPB Press, Bandung.
- Apel, K & H. Hirt. 2004. Reactive oxygen species : metabolism, oxidative stress and signal transduction. *Annu Rev Plant Biol* 55 : 373-399.
- Asada, K. 2006. Production and scavenging of reactive oxygen species in chloroplast and their functions. *Plant Physiology* 141 : 391-396.
- Ashraf, M & M. R. Foolad. 2007. Roles of glycine betaine and proline in improving plant abiotic stress resistance. *Environmental and Experimental Botany* 59 : 206-216.
- Astutiningsih, W. 2005. *Kajian Fisiologis Cekaman Al dan Defisiensi P terhadap Pertumbuhan Bibit Padi Gogo dengan Tingkat Ketahanan yang Berbeda*. Tesis : Universitas Gadjah Mada. Yogyakarta.
- Bailly, C., J. Leymarie, A. Lehner, S. Rousseau, D. Come & F. Corbineau. 2004. Catalase activity and expression in developing sun flower seeds as related to drying. *Journal of Experimental Botany* 55 : 475-483.
- Bangun, D. 2006. *Indonesian Palm Oil Industry*. Presented at the National Institute of Oil Seed Products Annual Convention. Arizona. USA.
- Blamey, F. P. C., D. G. Edwards & C. J. Asher. 1993. Factors affecting aluminium sorption by calcium pectate. *Plant and Soil* 113 : 1447-1455.
- Cakmak, I & W. J. Horst. 1991. Effect of aluminium on lipid peroxidation, superoxide dismutase, catalase and peroxidase activities in root tips of soybean (*Glycine max*). *Plant Physiol* 83 : 463-468.
- Charron, J. A & R. S. Quatrano. 2009. Between a rock and a dry place : the water-stressed moss. *Molecular Plant* 1-9.
- Choudhury, S & P. Sharma. 2014. Aluminium stress inhibits root growth and alters physiological and metabolic responses in chickpea (*Cicer arietinum* L.). *Plant Physiology and Biochemistry* 85 : 63-70.
- Chun, O. Y, D-O. Kim & C. Y. Lee. 2003. Superoxide radical scavenging activity of the major polyphenols in fresh plums. *J. Agric. Food Chem.* 51: 8067-8072.
- Clarkson, D. T. 1969. The effect of Aluminium and some other trivalent metal ions on the cell division in the root of *Allium cepa*. *Ann. Bot.* 20 : 309-315.
- Cocker, K. M., D. E. Evans & M. J. Hodson. 1998. The amelioration of aluminium toxicity by silicon in higher plant: Solution chemistry or an in planta mechanisms. *Physiol. Planta.* 104 : 608-614.

- Corley, R. H. V & P. B. Tinker. 2003. *The Oil Palm*. Blackwell Publishing, Oxford.
- Costa, M. A., H. A. Pinheiro, E. S. C. Shimizu, F. T. Fonseca., B. G. D. Filho, F. K. C. Moraes & D. G. De-Figueiredo. 2010. Lipid peroxidation, chloroplastic pigments and antioxidant strategies in *Carapa guianensis* (Aubl.) subjected to water-deficit and short-term rewetting. *Trees* 24 : 275-283.
- Crusciol, C. A. C., A.L. Pulz, L. B. Lemos, R. P. Soratto & G. P. P. Lima. 2009. Effects of silicon and drought stress on tuber yield and leaf biochemical characteristic in potato. *Crop Physiology and Metabolism* 49 : 949-954.
- Dai, W. M., K. Q. Zhang, B. W. Duan, C. X. Sun, K. L. Zheng, R. Cai & J. Y. Zhuang, 2005: Rapid determination of silicon content in rice. *Rice Sci.* 12:145–147.
- Duros, M. L. & C. Magne. 2009. Antioxidant activity and phenol content of *Crithmum maritimum* L. leaves. *Plant Physiology and Biochemistry* 47 : 37-41.
