

References

- Abdullahi, B.A., Huang, P., Bao, D.P., Meng, X.Y., Jiang, B.H., Zhu, J., Shen, H.G., Yang, Y.H. 2004. Effects of citric acid on soybean seedling growth under aluminum stress. *Journal of Plant Nutrition* 27: 367-375.
- Adams, F. 1984. Crop response to lime in the Southern United States. In: Adams, F. (Ed.), *Soil acidity and liming*. American Society of Agronomy, Crop Science Society of America, and Soil Science Society of America, pp. 211-265.
- Attanandana, T., Vacharotayan, S., Kyuma, K. 1982. Chemical characteristics and fertility status of acid sulphate soils of Thailand. In: van Breemen, N., Dost, H. (Eds.), *Proceedings of the Bangkok symposium on acid sulphate soils*. International Institute for Land Reclamation and Improvement (ILRI), Wageningen, The Netherlands, pp. 137-156.
- Balakumar, T., Sivaguru, M., James, M.R., Anbudurai, P.R., Palival, K. 1992. Impact of Aluminum Toxicity on Growth and Efficiency of Nutrient Metabolism in Some Tropical Rice Cultivars. *Tropical Agriculture* 69: 211-216.
- Baligar, V.C., Pitta, G.V.E., Gama, E.E.G., Schaffert, R.E., Bahia Filho, A.F., Clark, R.B. 1997. Soil acidity effects on nutrient use efficiency in exotic maize genotypes. *Plant and Soil* 192: 9-13.
- Barceló, J., Poschenrieder, C. 2002. Fast root growth responses, root exudates, and internal detoxification as clues to the mechanisms of aluminium toxicity and resistance: a review. *Environmental and Experimental Botany* 48: 75-92.

- Brady, N.C. 1974. The nature and properties of soils. Macmillan Publishing Co., Inc., New York.
- Cançado, G.M.A., Loguerio, L.L., Martins, P.R., Parentoni, S.N., Paiva, E., Borém, A., Lopes, M.A. 1999. Hematoxylin staining as a phenotypic index for aluminum tolerance selection in tropical maize (*Zea mays* L.). *Theoretical and Applied Genetics* 99: 747-754.
- Chang, T.-T. 1976. The origin, evolution, cultivation, dissemination, and diversification of Asian and African rices. *Euphytica* 25: 425-441.
- Charoenchamratcheep, C., Tantisira, B. 1982. The effects of liming and fertilizer applications to acid sulfate soils for improvement of rice production in Thailand. In: Dost, H., Van Breemen, N. (Eds.), Proceedings of the Bangkok Symposium on acid sulphate soils. International Institute for Land Reclamation and Improvement (ILRI), Wageningen, The Netherlands, p. 449.
- Clark, R.B. 1977. Effect of aluminum on growth and mineral elements of al-tolerant and Al-intolerant corn. *Plant and Soil* 47: 653-662.
- Costa de Macedo, C., Kinet, J.M., Van Sint Jan, V. 1997. Effects of duration and intensity of aluminum stress on growth parameters in four rice genotypes differing in aluminum sensitivity. *Journal of Plant Nutrition* 20: 181-193.
- de Freitas, F.A., Kopp, M.M., Zimmer, P.D., de Sousa, R.O., de Carvalho, F.I.F., de Oliveira, A.C. 2006. Evaluation of aluminum tolerance in rice. *Journal of Crop Improvement* 16: 141-151.
- Delhaize, E., Ryan, P.R. 1995. Aluminum toxicity and tolerance in plants. *Plant Physiology* 107: 315-321.

