

Nutritional Composition of Organically and Conventionally Produced Crops and Crop based Foods: A systematic Literature review and Meta-analyses

SUPPLEMENTARY DATA

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1. LITERATURE REVIEW

Supplementary Tables 1 to 8 and Supplementary Figures 1 to 2 provide detailed information on the comparison studies, types of data extracted, data sources and characteristics.

Table 1. List of relevant crops and foods used as terms of initial search of the literature

acerola, apple, apricot, arugula, asparagus, banana, barley, basil, bean, beet, beetroot, black currant, blueberry, broccoli, buckwheat, cabbage, canola, carrot, cauliflower, celeriac, celery, cereals, chard, chickpea, chicory, clementine, cocoa, coconut, coffee, collard, corn, courgettes, cucumber, diet, eggplant, endive, feed, fruit, garlic, grape, grapefruit, hop, kale, kiwifruit, leek, lemon, lentils, lettuce, lime, maize, mandarin, mango, marionberry, marjoram, melon, muskmelon, mustard, oat, olive, onion, orange, pac choi, papaya, parsley, parsnip, passion fruit, pea, peach, pear, pecan, pepper, persimmon, pineapple, plum, potato, pumpkin, radish, raspberry, rice, rocket, rye, savory, sesame, soybean, spinach, squash, strawberry, sunflower, tangerine, tea, thyme, tomato, triticale, vegetable, watercress, wheat, yedikule, zucchini

Table 2. List of comparison studies included in the meta-analysis.

| ID | Reference | SA* |
|-----|---|-----|
| 9 | Abreu, P.; Relva, A.; Matthew, S.; Gomes, Z.; Morais, Z. High-performance liquid chromatographic determination of glycoalkaloids in potatoes from conventional, integrated, and organic crop systems. <i>Food Control</i> 2007, 18 (1), 40-44. | |
| 313 | Acharya, T.; Bhatnagar, V. Quality assessment of organic and conventional Nagpur mandarins (Citrus reticulata). <i>Indian J. Nutr. Diet.</i> 2007, 44, 403-406. | + |
| 107 | Akcay, Y. D.; Yildirim, H. K.; Guvenc, U.; Sozmen, E. Y. The effects of consumption of organic and nonorganic red wine on low-density lipoprotein oxidation and antioxidant capacity in humans. <i>Nutr. Res.</i> 2004, 24 (7), 541-554. | |
| 482 | Aldrich, H. T.; Salandanan, K.; Kendall, P.; Bunning, M.; Stonaker, F.; Kuelen, O.; Stushnoff, C. Cultivar choice provides options for local production of organic and conventionally produced tomatoes with higher quality and antioxidant content. <i>J. Sci. Food Agric.</i> 2010, 90 (15), 2548-2555. | + |
| 154 | Alvarez, C. E.; Carracedo, A. E.; Iglesias, E.; Martinez, M. C. Pineapples cultivated by conventional and organic methods in a soil from a banana plantation - a comparative study of soil fertility, plant nutrition and yields. <i>Biol. Agric. Hortic.</i> 1993, 9, 161-171. | |
| 449 | Alvito, P.; Oliveira, L.; Alcobia, D.; Capucho, S.; Fonseca, C.; Vasconcelos, L.; Calhau, M. A. A comparative study on organic and conventional farming in Portugal - results on contaminant levels in vegetables. <i>Rev. Aliment. Hum.</i> 2004, 1, 27-32. | |
| 124 | Amarante, C. V. T.; Steffens, C. A.; Mafra, A. L.; Albuquerque, J. A. Yield and fruit quality of apple from conventional and organic production systems. <i>Pesqu. Agropecu. Bras.</i> 2008, 43 (3), 333-340. | |
| 29 | Amodio, M. L.; Colelli, G.; Hasey, J. K.; Kader, A. A. A comparative study of composition and postharvest performance of organically and conventionally grown kiwifruits. <i>J. Sci. Food Agric.</i> 2007, 87 (7), 1228-1236. | |
| 104 | Amor, F. M. d.; Serrano-Martinez, A.; Fortea, I.; Nunez-Delicado, E. Differential effect of organic cultivation on the levels of phenolics, peroxidase and capsidiol in sweet peppers. <i>J. Sci. Food Agric.</i> 2008, 88 (5), 770-777. | |

ID, Paper unique identification number. *Papers included in standard weighted meta-analysis: +; †Paper included in meta-analysis of frequency of detectable pesticide residues.

Table 2 cont. List of comparison studies included in the meta-analysis.

| ID | Reference | SA* |
|------------------|---|-----|
| 623† | Amvrazi, E. G.; Albanis, T. A., Pesticide residue assessment in different types of olive oil and preliminary exposure assessment of Greek consumers to the pesticide residues detected. In <i>Food Chem.</i> , 2009; Vol. 113, pp 253-261. | + |
| 622 ^c | Andersen, J. H.; Poulsen, M. E., Results from the monitoring of pesticide residues in fruit and vegetables on the Danish market, 1998-99. In <i>Food Addit. Contam.</i> , 2001; Vol. 18, pp 906-931. | + |
| 306 | Andjelkovic, M.; Acun, S.; Van Hoed, V.; Verhe, R.; Van Camp, J. Chemical Composition of Turkish Olive Oil-Ayvalik. <i>J. Am. Oil Chem. Soc.</i> 2009, 86 (2), 135-140. | |
| 108 | Annett, L. E.; Spaner, D.; Wismer, W. V. Sensory profiles of bread made from paired samples of organic and conventionally grown wheat grain. <i>J. Food Sci.</i> 2007, 72 (4), S254-S260. | + |
| 32 | Anttonen, M. J.; Hoppula, K. I.; Nestby, R.; Verheul, M. J.; Karjalainen, R. O. Influence of fertilization, mulch color, early forcing, fruit order, planting date, shading, growing environment, and genotype on the contents of selected phenolics in strawberry (<i>Fragaria x ananassa</i> Duch.) fruits. <i>J. Agric. Food Chem.</i> 2006, 54 (7), 2614-2620. | + |
| 30 | Anttonen, M. J.; Karjalainen, R. O. High-performance liquid chromatography analysis of black currant (<i>Ribes nigrum</i> L.) fruit phenolics grown either conventionally or organically. <i>J. Agric. Food Chem.</i> 2006, 54 (20), 7530-7538. | + |
| 307 | Arbos, K. A.; De Freitas, R. J. S.; Sterz, S. C.; Dornas, M. F. Influence of the Organic and Conventional Cultivation Systems on the Antioxidant Activity of Vegetables. <i>Bol. CEPPA</i> 2009, 27 (1), 53-58. | |
| 14 | Asami, D. K.; Hong, Y. J.; Barrett, D. M.; Mitchell, A. E. Comparison of the total phenolic and ascorbic acid content of freeze-dried and air-dried marionberry, strawberry, and corn grown using conventional, organic, and sustainable agricultural practices. <i>J. Agric. Food Chem.</i> 2003, 51 (5), 1237-1241. | |
| 110 | Bacchi, M. A.; Fernandes, E. A. D.; Tsai, S. M.; Santos, L. G. C. Conventional and organic potatoes: Assessment of elemental composition using k(0)-INAA. <i>J. Radioanal. Nucl. Chem.</i> 2004, 259 (3), 421-424. | |
| 619† | Baker, B. P.; Benbrook, C. M.; Groth, E.; Benbrook, K. L., Pesticide residues in conventional, integrated pest management (IPM)-grown and organic foods: insights from three US data sets. In <i>Food Addit. Contam. Part A: Chem., Anal., Control</i> , 2002; Vol. 19, pp 427-446. | + |
| 15 | Barrett, D. M.; Weakley, C.; Diaz, J. V.; Watnik, M. Qualitative and nutritional differences in processing tomatoes grown under commercial organic and conventional production systems. <i>J. Food Sci.</i> 2007, 72 (9), C441-C451. | |
| 290 | Basker, D. Comparison of taste quality between organically and conventionally grown fruits and vegetables. <i>Am. J. Alternative Agr.</i> 1992, 7, 129-136. | |
| 484 | Bavec, M.; Turinek, M.; Grobelnik-Mlakar, S.; Slatnar, A.; Bavec, F. Influence of Industrial and Alternative Farming Systems on Contents of Sugars, Organic Acids, Total Phenolic Content, and the Antioxidant Activity of Red Beet (<i>Beta vulgaris</i> L. ssp. <i>vulgaris</i> Rote Kugel). <i>J. Agric. Food Chem.</i> 2010, 58 (22), 11825-11831. | + |
| 66 | Baxter, G. J.; Graham, A. B.; Lawrence, J. R.; Wiles, D.; Paterson, J. R. Salicylic acid in soups prepared from organically and non-organically grown vegetables. <i>Eur. J. Nutr.</i> 2001, 40 (6), 289-292. | + |
| 17 | Beltran-Gonzalez, F.; Perez-Lopez, A. J.; Lopez-Nicolas, J. M.; Carbonell-Barrachina, A. A. Effects of agricultural practices on instrumental colour, mineral content, carotenoid composition, and sensory quality of mandarin orange juice, cv. Hernandina. <i>J. Sci. Food Agric.</i> 2008, 88 (10), 1731-1738. | + |
| 308 | Bender, I.; Ess, M.; Matt, D.; Moor, U.; Tonutare, T.; Luik, A. Quality of organic and conventional carrots. <i>Agron. Res.</i> 2009, 7 (Sp. Iss. 2), 572-577. | |
| 111 | Benge, J. R.; Banks, N. H.; Tillman, R.; De Silva, H. N. Pairwise comparison of the storage potential of kiwifruit from organic and conventional production systems. <i>N. Z. J. Crop Hortic. Sci.</i> 2000, 28 (2), 147-152. | + |

ID, Paper unique identification number. *Papers included in standard weighted meta-analysis: +; †Paper included in meta-analysis of frequency of detectable pesticide residues.

Table 2 cont. List of comparison studies included in the meta-analysis.