- Enggarini, W & E. Marwani. 2006. Pengaruh cekaman aluminium terhadap kandungan asam organik dalam kalus dan pinak tomat (*Lycopersicon esculentum* Mill.). *Jurnal AgroBiogen* 2 : 24-28
- Epstein, E. 1999. Silicon. *Annu Rev Plant Physiol Mol Biol* 50 : 641-664.
- Ezaki, B., Y. Yamamoto & H. Matsumoto. 1995. Cloning and sequencing of the cDNAs induced by aluminium treatment and P_i starvation in cultured tobacco cells. *Physiol. Plant.* 93: 11-18.
- Faiz, M. 2006. *Gambut : Agroekosistem dan Transformasi Karbon*. Gajah Mada University Press. Yogyakarta.
- Farooq, M., M. Hussain, A. Wahid & K. H. M. Siddique. 2012. Drought stress in plants: an overview. *In: R. Aroca (Ed.) Plant Responses to Drought Stress From Morphological to Molecular Features*. Springer-Heidelberg New York Dordecht. London.
- Fauzi, Y., Y. E. Widyastuti, I. Satyawibawa & R. H. Paeru. 2012. *Kelapa Sawit, Budidaya, Pemanfaatan Hasil dan Limbah, Analisis Usaha dan Pemasaran*. Penebar Swadaya. Depok.
- Galvez, L., R. B. Clark, M. Gourley & J. W. Maranville. 2008. Silicon interactions with manganese and aluminium toxicity in sorghum. *Journal of Plant Nutrition* 10 : 1139-1147.
- Galvez, L & R. B. Clark. Effects of silicon on growth and mineral composition of sorghum (*Sorghum bicolor*) grown with toxic levels of aluminium. Dalam *Plant-Soil Interactions at Low pH, Proceedings of the Second International Symposium on Plant Soil Interactions at Low pH*, Kluwer Academic Publisher, Beckley, WV. June 1990. 815-823.
- Gardner, F. P., R. B. Pearce & R. L. Mitchell. 1991. *Physiology of Crop Plants*. Universitas Indonesia Press. Jakarta.
- Giannakoula, A., M. Moustakas, P. Mylona, I. Papadakis & T. Yupsanis. 2008. Aluminium tolerance in maize is correlated with increased levels of mineral

- nutrients, carbohydrates and proline, and decreased levels of lipid peroxidation and Al accumulation. *Journal of Plant Physiology* 165 : 385-396.
- Grieve, C. M & S. R. Grattan. 1983. Rapid assay for determination of water soluble quaternary ammonium compounds. *Plant Soil* 70 : 303-307.
- Hameed, A., M. Goher & N. Iqbal. 2013. Drought induced programmed cell death and associated changes in antioxidants, proteases, and lipid peroxidation in wheat leaves. *Biologia Plantarum* 57 : 370-374.
- Hamilton, C. A., A. G. Good & G. J. Taylor. 2001. Induction of vacuolar ATPase and mitochondrial ATP synthase by aluminum in an aluminum-resistant cultivar of wheat. *Plant Physiol.* 125 : 2068-2077.
- Hansen, G. K & C. R. Jensen. 1977. Growth and Maintenance Respiration in Whole Plants, Tops, and Roots of *Lolium multiflorum*. *Physiol. Plant.* 39 : 155-164.
- Hanum, C., W. Q. Mugnisjah, S. Yahya, D. Sopandie, K. Idris & A. Sahar. 2009. Penapisan kedelai toleran cekaman aluminium dan kekeringan. *Forum Pascasarjana* 32 : 295-305.
- Heath, R. L & L. Pacher. 1969. Photoperoxidation in isolated chloroplast kinetics and stoichiometry of fatty acid peroxidation. *Arch. Biochem. Biophys* 125: 189-198.
- Hossain, A. M., M. Ashrafuzzaman & M. R. Ismail. 2011. Salinity triggers proline synthesis in peanut leaves. *Maejo Int. J. Sci. Technol.* 5 : 159-168.
- IMA (Indonesian Ministry of Agriculture). 2010. Area and Production by Category of Producers: Palm Oil, Direktorat Jenderal Perkebunan. Kementerian Pertanian. <http://ditjenbun.deptan.go.id/index.php/direktori/3-isi/4-kelapa-sawit.html>. (Diakses tanggal 26 Agustus 2015).