- Delhaize, E., Ryan, P.R., Randall, P.J. 1993. Aluminum tolerance in wheat (*Triticum aestivum* L.) II. Aluminum-stimulated excretion of malic acid from root apices. *Plant Physiology* 103: 695-702.
- Dobermann, A., Fairhurst, T. 2000. Rice. Nutrient disorders and nutrient management. Potash & Phosphate Institute (PPI), Potash & Phosphate Institute of Canada (PPIC) and International Rice Research Institute (IRRI).
- Echart, C.L., Fernandes Barbosa-Neto, J., Garvin, D.F., Cavalli-Molina, S. 2002. Aluminum tolerance in barley: Methods for screening and genetic analysis. *Euphytica* 126: 309-313.
- Fageria, N.K. 1985. Influence of aluminum in nutrient solutions on chemical-composition in 2 rice cultivars at different growth-stages. *Plant and Soil* 85: 423-429.
- Fageria, N.K. 2002. Dry matter yield of common bean, lowland rice, corn, soybean, and wheat at different basic cation saturation ratios in acid soil. *Communications in Soil Science and Plant Analysis* 33: 519-531.
- Fageria, N.K., Baligar, V.C., Wright, R.J. 1988(a). Aluminum toxicity in crop plants. *Journal of Plant Nutrition* 11: 303-319.
- Fageria, N.K., Baligar, V.C. 2001. Improving nutrient use efficiency of annual crops in Brazilian acid soils for sustainable crop production. *Communications in Soil Science and Plant Analysis* 32: 1303-1319.
- Fageria, N.K., Carvalho, J.R.P. 1982. Influence of aluminum in nutrient solutions on chemical-composition in upland rice cultivars. *Plant and Soil* 69: 31-44.

- Fageria, N.K., Santos, A.B. 1998. Rice and common bean growth and nutrient concentration as influenced by aluminum on an acid lowland soil. *Journal of Plant Nutrition* 21: 903-912.
- Fageria, N.K., Wright, R.J., Baligar, V.C. 1988(b). Rice cultivar response to aluminum in nutrient solution. *Communications in Soil Science and Plant Analysis* 19: 1133-1142.
- Fageria, N.K., Wright, R.J., Baligar, V.C., Carvalho, J.R.P. 1991. Response of upland rice and common bean to liming on an Oxisol. In: Wright, R.J., Baligar, V.C., Murrmann, R.P. (Eds.), *Plant-Soil Interactions at Low pH*. Kluwer Academic Publishers, Netherlands, pp. 519-525.
- FAO. 2000. <http://www.fao.org/ag/AGL/agll/prosoil/acid.htm>.
- Ferrufino, A., Smyth, T.J., Israel, D.W., Carter Jr, T.E. 2000. Root elongation of soybean genotypes in response to acidity constraints in a subsurface solution compartment. *Crop Science* 40: 413-421.
- FFTC. 2001. Micronutrient deficiencies of crops in Asia: Chapter 8. Micronutrient Toxicity. Food and Fertilizer Technology Center, An international information center for farmers in the Asia Pacific Region, Teipei, Taiwan.
- Foy, C.D. 1984. Physiological effects of hydrogen, aluminum, and manganese toxicities in acid soil. In: Adams, F. (Ed.), *Soil Acidity and Liming*. American Society of Agronomy, Crop Science Society of America, and Soil Science Society of America, pp. 57-97.
- Foy, C.D. 1988. Plant adaptation to acid, aluminum-toxicity soils. *Communications in Soil Science and Plant Analysis* 19: 959-987.

Foy, C.D., Chaney, R.L., White, M.C. 1978. The Physiology of Metal Toxicity in Plants. *Annual Review of Plant Physiology* 29: 511-566.

Geoghegan, I.E., Sprent, J.I. 1996. Aluminum and nutrient concentrations in species native to central Brazil. *Communications in Soil Science and Plant Analysis* 27: 2925-2934.

Górecka, H., Chojnacka, K., Górecki, H. 2006. The application of ICP-MS and ICP-OES in determination of micronutrients in wood ashes used as soil conditioners. *Talanta* 70: 950-956.

Gupta, P.C., O'Toole, J.C. 1986. Upland rice: A global perspective. IRRI, Los Bonos, Laguna, Philippines.

Hai, T.V., Houben, V., Mbouti, C.N., Dufey, J.E. 1993. Early diagnosis of aluminum toxicity to rice cultivars (*Oryza sativa L.*). *Agronomie* 13: 853-860.

Hai, T.V., Nga, T.T., Laudelout, H. 1989. Effect of aluminum on the mineral-nutrition of rice. *Plant and Soil* 114: 173-185.

Haynes, R.J., Mokolobate, M.S. 2001. Amelioration of Al toxicity and P deficiency in acid soil by additions of organic residues: a critical review of the phenomenon and the mechanisms involved. *Nutrient Cycling in Agroecosystems* 59: 47-63.