| ID | Reference | SA* |
|-----|--|-----|
| 156 | Bicanova, E.; Capouchova, I.; Krejicova, L.; Petr, J.; Erhartova, D. The effect of growth structure on organic winter wheat quality. <i>Zemdirb. Mokslo Darb.</i> 2006, 93, 297-305. | |
| 438 | Borguini, R. G.; da Silva, M. V. Nutrient contents of tomatoes from organic and conventional cultivation. <i>Aliment. Nutr.</i> 2007, 21, 41-46. | |
| 276 | Borguini, R. G.; da Silva, M. V. Physical chemical and seasonal characteristics of organic tomato in comparison to the conventional tomato. <i>Aliment. Nutr.</i> 2005, 16, 355-361. | |
| 254 | Borowczak, F.; Grzes, S.; Rebarz, K. Influence of irrigation and cultivation system of potatoes on the yields, chemical composition of tubers and uptake of nutrient components. <i>J. Res. Appl. Agric. Eng.</i> 2003, 48 (3), 33-37. | |
| 67 | Briviba, K.; Stracke, B. A.; Rufer, C. E.; Watzl, B.; Weibel, F. P.; Bub, A. Effect of consumption of organically and conventionally produced apples on antioxidant activity and DNA damage in humans. <i>J. Agric. Food Chem.</i> 2007, 55 (19), 7716-7721. | + |
| 78 | Bursac Kovacevic, D.; Vahcic, N.; Levaj, B.; Uzelac, V. D. The effect of cultivar and cultivation on sensory profiles of fresh strawberries and their purees. <i>Flavour Fragr. J.</i> 2008, 23 (5), 323-332. | |
| 580 | Camargo, L. K. P.; Resende, J. T. V.; Tominaga, T. T.; Kurchaidt, S. M.; Camargo, C. K.; Figueiredo, A. S. T. Postharvest quality of strawberry fruits produced in organic and conventional systems. <i>Hortic. Bras.</i> 2011, 29 (4), 577-583. | |
| 16 | Camin, F.; Moschella, A.; Miselli, F.; Parisi, B.; Versini, G.; Ranalli, P.; Bagnaresi, P. Evaluation of markers for the traceability of potato tubers grown in an organic versus conventional regime. <i>J. Sci. Food Agric.</i> 2007, 87 (7), 1330-1336. | |
| 524 | Camin, F.; Perini, M.; Bontempo, L.; Fabroni, S.; Faedi, W.; Magnani, S.; Baruzzi, G.; Bonoli, M.; Tabilio, M. R.; Musmeci, S.; Rossmann, A.; Kelly, S. D.; Rapisarda, P. Potential isotopic and chemical markers for characterising organic fruits. <i>Food Chem.</i> 2011, 125 (3), 1072-1082. | + |
| 38 | Carbonaro, M.; Mattera, M. Polyphenoloxidase activity and polyphenol levels in organically and conventionally grown peach (<i>Prunus persica</i> L., cv. Regina bianca) and pear (<i>Pyrus communis</i> L., cv. Williams). <i>Food Chem.</i> 2001, 72 (4), 419-424. | + |
| 39 | Carbonaro, M.; Mattera, M.; Nicoli, S.; Bergamo, P.; Cappelloni, M. Modulation of antioxidant compounds in organic vs conventional fruit (peach, <i>Prunus persica</i> L., and pear, <i>Pyrus communis</i> L.). <i>J. Agric. Food Chem.</i> 2002, 50 (19), 5458-5462. | + |
| 310 | Carcea, M.; Salvatorelli, S.; Turfani, V.; Mellara, F. Influence of growing conditions on the technological performance of bread wheat (<i>Triticum aestivum</i> L.). <i>Int. J. Food Sci. Technol.</i> 2006, 41, 102-107. | |
| 525 | Cardoso, P. C.; Tomazini, A. P. B.; Stringheta, P. C.; Ribeiro, S. M. R.; Pinheiro-Sant'Ana, H. M. Vitamin C and carotenoids in organic and conventional fruits grown in Brazil. <i>Food Chem.</i> 2011, 126 (2), 411-416. | + |
| 40 | Caris-Veyrat, C.; Amiot, M. J.; Tyssandier, V.; Grasselly, D.; Buret, M.; Mikolajczak, M.; Guillard, J. C.; Bouteloup-Demange, C.; Borel, P. Influence of organic versus conventional agricultural practice on the antioxidant microconstituent content of tomatoes and derived purees. Consequences on antioxidant plasma status in humans. <i>J. Agric. Food Chem.</i> 2004, 52 (21), 6503-6509. | + |
| 283 | Caussiol, L. P.; Joyce, D. C. Characteristics of banana fruit from nearby organic versus conventional plantations: A case study. <i>J. Hortic. Sci. Biotechnol.</i> 2004, 79 (5), 678-682. | |
| 12 | Cayuela, J. A.; Vidueira, J. M.; Albi, M. A.; Gutierrez, F. Influence of the ecological cultivation of strawberries (<i>Fragaria x Ananassa</i> Cv Chandler) on the quality of the fruit and on their capacity for conservation. <i>J. Agric. Food Chem.</i> 1997, 45 (5), 1736-1740. | + |
| 537 | Champagne, E. T.; Bett-Garber, K. L.; Grimm, C. C.; McClung, A. M. Effects of organic fertility management on physicochemical properties and sensory quality of diverse rice cultivars. <i>Cereal Chem.</i> 2007, 84 (4), 320-327. | |

ID, Paper unique identification number. *Papers included in standard weighted meta-analysis: +; †Paper included in meta-analysis of frequency of detectable pesticide residues.

Table 2 cont. List of comparison studies included in the meta-analysis.

| ID | Reference | SA* |
|------|--|-----|
| 295 | Chang, P.; Salomon, M. Metals in grains sold under various label - organic, natural, conventional. <i>J. Food Qual.</i> 1977, 1, 373-377. | |
| 13 | Chassy, A. W.; Bui, L.; Renaud, E. N. C.; Van Horn, M.; Mitchell, A. E. Three-year comparison of the content of antioxidant microconstituents and several quality characteristics in organic and conventionally managed tomatoes and bell peppers. <i>J. Agric. Food Chem.</i> 2006, 54 (21), 8244-8252. | + |
| 33 | Chinnici, F.; Bendini, A.; Gaiani, A.; Riponi, C. Radical scavenging activities of peels and pulps from cv. golden delicious apples as related to their phenolic composition. <i>J. Agric. Food Chem.</i> 2004, 52 (15), 4684-4689. | + |
| 490 | Citak, S.; Sonmez, S. Effects of conventional and organic fertilization on spinach (<i>Spinacea oleracea</i> L.) growth, yield, vitamin C and nitrate concentration during two successive seasons. <i>Sci. Hortic.</i> 2010, 126 (4), 415-420. | + |
| 489 | Citak, S.; Sonmez, S. Influence of Organic and Conventional Growing Conditions on the Nutrient Contents of White Head Cabbage (<i>Brassica oleracea</i> var. capitata) during Two Successive Seasons. <i>J. Agric. Food Chem.</i> 2010, 58 (3), 1788-1793. | |
| 118 | Citak, S.; Sonmez, S. Mineral Contents of Organically and Conventionally Grown Spinach (<i>Spinacea oleracea</i> L.) during Two Successive Seasons. <i>J. Agric. Food Chem.</i> 2009, 57 (17), 7892-7898. | |
| 294 | Clarke, R. P.; Merrow, S. B. Nutrient composition of tomatoes homegrown under different cultural procedures. <i>Ecol. Food Nutr.</i> 1979, 8, 37-49. | + |
| 119 | Colla, G.; Mitchell, J. P.; Joyce, B. A.; Huyck, L. M.; Wallender, W. W.; Temple, S. R.; Hsiao, T. C.; Poudel, D. D. Soil physical properties and tomato yield and quality in alternative cropping systems. <i>Agron. J.</i> 2000, 92 (5), 924-932. | |
| 120 | Colla, G.; Mitchell, J. P.; Poudel, D. D.; Saccardo, F. In Impacts of farming systems and soil characteristics on processing tomato fruit quality, 7th International Symposium on the Processing Tomato, Sacramento, Ca, USA, June 10-13; Hartz, T. K., Ed. Sacramento, Ca, USA, 2001; pp 333-341. | |
| 273 | Colla, G.; Mitchell, J. P.; Poudel, D. D.; Temple, S. R. Changes of tomato yield and fruit elemental composition in conventional, low input, and organic systems. <i>J. Sustain. Agric.</i> 2002, 20 (2), 53-67. | + |
| 624† | Collins, M.; Nassif, W., Pesticide residues in organically and conventionally grown fruit and vegetables in New South Wales, 1990-91. In <i>Food Australia: official journal of CAFTA and AIFST</i> , 1993; Vol. Sept 1993. v. 45 (9). | + |
| 526 | Cooper, J.; Sanderson, R.; Cakmak, I.; Ozturk, L.; Shotton, P.; Carmichael, A.; Haghighi, R. S.; Tetard-Jones, C.; Volakakis, N.; Eyre, M.; Leifert, C. Effect of Organic and Conventional Crop Rotation, Fertilization, and Crop Protection Practices on Metal Contents in Wheat (<i>Triticum aestivum</i>). <i>J. Agric. Food Chem.</i> 2011, 59 (9), 4715-4724. | + |
| 491 | Corrales, M.; Fernandez, A.; Vizoso Pinto, M. G.; Butz, P.; Franz, C. M. A. P.; Schuele, E.; Tauscher, B. Characterization of phenolic content, in vitro biological activity, and pesticide loads of extracts from white grape skins from organic and conventional cultivars. <i>Food Chem. Toxicol.</i> 2010, 48 (12), 3471-3476. | + |
| 259 | Dahlstedt, L.; Dlouhy, J. Other nutritional compounds in different foods. <i>Var Foda</i> 1995, 47 (8), 45-51. | |
| 311 | Damatto, E. R.; Boas, R. L. V.; Leonel, S.; Cabrera, J. C.; Saucó, V. G. Banana Production under Different Conditions in Tenerife Island. <i>Rev. Bras. Frutic.</i> 2009, 31 (2), 596-601. | |
| 6 | Dani, C.; Oliboni, L. S.; Vanderlinde, R.; Bonatto, D.; Salvador, M.; Henriques, J. A. P. Phenolic content and antioxidant activities of white and purple juices manufactured with organically- or conventionally-produced grapes. <i>Food Chem. Toxicol.</i> 2007, 45 (12), 2574-2580. | |
| 279 | Danilchenko, H. Effect of growing method on the quality of pumpkins and pumpkin products. <i>Folia Hortic.</i> 2002, 14, 103-112. | |

ID, Paper unique identification number. *Papers included in standard weighted meta-analysis: +; †Paper included in meta-analysis of frequency of detectable pesticide residues.

Table 2 cont. List of comparison studies included in the meta-analysis.

| ID | Reference | SA* |
|-----|--|-----|
| 298 | Daood, H. G.; Tomoskozi-Farkas, R.; Kapitany, J. Antioxidant content of bio and conventional spice red pepper (<i>Capsicum annuum</i> L.) as determined by HPLC. <i>Acta Agron. Hung.</i> 2006, 54, 133-140. | |
| 121 | De Martin, S.; Restani, P. Determination of nitrates by a novel ion chromatographic method: occurrence in leafy vegetables (organic and conventional) and exposure assessment for Italian consumers. <i>Food Addit. Contam. Part A: Chem., Anal., Control</i> 2003, 20 (9), 787-792. | + |
| 270 | DeEll, J. R.; Prange, R. K. Postharvest physiological disorders, diseases and mineral concentrations of organically and conventionally grown McIntosh and Cortland apples. <i>Can. J. Plant Sci.</i> 1993, 73 (1), 223-230. | + |
| 269 | DeEll, J. R.; Prange, R. K. Postharvest quality and sensory attributes of organically and conventionally grown apples. <i>Hortscience</i> 1992, 27 (10), 1096-1099. | |
| 68 | Del Amor, F. M. Yield and fruit quality response of sweet pepper to organic and mineral fertilization. <i>Renew. Agric. Food Syst.</i> 2007, 22 (3), 233-238. | + |
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ID, Paper unique identification number. *Papers included in standard weighted meta-analysis: +; †Paper included in meta-analysis of frequency of detectable pesticide residues.

Table 2 cont. List of comparison studies included in the meta-analysis.

| ID | Reference | SA* |
|-----|---|-----|
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ID, Paper unique identification number. *Papers included in standard weighted meta-analysis: +; †Paper included in meta-analysis of frequency of detectable pesticide residues.

Table 2 cont. List of comparison studies included in the meta-analysis.

| ID | Reference | SA* |
|-----|--|-----|
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ID, Paper unique identification number. *Papers included in standard weighted meta-analysis: +; †Paper included in meta-analysis of frequency of detectable pesticide residues.

Table 2 cont. List of comparison studies included in the meta-analysis.

| ID | Reference | SA* |
|------|---|-----|
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ID, Paper unique identification number. *Papers included in standard weighted meta-analysis: +; †Paper included in meta-analysis of frequency of detectable pesticide residues.

Table 2 cont. List of comparison studies included in the meta-analysis.

| ID | Reference | SA* |
|-----|--|-----|
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ID, Paper unique identification number. *Papers included in standard weighted meta-analysis: +; †Paper included in meta-analysis of frequency of detectable pesticide residues.

