

REFERENCES

- Aciksoz S. B., Yazici A., Ozturk L. and Cakmak I. 2011. Biofortification of wheat with iron through soil and foliar application of nitrogen and iron fertilizers. *Plant and soil.* 349: 215-225.
- Alcantara J. M. and Cassman K. G. 1996. Effects of late nitrogen fertilizer application on head rice yield, protein content, and grain quality of rice. *Cereal Chemistry.* 73: 556-560.
- Allan J. 1961. The determination of zinc in agricultural materials by atomic absorption spectrophotometry. *Analyst.* 86: 530-534.
- Ambardekar A. A., Siebenmorgen T. J., Counce P. A., Lanning S. B. and Mauromoustakos A. 2011. Impact of field-scale nighttime air temperatures during kernel development on rice milling quality. *Field Crops Research.*
- Azhakanandam K., Power J. B., Lowe K. C., Cocking E. C., Tongdang T., Jumel K., Bligh H. F. J., Harding S. E. and Davey M. R. 2000. Qualitative Assessment of Aromatic Indica Rice (*Oryza sativa* L.): Proteins, Lipids and Starch in Grain from Somatic Embryo-and Seed-Derived Plants. *Journal of plant physiology.* 156: 783-789.
- Baker J., Lh Allen J. and Boote K. 1992. Temperature effects on rice at elevated CO₂ concentration. *Journal of Experimental Botany.* 43: 959-964.
- Bashir K., Ishimaru Y. and Nishizawa N. 2010. Iron Uptake and Loading into Rice Grains. *Rice.* 3: 122-130.
- Bhattacharya K. R. 2011. *Rice quality: a guide to rice properties and analysis.* Woodhead Publishing Ltd, Cambridge, United Kingdom.
- Bond A. E. 2004. Consumer sensory characteristics of butter cake made from wheat and rice flours. Louisiana State University.

- Boonchuay P., Cakmak I., Rerkasem B. and Prom-u-thai C. 2013. Effect of different foliar zinc application at different growth stages on seed zinc concentration and its impact on seedling vigor in rice. *Soil Science and Plant Nutrition*. 59: 180-188.
- Borrell A., Garside A., Fukai S, and Reid D. 1999. Grain quality of flooded rice is affected by season, nitrogen rate, and plant type. *Australian journal of agricultural research*. 50: 1399-1408.
- Cagampang G. B., Cruz L. J., Espiritu S. G., Santiago R. G. and Juliano B. O. 1966. Studies on the extraction and composition of rice proteins. *Cereal Chemistry*. 43: 145-155.
- Cagampang G. B., Perez C. M. and Juliano B. O. 1973. A gel consistency test for eating quality of rice. *Journal of the Science of Food and Agriculture*. 24: 1589-1594.
- Cakmak I. 2008. Enrichment of cereal grains with zinc: Agronomic or genetic biofortification? *Plant and soil*. 302: 1-17.
- Cakmak I., Pfeiffer W. H. and McClafferty B. 2010. Review: biofortification of durum wheat with zinc and iron. *Cereal Chemistry*. 87: 10-20.
- Champagne E. T., Bett K. L., Vinyard B. T., McClung A. M., Barton F. E., Moldenhauer K., Linscombe S and McKenzie K. 1999. Correlation Between Cooked Rice Texture and Rapid Visco Analyser Measurements. *Cereal Chemistry*. 76: 764-771.
- Chitpan M., Chavasit V. and Kongkachuchai R. 2005. Development of fortified dried broken rice as a complementary food. *Food and Nutrition Bulletin* 26, 376-384.
- Choudhury N. H. and Juliano B. O. 1980. Lipids in developing and mature rice grain. *Phytochemistry*. 19: 1063-1069.
- Chung G. 1979. The rice cold tolerance program in Korea. In Report of a Rice Cold Tolerance Workshop. Manila: IRRI. pp 7-19.
- Cooper N. T. W., Siebenmorgen T. J., Counce P A and Meullenet J-F. 2006. Explaining Rice Milling Quality Variation Using Historical Weather Data Analysis. *Cereal Chemistry*. 83: 447-450.