Hede, A.R., Skovmand, B., Lopez-Cesati, J. 2000. Breeding for nutritional and soil factors. Chapter 15: Acid soils and aluminum toxicity. In: Reynolds, M.P., Ortiz-Monasterio, J.I., McNap, A. (Eds.), Application of physiology in wheat breeding. CIMMYT, 240 p.

Hede, A.R., Skovmand, B., Ribaut, J.M., Gonzalez-de-Leo'N, D., Stolen, O. 2002. Evaluation of aluminium tolerance in a spring rye collection by hydroponic screening. *Plant breeding* 121: 241-248.

- Helyar, K.R. 1991. The management of acid soils. In: Wright, R.J., Baligar, V.C., Murrmann, R.P. (Eds.), *Plant-Soil Interactions at Low pH*. Kluwer Academic Publishers, Netherlands, pp. 365-382.
- Howeler, R.H. 1991. Identifying plants adaptable to low pH conditions. In: Wright, R.J., Baligar, V.C., Murrmann, R.P. (Eds.), *Plant-Soil Interactions at Low pH*. Kluwer Academic Publishers, Netherlands, pp. 885-904.
- Howeler, R.H., Cadavid, L.F. 1976. Screening of rice cultivars for tolerance to Al-toxicity in nutrient solutions as compared with a field screening method. *Agronomy Journal* 68: 551-555.
- Huang, J.W., Shaff, J.E., Grunes, D.L., Kochian, L.V. 1992. Aluminum effects on calcium fluxes at the root apex of aluminum-tolerant and aluminum-sensitive wheat cultivars. *Plant Physiology* 98: 230-237.
- Insalud, N. 2006. Genotypic variation in responses to aerobic and anaerobic conditions in rice. Ph.D. Thesis, Graduate School, Chiang Mai University, Chiang Mai, 228 p.
- Ishikawa, S., Wagatsuma, T., Sasaki, R., Ofei-Manu, P. 2000. Comparison of the amount of citric and malic acids in Al media of seven plant species and two cultivars each in five plant species. *Soil Science and Plant Nutrition* 46: 751-758.
- Jan, F., Pettersson, S. 1989. Varietal diversity of upland rice in sensitivity to aluminum. *Journal of Plant Nutrition* 12: 973-993.
- Jan, F., Pettersson, S. 1993. Effects of low aluminum levels on growth and nutrient relations in 3 rice cultivars with different tolerances to aluminum. *Journal of Plant Nutrition* 16: 359-372.

- Jan, F., Pettersson, S. 1995. Aluminum sensitivity of 2 upland rice cultivars at various levels of nutrient supply. *Journal of Plant Nutrition* 18: 1323-1335.
- Jan, F., Yamashita, K., Matsumoto, H., Maeda, M. 2001. Protein and peroxidase changes in various root-cell fractions of two upland rice cultivars differing in Al tolerance. *Environmental and Experimental Botany* 46: 141-146.
- Jemo, M., Abaidoo, R.C., Nolte, C., Horst, W.J. 2007. Aluminum resistance of cowpea as affected by phosphorus-deficiency stress. *Journal of Plant Physiology* 164: 442-451.
- Juo, A.S.R., Manu, A. 1996. Chemical dynamics in slash-and-burn agriculture. *Agriculture, Ecosystems and Environment* 58: 49-60.
- Kamprath, E.J. 1984. Crop response to lime on soils in the tropics. In: Adams, F. (Ed.), *Soil Acidity and Liming*. American Society of Agronomy, Crop Science Society of America, and Soil Science Society of America, pp. 349-368.
- Keltjens, W.G., Tan, K. 1993. Interactions between aluminium, magnesium and calcium with different monocotyledonous and dicotyledonous plant species. *Plant and Soil* 155-156: 485-488.
- Khatiwada, S.P., Senadhira, D., Carpeta, A.L., Zeigler, R.S., Fernandez, P.G. 1996. Variability and genetics of tolerance for aluminum toxicity in rice (*Oryza sativa* L.). *Theoretical and Applied Genetics* 93: 738-744.
- Kheoruenromne, I., Kesawapitak, P. 1989. Management of Acid Soils for Food Crop Production in Thailand. In: Craswell, E.T., Pushparajah, E. (Eds.), *Management of acid soils in the humid tropics of asia*. Australian Centre for International Agricultural Research and International Board for Soil Research and Management, pp. 100-109.