Table 2 cont. List of comparison studies included in the meta-analysis.

| ID | Reference | SA* |
|------|--|-----|
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ID, Paper unique identification number. *Papers included in standard weighted meta-analysis: +; †Paper included in meta-analysis of frequency of detectable pesticide residues.

Table 2 cont. List of comparison studies included in the meta-analysis.

| ID | Reference | SA* |
|-----|---|-----|
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ID, Paper unique identification number. *Papers included in standard weighted meta-analysis: +; †Paper included in meta-analysis of frequency of detectable pesticide residues.

Table 2 cont. List of comparison studies included in the meta-analysis.

| ID | Reference | SA* |
|-----|--|-----|
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ID, Paper unique identification number. *Papers included in standard weighted meta-analysis: +; †Paper included in meta-analysis of frequency of detectable pesticide residues.

Table 2 cont. List of comparison studies included in the meta-analysis.

| ID | Reference | SA* |
|-----|---|-----|
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ID, Paper unique identification number. *Papers included in standard weighted meta-analysis: +; †Paper included in meta-analysis of frequency of detectable pesticide residues.

Table 2 cont. List of comparison studies included in the meta-analysis.

| ID | Reference | SA* |
|------|--|-----|
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ID, Paper unique identification number. *Papers included in standard weighted meta-analysis: +; †Paper included in meta-analysis of frequency of detectable pesticide residues.

Table 2 cont. List of comparison studies included in the meta-analysis.

| ID | Reference | SA* |
|-----|---|-----|
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ID, Paper unique identification number. *Papers included in standard weighted meta-analysis: +; †Paper included in meta-analysis of frequency of detectable pesticide residues.

Table 2 cont. List of comparison studies included in the meta-analysis.

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ID, Paper unique identification number. *Papers included in standard weighted meta-analysis: +; †Paper included in meta-analysis of frequency of detectable pesticide residues.

Table 2 cont. List of comparison studies included in the meta-analysis.

| ID | Reference | SA* |
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ID, Paper unique identification number. *Papers included in standard weighted meta-analysis: +; †Paper included in meta-analysis of frequency of detectable pesticide residues.

Table 2 cont. List of comparison studies included in the meta-analysis.

| ID | Reference | SA* |
|-----|--|-----|
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ID, Paper unique identification number. *Papers included in standard weighted meta-analysis: +; †Paper included in meta-analysis of frequency of detectable pesticide residues.

Table 2 cont. List of comparison studies included in the meta-analysis.

| ID | Reference | SA* |
|------|---|-----|
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ID, Paper unique identification number. *Papers included in standard weighted meta-analysis: +; †Paper included in meta-analysis of frequency of detectable pesticide residues.

Table 2 cont. List of comparison studies included in the meta-analysis.

| ID | Reference | SA* |
|-----|--|-----|
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ID, Paper unique identification number. *Papers included in standard weighted meta-analysis: +; †Paper included in meta-analysis of frequency of detectable pesticide residues.

Table 2 cont. List of comparison studies included in the meta-analysis.

| ID | Reference | SA* |
|-----|--|-----|
| 101 | Yanez, J. A.; Remsberg, C. M.; Miranda, N. D.; Vega-Villa, K. R.; Andrews, P. K.; Davies, N. M. Pharmacokinetics of selected chiral flavonoids: Hesperetin, naringenin and eriodictyol in rats and their content in fruit juices. <i>Biopharm. Drug Dispos.</i> 2008, 29 (2), 63-82. | + |
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| 60 | Zhao, X.; Carey, E. E.; Young, J. E.; Wang, W. Q.; Iwamoto, T. Influences of organic fertilization, high tunnel environment, and postharvest storage on phenolic compounds in lettuce. <i>Hortscience</i> 2007, 42 (1), 71-76. | + |
| 152 | Zhao, X.; Iwamoto, T.; Carey, E. E. Antioxidant capacity of leafy vegetables as affected by high tunnel environment, fertilisation and growth stage. <i>J. Sci. Food Agric.</i> 2007, 87 (14), 2692-2699. | + |
| 61 | Zhao, X.; Nechols, J. R.; Williams, K. A.; Wang, W. Q.; Carey, E. E. Comparison of phenolic acids in organically and conventionally grown pac choi (<i>Brassica rapa</i> L. <i>chinensis</i>). <i>J. Sci. Food Agric.</i> 2009, 89 (6), 940-946. | |
| 475 | Zoerb, C.; Betsche, T.; Langenkaemper, G. Search for Diagnostic Proteins To Prove Authenticity of Organic Wheat Grains (<i>Triticum aestivum</i> L.). <i>J. Agric. Food Chem.</i> 2009, 57 (7), 2932-2937. | + |
| 363 | Zoerb, C.; Niehaus, K.; Barsch, A.; Betsche, T.; Langenkamper, G. Levels of compounds and metabolites in wheat ears and grains in organic and conventional agriculture. <i>J. Agric. Food Chem.</i> 2009, 57 (20), 9555-9562. | + |
| 511 | Zuchowski, J.; Jonczyk, K.; Pecio, L.; Oleszek, W. Phenolic acid concentrations in organically and conventionally cultivated spring and winter wheat. <i>J. Sci. Food Agric.</i> 2011, 91 (6), 1089-1095. | + |

ID, Paper unique identification number. *Papers included in standard weighted meta-analysis: +; †Paper included in meta-analysis of frequency of detectable pesticide residues.

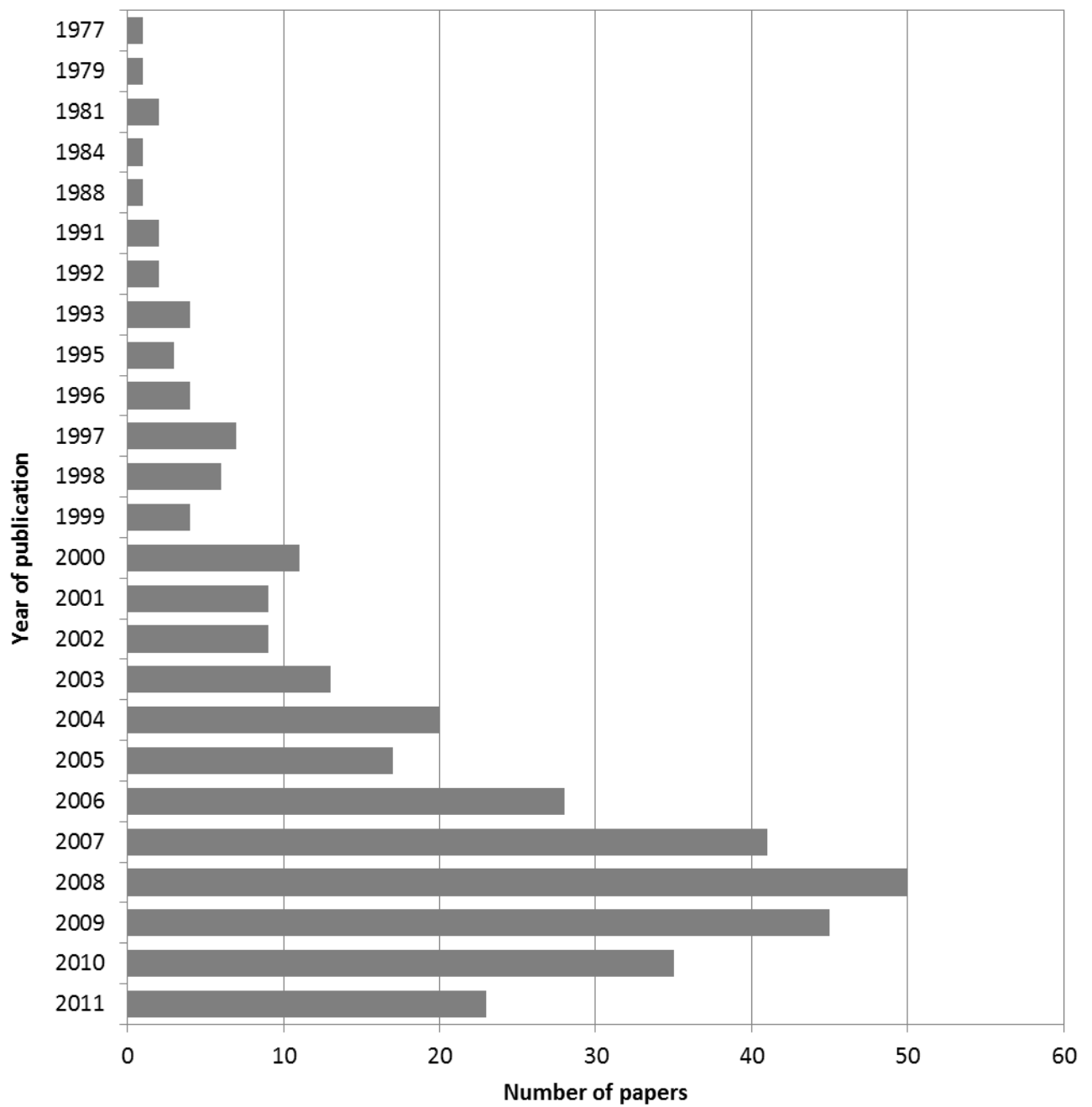


Figure 1. Number of papers included in the meta-analysis by year of publication.

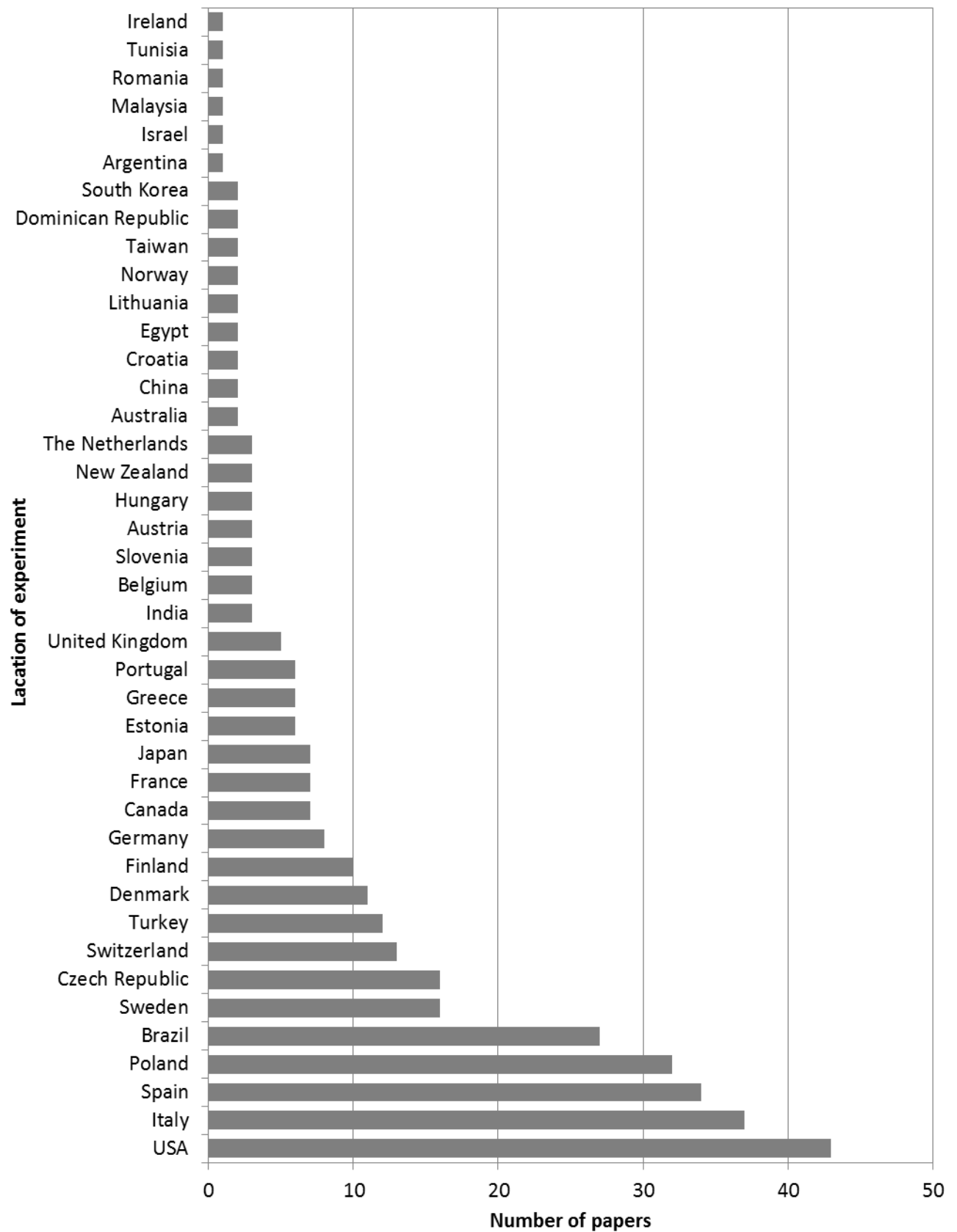


Figure 2. Number of papers included in the meta-analysis by location of the experiment (country).