- Cooper N., Siebenmorgen T. and Counce P. 2008. Effects of nighttime temperature during kernel development on rice physicochemical properties. *Cereal Chemistry*. 85: 276-282.
- Counce P., Bryant R., Bergman C., Bautista R., Wang Y., Siebenmorgen T., Moldenhauer K. and Meullenet J. 2005. Rice milling quality, grain dimensions, and starch branching as affected by high night temperatures. 82: 645-648.
- De Datta S K., Obcemea W N and Jana R K. 1972. Protein content of rice grain as affected by nitrogen fertilizer and some triazines and substituted ureas1. *Agronomy Journal*. 64: 785-788.
- Del Rosario A. R., Briones V. P., Vidal A. J. and Juliano B. 1968. Composition and endosperm structure of developing and mature rice kernel. *Cereal Chemistry*. 45: 225-235.
- Dingkuhn M. and Le Gal P.Y. 1996. Effect of drainage date on yield and dry matter partitioning in irrigated rice. *Field Crops Research*. 46: 117-126.
- Fang Y., Wang L., Xin Z., Zhao L., An X. and Hu Q. 2008. Effect of Foliar Application of Zinc, Selenium, and Iron Fertilizers on Nutrients Concentration and Yield of Rice Grain in China. *Journal of Agricultural and Food Chemistry*. 56: 2079-2084.
- Fitzgerald M. A., McCouch S. R and Hall R. D. 2009. Not just a grain of rice: the quest for quality. *Trends in Plant Science*. 14: 133-139.
- Funaba M., Ishibashi Y., Hossain Molla A., Iwanami K. and Iwaya-Inoue M. 2006. Influence of low/high temperature on water status in developing and maturing rice grains. *Plant Production Science*. 9: 347-354.
- Furukawa S., Tanaka K., Masumura T., Ogihara Y., Kiyokawa Y. and Wakai Y. 2006. Influence of rice proteins on eating quality of cooked rice and on aroma and flavor of sake. *Cereal Chemistry*. 83: 439-446.
- Gobbetti M., De Angelis M., Corsetti A. and Di Cagno R. 2005. Biochemistry and physiology of sourdough lactic acid bacteria. *Trends in Food Science & Technology*. 16: 57-69.

- Gomez K. and De Datta S. 1975. Influence of environment on protein content of rice. *Agronomy Journal*. 67: 565-568.
- Gopala Krishna A., Prabhakar J. and Sen D. 1984. Effect of degree of milling on tocopherol content of rice bran. *Journal of Food Science and Technology*. 21: 222-224.
- Graham R., Senadhira D., Beebe S., Iglesias C and Monasterio I. 1999. Breeding for micronutrient density in edible portions of staple food crops: conventional approaches. *Field Crops Research*. 60: 57-80.
- Gregorio G. B. 2002. Progress in breeding for trace minerals in staple crops. *Journal of Nutrition*. 132: 500S-502.
- Han L., Koh H. and Piao Z. 2002. Status and prospects of genetic and QTLs analysis for cold tolerance in rice. *Chinese Journal of Rice Science*. 16: 193-198.
- Hao H-l., Wei Y-z., Yang X-e., Feng Y. and Wu C-y. 2007. Effects of different nitrogen fertilizer levels on Fe, Mn, Cu and Zn concentrations in shoot and grain quality in rice (*Oryza sativa*). *Rice Science*. 14: 289-294.
- Hayashi M., Sugiura K., Kuno C., Endo I., Tanaka Y. and Yamauchi A. 2011. Reduction of rice chalky grain by deep and permanent irrigation method; effect on growth and grain quality of rice. *Plant Production Science*. 14: 282-290.
- Hell R. and Stephan U. W. 2003. Iron uptake, trafficking and homeostasis in plants. *Planta*. 216: 541-551.
- Hemavathy J. and Prabhakar J. 1987. Lipid composition of rice (*Oryza sativa* L.) bran. *Journal of the American Oil Chemists' Society*. 64: 1016-1019.
- Hotz C. and Brown K. H. 2004. Assessment of the risk of zinc deficiency in populations and options for its control. *Food and Nutrition Bulletin*: S94-S203.
- Houston D. and Mohammad A. 1970. Purification and partial characterization of a major globulin from rice endosperm. *Cereal Chemistry*. 47: 5-11.
- Inoue H., Kobayashi T., Nozoye T., Takahashi M., Kakei Y., Suzuki K., Nakazono M., Nakanishi H., Mori S. and Nishizawa N. K. 2009. Rice OsYSL15 is an iron-