- Jain, M., G. Mathur, S. Koul & N. B. Sarin. 2001. Ameliorative effects of proline on salt stress-induced lipid peroxidation in cell lines of groundnut (*Arachis hypogaea* L.). *Plant Cell Rep* 20 : 463-468.
- James, J. J & E. D. Rebecca. 2007. A basis for relative growth rate differences between native and invasive forb seedlings. *Rangeland Ecology and Management* 60 : 131-136.
- Jones, D. L. 1994. *Palms Throughout the World*. Reed Books. Australia.
- Kidd, P. S., M. Llugany, C. Poschenrieder, B. Gunse & J. Barcelo. 2001. The role of root exudates in aluminium resistance and silicon-induced amelioration of aluminium toxicity in three varieties of maize (*Zea mays* L.). *Journal of Experimental Botany* 52 : 1339-1352.
- Kikuzaki, H., M. Hisamoto, K. Hirose, K. Akiyama & H. Taniguchi. 2002. Antioxidant properties of ferulic acid and its related compounds. *J. Agric. Food Chem* 50 : 2161-2168.
- Lakitan, B. 2000. *Dasar-Dasar Fisiologi Tumbuhan*. Raja Grafindo Persada. Jakarta.
- Lubis, A. U. 2008. *Kelapa Sawit (*Elaeis guineensis* Jacq.) di Indonesia Edisi 2*. Pusat Penelitian Kelapa Sawit Medan. Sumatera Utara.

- Makarim, A. K. 2006. Cekaman abiotik utama dalam peningkatan produktivitas tanaman. Prosiding Seminar Nasional Pemanfaatan Bioteknologi untuk Mengatasi Cekaman Abiotik pada Tanaman. Badan Litbang Pertanian, Kementerian Pertanian Republik Indonesia.
- Mangoensoekarjo, S & H. Semangun. 2005. Manajemen Agrobisnis Kelapa Sawit. Gajah Mada University Press. Yogyakarta.
- Marafon, C. A & L. Endres. 2013. Silicon : fertilization and nutrition in higher plants. *Amazonian Journal of Agricultural and Environmental Sciences* 56 : 380-388.
- Marscher, P. 2012. Marschner's Mineral Nutrition of Higher Plants Third Edition. Elsevier. San Diego. USA.
- Matichenkov, V. V & D. V. Calvert. 2002. Silicon as beneficial element for sugarcane. *Journal Society of Sugarcane Technologist* 22 : 21-30.
- Matsumoto, H. 2000. Cell biology of aluminium toxicity and tolerance in higher plants. In *Rev Cytol* 200 : 1-46.
- Mega, I. M & D. A. Swastini. 2010. Screening fitokimia dan aktivitas anti radikal bebas ekstrak metanol daun gaharu (*Gyrinops versteegii*). *Jurnal Kimia* 2: 187-192.
- Miao, B., X. Han & W. Zhang. 2010. The ameliorative effect of silicon on soybean seedlings grown in potassium-deficient medium. *Annals of Botany* 105 : 967-973.
- Mossor-Pietraszewska, T. 2001. Effect of aluminium on plant growth and metabolism. *Acta Biochimica Polonica* 48 : 673-686.
- Mursito, D & Kawiji. 2002. Pengaruh kerapatan tanam dan kedalaman olah tanah terhadap hasil umbi lobak (*Raphanus sativus* L.). *Agrosains* 4 : 1-6.
- Naik, G. H., K. I. Priyadarsini, J. G. Satav, M. M. Banavalikar, D. P. Sohoni, M. K. Biyani & H. Mohan. 2003. Comparative antioxidant activity of individual herbal components used in ayurvedic medicine. *Phytochemistry* 63 : 97-104.
- Nasih, W. Y. 2009. Membangun kesuburan tanah di lahan marginal. *Jurnal Ilmu Tanah dan Lingkungan* 9 : 137-141.