Table 3. Study type, location and crop/product information of the comparison studies included in the meta-analysis.

| ID | ST | Location | Crop/Product | Group |
|----|----|----------------|---|-----------------|
| 1 | EX | USA | potato (tuber) | Vegetables |
| 2 | EX | Canada | potato (tuber), sweet corn (kernel) | Vegetables |
| 3 | EX | France | grape (fruit) | Fruits |
| 4 | CF | USA | blueberry (fruit) | Fruits |
| 5 | CF | Finland | strawberry (fruit) | Fruits |
| 6 | BS | Brazil | grape (juice) | Fruits |
| 7 | CF | Greece | apple (fruit) | Fruits |
| 8 | EX | Canada | cabbage (leaves), carrot (root) | Vegetables |
| 9 | EX | Portugal | potato (tuber) | Vegetables |
| 10 | EX | Spain | mandarin (juice) | Fruits |
| 11 | EX | USA | tomato (fruit) | Vegetables |
| 12 | CF | Spain | strawberry (fruit) | Fruits |
| 13 | EX | USA | pepper (fruit), tomato (fruit) | Vegetables |
| 14 | CF | USA | blueberry (fruit), corn (grain) | Fruits, Cereals |
| 15 | CF | USA | tomato (fruit) | Vegetables |
| 16 | CF | Italy | potato (tuber) | Vegetables |
| 17 | EX | Spain | mandarin (juice) | Fruits |
| 18 | EX | Portugal | cabbage (Tronchuda) (leaves) | Vegetables |
| 19 | EX | Sweden | cabbage (leaves), carrot (root), onion (bulb), pea, pea (pod), potato (tuber) | Vegetables |
| 20 | CF | Spain | banana (fruit) | Fruits |
| 21 | CF | Czech Republic | potato (tuber) | Vegetables |
| 22 | EX | Czech Republic | potato (tuber) | Vegetables |
| 23 | EX | Taiwan | tomato (fruit) | Vegetables |
| 24 | EX | Estonia | black currant (fruit) | Fruits |
| 25 | CF | Italy | apple (fruit) | Fruits |
| 26 | EX | Italy | plum (fruit) | Fruits |
| 27 | CF | Spain | pepper (fruit) | Vegetables |
| 28 | CF | Belgium | hop (raw) | Other |
| 29 | EX | USA | kiwifruit (fruit) | Fruits |
| 30 | CF | Finland | black currant (fruit) | Fruits |
| 31 | CF | Finland | black currant (fruit) | Fruits |
| 32 | CF | Finland | strawberry (fruit) | Fruits |
| 33 | EX | Italy | apple (fruit) | Fruits |
| 34 | CF | USA | grapefruit (juice) | Fruits |
| 35 | CF | Taiwan | tomato (fruit) | Vegetables |
| 36 | CF | Italy | grape (berry skin), grape (must) | Fruits |
| 37 | CF | Spain | banana (fruit) | Fruits |
| 38 | EX | Italy | peach (fruit), pear (fruit) | Fruits |
| 39 | EX | Italy | peach (fruit), pear (fruit) | Fruits |
| 40 | EX | France | tomato (fruit), tomato (puree) | Vegetables |
| 41 | EX | Sweden | onion (bulb) | Vegetables |
| 42 | CF | Argentina | swiss chard (leaves) | Vegetables |
| 43 | EX | Spain | grape (wine, red) | Fruits |

ID, Paper unique identification number (see Table 2 for references); ST, Study type (CF – Comparison of Farms, BS – Basket Study, EX – Controlled Experiment); *Paper included in meta-analysis of frequency of detectable pesticide residues.

Table 3 cont. Study type, location and crop/product information of the comparison studies included in the meta-analysis.

| ID | ST | Location | Crop/Product | Group |
|----|----|--|---|----------------------------------|
| 44 | CF | Italy | tomato (fruit) | Vegetables |
| 45 | EX | Sweden | strawberry (fruit) | Fruits |
| 46 | CF | Spain | tomato (fruit) | Vegetables |
| 47 | EX | Italy | tomato (fruit) | Vegetables |
| 48 | EX | USA | apple (fruit) | Fruits |
| 49 | CF | USA | tomato (fruit), tomato (sauce) | Vegetables |
| 50 | CF | Italy | orange (fruit) | Fruits |
| 51 | CF | Poland | apple (puree) | Fruits |
| 52 | CF | USA | broccoli (flower) | Vegetables |
| 53 | EX | Spain | tomato (fruit) | Vegetables |
| 54 | CF | Portugal | cabbage (Tronchuda) (leaves) | Vegetables |
| 55 | CF | Switzerland | apple (fruit) | Fruits |
| 56 | CF | Italy | apple (fruit) | Fruits |
| 57 | BS | Italy | orange (red) (fruit) | Fruits |
| 58 | EX | USA | collard (leaves), lettuce (leaves), pac choi (leaves) | Vegetables |
| 59 | CF | Spain | grape (wine, red), grape (wine, white) | Fruits |
| 60 | EX | USA | lettuce (leaves) | Vegetables |
| 61 | EX | USA | pac choi (leaves) | Vegetables |
| 62 | CF | France | peach (fruit) | Fruits |
| 64 | CF | Poland | tomato (fruit) | Vegetables |
| 65 | CF | Switzerland | grape (wine) | Fruits |
| 66 | BS | United Kingdom (marketed) | carrot (soup), lentils (soup), tomato (soup), vegetable (soup) | Vegetables |
| 67 | CF | Switzerland | apple (fruit) | Fruits |
| 68 | EX | Spain | pepper (fruit) | Vegetables |
| 70 | BS | Brazil | broccoli (flower), cabbage (white) (leaves), carrot (root), onion (bulb), potato (tuber) | Vegetables |
| 72 | CF | Poland | apple (juice), black currant (juice), pear (juice), beetroot (juice), carrot (juice), celery (juice) | Fruits, Vegetables |
| 73 | CF | Poland | carrot (root) | Vegetables |
| 74 | CF | Austria | apple (fruit) | Fruits |
| 75 | EX | Italy | chicory (leaves) | Vegetables |
| 76 | BS | Malaysia (marketed) | cabbage (leaves), chinese kale (leaves), chinese mustard (leaves), lettuce (leaves), spinach (leaves) | Vegetables |
| 77 | BS | USA (marketed) | marinara pasta sauce (with vegetables) | Vegetables |
| 78 | CF | Croatia | strawberry (puree) | Fruits |
| 79 | CF | Brazil | broccoli (stalks), potato (peel), radish (skin), spinach (stalks), pumpkin (seeds) | Vegetables, Oil seeds and pulses |
| 80 | CF | Brazil | chinese cabbage (leaves), maize (bran) | Vegetables, Cereals |
| 81 | BS | Australia (marketed) | orange (fruit), cabbage (leaves), carrot (root), lettuce (leaves) | Fruits, Vegetables |
| 82 | BS | Spain | lettuce (leaves) | Vegetables |
| 83 | BS | Italy, Spain, Germany, France, The Netherlands | broccoli (flower), cabbage (red) (leaves) | Vegetables |

ID, Paper unique identification number (see Table 2 for references); ST, Study type (CF – Comparison of Farms, BS – Basket Study, EX – Controlled Experiment); *Paper included in meta-analysis of frequency of detectable pesticide residues.

Table 3 cont. Study type, location and crop/product information of the comparison studies included in the meta-analysis.

| ID | ST | Location | Crop/Product | Group |
|-----|----|-------------------|---|--------------------|
| 84 | EX | India | tea (leaves) | Other |
| 85 | EX | Spain | pepper (sweet) (fruit) | Vegetables |
| 86 | EX | Spain | pepper (sweet) (fruit) | Vegetables |
| 87 | CF | Poland | potato (tuber) | Vegetables |
| 88 | CF | Japan | chinese cabbage (leaves), pepper (fruit), qing-gen-cai (leaves), spinach (leaves), welsh onion (bulb) | Vegetables |
| 89 | BS | Italy, Spain | apricot (nectar), peach (nectar), pear (juice), pear (nectar) | Fruits |
| 90 | EX | Italy | tomato (fruit) | Vegetables |
| 91 | EX | Czech Republic | tomato (fruit) | Vegetables |
| 92 | EX | Portugal | cabbage (leaves) | Vegetables |
| 93 | CF | Germany | carrot (root) | Vegetables |
| 94 | BS | France | grape (wine, red), grape (wine, white) | Fruits |
| 95 | EX | Sweden | tomato (fruit) | Vegetables |
| 96 | CF | Austria, Slovenia | apple (fruit) | Fruits |
| 97 | BS | Italy | apricot (juice) | Fruits |
| 98 | CF | Switzerland | apple (fruit) | Fruits |
| 99 | BS | USA (marketed) | broccoli (flower) | Vegetables |
| 100 | BS | Not Specified | lemon (juice) | Fruits |
| 101 | BS | USA (marketed) | apple (juice), grapefruit (juice), lemon (juice), lime (juice), orange (juice), tomato (juice) | Fruits, Vegetables |
| 102 | BS | Turkey | grape (wine) | Fruits |
| 103 | CF | Switzerland | apple (fruit) | Fruits |
| 104 | EX | Spain | pepper (sweet) (fruit) | Vegetables |
| 106 | BS | South Korea | kale (leaves) | Vegetables |
| 107 | BS | Turkey | grape (wine, white) | Fruits |
| 108 | EX | Canada | wheat (grain) | Cereals |
| 110 | EX | Brazil | potato (tuber) | Vegetables |
| 111 | CF | New Zealand | kiwifruit (fruit) | Fruits |
| 118 | EX | Turkey | spinach (leaves) | Vegetables |
| 119 | EX | USA | tomato (fruit) | Vegetables |
| 120 | EX | USA | tomato (fruit) | Vegetables |
| 121 | CF | Italy | chicory (leaves), endive, prickly lettuce (leaves), rocket (leaves) | Vegetables |
| 122 | CF | Poland | carrot (root) | Vegetables |
| 123 | EX | Sweden | oat (grain) | Cereals |
| 124 | CF | Brazil | apple (fruit) | Fruits |
| 126 | EX | Finland | oat (grain) | Cereals |
| 127 | CF | Brazil | passion fruit (fruit) | Fruits |
| 128 | CF | Spain | banana (fruit) | Fruits |
| 130 | BS | Brazil | arugula (leaves), lettuce (leaves), watercress (leaves) | Vegetables |
| 131 | CF | Denmark | onion (bulb), pea, pea (raw) | Vegetables |
| 132 | EX | Canada | strawberry (fruit) | Fruits |

ID, Paper unique identification number (see Table 2 for references); ST, Study type (CF – Comparison of Farms, BS – Basket Study, EX – Controlled Experiment); *Paper included in meta-analysis of frequency of detectable pesticide residues.