- regulated Iron(III)-deoxymugineic acid transporter expressed in the roots and is essential for iron uptake in early growth of the seedlings. *Journal of Biological Chemistry*. 284: 3470-3479.
- IRRI. 1979. *Chemical Aspects of Rice Grain Quality*. International Rice Research Institute, Philippines.
- Ishimaru T., Horigane A. K., Ida M., Iwasawa N., San-oh Y. A., Nakazono M., Nishizawa N. K., Masumura T., Kondo M. and Yoshida M. 2009. Formation of grain chalkiness and changes in water distribution in developing rice caryopses grown under high-temperature stress. *Journal of Cereal Science*. 50: 166-174.
- Ishimaru Y., Bashir K. and Nishizawa N. K. 2011. Zn uptake and translocation in rice plants. *Rice*. 4: 21-27.
- Ishimaru Y., Masuda H., Bashir K., Inoue H., Tsukamoto T., Takahashi M., Nakanishi H., Aoki N., Hirose T., Ohsugi R. and Nishizawa N. K. 2010. Rice metal-nicotianamine transporter, OsYSL2, is required for the long-distance transport of iron and manganese. *The Plant Journal*. 62: 379-390.
- Ishimaru Y., Suzuki M., Kobayashi T., Takahashi M., Nakanishi H., Mori S and Nishizawa N K. 2005. OsZIP4, a novel zinc-regulated zinc transporter in rice. *Journal of Experimental Botany*. 56: 3207-3214.
- Ishimaru Y., Suzuki M., Tsukamoto T., Suzuki K., Nakazono M., Kobayashi T., Wada Y., Watanabe S., Matsuhashi S., Takahashi M., Nakanishi H., Mori S and Nishizawa N K. 2006. Rice plants take up iron as an Fe³⁺-phytosiderophore and as Fe²⁺. *The Plant Journal*. 45: 335-346.
- Islam N., Inanaga S., Chishaki N. and Horiguchi T. 1996. Effect of N top-dressing on protein content in japonica and indica rice grains. *Cereal Chemistry*. 73: 571-573.
- Jackson H. 1967. *Soil Chemistry Analysis*. Prentice-Hall of India Private Limited, New Delhi. pp. 498
- Jagadish S., Craufurd P. and Wheeler T. 2007. High temperature stress and spikelet fertility in rice (*Oryza sativa* L.). *Journal of Experimental Botany*. 58: 1627-1635.

- Jiang H., Dian W. and Wu P. 2003. Effect of high temperature on fine structure of amylopectin in rice endosperm by reducing the activity of the starch branching enzyme. *Phytochemistry*. 63: 53-59.
- Jiang S., Wu J., Thang N., Feng Y., Yang X. and Shi C. 2008. Genotypic variation of mineral elements contents in rice (*Oryza sativa L.*). *European Food Research and Technology*. 228: 115-122.
- Jiang W., Struik P., Van Keulen H., Zhao M., Jin L. and Stomph T. 2008. Does increased zinc uptake enhance grain zinc mass concentration in rice? *Annals of Applied Biology* 153, 135-147.
- Jin Z., Minyan W., Lianghuan W., Jiangguo W. and Chunhai S. 2008. Impacts of Combination of Foliar Iron and Boron Application on Iron Biofortification and Nutritional Quality of Rice Grain. *Journal of Plant Nutrition*. 31: 1599-1611.
- Juliano B. O. and Bechtel D. B. 1985. *The rice grain and its gross composition*. American Association of Cereal Chemists, St Paul, MN, USA.
- Juliano B. O. and Perez C M. 1983. Major factors affecting cooked milled rice hardness and cooking time. *Journal of texture studies*. 14: 235-243.
- Juliano B O. 1980. Properties of the rice caryopsis. *Rice: production and utilization*. Westport: Connecticut AVI Publishing: 403-438.
- Juliano B. O., Antonio A A and Esmama B V. 1973. Effects of protein content on the distribution and properties of rice protein. *Journal of the Science of Food and Agriculture*. 24: 295-306.
- Juliano B. O., Food., Nations A O o t U and Institute I R R. 1993. *Rice in human nutrition*. Food and Agriculture Organization of the United Nations.
- Juliano B. 1972. The rice caryopsis and its composition. *Rice Chemistry and Technology*. American Association of Cereal Chemists, St. Paul: 16–74.
- Khush G. S. 2005. What it will take to feed 5.0 billion rice consumers in 2030. *Plant Molecular Biology*. 59: 1-6.