- Kikui, S., Sasaki, T., Maekawa, M., Miyao, A., Hirochika, H., Matsumoto, H., Yamamoto, Y. 2005. Physiological and genetic analyses of aluminium tolerance in rice, focusing on root growth during germination. *Journal of Inorganic Biochemistry* 99: 1837-1844.
- Kinraide, T.B. 1991. Identify of the rhizotoxic aluminum species. *Plant and Soil* 134: 167-178.
- Kochian, L.V. 1995. Cellular mechanisms of aluminum toxicity and resistance in plants. *Annual Review of Plant Physiology and Plant Molecular Biology* 46: 237-260.
- Kochian, L.V., Hoekenga, O.A., Pineros, M.A. 2004. How do crop plants tolerate acid soils? - Mechanisms of aluminum tolerance and phosphorous efficiency. *Annual Review of Plant Biology* 55: 459-493.
- Kochian, L.V., Pineros, M.A., Hoekenga, O.A. 2005. The physiology, genetics and molecular biology of plant aluminum resistance and toxicity. *Plant and Soil* 274: 175-195.
- Li, X.F., Ma, J.F., Matsumoto, H. 2002. Aluminum-induced secretion of both citrate and malate in rye. *Plant and Soil* 242: 235-243.
- Ludwig, B., Rumpf, S., Mindrup, M., Meiwas, K.-J., Khanna, P.K. 2002. Effects of lime and wood ash on soil-solution chemistry, soil chemistry and nutritional status of a pine stand in northern Germany. *Scandinavian Journal of Forest Research* 17: 225-237.
- Ma, J.F. 2000. Role of organic acids in detoxification of aluminum in higher plants. *Plant and Cell Physiology* 41: 383-390.

- Ma, J.F. 2005. Physiological mechanisms of at resistance in higher plants. *Soil Science and Plant Nutrition* 51: 609-612.
- Ma, J.F., Hiradate, S. 2000. Form of aluminum for uptake and translocation in buckwheat (*Fagopyrum esculentum* Moench). *Planta* 211: 355-360.
- Ma, J.F., Ryan, P.R., Delhaize, E. 2001. Aluminium tolerance in plants and the complexing role of organic acids. *Trends in Plant Science* 6: 273-278.
- Ma, J.F., Shen, R.F., Zhao, Z.Q., Wissuwa, M., Takeuchi, Y., Ebitani, T., Yano, M. 2002. Response of rice to Al stress and identification of quantitative trait loci for Al tolerance. *Plant and Cell Physiology* 43: 652-659.
- Ma, J.F., Taketa, S., Yang, Z.M. 2000. Aluminum tolerance genes on the short arm of chromosome 3R are linked to organic acid release in triticale. *Plant Physiology* 122: 687-694.
- Maneewan, N., Sa-nguansubpayakorn, C. 2007. Effect of organic and chemical fertilizers on acid sulfate soils management for Patumthani 1 rice production. 4th INWEPF Steering Meeting and Symposium, The Emerald Hotel, Bangkok, Thailand.
- Mariano, E.D., Keltjens, W.G. 2005. Long-term effects of aluminum exposure on nutrient uptake by maize genotypes differing in aluminum resistance. *Journal of Plant Nutrition* 28: 323-333.
- Marschner, H. 1991. Mechanisms of adaptation of plants to acid soils. In: Wright, R.J., Baligar, V.C., Murrmann, R.P. (Eds.), *Plant-Soil Interactions at Low pH*. Kluwer Academic Publishers, Netherlands, pp. 683-702.
- Marschner, H. 1995. Mineral nutrition of higher plants. Academic Press, London.