Table 3 cont. Study type, location and crop/product information of the comparison studies included in the meta-analysis.

| ID | ST | Location | Crop/Product | Group |
|-----|------------|-----------------------------------|---|----------------------|
| 133 | EX | Norway | carrot (root) | Vegetables |
| 134 | CF | Finland | strawberry (fruit) | Fruits |
| 136 | BS, CF, EX | Sweden | carrot (root), potato (tuber), potato (tuber), rye (grain), wheat (grain) | Vegetables, Cereals |
| 137 | EX | Denmark | apple (fruit), carrot (root), kale (leaves), kale (leaves, dried), pea, pea (dried), potato (tuber) | Fruits, Vegetables |
| 140 | EX | Switzerland | beetroot (root) | Vegetables |
| 141 | EX | Italy | potato (tuber) | Vegetables |
| 142 | EX | Italy | wheat (winter) (flour), wheat (winter) (grain) | Cereals |
| 143 | CF | Brazil | kale (leaves) | Vegetables |
| 144 | CF | Japan | spinach (leaves) | Vegetables |
| 146 | BS | Brazil | mango (fruit) | Fruits |
| 147 | CF | USA | potato (tuber) | Vegetables |
| 148 | EX | Lithuania | cabbage (leaves), carrot (root), potato (tuber) | Vegetables |
| 149 | CF | Australia | wheat (grain) | Cereals |
| 150 | BS/CF | USA | leafy vegetables (leaves) | Vegetables |
| 152 | EX | USA | pac choi (leaves) | Vegetables |
| 154 | EX | Spain | pineapple (fruit) | Fruits |
| 156 | EX | Czech Republic | wheat (grain) | Cereals |
| 163 | EX | Finland | oat (grain) | Cereals |
| 164 | CF | Finland | strawberry (fruit) | Fruits |
| 165 | CF | Poland | tomato (fruit) | Vegetables |
| 166 | EX | Poland | onion (bulb) | Vegetables |
| 168 | EX | USA | kiwifruit (fruit) | Fruits |
| 170 | BS | Spain | tomato (fruit) | Vegetables |
| 171 | BS | Spain | tomato (fruit) | Vegetables |
| 172 | BS | Spain | tomato (fruit) | Vegetables |
| 175 | CF | The Netherlands, Austria, Denmark | animal feed (chicken feed) | Compound food |
| 179 | EX | Czech Republic | wheat (winter) (grain) | Cereals |
| 180 | EX | Czech Republic | wheat (winter) (grain) | Cereals |
| 181 | CF | France | carrot (root), celeriac (root) | Vegetables |
| 182 | EX | Turkey | strawberry (fruit) | Fruits |
| 184 | BS/CF | Italy | grape (wine, red) | Fruits |
| 185 | EX | Italy | wheat (hard) (grain), wheat (soft) (grain) | Cereals |
| 187 | CF | New Zealand | pea (raw), barley (grain), wheat (grain) | Vegetables, Cereals |
| 189 | BS | Italy (marketed) | sunflower (oil) | Oil seeds and pulses |
| 195 | EX | Denmark | carrot (root), onion (bulb), potato (tuber) | Vegetables |
| 201 | CF | USA | eggplant (fruit) | Vegetables |
| 202 | BS | Egypt | potato (tuber) | Vegetables |
| 203 | BS | Egypt | cucumber (fruit) | Vegetables |

ID, Paper unique identification number (see Table 2 for references); ST, Study type (CF – Comparison of Farms, BS – Basket Study, EX – Controlled Experiment); *Paper included in meta-analysis of frequency of detectable pesticide residues.

Table 3 cont. Study type, location and crop/product information of the comparison studies included in the meta-analysis.

| ID | ST | Location | Crop/Product | Group |
|-----|----|--------------------|---|---|
| 206 | CF | Spain | grape (wine, white) | Fruits |
| 208 | BS | Poland | cabbage (leaves), carrot (root), onion (bulb), potato (tuber) | Vegetables |
| 210 | EX | Tunisia | tomato (fruit) | Vegetables |
| 211 | CF | Italy | wheat (grain) | Cereals |
| 212 | BS | Not Specified | coconut (oil), olive (oil), canola (oil), mustard seed (oil), sesame (oil) | Fruits, Vegetables, Oil seeds and pulses |
| 215 | CF | USA | eggplant (fruit) | Vegetables |
| 218 | EX | Sweden | wheat (spring) (grain), wheat (winter) (grain) | Cereals |
| 219 | EX | Sweden | wheat (spring) (grain), wheat (winter) (grain) | Cereals |
| 229 | CF | France | apple (fruit), bean (French) (pod), carrot (root), lettuce (leaves), spinach (leaves), tomato (fruit), barley (grain), wheat (grain), buckwheat (seeds) | Fruits, Vegetables, Cereals, Oil seeds and pulses |
| 233 | CF | Belgium | wheat (grain) | Cereals |
| 249 | EX | Denmark | carrot (root) | Vegetables |
| 251 | EX | Czech Republic | potato (tuber) | Vegetables |
| 252 | EX | Czech Republic | potato (tuber) | Vegetables |
| 253 | EX | Turkey | lettuce (Iceberg, Yedikule) (leaves) | Vegetables |
| 254 | EX | Poland | potato (tuber) | Vegetables |
| 255 | CF | Italy | chicory (leaves), lettuce (leaves), rocket (leaves) | Vegetables |
| 259 | CF | Sweden | carrot (root), tomato (fruit), wheat (grain) | Vegetables, Cereals |
| 260 | EX | United Kingdom | potato (tuber) | Vegetables |
| 261 | EX | Sweden | wheat (winter) (flour), wheat (winter) (grain) | Cereals |
| 262 | EX | Sweden | wheat (winter) (flour) | Cereals |
| 264 | EX | Poland | savory (leaves) | Herbs and spices |
| 265 | EX | Czech Republic | barley (grain), barley (wort) | Cereals |
| 269 | CF | Canada | apple (fruit) | Fruits |
| 270 | CF | Canada | apple (fruit) | Fruits |
| 271 | CF | Japan | rice (grain) | Cereals |
| 272 | EX | Sweden | wheat (winter) (grain) | Cereals |
| 273 | EX | USA | tomato (fruit) | Vegetables |
| 275 | EX | Czech Republic | wheat (winter) (grain) | Cereals |
| 276 | CF | Brazil | tomato (fruit) | Vegetables |
| 277 | BS | Spain | carrot (root), lettuce (leaves), pea (raw) | Vegetables |
| 278 | CF | Czech Republic | triticale (grain) | Cereals |
| 279 | EX | Lithuania | pumpkin (jam with apple), pumpkin (jam with black currant), pumpkin (sweetmeat with apple), pumpkin (sweetmeat with black currant), pumpkin (fruit) | Fruits, Vegetables |
| 281 | CF | Japan | rice (grain) | Cereals |
| 282 | EX | USA | sweet potato (root) | Vegetables |
| 283 | CF | Dominican Republic | banana (fruit) | Fruits |
| 285 | EX | Italy | rice (grain) | Cereals |
| 286 | BS | Poland | beetroot (root), cabbage (white) (leaves), carrot (root), parsley (root), potato (tuber) | Vegetables |

ID, Paper unique identification number (see Table 2 for references); ST, Study type (CF – Comparison of Farms, BS – Basket Study, EX – Controlled Experiment); *Paper included in meta-analysis of frequency of detectable pesticide residues.

Table 3 cont. Study type, location and crop/product information of the comparison studies included in the meta-analysis.

| ID | ST | Location | Crop/Product | Group |
|-----|--------|-----------------------------|--|-------------------------------|
| 287 | BS | Germany | cabbage (leaves), carrot (root), lettuce (leaves), potato (tuber) | Vegetables |
| 288 | BS | Dominican Republic | banana (fruit) | Fruits |
| 289 | EX | Czech Republic | wheat (winter) (grain) | Cereals |
| 290 | BS, CF | Israel | banana (fruit), grape (fruit), grapefruit (juice), mango (fruit), orange (juice), carrot (root), spinach (leaves), tomato (fruit), sweet corn (kernel) | Fruits, Vegetables, Cereals |
| 291 | EX | Czech Republic | potato (tuber) | Vegetables |
| 292 | EX | Norway | barley (grain), oat (grain), wheat (grain) | Cereals |
| 294 | CF | USA | tomato (fruit) | Vegetables |
| 295 | BS | USA | barley (grain), maize (corn meal), maize (processed foods), rice (brown), rice (brown) (grain), lentils (grain), lentils (seeds) | Cereals, Oil seeds and pulses |
| 296 | CF | USA | wheat (grain) | Cereals |
| 297 | CF | Poland | potato (tuber) | Vegetables |
| 298 | EX | Hungary | pepper (red) (fruit) | Vegetables |
| 299 | CF | USA | maize (grain) | Cereals |
| 300 | CF | Poland | pepper (red) (fruit) | Vegetables |
| 301 | CF | Poland | pepper (fruit) | Vegetables |
| 302 | CF | Poland | apple (juice), apple (mousse) | Fruits |
| 303 | CF | Poland | apple (pomace) | Fruits |
| 304 | EX | United Kingdom | rat feed | Compound food |
| 305 | EX | Finland | oat (groat) | Cereals |
| 306 | BS | Turkey | olive (extra virgin oil) | Vegetables |
| 307 | EX | Brazil | chicory (leaves), lettuce (leaves), rocket (leaves) | Vegetables |
| 308 | EX | Estonia | carrot (root) | Vegetables |
| 310 | EX | Italy | wheat (grain) | Cereals |
| 311 | CF/EX | Spain | banana (fruit) | Fruits |
| 312 | CF | Spain | pepper (fruit) | Vegetables |
| 313 | CF | India | mandarin (nagpur) (fruit) | Fruits |
| 314 | EX | Hungary | apple (fruit) | Fruits |
| 315 | CF | Spain | grape (fruit) | Fruits |
| 316 | EX | Spain | olive (virgin oil) | Vegetables |
| 318 | EX | Estonia | potato (tuber) | Vegetables |
| 319 | EX | Sweden | wheat (winter) (flour), wheat (winter) (grain) | Cereals |
| 323 | EX | Sweden | wheat (grain), wheat (winter) (grain) | Cereals |
| 324 | BS | Brazil | broccoli (flower) | Vegetables |
| 327 | EX | Japan | soybean (seeds) | Oil seeds and pulses |
| 328 | CF | Italy | olive (extra virgin oil) | Vegetables |
| 330 | EX | Turkey | lettuce (iceberg) (leaves) | Vegetables |
| 331 | BS | Poland | cabbage (leaves), carrot (root), potato (tuber) | Vegetables |
| 333 | EX | Canada | wheat (spring) (grain) | Cereals |
| 334 | CF, EX | Germany, Italy, Switzerland | wheat (grain), wheat (hard) (grain), wheat (soft) (grain), wheat (grain) | Cereals |

ID, Paper unique identification number (see Table 2 for references); ST, Study type (CF – Comparison of Farms, BS – Basket Study, EX – Controlled Experiment); *Paper included in meta-analysis of frequency of detectable pesticide residues.