- Kim S. A. and Guerinot M L. 2007. Mining iron: iron uptake and transport in plants. *FEBS Letters*. 581: 2273-2280.
- Krishnan S. and Dayanandan P. 2003. Structural and histochemical studies on grain-filling in the caryopsis of rice (*Oryza sativa* L.). *Journal of Biosciences*. 28: 455-469.
- Krishnan S., Datta K., Baisakh N., de Vasconcelos M. and Datta S. K. 2003. Tissue-specific localization of beta-carotene and iron in transgenic indica rice(*Oryza sativa* L.). *Current Science* 84, 1232-1234.
- Kutman U. B., Yildiz B., Ozturk L. and Cakmak I. 2010. Biofortification of durum wheat with zinc through soil and foliar applications of nitrogen. *Cereal Chemistry*. 87: 1-9.
- Lee S., Jeong H., Kim S., Lee J., Guerinot M. and An G. 2010. OsZIP5 is a plasma membrane zinc transporter in rice. *Plant Molecular Biology*. 73: 507-517.
- Leenhardt F., Levrat-Verny M-A., Chanliaud E. and Rémesy C. 2005. Moderate decrease of pH by sourdough fermentation is sufficient to reduce phytate content of whole wheat flour through endogenous phytase activity. *Journal of Agricultural and Food Chemistry*. 53: 98-102.
- Leesawatwong M., Jamjod S., Kuo J., Dell B. and Rerkasem B. 2005. Nitrogen Fertilizer Increases Seed Protein and Milling Quality of Rice. *Cereal Chemistry*. 82: 588-593.
- Liang J., Li Z., Tsuji K., Nakano K., Nout M. and Hamer R. J. 2008. Milling characteristics and distribution of phytic acid and zinc in long-, medium-and short-grain rice. *Journal of Cereal Science* 48, 83-91.
- Ling Y., Wu L., Yang C. and Lv Q. 2012. Effects of iron and zinc foliar applications on rice plants and their grain accumulation and grain nutritional quality. *Journal of the Science of Food and Agriculture*. 93: 254-61.

- Lisle A. J., Martin M. and Fitzgerald M. A. 2000. Chalky and translucent rice grains differ in starch composition and structure and cooking properties. *Cereal Chemistry*. 77: 627-632.
- Lu S., Chen L-N. and Lii C-Y. 1997. Correlations between the fine structure, physicochemical properties, and retrogradation of amylopectins from taiwan rice varieties 1. *Cereal Chemistry*. 74: 34-39.
- Marschner H. 1995. *Mineral Nutrition of Higher Plants*. Academic Press, London. pp. 889.
- Marshall W. E. and Wadsworth J. I. 1994. *Rice science and technology*. CRC. Medison avenue, New York.
- Martin M. and Fitzgerald M. 2002. Proteins in rice grains influence cooking properties! *Journal of Cereal Science*. 36: 285-294.
- Matsui T., Namuco O. S., Ziska L H and Horie T. 1997. Effects of high temperature and CO₂ concentration on spikelet sterility in indica rice. *Field Crops Research*. 51: 213-219.
- Matsui T., Omasa K. and Horie T. 2000. High temperature at flowering inhibits swelling of pollen grains, a driving force for thecae dehiscence in rice (*Oryza sativa* L.). *Plant Production Science*. 3: 430-434.
- Matsuo T. and Hoshihawa K. 1993. *Science of the rice plant. Volume 1: Morphology*. Food and Agriculture Policy Research Center. Japan.
- Matsuo T., Kumazawa K., Ishii R., Ishihara K and Hirata H. 1995. *Science of the rice plant. Volume 2: Physiology*. Food and Agriculture Policy Research Center. Japan.
- Mohammed A. R. and Tarpley L. 2009. High nighttime temperatures affect rice productivity through altered pollen germination and spikelet fertility. *Agricultural and Forest Meteorology*. 149: 999-1008.