- Nurita, T. M., W. Gede, G. Edi, A. Hajrial, Y. Sudirman & Subronto. 2001. Respon tanaman kelapa sawit (*Elaeis guineensis* Jacq.) terhadap cekaman kekeringan. *Menara Perkebunan* 69: 29-45.
- Pahan, I. 2006. Panduan Lengkap Kelapa Sawit. Penebar Swadaya. Jakarta.
- Pokorny, J., N. Yanishlieva & M. Gordon. 2001. Antioxidant in Food; Practical Applications. CRC Press. New York.
- Primadini, D.R. 2010. Uji aktifitas pengkhelatan besi pada ekstrak metanol tanaman obat pegagan (*Centella asiatica*), bunga merak (*Caesalpinia pulcherrima*) dan sendilaw udang (*Commersonia batramia*). Skripsi. Universitas Bengkulu. Bengkulu.

- Pontigo, S., A. Ribera., L. Gianfreda., M. L. Mora., M. Nikolic & P. Cartes. 2015. Silicon in vascular plants : uptake, transport and its influence on mineral stress under acidic conditions. *Plant* 242 : 23-37.
- Pritchard, S. G., Z. Ju, E. Van Snten, J. Qiu, D.B. Weaver, S.A. Prior & H.H. Rogers. 2000. The influence of elevated CO₂ on the activities of antioxidative enzymes in two soybean genotypes. *Aust J Plant Physiol* 27 : 1061-1068.
- Rengel, Z. 1997. Role of calcium in aluminium. *New Phytol* 21: 499 – 513.
- Richards, K. D., E.J. Schott, Y. K. Sharma, K. R. Davis & R. C. Gardner. 1998. Aluminum induces oxidative stress genes in *Arabidopsis thaliana*. *Plant Physiol* 116 : 409-418
- Risza, S. 2008. Kelapa Sawit dan Upaya Peningkatan Produktivitas. Penerbit Kanisius. Jakarta
- Rohman, A, S. Riyanto & D. Utari. 2006. Aktivitas antioksidan, kandungan fenolik total dan kandungan flavonoid total ekstrak etil asetat buah mengkudu serta fraksi-fraksinya. *Majalah Farmasi Indonesia* 17 : 136-142.
- Rohman, A., S. Riyanto & N. K. Hidayati. 2007. Aktivitas antioksidan, kandungan fenolik total, dan flavonoid total daun mengkudu (*Morinda citrifolia* L.). *AGRITECH* 27: 147-151.
- Roohizadeh, G., S. Arbabian, G. Tajadod, A. Majd & F. Salimpour. 2015. The study of nano silica effects on the total protein content and the activities of catalase, peroxidase and superoxide dismutase of *Vicia faba* L. *Tropical Plant Research* 2 : 47-50.
- Rorison, J. W. 1973. The effect of acidity on the nutrient uptake and physiology of plants. *In Dost* 1 : 223-254.
- Rosmarkam, A & N. W. Yuwono. 2006. Ilmu Kesuburan Tanah. Penerbit Kanisius. Yogyakarta.
- Salisbury, F. B & C. W. Ross. 1995. Fisiologi Tumbuhan (diterjemahkan oleh Lukman dan Sumaryono). ITB. Bandung.
- Sarmidi, M. R., H. A. E. Enshasy & M. A. Hamid. 2009. Oil palm : the rich mine for pharma, food, feed and fuel. *American-Eurasian J. Agric. & Environ. Sci.* 5 : 767-776.
- Sastrosayono, S. 2003. Budidaya Kelapa Sawit. Agromedia Pustaka. Jakarta.
- Savant, N. K, G. H. Korndorfer, L. E. Datnoff & G. H. Snyder. 1999. Silicon nutrition and sugarcane production : a review. *Journal Plant and Nutrition* 22 : 1853-1903.
- Sawit Indonesia. 2015. Pemanfaatan Lahan Marginal Basah untuk Perkebunan Kelapa Sawit. < <http://www.sawitindonesia.com/rubrikasi-majalah/inovasi/pemanfaatan-lahan-marginal-basah-untuk-perkebunan-kelapa-sawit>>. (Diakses 26 Agustus 2015).