Table 3 cont. Study type, location and crop/product information of the comparison studies included in the meta-analysis.

| ID | ST | Location | Crop/Product | Group |
|-----|-----------|----------------|---|--|
| 335 | BS/CF | China | celeriac, celery (root) | Vegetables |
| 336 | EX | China | muskmelon (fruit) | Fruits |
| 337 | BS | Brazil | potato (tuber) | Vegetables |
| 338 | EX | Switzerland | wheat (grain) | Cereals |
| 339 | CF | Switzerland | apple (fruit) | Fruits |
| 340 | CF | Estonia | strawberry (fruit) | Fruits |
| 341 | CF | Brazil | orange (juice) | Fruits |
| 342 | CF | Japan | rice (grain) | Cereals |
| 343 | EX | Finland | potato (tuber) | Vegetables |
| 345 | BS | Poland | apple (puree) | Fruits |
| 346 | BS | Greece | peach (fruit), beetroot, French bean, lettuce (leaves), pepper (fruit), potato (tuber), tomato (fruit), lentils (seeds), amarantus blitum | Fruits, Vegetables, Oil seeds and pulses, Herbs and spices |
| 347 | BS | Not Specified | lettuce (leaves), tomato (fruit) | Vegetables |
| 348 | EX | Denmark | animal feed (rat feed) | Compound food |
| 354 | CF | Spain | grape (fruit) | Fruits |
| 357 | CF | Belgium | apple (juice) | Fruits |
| 358 | CF | Greece | apple (fruit) | Fruits |
| 359 | EX | Poland | basil (leaves), marjoram (leaves, dried) | Herbs and spices |
| 360 | CF | Poland | pepper (fruit) | Vegetables |
| 361 | EX | Poland | pepper (fruit) | Vegetables |
| 363 | EX | Switzerland | wheat (grain) | Cereals |
| 364 | CF, BS/CF | Poland | carrot (root), potato (tuber) | Vegetables |
| 365 | EX | Poland | onion (bulb) | Vegetables |
| 422 | EX | Italy | sunflower (seeds) | Oil seeds and pulses |
| 424 | EX | Switzerland | wheat (winter) (grain) | Cereals |
| 426 | EX | USA | apple (fruit) | Fruits |
| 428 | EX | Czech Republic | barley (grain) | Cereals |
| 429 | CF | Germany | apple (fruit), carrot (root) | Fruits, Vegetables |
| 430 | CF/EX | Italy | tomato (fruit) | Vegetables |
| 431 | CF/EX | Italy | strawberry (fruit) | Fruits |
| 432 | CF | Japan | tomato (fruit) | Vegetables |
| 433 | CF | Slovenia | apple (fruit) | Fruits |
| 434 | EX | Turkey | tomato (fruit) | Vegetables |
| 435 | EX | Sweden | leek (raw) | Vegetables |
| 436 | CF | Sweden | celeriac (root), parsnip (root) | Vegetables |
| 438 | CF | Brazil | tomato (fruit) | Vegetables |
| 442 | EX | Italy | cauliflower (curd) | Vegetables |
| 443 | EX | South Korea | pepper (hot) (fruit) | Vegetables |
| 446 | EX | Denmark | apple (fruit), carrot (root), kale (leaves), kale (leaves, cooked), pea (cooked), potato (tuber) | Fruits, Vegetables |

ID, Paper unique identification number (see Table 2 for references); ST, Study type (CF – Comparison of Farms, BS – Basket Study, EX – Controlled Experiment); *Paper included in meta-analysis of frequency of detectable pesticide residues.

Table 3 cont. Study type, location and crop/product information of the comparison studies included in the meta-analysis.

| ID | ST | Location | Crop/Product | Group |
|------|-----------|---|--|----------------------------------|
| 448 | BS | Portugal (marketed); Spain and Switzerland (produced) | cereals (baby food) | Compound food |
| 449 | BS | Portugal | cabbage (savoy) (leaves), carrot (root), lettuce (leaves), savoy cabbage (leaves), spinach (leaves) | Vegetables |
| 452* | BS/CF | The Netherlands | carrot (root), lettuce (iceberg) (leaves), lettuce (leaves) | Vegetables |
| 460* | BS | Denmark | apple (fruit), banana (fruit), beetroot, black currant (fruit), broccoli (flower), cabbage (leaves), carrot (root), chickpea (seeds), cucumber (fruit), grape (fruit), grapefruit (fruit), kale (leaves), leek, lemon (fruit), mandarin (fruit), mushroom, onion (bulb), orange (fruit), parsley (root), parsnip (root), pear (fruit), potato (tuber), raspberry (fruit), tea (dry leaves), tomato (fruit) | Fruits, Vegetables, Seeds, Other |
| 462 | EX | Estonia | barley (grain), oat (spring) (grain), wheat (spring) (grain) | Cereals |
| 463 | EX | Czech Republic | basil (leaves) | Herbs and spices |
| 471 | EX | USA | pecan (kernel) | Fruits |
| 475 | EX | Switzerland | wheat (grain) | Cereals |
| 477 | EX | Brazil | strawberry (fruit) | Fruits |
| 482 | EX | USA | tomato (fruit) | Vegetables |
| 483 | EX | Romania | wheat (grain) | Cereals |
| 484 | EX | Slovenia | red beet (root) | Vegetables |
| 486 | CF/EX, EX | Spain | eggplant (fruit) | Vegetables |
| 488 | CF | USA | strawberry (fruit) | Fruits |
| 489 | EX | Turkey | cabbage (white) (leaves) | Vegetables |
| 490 | EX | Turkey | spinach (leaves) | Vegetables |
| 491 | CF | Germany | grape (skin extract) | Fruits |
| 492 | BS | Brazil | apple (fruit), banana (fruit), mango (fruit), orange (fruit), papaya (fruit), tangerine (fruit), broccoli (flower), cabbage (white) (leaves), carrot (root), onion (bulb), potato (tuber), tomato (fruit) | Fruits, Vegetables |
| 493 | CF/EX | Brazil | tomato (fruit) | Vegetables |
| 494* | BS | Brazil | tomato (fruit) | Vegetables |
| 495 | CF | United Kingdom | potato (tuber) | Vegetables |
| 497 | EX | Estonia | wheat (spring) (bran), wheat (spring) (grain) | Cereals |
| 500 | BS | Ireland | baby food (berry-based dessert), baby food (chicken and vegetable dinner) | Compound food |
| 501 | EX | Italy | apricot (fruit) | Fruits |
| 502 | EX | Brazil | onion (bulb) | Vegetables |
| 503 | CF | USA | blueberry (fruit), raspberry (fruit) | Fruits |
| 504 | CF | Spain | grape (fruit), grape (wine) | Fruits |
| 505 | CF | Brazil | coffee (beans), coffee (green) | Other |

ID, Paper unique identification number (see Table 2 for references); ST, Study type (CF – Comparison of Farms, BS – Basket Study, EX – Controlled Experiment); *Paper included in meta-analysis of frequency of detectable pesticide residues.

Table 3 cont. Study type, location and crop/product information of the comparison studies included in the meta-analysis.

| ID | ST | Location | Crop/Product | Group |
|------------------|------------------|--------------------------------|---|--|
| 506 | EX | Turkey | tomato (fruit) | Vegetables |
| 508 | CF | Croatia | grape (red wine), grape (white wine), grape (wine, red), grape (wine, white) | Fruits |
| 509 | EX | USA | blueberry (fruit) | Fruits |
| 510 | EX | USA | pac choi (leaves) | Vegetables |
| 511 | EX | Poland | wheat (spring) (grain), wheat (winter) (grain) | Cereals |
| 512 | EX | Turkey | tomato (fruit) | Vegetables |
| 513 | EX | Italy | durum wheat (semolina) | Cereals |
| 517 | CF/EX | New Zealand | kiwifruit (fruit) | Fruits |
| 518 | CF/EX | Greece | orange (juice) | Fruits |
| 519 | CF/EX | Spain | mandarin (juice) | Fruits |
| 520 | EX | Denmark | carrot (root), food (whole diet) | Vegetables, Compound food |
| 522 | EX | USA | pac choi (leaves) | Vegetables |
| 524 | CF, EX, CF/EX | Italy | clementine (fruit), orange (fruit), peach (fruit), strawberry (fruit) | Fruits |
| 525 | EX | Brazil | acerola (fruit), persimmon (fruit), strawberry (fruit) | Fruits |
| 526 | EX | United Kingdom | wheat (grain) | Cereals |
| 527 | BS/EX | Brazil | coffee (roasted ground) | Other |
| 528 | EX | Czech Republic | buckwheat (groat) | Cereals |
| 531 | CF | USA | strawberry (fruit) | Fruits |
| 532 | EX | Denmark | potato (tuber), barley (grain), wheat (grain), wheat (winter) (grain), faba bean (seed), faba bean (seeds) | Vegetables, Cereals, Oil seeds and pulses |
| 533 | CF | Spain | tomato (fruit) | Vegetables |
| 536 | CF | Denmark | beetroot (root), carrot (root), cucumber (fruit), potato (tuber) | Vegetables |
| 537 | EX | USA | rice (grain) | Cereals |
| 541 | EX | Poland | sweet marjoram (leaves) | Herbs and spices |
| 542 | EX | Poland | marjoram (leaves, dried), savory (leaves, dried), sweet basil (leaves, dried), thyme (leaves, dried) | Herbs and spices |
| 543 | EX | Poland | marjoram (leaves, dried), savory (leaves, dried), sweet basil (leaves, dried), thyme (leaves, dried) | Herbs and spices |
| 544 | EX | Poland | savory (leaves) | Herbs and spices |
| 545 | EX | Poland | thyme (leaves) | Herbs and spices |
| 546 | EX | Poland | basil (leaves) | Herbs and spices |
| 548 ^c | BS | EU countries (mostly Italy) | foods of a plant origin | Compound food |
| 549 | CF | Brazil | lettuce (leaves) | Vegetables |
| 550 | BS | USA | asparagus (stem), green beans (pod), pepper (red) (fruit), spinach (leaves) | Vegetables |
| 571 | CF | Greece | cabbage (leaves), celery (leaves), lettuce (leaves), spinach (leaves) | Vegetables |
| 572 | BS | Poland | beetroot (root), carrot (root), potato (tuber) | Vegetables |
| 580 | EX | Brazil | strawberry (fruit) | Fruits |

ID, Paper unique identification number (see Table 2 for references); ST, Study type (CF – Comparison of Farms, BS – Basket Study, EX – Controlled Experiment); ^cPaper included in meta-analysis of frequency of detectable pesticide residues.

Table 3 cont. Study type, location and crop/product information of the comparison studies included in the meta-analysis.

| ID | ST | Location | Crop/Product | Group |
|------|----|----------|--|-----------------------------------|
| 581 | EX | India | wheat (grain) | Cereals |
| 584 | EX | Germany | tomato (fruit) | Vegetables |
| 585 | EX | Greece | tomato (fruit) | Vegetables |
| 586 | CF | Brazil | mango (fruit) | Fruits |
| 587 | EX | Hungary | wheat (grain) | Cereals |
| 619* | BS | USA | apple (fruit), banana (fruit), muskmelon (fruit), grape (fruit), orange (fruit), peach (fruit), pear (fruit), strawberry (fruit), broccoli (flower), carrot (root), celery (root), cucumber (fruit), bean (raw), lettuce (leaves), potato (tuber), spinach (leaves), pepper (sweet) (fruit), sweet potato (tuber), tomato (fruit), squash (raw), foods of a plant origin, pepper (fruit) | Fruits, Vegetables, Compound food |
| 620* | BS | Austria | foods of a plant origin | Compound food |
| 621* | BS | Italy | tomato (fruit) | Vegetables |
| 622* | BS | Denmark | foods of a plant origin | Compound food |
| 623* | BS | Denmark | foods of a plant origin | Compound food |
| 624* | BS | Austria | foods of a plant origin | Compound food |

ID, Paper unique identification number (see Table 2 for references); ST, Study type (CF – Comparison of Farms, BS – Basket Study, EX – Controlled Experiment); *Paper included in meta-analysis of frequency of detectable pesticide residues.