- Meesin, S. 2003. The structure of genetic diversity in a local Thai rice germplasm. MSc Thesis (Agronomy). Graduate School, Chiang Mai University, Chiang Mai, Thailand, 142 p.
- Mengel, K., Kirkby, E.A. 1987. Principles of Plant Nutrition. International Potash Institute, Switzerland.
- Mossor-Pietraszewska, T. 2001. Effect of aluminum on plant growth and metabolism. *Acta Biochimica Polonica* 48: 673-686.
- Nakagawa, T., Mori, S., Yoshimura, E. 2003. Amelioration of aluminum toxicity by pretreatment with phosphate in aluminum-tolerant rice cultivar. *Journal of Plant Nutrition* 26: 619-628.
- Nei, M. 1978. Estimation of average heterozygosity and genetic distance from a small number of individuals. *Genetics*. 89: 583-590.
- Nei, M., Tajima, F. and Tateno, Y. 1983. Accuracy of estimated phylogenetic trees from molecular data. *Journal of Molecular Evolution* 19: 153-170.
- Nei, M. and Kumar, S. 2000. Molecular Evolution and Phylogenetics. Oxford University press. London.
- Nguyen, V.T., Burow, M.D., Nguyen, H.T., Le, B.T., Le, T.D., Paterson, A.H. 2001. Molecular mapping of genes conferring aluminum tolerance in rice (*Oryza sativa* L.). *Theoretical and Applied Genetics* 102: 1002-1010.
- Ni, J., Colowit, P.M., Mackill, D.J. 2002. Evaluation of genetic diversity in rice subspecies using microsatellite markers. *Crop Science* 42: 601-607.

- Nian, H., Yang, Z., Huang, H., Yan, X., Matsumoto, H. 2004. Citrate secretion induced by aluminum stress may not be a key mechanism responsible for differential aluminum tolerance of some soybean genotypes. *Journal of Plant Nutrition* 27: 2047-2066.
- Nkana, J.C.V., Demeyer, A., Verloo, M.G. 1998. Chemical effects of wood ash on plant growth in tropical acid soils. *Bioresource Technology* 63: 251-260.
- Ohno, T. 1992. Neutralization of soil acidity and release of phosphorus and potassium by wood ash. *Journal of Environmental Quality*: 433-438.
- Okada, K., Fischer, A.J. 2001. Adaptation mechanisms of upland rice genotypes to highly weathered acid soils of South American savannas. In: Ae, N., Arihara, J., Okada, K., Srinivasan, A. (Eds.), *Plant Nutrient Acquisition: new perspectives*. Springer-Verlag, Tokyo, Japan, pp. 185-200.
- Okada, K., Fischer, A.J., Salasar, F.A.P., Romero, Y.C. 2003. Difference in the retention of Ca and Al as possible mechanisms of Al resistance in upland rice. *Soil Science and Plant Nutrition* 49: 889-895.
- Okada, K., Wissuwa, M. 2004. Soil acidity and related problems in upland rice in the tropics. In: Toriyama, K., Heong, K.L., Hardy, B. (Eds.), *Rice is life: scientific perspectives for the 21st century*. International Rice Research Institute (IRRI), Proceedings of the World Rice Research Conference held in Tsukuba, Japan, 4-7 November 2004, pp. 454-456.
- Olufowote, J.O., Xu, Y., Chen, X., Park, W.D., Beachell, H.M., Dilday, R.H., Goto, M., McCouch, S.R. 1997. Comparative evaluation of within-cultivar variation of rice (*Oryza sativa L.*) using microsatellite and RFLP markers. *Genome* 40: 370-378.

