

## REFERENCES

- Akbarsha MA, Kadalmali B, Girija R, Faridha A and Hamid KS. 2000. Spermatotoxic effect of carbendazim. Indian J Exp Biol, 39: 921-924.
- Akoto O, Andoh , Darko G, Eshun K and Osei-Fosu P. 2013. Health risk assessment of pesticides residue inmaize and cowpea from Ejura, Ghana. Chemosphere, 92: 67–73.
- Al-Ebaisat H. 2011. Determination of some benzimidazole fungicides in tomato puree by high performance liquid chromatography with SampliQ polymer SCX solid phase extraction, Arab J Chem, 4: 115–117.
- Amer SM, Donya SM and Aly FA. 2003. Genotoxicity of benomyl and its residues in somatic and germ cells of mice fed on treated stored wheat grains. Arch Toxicol, 77: 712–721.
- Anastassiades M and Schwack W. 1998. Analysis of carbendazim, benomyl, thiophanate methyl and 2,4-dichlorophenoxyacetic acid in fruits and vegetables after supercritical fluid extraction. J Chromatogr A, 825(1): 45-54.
- Australian Pesticides and Veterinary Medicines Authority. 2012. Carbendazim review finding report.
- Bernal JL, Nozal MJ del, Toribio L, Jimenez JJ and Atienza J. 1997. High-performance liquid chromatographic determination of benomyl and carbendazim residues in apiarian samples. J Chromatogr A, 787(1-2): 129-136.

- Blasco C, Fernandez M, Pico Y, Font G and Maaes J. 2002. Simultaneous determination of imidacloprid, carbendazim, methiocarb and hexythiazox in peaches and nectarines by liquid chromatography–mass spectrometry, *Anal Chim Acta*, 461: 109–116.
- Blasco C, Font G and Pico Y. 2006. Evaluation of 10 pesticide residues in oranges and tangerines from Valencia (Spain). *Food Control*, 17 (11): 841-846.
- Burpee L. 2006. Integrated disease management, an introduction to Fungicides. Courses support.
- Caldas E, Miranda MCC, Conceicao MH and de Souza LCKR. 2004. Dithiocarbamates residues in Brazilian food and the potential risk for consumers. *Food Chem Toxicol*, 42: 1877–1883.
- Caldas ED, Conceicao MH, Miranda MCC and de Souza LCKR. 2001. Determination of dithiocarbamate fungicide residues in food by the spectrophotometric method using a vertical disulfide reaction system. *J Agric Food Chem*, 49: 4521-4525.
- Caldas ED, Tressou J, Boon PE. 2006. Dietary exposure of Brazilian consumers to dithiocarbamate pesticides-A probabilistic approach. *Food Chem Toxicol*, 44: 1562-1571.
- Caldas ED, De Souza MV and Jardim ANO. 2011. Dietary risk assessment of organophosphorus and dithiocarbamate pesticides in a total diet study at a Brazilian university restaurant. *Food Add Contam*, 28(1): 71-79.

- Cesnik HB and Gregoric A. 2006. Validation of the method for the determination of dithiocarbamates and thiram disulphide on apple, lettuce, potato, strawberry and tomato matrix. *Acta Chim Slov*, 53 : 100-104.
- Choua TC, Shihe TS, Sheud HM, Changc SJ, Huange CC and Changa HY. 2004. The effect of personal factors on the relationship between carbon disulfide exposure and urinary 2-thiothiazolidine-4-carboxylic acid levels in rayon manufacturing workers. *Sci Total Envi*, 322 : 51–62.
- Codex Alimentarius. 2000. Food Standards Programme, Portion of commodities to which codex maximum residue limits apply and which is analyzed, 2A, Part 1, FAO/WHO, Rome.
- Codex Alimentarius. 2006. Pesticide Residues in Food and Feed.
- Coldwell MR, Pengelly I and Rimmer DA. 2003. Determination of dithiocarbamate pesticides in occupational hygiene sampling devices using the isoocetane method and comparison with an automatic thermal desorption (ATD) method. *J Chromatogr A*, 984(1): 81-88.
- Di Muccio A, Camoni I, Ventriglia M, Barbini AD, Mauro M, Pelosi P, Generali T, Ausili A and Girolimetti S. 1995. Simplified clean-up for the determination of benzimidazolic fungicides by high-performance liquid chromatography with UV detection. *J Chromatogr A*, 697(1-2): 145-152.
- DOA. 2013. “Import agricultural chemical report 2012.” Department of Agriculture, Ministry of Agriculture and Cooperatives, Bangkok, Thailand, Available <http://www.doa.go.th> (31 July 2013).