- Mohammed A. R. and Tarpley L. 2010. Effects of high night temperature and spikelet position on yield-related parameters of rice (*Oryza sativa* L.) plants. *European Journal of Agronomy*. 33: 117-123.
- Mundo A. M., Kosco D. A., Juliano B. O., Siscar J. J. O .Y. H. and Perez C. M. 1989. Sensory and instrumental evaluation of texture of cooked and raw milled rices with similar starch properties. *Journal of texture studies*. 20: 97-110.
- Nangju D. and De Datta S. K. 1970. Effect of time of harvest and nitrogen level on yield and grain breakage in transplanted rice1. *Agronomy Journal*. 62: 468-474.
- Ning H., Liu Z., Wang Q., Lin Z., Chen S., Li G., Wang S. and Ding Y. 2009. Effect of nitrogen fertilizer application on grain phytic acid and protein concentrations in japonica rice and its variations with genotypes. *Journal of Cereal Science*. 50: 49-55.
- Ning H., Qiao J., Liu Z., Lin Z., Li G., Wang Q., Wang S. and Ding Y. 2010. Distribution of proteins and amino acids in milled and brown rice as affected by nitrogen fertilization and genotype. *Journal of Cereal Science*. 52: 90-95.
- Ogawa M., Kumamaru T., Satoh H., Iwata N., Omura T., Kasai Z. and Tanaka K. 1987. Purification of protein body-I of rice seed and its polypeptide composition. *Plant and Cell Physiology*. 28: 1517.
- Oh-e I., Saitoh K. and Kuroda T. 2007. Effects of high temperature on growth, yield and dry-matter production of rice grown in the paddy field. *Plant Production Science*. 10: 412-422.
- Oparka K. J. and Gates P. 1981. Transport of assimilates in the developing caryopsis of rice (*Oryza sativa* L.). *Planta* 151, 561-573.
- Padhye V. and Salunkhe D. 1979. Extraction and characterization of rice proteins. *Cereal Chemistry*. 56: 389-393.
- Patindol J. and Wang Y-J. 2002. Fine structures of starches from long-grain rice cultivars with different functionality. *Cereal Chemistry*. 79: 465-469.

- Peng S., Huang J., Sheehy J. E., Laza R. C., Visperas R. M., Zhong X., Centeno G. S., Khush G. S. and Cassman K. G. 2004. Rice yields decline with higher night temperature from global warming. *Proceedings of the National Academy of Sciences of the United States of America*. 101: 9971-9975.
- Perez C. M., Juliano B. O., Liboon S. P., Alcantara J. M. and Cassman K. G. 1996. Effects of Late Nitrogen Fertilizer Application on Head Rice Yield, Protein Content, and Grain Quality of Rice. *Cereal Chemistry*. 75: 556-560.
- Phattarakul N., Rerkasem B., Li L., Wu L., Zou C., Ram H., Sohu V., Kang B., Surek H. and Kalayci M. 2012. Biofortification of rice grain with zinc through zinc fertilization in different countries. *Plant and soil*: 1-11.
- Ponnamperuma F. 1972. *The chemistry of submerged soils*. Academic Press NY and London.
- Prom-u-thai C. D., Huang L. D., Fukai S. P. and Rerkasem B. P. 2009. Iron fortification in parboiled rice – a rapid and effective tool for delivering Fe nutrition to rice consumers. *The Proceeding of The International Plant Nutrition Colloquium XVI*. University of California, Devis.
- Prom-u-thai C., Fukai S., Godwin D. I. and Huang L. 2007. Genotypic variation of iron partitioning in rice grain. *Journal of the Science of Food and Agriculture*. 87: 2049-2054.
- Prom-u-thai C., Fukai S., Godwin I. D., Rerkasem B. and Huang L. 2008. Iron-fortified parboiled rice - A novel solution to high iron density in rice-based diets. *Food Chemistry*. 110: 390-398.
- Prom-u-thai C., Fukai S., Godwin I. D., Rerkasem B. and Huang L. 2008a. Iron-fortified parboiled rice - A novel solution to high iron density in rice-based diets. *Food Chemistry*. 110: 390-398.
- Prom-u-thai C., Glahn R. P., Cheng Z., Fukai S., Rerkasem B. and Huang L. 2009a. The bioavailability of iron fortified in whole grain parboiled rice. *Food Chemistry*. 112, 982-986.

- Prom-u-thai C., Huang L., Glahn R. P., Welch R. M., Fukai S. and Rerkasem B. 2006. Iron (Fe) bioavailability and the distribution of anti-Fe nutrition biochemicals in the unpolished, polished grain and bran fraction of five rice genotypes. *Journal of the Science of Food and Agriculture*. 86: 1209-1215.
- Prom-u-thai C., Huang L., Rerkasem B., Thomson G., Kuo J., Saunders M. and Dell B. 2008b. Distribution of protein bodies and phytate-rich inclusions in grain tissues of low and high iron rice genotypes. *Cereal Chemistry*. 85: 257-265.
- Prom-u-thai C., Rerkasem B., Cakmak I. and Huang L. 2010. Zinc fortification of whole rice grain through parboiling process. *Food Chemistry*. 120: 858-863.
- Prom-u-thai C., Sanchai C., Rerkasem B., Jamjod S., Fukai S., Godwin I. D. and Huang L. 2007b. Effect of grain morphology on degree of milling and iron loss in rice. *Cereal Chemistry*. 84: 384-388.
- Raboy V. 1997. Accumulation and storage of phosphate and minerals. *Advances in Cellular and Molecular Biology of Plants*. 4: 441-477.
- Raboy V. 2001. Seeds for a better future: ‘low phytate’ grains help to overcome malnutrition and reduce pollution. *Trends in Plant Science*. 6: 458-462.
- Ramesh M., Zakiuddin Ali S. and Bhattacharya K. R. 1999. Structure of rice starch and its relation to cooked-rice texture. *Carbohydrate Polymers*. 38: 337-347.
- Ren X. L., Liu Q. L., Wu D. X. and Shu Q. Y. 2006. Variations in concentration and distribution of health-related elements affected by environmental and genotypic differences in rice grains. *Rice Science* 13, 170-178.
- Resurreccion A. P., Hara T., Juliano B. O. and Yoshida S. 1977. Effect of temperature during ripening on grain quality of rice. *Soil Science and Plant Nutrition*. 23: 109-112.
- Resurrection A. P., Juliano B. O. and Tanaka Y. 1979. Nutrient content and distribution in milling fractions of rice grain. *Journal of the Science of Food and Agriculture*. 30, 475-481.