Table 4. Information extracted from the papers and included in the database used for meta-analysis.

| | |
|------------------------------------|---|
| Information about the paper | Paper ID, authors, publication year, title, journal/publisher, type of paper (journal article, conference proceedings, conference paper, report, book, thesis), corresponding author, language of publication, information if paper was peer-reviewed, source of paper (electronic databases, contact with authors, reference list of reviews and original publications). |
| Study characteristics | Study type (Controlled Experiment - EX, Comparison of Farms - CF, Basket Study - BS), product, species, cultivar or variety, production system description, experimental year(s), location of the study. |
| Data | Name of the compositional parameter, number of samples, mean, SE or SD, measurement unit, data type (numeric, graphical). |

Table 5. Summary of inclusion criteria used in the standard weighted (analysis 1) and the standard unweighted (analysis 5) meta-analysis, and the 6 sensitivity analyses carried out. Detailed results of sensitivity analysis are shown on the Newcastle University website (<http://research.ncl.ac.uk/nefg/QOF>)

| Analysis No | Data available | | Cultivar or variety of the crop | | Experimental years | |
|---------------------------------|---------------------------------|----------------------------|---------------------------------|---|--------------------------------|---|
| | Only papers with N, mean, SD/SE | All papers reporting means | Cultivar/variety averaged* | Each cultivar/variety as separate data point† | One data point from one paper‡ | Individual year as separate data point§ |
| Weighted meta-analysis | | | | | | |
| 1 standard | + | | + | | + | |
| 2 | + | | + | | | + |
| 3 | + | | | + | + | |
| 4 | + | | | + | | + |
| Unweighted meta-analysis | | | | | | |
| 5 standard | | + | + | | + | |
| 6 | | + | + | | | + |
| 7 | | + | | + | + | |
| 8 | | + | | + | | + |

*If data from more than one cultivar or variety of the crop were presented separately in the paper, average was calculated and included in the analysis; †If data from more than one cultivar or variety of the crop were presented separately in the paper, they were analysed separately, as individual data points; ‡If data from more than one experimental years were presented separately in the paper, average was calculated and included in the analysis; §If data from more than one experimental years were presented separately in the paper, they were analysed separately, as individual data points; ||Results of the standard unweighted and weighted meta-analysis are presented in the main paper.

Table 6. List of composition parameters included in the statistical analyses.*

| Category | Parameters |
|--|---|
| Major components | Ash, Ash (total), Carbohydrates, Carbohydrates (total), Dry matter, Fat, Fat (crude), Fibre, Fibre (insoluble), Fibre (soluble), Fibre (total), Fructose, Glucose, Protein (total), Solids, Solids (soluble), Solids (total), Starch, Sucrose, Sugars (reducing), Water |
| Amino acids | Amino acids, Amino acids (total), Alanine (Ala), Arginine (Arg), Asparagine (Asn), Aspartic acid (Asp), Glutamic acid (Glu), Glutamine (Gln), Glycine (Gly), Histidine (His), Isoleucine (Ile), Leucine (Leu), Lysine (Lys), Methionine (Met), Phenylalanine (Phe), Proline (Pro), Serine (Ser), Threonine (Thr), Tyrosine (Tyr), Valine (Val) |
| Fatty acids | 16.0 fatty acid (palmitic acid), 18.0 fatty acid (stearic acid), 18.1 fatty acid (oleic acid), 18.2 fatty acid (linoleic acid), 18.3 fatty acid (linolenic acid), 20.0 fatty acid (arachidic acid), Monounsaturated fatty acids, Polyunsaturated fatty acids, Saturated fatty acids, Saturated fatty acids (total) |
| Vitamins and antioxidants | Alpha-carotene, Alpha-tocopherol, Anthocyanins, Antioxidant activity based on 2,2-diphenyl-1-picrylhydrazyl (DPPH), Ferric reducing antioxidant power (FRAP), Trolox equivalent antioxidant capacity (TEAC), Oxygen radical antioxidant capacity (ORAC), Apigenin, Ascorbic acid, Beta-carotene, Beta-cryptoxanthin, Carotenes, Carotenoids, Carotenoids (total), Dehydroascorbic acid, Flavanols, Flavanones, Flavones, Flavones and flavonols, Flavones and flavonols (total), Flavonoids (total), Flavonols, Flavonols (total), Gamma-tocopherol, Kaempferol, Kaempferol 3-O-glucoside, Lutein, Luteolin, Luteolin-7-o-glucoside, Lycopene, Myricetin, Myricetin 3-o-glucoside, Polyphenoloxidase (PPO) activity (towards caffeic acid), Polyphenoloxidase (PPO) activity (towards chlorogenic acid), Quercetin, Quercetin 3-galactoside, Quercetin 3-glucoside, Quercetin 3-rhamnoside, Quercetin malonylglucoside, Quercetin-3-rutinoside (Rutin), Vitamin B, Vitamin B ₁ , Vitamin C, Vitamin C (total), Vitamin E, Zeaxanthin |
| Minerals and undesirable metals | Aluminium (Al), Arsenic (As), Barium (Ba), Boron (B), Bromine (Br), Cadmium (Cd), Calcium (Ca), Carbon (C), Cerium (Ce), Chloride (Cl), Chromium (Cr), Cobalt (Co), Copper (Cu), Elements, Gallium (Ga), Indium (In), Iron (Fe), Lanthanum (La), Lead (Pb), Magnesium (Mg), Manganese (Mn), Molybdenum (Mo), Nickel (Ni), Nitrogen (N), Phosphorus (P), Potassium (K), Rhenium (Re), Rubidium (Rb), Selenium (Se), Sodium (Na), Strontium (Sr), Sulphur (S), Thallium (Tl), Tin (Sn), Vanadium (V), Wolfram (W), Zinc (Zn) |
| Phenolic compounds | 5-o-Caffeoylquinic acid (5-CQA), Caffeic acid, Chlorogenic acid, Ellagic acid, Ferulic acid, Gallic acid, Hydroxycinnamic acids (total), p-coumaric acid (pCA), Phenolic acids, Phenolic acids (total), Phenolic compounds, Phenolic compounds (total), Salicylic acid, Sinapic acid (SA) |
| Volatile compounds | Volatile compounds |
| Other | Acidity, Acidity (total), Acidity (volatile), Acids (total), Anthocyanins (total), Catechin, Chalcones, Citric acid, Dihydrochalcones, Energy, Epicatechin, Flavanols (total), Glucoraphanin, Glucosinolates, Malic acid, Naringenin, Naringenin (R-enantiomer), Nitrates, Nitrites, Organic acids, Other defense compounds, Other non-defense compounds, Other non-defense compounds (total), pH, Phloretin, Procyanidins, Resveratrol, Stilbenes, Titratable acidity, Xanthophylls |

*Compounds for which number of comparisons organic vs. conventional was ≥ 3 .

Table 7. List of composition parameters excluded from the statistical analyses.*

| Category | Parameters |
|----------------------------------|--|
| Major components | Albumin, Amirose, Amylose, Ash (crude), Ash at 700°C, Brix degree, Essential oil, Fibre (crude), Galactose, Glutelin, Gluten, Gluten (dry), Gluten (wet), Glycerides (total), Maltose, Non-starch polysaccharides (soluble), Non-starch polysaccharides (total), Protein, Protein (soluble), Protein (true), Stachyose, Starch Index, Sugars (non-reducing), Sugars (soluble) |
| Amino acids | Amino acids (essential), Amino acids (free), Alanine (% of total EAA), Alanine (hydrolysed), Alpha-aminobutyric acid, Arginine (% of total EAA), Arginine (hydrolysed), Aspartic acid (% of total EAA), Aspartic acid (hydrolysed), Beta-alanine, Cysteine (Cys), Cystine, Cystine (% of total EAA), Essential amino acids (total), Glutamic acid (% of total EAA), Glutamic acid (hydrolysed), Glutamine (hydrolysed), Glycine (% of total EAA), Histidine (% of total EAA), Histidine (hydrolysed), Isoleucine (% of total EAA), Isoleucine (hydrolysed), Leucine (% of total EAA), Leucine (hydrolysed), Lysine (% of total EAA), Lysine (hydrolysed), Methionine (% of total EAA), Methionine (hydrolysed), Methionine + Cystine, Phenylalanine (% of total EAA), Phenylalanine (hydrolysed), Proline (% of total EAA), Proline (hydrolysed), Serine (% of total EAA), Serine (hydrolysed), Threonine (% of total EAA), Threonine (hydrolysed), Tryptophane (Trp), Tyrosine (% of total EAA), Tyrosine (hydrolysed), Valine (% of total EAA), Valine (hydrolysed) |
| Fatty acids | 12.0 fatty acid, 14.0 fatty acid, 14.1 fatty acid, 16.1 c9 fatty acid, 16.1 fatty acid (palmitoleic acid), 16.1 n-7 fatty acid, 17.0 fatty acid, 17.1 fatty acid, 18.1 cis fatty acid, 18.1 n-9 fatty acid, 18.2 n-6 fatty acid, 18:3 n-3 fatty acid (alpha-linolenic acid), 20.1 fatty acid, 20.1 n-9 fatty acid, 20.2 fatty acid, 20.3 (n-3) fatty acid, 20.3 (n-6) fatty acid, 20.4 fatty acid, 22.0 fatty acid, 22.1 fatty acid, 22.6 fatty acid, 24.0 fatty acid, 24.1 fatty acid, Fatty acids, Fatty acids (free), Fatty acids (total), Monounsaturated fatty acids (MUFA), Monounsaturated fatty acids (total), n-3 - n-6 fatty acids ratio, n-3 fatty acids, n-6 fatty acids, Polyunsaturated fatty acids (PUFA), Polyunsaturated fatty acids (total), Saturated fatty acids (SFA) |
| Vitamins and antioxidants | 13-cis-lycopene, 13-cis- β -carotene, 15-cis-lycopene, 5-formyltetrahydrofolate (5-formylTHF), 5-methyltetrahydrofolate (5-methylTHF), 9-cis-lycopene, 9-cis-violaxanthin, All-trans- + 5-cis-lycopene, All-trans- β -carotene, Alpha-tocotrienol, Antheraxanthin, Antioxidant activity (Catalase-like activity), Antioxidant activity (hydrophilic) (ORAC), Antioxidant activity (hydrophilic) (TEAC), Antioxidant activity (IC50), Antioxidant activity (lipophilic) (ORAC), Antioxidant activity (microchemiluminescence), Antioxidant activity (Randox), Antioxidant activity (scavenging effect for DPPH radical of tea extract) (concentration 100 μ g per ml), Antioxidant activity (scavenging effect for DPPH radical of tea extract) (concentration 1mg per ml), Antioxidant activity (scavenging effect for DPPH radical of tea extract) (concentration 200 μ g per ml), Antioxidant activity (scavenging effect for DPPH radical of tea extract) (concentration 300 μ g per ml), Antioxidant activity (scavenging effect for DPPH radical of tea extract) (concentration 50 μ g per ml), Antioxidant activity (Sod-like activity), Antioxidant activity (water insoluble) (TEAC), Antioxidant activity (water soluble) (TEAC), Antioxidant capacity (superoxide scavenging), Antioxidant effect of 10ug per ml extract, Antioxidant effect of 1ug per ml extract, Antioxidant effect of 5ug per ml extract, Apigenin 6-C-Galactoside, 8-C-Glucoside, Apigenin glucuronide, Ascorbate peroxidase (AsA-POD) activity, Baicalein, Beta-tocopherol, Beta-tocotrienol, Capsanthin, Capsanthin 5,6-epoxide, Capsanthin diester, Capsorubin, Carotene, Catalase-like activity (CAT), Cis-antheraxanthin, Cis-capsanthin, Cucurbitaxanthin A, Dehydroascorbate reductase (DHAR) activity, Delta-tocopherol, Fisetin aglycones, Fisetin glycosides, Flavonoids (non-anthocyan), Flavonoids (other), Flavonoids (sum), Flavonols (total) and xanthone glycosides, Folate, Glutathione peroxidase (GSH-POD) activity, Glutathione reductase (GR) activity, Guaiacol peroxidase (G-POD) activity, Isomangiferin, Isoorientin, Isoorientin 2'-O-Rhamnoside, Isoorientin 6'-O-Xyloside, Isorhamnetin, Isorhamnetin rutinoside, Isorhamnetin-3,4'-diglycoside (I-3,4'-digly), Isorhamnetin-4'-glycoside (I-4'-gly), Isoscoparin (3'-methyluteolin 6-C-glucoside), Isovitexin, Kaempferol + Kaempferol glycoside, Kaempferol 3-O-(caffeoyl)sophoroside-7-O-glucoside, Kaempferol 3-O-(feruloyl)sophoroside + kaempferol 3-O-sophoroside, Kaempferol 3-O-(feruloyl)sophoroside-7-O-glucoside, Kaempferol 3-O-(feruloyl)sophorotrioside, Kaempferol 3-O-(feruloyl)sophorotrioside + kaempferol 3-O-(feruloyl)sophoroside, Kaempferol 3-O-(feruloyl-caffeoyl)sophoroside-7-O-glucoside, Kaempferol 3-O-(methoxycaffeoyl-caffeoyl)sophoroside-7-O-glucoside, Kaempferol 3-O-(sinapoyl)sophoroside, Kaempferol 3-O-(sinapoyl)sophoroside-7-O-glucoside, Kaempferol 3-O-(sinapoyl-caffeoyl)sophoroside-7-O-glucoside, Kaempferol 3-O-sophoroside |