- EN15662. 2008. Foods of plant origin-determination of pesticide residues using GC-MS and/or LC-MS/MS following acetonitrile extraction/partitioning and cleanup by dispersive SPE - QuEChERS-method.
- European Commission. 2011. European parliament and of the council as regards maximum residue levels for carbendazim in or on certain products.
- EXTOXNET. 1996. Pesticide Information Profiles ; mancozeb. California. Available <http://extoxnet.orst.edu/pips/mancozeb.htm> (31 July 2013).
- Fernandez-Alba AR, Valverde A, Aguera A, Contreras M and Chiron S. 1996. Determination of imidacloprid in vegetables by high-performance liquid chromatography with diode-array detection. *J Chromatogr A*, 721(1): 97-105.
- Fong WG, Moye HA, Seiber JN and Toth JP. 1999. *Pesticide Residues in Foods – Methods, Techniques and Regulations*. Wiley, New York. USA : 300.
- Food and Agricultural Organization/World Health Organization (FAO/WHO). 1995. *Pesticide residues in food*. Joint Meeting of the FAO Panel of Experts on Pesticides in Food and the Environment and the WHO Cores Assessment Group on Pesticide Residues.
- Foster and Smith. 2010. *Germs: Viruses, Bacteria, and Fungi*. Veterinary & Aquatic Services Department Foster and Smith, Inc. Wisconsin, USA.
- Garrido J, Alba M de , Jimenez I, Casado E, Folgueiras ML. 1997. Chromatographic analysis of imazalil and carbendazim in fruits method validation and residue monitoring program 1995. *J Chromatogr A*, 765: 91-97.

- Goldman J.M. et al., 1989. Effects of the benomyl metabolite carbendazim on the hypothalamic pituitary reproductive axis in male rats. *Toxicology*, 57: 173-182.
- Hiemstra M and de Kok A. 2007. Comprehensive multi-residue method for the target analysis of pesticides in crops using liquid chromatography-tandem mass spectrometry. *J Chromatogr A*, 1154(1-2): 3-25.
- Hu Y, Yang X, Wang Z, Wang C and Zhao J. 2004. Determination of carbendazim and thiabendazole in tomatoes by solid-phase microextraction coupled with high performance liquid chromatography and fluorescence detection. *Chin J Chromatogr*, 23(6): 581-4.
- Hu Y, Yang X, Wang Z, Wang C and Zhao J. 2005. Determination of carbendazim and thiabendazole in tomatoes by solid-phase microextraction coupled with high performance liquid chromatography and fluorescence detection. *Chin J Chromatogr*, 23(6): 581-584.
- Hu Y, Yang X, Wang C, Zhao J, Li W and Wang Z. 2008. A sensitive determination method for carbendazim and thiabendazole in apples by solid-phase microextraction-high performance liquid chromatography with fluorescence detection. *Food Addit Contam*, 25(3): 314–319.
- Hutson D and Miyamoto J. 1999. Fungicidal Activity: Chemical and Biological Approaches to Plant Protection. John Wiley & Sons. New York. USA.
- IARC. 2006. Preamble to the IARC monographs (amended January 2006). Lyon, International Agency for Research on Cancer. Available <http://monographs.iarc.fr/ENG/Preamble/index.php> (19 August 2013).