- Saenchai C., Prom-u-thai C., Jamjod S., Dell B. and Rerkasem B. 2012. Genotypic variation in milling depression of iron and zinc concentration in rice grain. *Plant and Soil* 361, 271-278.
- Satake T and Hayase H. 1970. Male sterility caused by cooling treatment at the young microspore stage in rice plants. V. Estimation of pollen developmental stage and the most sensitive stage to coolness. *Crop Science Society of Japan*. 39: 468-473.
- Satake T. and Koike S. 1983. Sterility caused by cooling treatment at the flowering stage in rice plants, 1: The stage and organ susceptible to cool temperature. *Japanese Journal of Crop Science*. 52. 207-214.
- Sellappan K., Datta K., Parkhi V. and Datta S. K. 2009. Rice caryopsis structure in relation to distribution of micronutrients (iron, zinc, β -carotene) of rice cultivars including transgenic indica rice. *Plant Science*. 177: 557-562.
- Shimono H., Okada M., Kanda E. and Arakawa I. 2007. Low temperature-induced sterility in rice: Evidence for the effects of temperature before panicle initiation. *Field Crops Research*. 101: 221-231.
- Siebenmorgen T. J., Bautista R. C. and Meullenet J-F. 2006. Predicting rice physicochemical properties using thickness fraction properties. *Cereal Chemistry*. 83: 275-283.
- Sivaprakash K., Krishnan S., Datta S. K. and Parida A. K. 2006. Tissue-specific histochemical localization of iron and ferritin gene expression in transgenic indica rice Pusa Basmati (*Oryza sativa* L.). *Journal of Genetics* 85, 157-160.
- Sperotto R. A., Boff T., Duarte G. L., Santos L. S., Grusak M. A. and Fett J. P. 2010. Identification of putative target genes to manipulate Fe and Zn concentrations in rice grains. *Journal of plant physiology*. 167: 1500-1506.
- Sperotto R. A., Ricachenevsky F. K., Duarte G. L., Boff T., Lopes K. L., Sperb E. R., Grusak M. A. and Fett J. P. 2009. Identification of up-regulated genes in flag leaves during rice grain filling and characterization of OsNAC5, a new ABA-dependent transcription factor. *Planta*. 230: 985-1002.

- Sperotto R. A., Ricachenevsky F. K., Waldow V. A. and Fett J. P. 2012. Iron biofortification in rice: It's a long way to the top. *Plant Science*. 190: 24-39.
- Sun H and Siebenmorgen T. 1993. Milling characteristics of various rough rice kernel thickness fractions. *Cereal Chemistry*. 70: 727-727.
- Taira H., Nakagahra M. and Nagamine T. 1988. Fatty acid composition of Indica, Sinica, Javanica, Japonica groups of nonglutinous brown rice. *Journal of Agricultural and Food Chemistry*. 36: 45-47.
- Takahashi N. 1984. Differentiation of ecotypes in *Oryza sativa* L. *Biology of Rice. Japan Scientific Societies Press, Tokyo*: 31-67.
- Tanaka K., Yoshida T., Kozi A. and Zenzaburo K. 1973. Subcellular particles isolated from aleurone layer of rice seeds. *Archives of Biochemistry and Biophysics*. 155: 136-143.
- Tanaka Y., Resurreccion A. P., Juliano B. O. and Bechtel D. B. 1978. Properties of whole and undigested fraction of protein bodies of milled rice. *Agricultural and Biological Chemistry*. 42: 2015-2023.
- Tashiro T. and Wardlaw I. 1991. The effect of high temperature on kernel dimensions and the type and occurrence of kernel damage in rice. *Australian Journal of Agricultural Research*. 42: 485-496.
- Thai Rice Department. 2014. Rice Knowledge Bank. <http://www.brrd.in.th/rkb/index.php.htm> Date Accessed 13 March 2014.
- Thai Rice Exporters Association. 2012. Rice export prices. <http://www.thairiceexporters.or.th>List %20of statistic.htm> . March 30, 2012.
- Tsukaguchi T. and Iida Y. 2008. Effects of Assimilate Supply and High Temperature during Grain-Filling Period on the Occurrence of Various Types of Chalky Kernels in Rice Plants (*Oryza sativa* L.). *Plant Production Science*. 11: 203-210.
- Tuaňo A. P. P., Umemoto T., Aoki N., Nakamura Y., Sawada T. and Juliano B. O. 2011. Grain Quality and Properties of Starch and Amylopectin of Intermediate-