- Sayed, S. A & M. A. A. Gadallah. 2013. Effects of silicon on Zea mays plants exposed to water and oxygen deficiency. *Russian Journal of Plant Physiology* 61 : 460–466.
- Serraj, R & T. R. Sinclair. 2002. Osmolyte accumulation : can it really help increase crop yield under drought conditions. *Plant, Cell and Environment* 25 : 333-341.
- Setyamidjaja, D. 2006. Kelapa Sawit. Kanisius. Yogyakarta.
- Shahnaz, G., E. Shekoofeh, D. Kourosh & B. Moohamadbagher. Interactive effects of silicon and aluminum on the malondialdehyde (MDA), proline, protein and phenolic compounds in *Borago officinalis* L. *Journal of Medicinal Plants Research* 5 : 5818-5827.
- Sianturi, H.S.D. 1991. Budidaya Kelapa Sawit. Fakultas Pertanian Universitas Sumatera Utara. Medan.
- Simoonovicova, M., L. Tamas, J. Huttova & I. Mistrik. 2004. Effect of aluminium on oxidative stress related enzymes activities in barley roots. *Biologia Plantarum* 48 : 261-266.
- Subagyo, H., N. Suharta & A. B. Siswanto. 2000. Sumber Daya Lahan Indonesia & Pengelolaannya. Pusat Penelitian Tanah dan Agroklimat, Bogor.
- Sunarko. 2007. Petunjuk Praktis Budidaya & Pengolahan Kelapa Sawit. Agromedia Pustaka. Jakarta.
- Sunarko. 2009. Budidaya dan Pengelolaan Kebun Kelapa Sawit dengan Sistem Kemitraan. Agromedia Pustaka. Jakarta.
- Suprpto, A. 2002. Land and water resources development in Indonesia. dalam. FAO. Investment in Land and Water. Proceedings of the Regional Consultation.
- Ti-da, Ge., F.G. Sui, B. Li-ping, L. Yin-yan & Z. Guang-sheng. Effects of water stress on the protective enzyme activities and lipid peroxidation in roots and leaves of summer maize. *Agricultural Sciences in China* 5 : 291-298.
- Tim Penulis PS. 1998. Kelapa Sawit Usaha Budidaya, Pemanfaatan Hasil dan Aspek Pemasaran. Penebar Swadaya. Jakarta.
- Umebese, C. U., T. O. Olatimelitin & T. A. Ogunsusi. 2009. Salicylic acid protects NR activity, growth and proline in amaranth and tomato plants during water deficit. *American Journal of Agr. & Biological Sciences* 4 : 224-229.
- USDA (United States Department of Agriculture). 2007. Indonesian Palm Oil Production. <http://www.pecad.fas.usda.gov/highlights/2007/12/Indonesia_palmoil/>. (Diakses 26 Agustus 2015).
- Waterhouse, A. 1999. Folin - Ciocalteu Micro Method for Total Phenol in Wine. Department Of Viticulture & Enology University Of California. Davis.
- Wikipedia. 2015. Kelapa Sawit. <https://id.wikipedia.org/wiki/Kelapa_sawit>. (Diakses 26 Agustus 2015).

- Xu, Z., G. Zhou, G. Han & Y. Li. 2011. Photosynthetic potential and its association with lipid. *J Plant Growth Regul* 30 : 41–50.
- Yamamoto, Y., Yukiko K & Hideaki M. 2001. Lipid peroxidation is an early symptom triggered by aluminium, but not primary cause of elongation inhibition in pea roots. *Plant Physiol* 125 : 199-208.
- Yashinta, A. 2014. Induksi Ketahanan Kekeringan Delapan Hibrida Kelapa Sawit (*Elaeis guineensis* Jacq.) dengan Silika. Skripsi. Fakultas Pertanian Universitas Gadjah Mada. Yogyakarta.
- Yukamgo, E & N. W. Yuwono. 2007. Peran silikon sebagai unsur bermanfaat pada tanaman tebu. *Jurnal Ilmu Tanah dan Lingkungan* 7 : 103-116.