- Osaki, M., Watanabe, T., Tadano, T. 1997. Beneficial effect of aluminum on growth of plants adapted to low pH soils. *Soil Science and Plant Nutrition* 43: 551-563.
- Panaud, O., Chen, X., McCouch, S.R. 1996. Development of microsatellite markers and characterization of simple sequence length polymorphism (SSLP) in rice (*Oryza sativa L.*). *Molecular and General Genetics* 252: 597-607.
- Park, B.B., Yanai, R.D., Sahm, J.M., Ballard, B.D., Abrahamson, L.P. 2004. Wood ash effects on soil solution and nutrient budgets in a willow bioenergy plantation. *Water, Air, & Soil Pollution* 159: 209-224.
- Parkpian, P., Pongsakul, P., Sangtong, P. 1991. Characteristics of acid soils in Thailand: A review. In: Wright, R.J., Baligar, V.C., Murrmann, R.P. (Eds.), *Plant-Soil Interactions at Low pH*. Kluwer Academic Publishers, Netherlands, pp. 397-405.
- Pellet, D.M., Grunes, D.L., Kochian, L.V. 1995. Organic acid exudation as an aluminum-tolerance mechanism in maize (*Zea mays L.*). *Planta* 196: 788-795.
- Pintasen, S., Prom-u-thai, C., Jamjod, S., Yimyam, N., Rerkasem, B. 2007. Variation of grain iron content in a local upland rice germplasm from the village of Huai Tee Cha in northern Thailand. *Euphytica* 158: 27-34.
- Prom-u-thai, C., Pintasen, S., Jamjod, S., Rerkasem, B. 2004. Variation in grain iron between seed lots of some upland rice varieties. In New directions for a diverse planet: Proceedings of the 4th International Crop Science Congress, Brisbane, Australia.

- Ponnampерuma, F.N. 1994. Evaluation and improvement of lands for wetland rice production. In: Senadhira, D. (Ed.), Rice and Problem Soils in South and Southeast Asia: IRRI Discussion Paper Series No.4. International Rice Research Institute, Manila, Philippines, pp. 3-19.
- Power, L.E. and McSorley, R. 2000. Ecological Principles of Agriculture. Delmar. Thomson learning. 433 p.
- Rao, I.M., Zeigler, R.S., Vera, R., Sarkarung, S. 1993. Selection and breeding for Acid-Soil Tolerance in Crops; Upland rice and tropical forages as case studies. *Bioscience* 43: 454-465.
- Rengel, Z. 1992. Role of calcium in aluminum toxicity. *New Phytologist* 121: 499-513.
- Rengel, Z., Jurkic, V. 1992. Genotypic differences in wheat Al tolerance. *Euphytica* 62: 111-117.
- Rengel, Z. 1996. Uptake of aluminum by plant cells. *New Phytologist* 134: 389-406.
- Reuter, D.J. and Robinson, J.B. 1997. Plant analysis: an interpretation manual. CSIRO publisher.
- Rout, G.R., Samantaray, S., Das, P. 2001. Aluminum toxicity in plants: a review. *Agronomie* 21: 3-21.
- Ryan, P.R., Delhaize, E., Jones, D.L. 2001. Function and mechanism of organic anion exudation from plant roots. *Annual Review of Plant Physiology and Plant Molecular Biology* 52: 527-560.
- Saarsalmi, A., Mälkönen, E., Piirainen, S. 2001. Effects of wood ash fertilization on forest soil chemical properties. *Silva Fennica* 35: 355-368.