and Low-Amylose Indica Rices. *The Philippine Agricultural Scientist*. 94: 140-148

Vasconcelos M., Datta K., Oliva N., Khalekuzzaman M., Torrizo L., Krishnan S., Oliveira M., Goto F and Datta S K. 2003. Enhanced iron and zinc accumulation in transgenic rice with the ferritin gene. *Plant Science*. 164: 371-378.

Villareal C. P., Maranville J. W and Juliano B. O. 1991. Nutrient content and retention during milling of brown rices from the International Rice Research Institute. *Cereal Chemistry*. 68: 437-439.

von Wirén N., Klair S., Bansal S., Briat J-F., Khodr H., Shioiri T., Leigh R. A. and Hider R. C. 1999. Nicotianamine chelates both FeIII and FeII. Implications for metal transport in plants. *Plant Physiology*. 119: 1107-1114.

Wada Y., Oogaki M. and Konishi T. 2010. Effects of a high temperature before anthesis on rice growth and grain quality. *Japanese Journal of Crop Science*. 79: 460-467.

Wakamatsu K., Sasaki O., Uezono I. and Tanaka A. 2007. Effects of high air temperature during the ripening period on the grain quality of rice *Oryza sativa* in warm regions of Japan. *Japanese Journal of Crop Science*. 76: 71-78.

Wang K. M., Wu J. G., Li G., Zhang D. P., Yang Z. W. and Shi C. H. 2011. Distribution of phytic acid and mineral elements in three indica rice (*Oryza sativa* L.) cultivars. *Journal of Cereal Science*. In Press, Corrected Proof.

Waters B. M. and Sankaran R. P. 2011. Moving micronutrients from the soil to the seeds: Genes and physiological processes from a biofortification perspective. *Plant Science*. 180: 562-574.

Webb B. D. 1991. Rice Quality and Grades. In *Rice: Utilization*. Ed. B S Luh. pp 89-118. Van Nostrand Reinhold, New York.

Wei Y., Shohag M., Yang X and Yibin Z. 2012. Effects of foliar iron application on iron concentration in polished rice grain and its bioavailability. *Journal of Agricultural and Food Chemistry*. 60: 11433-11439.

- Welch R. M. and Graham R. D. 2004. Breeding for micronutrients in staple food crops from a human nutrition perspective. *Journal of Experimental Botany*. 55: 353.
- Wissuwa M., Ismail A. M. and Graham R. D. 2008. Rice grain zinc concentrations as affected by genotype, native soil-zinc availability, and zinc fertilization. *Plant and soil*. 306: 37-48.
- Yamakawa H., Hirose T., Kuroda M. and Yamaguchi T. 2007. Comprehensive Expression Profiling of Rice Grain Filling-Related Genes under High Temperature Using DNA Microarray. *Plant Physiology*. 144: 258-277.
- Yang J., Zhang J., Wang Z., Zhu Q. and Wang W. 2001. Remobilization of carbon reserves in response to water deficit during grain filling of rice. *Field Crops Research*. 71: 47-55.
- Yeshwant G. D., Devara S., Shankar R. and Bhavani B. 1979. Effect of milling on mineral and trace element composition of raw and parboiled rice. *Journal of the Science of Food and Agriculture*. 30: 40-46.
- Yoneyama T., Gosho T., Kato M., Goto S. and Hayashi H. 2010. Xylem and phloem transport of Cd, Zn and Fe into the grains of rice plants (*Oryza sativa L.*) grown in continuously flooded Cd-contaminated soil. *Soil Science & Plant Nutrition* 56: 445-453.
- Yoshida S. and Hara T. 1977. Effects of air temperature and light on grain filling of an indica and a japonica rice (*Oryza sativa L.*) under controlled environmental conditions. *Soil Science and Plant Nutrition*. 23: 93-107.
- Yoshida S. 1981. *Fundamentals of rice crop science*. International Rice Research Institute.
- Yoshida S., Satake T. and Mackill D. 1981. High-temperature stress in rice [study conducted at IRRI, Philippines]. *IRRI Research Paper Series*.
- Yuan L., Wu L., Yang C and Lv Q. 2013. Effects of iron and zinc foliar applications on rice plants and their grain accumulation and grain nutritional quality. *Journal of the Science of Food and Agriculture*. 93: 254-261.