- IARC. 2004. Some drinking-water disinfectants and contaminants, including arsenic. Lyon, International Agency for Research on Cancer (IARC Monographs on the Evaluation of Carcinogenic Risks to Humans, 84. Available <http://monographs.iarc.fr/ENG/Monographs/vol84/mono84.pdf> (19 August 2013).
- Japan Ministry of Health, Labor and Welfare (JMHLW). 2006. Japan MRL (Maximum Residue Limit) List. Available [http://www.m5.ws001.squarestart.ne.jp/foundation/agrdtl.php?a\\_inq=28700](http://www.m5.ws001.squarestart.ne.jp/foundation/agrdtl.php?a_inq=28700) (21 January 2012).
- Jia L, Garza M, Wong H, Reimer D, Redelmeier T, Camden JB and Weitman SD. 2002. Pharmacokinetic comparison of intravenous carbendazim and remote loaded carbendazim liposomes in nude mice. *J Pharm Biomed Anal*, 28: 65-72.
- Joint FAO/WHO Meeting on Pesticide Residues (JMPR). 1998. Pesticide residues in food.
- Juan-Garcia A, Font G and Pico Y. 2007. On-line preconcentration strategies for analyzing pesticides in fruits and vegetables by micellar electrokinetic chromatography. *J Chromatogr A*, 1153(1-2): 104-113.
- Kazos EA, Stalikas CD, Nanos CG and Konidari CN. 2007. Determination of dithiocarbamate fungicide propineb and its main metabolite propylenethiourea in airborne samples. *Chemosphere*, 68: 2104-2110.

- Kim DJ, Seok SH, Baek MW, Lee HY, Na YR, Park SH, Lee HK, Dutta NK, Kawakami K and Park JH. 2009. Benomyl induction of brain aromatase and toxic effects in the zebrafish embryo. *J Appl Toxicol*, 29: 289–294.
- Latijnhouwers M, de Wit PJ, and Govers F. 2000. Oomycetes and fungi: similar weaponry to attack plants. *Trends in Microbiology*, 11: 462-469.
- Lehotay SJ, Hiemstra M, van Bodegraven P, de Kok A. 2007. Validation of a fast and easy method for the determination of more than 200 pesticide residues in fruits and vegetables using gas and liquid chromatography and mass spectrometric detection. *J. AOAC Int*, 88: 595.
- Lesueur C, Gartner M, Mentler A and Fuerhacker M. 2008. Comparison of four extraction methods for the analysis of 24 pesticides in soil samples with gas chromatography–mass spectrometry and liquid chromatography–ion trap–mass spectrometry. *Talanta*, 75(1): 284-293.
- Marinovich M, Viviani B, Capra V, Corsini E, Anselmi L, Agostino GD, Di Nucci A, Binaglia M, Tonini M and Galli CL. 2002. Facilitation of acetylcholine signaling by the dithiocarbamate fungicide propineb. *Chem Res Toxicol*, 15 (1): 26 -32.
- Marosanovic B. and Pandurevic Maja. 2010. Determination of dithiocarbamate residues in fruits and vegetables by GC/ECD/HSS. [Online]. Available <http://www.splabora-torija.rs> (30 June 2011).

Martina SG, Juliet B, Andrew SB, Jules NP and Mark Osborn A. 2004. Responses of active bacterial and fungal communities in soils under winter wheat to different fertilizer and pesticide regimes. *Appl Environ Microbiol*, 70 (5): 2692-2701.

McCarrolla NE, Protzela A, Ioannoua Y, Stackb HF, Jacksonb MA, Watersc MD, Dearfield KL. 2002. A survey of EPA/OPP and open literature on selected pesticide chemicals III. Mutagenicity and carcinogenicity of benomyl and carbendazim, *Mutation Research* 512 1–35.

Morinaga H, Yanase T, Nomura M, Okabe T, Goto K, Harada N and Nawata H. 2004. A Benzimidazole fungicide, benomyl and its Metabolite, carbendazim, induce aromatase activity in a human ovarian granulose-like tumor cell line (KGN). *Endocrinology*, 145(4): 1860–1869.