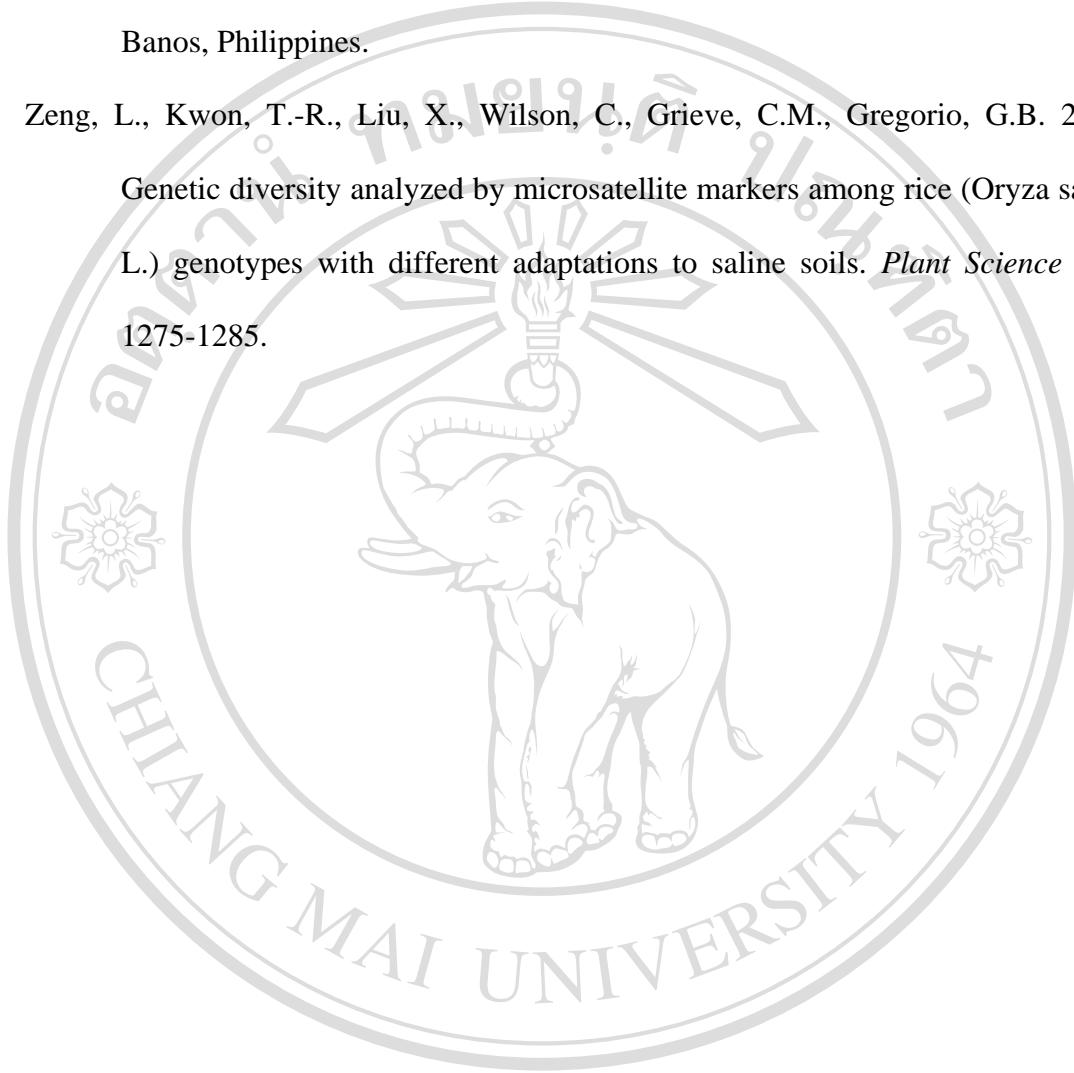
- Samac, D.A., Tesfaye, M. 2003. Plant improvement for tolerance to aluminum in acid soils - a review. *Plant Cell Tissue and Organ Culture* 75: 189-207.
- Savant, N., Kibe, M. 1971. Influence of continuous submergence on pH, exchange acidity and pH-dependent acidity in rice soils. *Plant and Soil* 35: 205-208.
- Shen, R., Chen, R., Ma, J. 2006. Buckwheat accumulates aluminum in leaves but not in seeds. *Plant and Soil* 284: 265-271.
- Sierra, J., Ozier-Lafontaine, H., Dufour, L., Meunier, A., Bonhomme, R., Welcker, C. 2006. Nutrient and assimilate partitioning in two tropical maize cultivars in relation to their tolerance to soil acidity. *Field Crops Research* 95: 234-249.
- Sirabanchongkran, A., Rerkasem, K., Yimyam, N., Boonma, W., Coffey, K., Pinedo-Vasquez, M., Padoch, C. 2004. Varietal Turnover and Seed Exchange: Implications for Conservation of Rice Genetic Diversity On-Farm. *IRRN* 29: 18-20.
- Sivaguru, M., Palival, K. 1993. Differential aluminium tolerance in some tropical rice cultivars. II Mechanism of aluminium tolerance. *Journal of Plant Nutrition* 16: 1717-1732.
- Stodart, B.J., Raman, H., Coombes, N., Mackay, M. 2007. Evaluating landraces of bread wheat *Triticum aestivum* L. for tolerance to aluminium under low pH conditions. *Genetic Resources and Crop Evolution* 54: 759-766.
- Supamongkol, P. 2006. Genetic diversity of local rice cv. Muey Nawng. MSc Thesis (Agronomy). Graduate School, Chiang Mai University, Chiang Mai, Thailand, 94 p.