Zhang J., Wu L. and Wang M. 2008. Can iron and zinc in rice grains (*Oryza sativa* L.) be biofortified with nitrogen fertilisation under pot conditions? *Journal of the Science of Food and Agriculture.* 88: 1172-1177.

Zhang W. H., Zhou Y., Dibley K. E., Tyerman S. D., Furbank R. T. and Patrick J. W. 2007. Review: Nutrient loading of developing seeds. *Functional Plant Biology.* 34: 314-331.

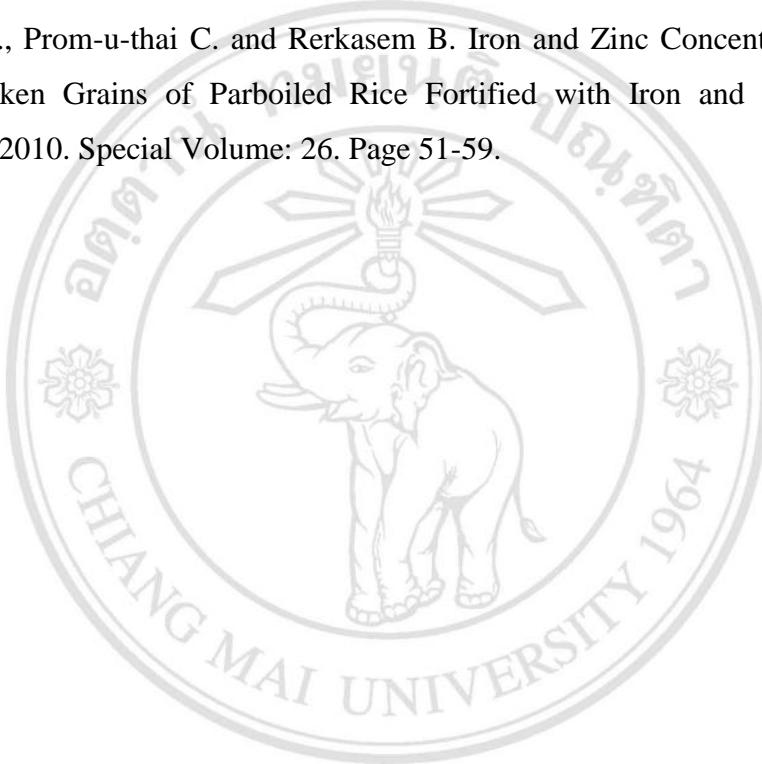
Zheng L., Cheng Z., Ai C., Jiang X., Bei X., Zheng Y., Glahn R. P., Welch R M., Miller D. D. and Lei X. G. 2010. Nicotianamine, a novel enhancer of rice iron bioavailability to humans. *PloS one.* 5: e10190.

Zhong L., Cheng F., Wen X., Sun Z. and Zhang G. 2005. The deterioration of eating and cooking quality caused by high temperature during grain filling in early-season indica rice cultivars. *Journal of Agronomy and Crop Science.* 191: 218-225.

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่
Copyright© by Chiang Mai University
All rights reserved

LIST OF PUBLICATIONS

1. Laenoi S., Phattarakul N., Jamjod S., Yimyam N., Dell B., and Rerkasem B. Genotypic variation in adaptation to soil acidity in local upland rice varieties. Plant Genetic Resources and Utilization. 2014. Page 1-7.
2. Laenoi S., Prom-u-thai C. and Rerkasem B. Iron and Zinc Concentration in Full and Broken Grains of Parboiled Rice Fortified with Iron and Zinc. Journal (CMU). 2010. Special Volume: 26. Page 51-59.



ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่
Copyright© by Chiang Mai University
All rights reserved