Michel M and Buszewski B. 2004. Optimization of a matrix solid-phase dispersion method for the determination analysis of carbendazim residue in plant material. *J Chromatogr B*, 800: 309-314.

Ministry of Agriculture and Cooperatives. 2006. Food consumption data of Thailand.

Ministry of Agriculture and Cooperatives, Bangkok, Thailand.

Moffit JS, Bryant BH, Hall SJ and Boekelheide K. 2007. Dose-Dependent Effects of Sertoli Cell Toxicants 2,5-Hexanedione, Carbendazim and Mono-(2-ethylhexyl) phthalate in Adult Rat Testis. *Toxicol Pathol*, 35: 719-727.

- Nemeth-Konda L, Fuleky G, Morovjan G and Csokan P. 2002. Sorption behaviour of acetochlor, atrazine, carbendazim, diazinon, imidacloprid and isoproturon on Hungarian agricultural soil. *Chemosphere*, 48: 545–552
- Nollet LML. 1996. *Handbook of Food Analysis*. Marcel Dekker, New York, USA : 1461.
- Nougadere A, Sirot V, Kadar A, Fastier A, Truchot E, Vergnet C, Hommet F, Bayle J, Gros P and Leblanc JC. 2012. Total diet study on pesticide residues in France: Levels in food as consumed and chronic dietary risk to consumers. *Environ Int*, 45: 135–150.
- Nozal MJ, Bernal JL, Jimenez JJ, Martin MT and Bernal J. 2005. Determination of azolic fungicides in wine by solid-phase extraction and high-performance liquid chromatography-atmospheric pressure chemical ionization-mass spectrometry. *J Chromatogr A*, 1076(1-2): 90-96.
- Pakvilai N, Prapamontol T, Thavornyutikarn P, Mangklabruks A, Chantara S, Hongsibsong S, and Santasup C. 2013. A Simple and Sensitive GC-ECD Method for Detecting Synthetic Pyrethroid Insecticide Residues in Vegetable and Fruit Samples, *Chiang Mai J Sci*. Accepted for publication, 27 July 2013.
- Pan J, Xia XX and Liang J. 2008. Analysis of pesticide multi-residues in leafy vegetables by ultrasonic solvent extraction and liquid chromatography-tandem mass spectrometry. *Ultrason Sonochem*, 15(1): 25-32.

- Park BJ, Son KA, Paik MK, Kim JB, Hong SM, Im GJ and Hong MK. 2010. Monitoring of neonicotinoid pesticide residues in fruit vegetable and human exposure assessment. *Korean Journal of Pesticide Science*, 14: 104–109.
- Radisic M, Grujic S, Vasiljevic T and Lausevic M. 2009. Determination of selected pesticides in fruit juices by matrix solid-phase dispersion and liquid chromatography–tandem mass spectrometry. *Food Chem*, 113: 712–719.
- Romero-Gonzalez R, Garrido Frenich A, and Martinez Vidal JL. 2008. Multiresidue method for fast determination of pesticides in fruit juices by ultra performance liquid chromatography coupled to tandem mass spectrometry. *Talanta*, 76(1): 211-225.
- Schmidta B, Christensena HB, Petersena A, Slotha JJ and Poulsena ME. 2013. Method validation and analysis of nine dithiocarbamates in fruits and vegetables by LC-MS/MS. *Food Addit Contam Part A*, 30(7): 1287–1298.
- Shukla Y and Arora A. 2001. Transplacental carcinogenic potential of the carbamate fungicide mancozeb. *J Environ Pathol Toxicol Oncol*, 20(2) : 127-131.
- Singh SB, Foster GD and Khan SU. 2007. Determination of thiophanate methyl and carbendazim residues in vegetable samples using microwave-assisted extraction. *J Chromatogr A*, 1148(2): 152-157.
- Soleo L, Defazio G, Scarselli R, Zefferino R, Livrea P and Foa V. (1996). Toxicity of fungicides containing ethylene-bis-dithiocarbamate in serumless dissociated mesencephalic-striatal primary coculture. *Arch Toxicol*, 70(10): 678-82.