- Tan, K., Keltjens, W.G. 1990. Interaction between aluminum and phosphorus in sorghum plants I. *Studies with aluminum sensitive sorghum genotype TAM428 Plant and Soil* 124: 15-23.
- Thanh, N.D., Thanh, N.D., Zheng, H.G., Dong, N.V., Trinh, L.N., Ali, M.L., Nguyen, H.T. 1999. Genetic variation in root morphology and microsatellite DNA loci in upland rice (*Oryza sativa* L.) from Vietnam. *Euphytica* 105: 53-62.
- Thawornwong, N., Diest, A.V. 1974. Influences of high acidity and aluminum on the growth of lowland rice. *Plant and Soil* 41: 141-159.
- Vasconcelos, S.S., Jacob-Neto, J., Rossiello, R.O.P. 2002. Differential root responses to aluminum stress among Brazilian rice genotypes. *Journal of Plant Nutrition* 25: 655-669.
- Villagarcia, M.R., Carter T.E., J., Rufty, T.W., Niewoehner, A.S., Jennette, M.W., Arrellano, C. 2001. Genotypic rankings for aluminum tolerance of soybean roots grown in hydroponics and sand culture. *Crop Science* 41: 1499-1507.
- von Uexküll, H.R., Bosshart, R.P. 1989. Management of acid upland soils in asia. In: Craswell, E.T., Pushparajah, E. (Eds.), Management of acid soils in the humid tropics of asia. Australian Centre for Internatiional Agricultural Research and International Board for Soil Research and Management.
- von Uexküll, H.R., Mutert, E. 1995. Global extent, development and economic- impact of acid soils. *Plant and Soil* 171: 1-15.
- Watanabe, T., Okada, K. 2005. Interactive effects of Al, Ca and other cations on root elongation of rice cultivars under low pH. *Annals of Botany* 95: 379-385.

- Watanabe, T., Osaki, M. 2002. Mechanisms of adaptation to high aluminum condition in native plant species growing in acid soils: A review. *Communications in Soil Science and Plant Analysis* 33: 1247-1260.
- Wongmo, J. 2008. Influences of Arbuscular Mycorrhizal fungi on different food crops. Ph.D. Thesis, Graduate School, Chiang Mai University, Chiang Mai, 145 p.
- Xu, H.S., Gu, W.L., Dong, D.F., Peng, X.X. 2004. Differential resistance of two subtropical rice cultivars to aluminum toxicity. *Journal of Plant Nutrition* 27: 1601-1609.
- Yang, Z.M., Nian, H., Sivaguru, M., Tanakamaru, S., Matsumoto, H. 2001. Characterization of aluminium-induced citrate secretion in aluminium-tolerant soybean (*Glycine max*) plants. *Physiologia Plantarum* 113: 64-71.
- Yeh, F.C., Yang, R.C. and Boyle, T. 1999. POPGENE, the Microsoft Window-Based User-Friendly Software for Population Genetics Analysis of Co-dominant and Dominant Markers and Quantitative Traits. University of Alberta, Center for International Forestry Research, Alberta, Canada.
- Yimyam, N. 2006. Fallow regeneration and upland rice yield variation in a system of shifting cultivation with Pada (*Macaranga denticulata* (BL.) muell. arg) as the fallow enriching species in northern Thailand. Ph.D. Thesis, Graduate School, Chiang Mai University, Chiang Mai, 285 p.
- Yimyam, N., Rerkasem, K., Rerkasem, B. 2003. Fallow enrichment with pada (*Macaranga denticulata* (Bl.) Muell. Arg.) trees in rotational shifting cultivation in northern Thailand. *Agroforestry Systems* 57: 79-86.
- Yoshida, S. 1981. Fundamentals of Rice Crop Science. International Rice Research Institute, Los Banos, Philippines.

Yoshida, S., Forno, D.A., Cock, J.H., Gomez, K.A. 1976. Laboratory manual for physiological studies of rice. The International Rice Research Institute, Los Banos, Philippines.

Zeng, L., Kwon, T.-R., Liu, X., Wilson, C., Grieve, C.M., Gregorio, G.B. 2004. Genetic diversity analyzed by microsatellite markers among rice (*Oryza sativa* L.) genotypes with different adaptations to saline soils. *Plant Science* 166: 1275-1285.



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