- Taylor MJ, Hunter K, Hunter KB, Lindsay D and Bouhellec SL. 2002. Multi-residue method for rapid screening and confirmation of pesticides in crud extracts of fruits and vegetables using isocratic liquid chromatography with electrospray tandem mass spectrometry. *J Chromatogr A*, 982: 225–236.
- Thai Agricultural Commodity and Food Standard (TACFS 9002). 2008. Thailand MRLs.
- Tharsis N, Portillo JL, Broto-Puig F and Comellas L. 1997. Simplified reversed-phase conditions for the determination of benzimidazole fungicides in fruits by high-performance liquid chromatography with UV detection. *J Chromatogr A*, 778 (1): 95-101.
- Timothy CM and Brian B. 2004. Pesticide toxicology and international regulation. John wiley and sons Ltd, West Sussex, England : 193-196.
- Tambon Suthep Municipality. 2012. Reporting of population in Suthep sub-district. Chiang Mai, Thailand.
- Vaccari A, Ferraro L, Saba PL, Ruiu S, Mocci I, Antonelli T and Tanganelli S. 1998. Differential mechanisms in the effect of disulfiram and diethyldithiocarbamate intoxication on striatal release and vesicular transport of glutamate. *J Pharmacol Exp Ther*, 285: 961-967.
- Vaccari A, Saba PL, Mocci I and Ruiu S. 1999. Dithiocarbamate pesticides affect glutamate transport in brain synaptic vesicles. *J Pharmacol Exp Ther*, 288: 1-5.

- Veneziano A, Vacca G, Arana S, De Simone F and Rastrelli L. 2004. Determination of carbendazim, thiabendazole and thiophanate-methyl in banana (*Musa acuminata*) samples imported to Italy. *Food Chem*, 87: 383–386.
- Vryzas Z, Papadakis EN, and Papadopoulou-Mourkidou E. 2002. Microwave-assisted extraction (MAE)- acid hydrolysis of dithiocarbamates for trace analysis in tobacco and peaches. *J Agric Food Chem*, 50: 2220-2226.
- Wang N, Yi L, Shi L, Kong D, Cai D, Wang D and Shan Z. 2012. Pollution level and human health risk assessment of some pesticides and polychlorinated biphenyls in Nantong of Southeast China. *J Environ Sci*, 24 (10): 1854–1860.
- World Health Organization (WHO). 1993. Carbendazim (environmental Health Criteria 149). International Programme on Chemical Safety, Geneva. Switzerland.
- World Health Organization (WHO). 2005. Total diet studies: a recipe for safer food. Food Safety Department. Geneva, Switzerland.
- Wu Q, Li Y, Wang C, Liu Z, Zang X, Zhou X and Wang Z. 2009. Dispersive liquid-liquid microextraction combined with high performance liquid chromatography-fluorescence detection for the determination of carbendazim and thiabendazole in environmental samples. *Anal Chim Acta*, 638(2) : 139-145.
- Yu G, Guo Q and Xie L. 2009. Effects of subchronic exposure to carbendazim on spermatogenesis and fertility in male rats. *Toxicol Ind Health*, 25: 41–47

Zan KL and Chantara S. 2007. Optimization Method for Determination of carbofuran and Carboxin Residues in Cabbages by SPE and HPLC-UV. Chiang Mai J Sci, 34(2): 227-234.

Zamora DP, Martinez Vidal JL, Martinez GM, Frenich AG, Lopez Gonzalez JL and Arahal MR. 2003. Correction of predicted concentration in the use of solvent-based calibration lines for determining carbendazim, fuberidazole and thiabendazole in water after a SPE step. Talanta, 60(2-3): 335-344.

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