*Compounds for which number of comparisons organic vs. conventional was < 3.

Table 7 cont. List of composition parameters excluded from the statistical analyses.*

| Category | Parameters |
|--|--|
| Vitamins and antioxidants cont. | Kaempferol 3-O-sophoroside-7-O-glucoside, Kaempferol 3-O-sophoroside-7-O-sophoroside, Kaempferol 3-O-sophoroside-7-O-sophoroside + kaempferol 3-O-tetraglucoside-7-O-sophoroside, Kaempferol 3-O-sophorotrioside, Kaempferol 3-O-sophorotrioside + kaempferol 3-O-(sinapoyl)sophoroside, Kaempferol 3-O-sophorotrioside-7-O-glucoside, Kaempferol 3-O-sophorotrioside-7-O-glucoside + kaempferol 3-O-(methoxycaffeoyl-caffeoyl)sophoroside-7-O-glucoside, Kaempferol 3-O-sophorotrioside-7-O-sophoroside, Kaempferol aglycones, Kaempferol glucoside, Kaempferol glucuronide, Kaempferol glycoside, Kaempferol malonylglucoside, Kaempferol rutinoside, L-ascorbic acid, Lutein + violaxanthin, Luteolin 6-C-Galactoside, 8-C-Glucoside and Lucenin-2 (Luteolin 6, 8 Di-C-Glucoside), Luteolin glucuronide, Luteolin-7-(2-apiosyl-4-glucosyl-6-acetyl)glucoside, Luteolin-7-(2-apiosyl-6-acetyl)glucoside, Luteoxanthin b, Luteoxanthin-like, Mangiferin, Methylquercetin glucoside, Monodehydroascorbate reductase (MDAR) activity, Morin, Mutatoxanthin, Mutatoxanthin-like, Myricetin 3-arabinoside, Myricetin aglycones, Myricetin glycosides, Myricetin malonylglucoside, Myricetin rutinoside, Neoxanthin, Peroxidase activity, Peroxide, Peroxide index, Peroxide number, Phytoene, Phytofluene, Polyphenoloxidase (PPO) activity (towards catechol), Polyphenoloxidase activity, Quercetin + quercetin glycoside, Quercetin 3-arabinofuranoside, Quercetin 3-arabinoside, Quercetin 3-o-glucoside + quercetin 3-O-rutinoside, Quercetin 3-xyloside, Quercetin 4'-monoglucoside, Quercetin aglycones, Quercetin glycosides, Quercetin glycosides, Quercetin glycosides (other), Quercetin rutinoside, Quercetin-3,4'-diglucoside (Q-3,4'-diglu), Quercetin-3,7,4'-triglycoside (Q-3,7,4'-trigly), Quercetin-3-glucoside (Q-3-glu), Quercetin-3-o-glucuronide, Quercetin-4'-glucoside (Q-4'-glu), Riboflavin, SDS (1-sodium dodecyl sulfate) activation (-fold) of polyphenol oxidase using 4-methyl catechol, SDS (1-sodium dodecyl sulfate) activation (-fold) of polyphenol oxidase using 4-tert-butyl catechol, SDS (1-sodium dodecyl sulfate) activation (-fold) of polyphenol oxidase using chlorogenic acid, Superoxide dismutase (SOD) activity, Tocopherolquinone (TQ), Tocopherols (total), Total phenol index (TPI), Tricin, Trypsin-mediated activation of polyphenol oxidase, Violaxanthin, Vitamin A, Vitamin B ₂ , Vitamin B ₆ , Vitamin E (total), Vitamin K ₁ , Zeinoxanthin |
| Minerals and undesirable metals | Antimony (Sb), Beryllium (Be), Bismuth (Bi), Calcium (Ca) (HCl extractable), Cesium (Cs), Dysprosium (Dy), Europium (Eu), Gadolinium (Gd), Gold (Au), Hafnium (Hf), Holmium (Ho), Iodine (I), Magnesium (Mg) (HCl extractable), Mercury (Hg), Mineral compounds, Neodymium (Nd), NH ₄ -Nitrogen, Niobium (Nb), Nitrogen (assimilable), Phosphorus (P) (HCl extractable), Platinum (Pt), Praseodymium (Pr), Samarium (Sm), Scandium (Sc), Silver (Ag), Tellurium (Te), Terbium (Tb), Thorium (Th), Thulium (Tm), Titanium (Ti), Uranium (U), Ytterbium (Yb), Yttrium (Y), Zirconium (Zr) |
| Phenolic compounds | 1,2'-disinapoyl-2-feruloylgentiobiose, 1,2-disinapoylgentiobiose + 1-sinapoyl-2-feruloylgentiobiose + isomer of 1,2-disinapoylgentiobiose + 1,2,2'-trisinapoylgentiobiose, 3-acetyl-5-caffeoylquinic acid, 3-caffeoylquinic acid derivate, 3-p-coumaroylquinic acid, 4-o-Caffeoylquinic acid (4-CQA), 4-p-coumaroylquinic acid, Caffeic acid derivatives (total), Caffeoyl derivatives, Caffeoylglucose, Caffeoyltartaric acid, Chicoric acid, Cinnamic acid, Coumaric acid, Coumaric acid glucoside, Coumarins, Dicafeoyltartaric acid, Ellagic acid + ellagic acid glycoside, Ellagic acid aglycones, Ellagic acid glucoside, Ellagic acid glycoside, Ferulic acid (bound), Ferulic acid (conjugated), Ferulic acid glucoside, Feruoyglucose, Hydroxycinnamates, Hydroxycinnamic acid derivate a, Hydroxycinnamic acid derivate b, Hydroxycinnamic acid derivative (unidentified), Hydroxycinnamic acid derivatives (total), N-(3,4-dihydroxy)-E-cinnamoyl-5-hydroxyanthranilic acid, N-(4-hydroxy)-E-cinnamoyl-5-hydroxyanthranilic acid, N-(4-hydroxy-3-methoxy)-E-cinnamoyl-5-hydroxyanthranilic acid, Neo-chlorogenic acid, p-coumaric acid derivate, p-coumaroylglucose, p-coumaroylquinic acid, Phenolics (bound) (total), Phenolics (free) (total), Phenolics (soluble conjugulated) (total), p-hydroxybenzoic acid (pHBA), Polyphenols hydrolyzable (total), Protocatecic acid, Sinapic acid glucose derivate, Syringic acid, Trans-caffeoyltartaric acid, Trans-p-coumaric acid, Trans-p-cumaroyltartaric acid, Vanillic acid (VA) |
| Volatile compounds | (E)-2-decen-1-ol, (E)-2-hepten-1-ol, (E)-2-hexenal, (E)-2-nonen-1-ol, (E)-2-octenal, (E)-3-hepten-1-ol, (E)oak lactone, (E,E)-2,4-hexadienal, (Z)-3-hexen-1-ol, (Z)-3-hexenal, (Z)-6-nonenal, (Z)oak lactone, 1,1-diethoxyethane, 1,8-cineole, 1-butanol, 1-hexanol, 1-hexen-3-ol, 1-isothiocyanato-butane, 1-nonanol, 1-octanol, 1-octen-3-ol, 1-pentanol, 1-penten-3-ol, 1-propanol, 2,6,6-trimethyl-1-cyclohexene-1-carboxaldehyde, 2-butanol, 2-butanone, 2-decanone, 2-hexen-1-ol (cis), 2-hexen-1-ol (trans), 2-hexenal |

*Compounds for which number of comparisons organic vs. conventional was < 3.

Table 7 cont. List of composition parameters excluded from the statistical analyses.*

| Category | Parameters |
|---------------------------------|--|
| Volatile compounds cont. | 2-hexenal (cis), 2-hexenal (trans), 2-hexyn-1-ol, 2-Isothiocyanatoethyl-benzene, 2-methyl-3-pentanone, 2-methyl-butanoic acid methyl ester, 2-nonanone, 2-pentenal, 2-undecanone, 3,7-dimethyl-1,6-octadien-3-ol (linalool), 3-carene, 3-ethoxy-1-propanol, 3-hexen-1-ol (cis), 3-methyl-1-pentanol, 3-methyl-2-butanone, 3-pentanone-1-(methylthio), 4,5-dimethyl-thiazole, 4-ethyl-5-methylthiazole, 4-ethylguaiacol, 4-ethylphenol, 4-hexen-1-ol, 4-isothiocyanato-1-butene, 4-methyl-1-pentanol, 4-methyl-1-undecene, 4-methylpentyl isothiocyanate, 5-methylfurfural, 6,10-dimethyl-5,9-undecadien-2-one (geranylacetone), Acetaldehyde, Acetaldehyde and derivatives, Acetic acid octyl ester, Acetoin, Allyl isothiocyanate, Alpha-humulene, Alpha-phellandrene, Alpha-pinene, Alpha-terpinene, Benzaldehyde, Benzene propanenitrile, Benzeneacetaldehyde, Benzyl alcohol, Benzyl nitrile, Beta-caryophyllene, Beta-murolene, Beta-myrcene, (E)-2-decen-1-ol, (E)-2-hepten-1-ol, (E)-2-hexenal, (E)-2-nonen-1-ol, (E)-2-octenal, (E)-3-hepten-1-ol, (E)oak lactone, (E,E)-2,4-hexadienal, (Z)-3-hexen-1-ol, (Z)-3-hexenal, (Z)-6-nonenal, (Z)oak lactone, 1,1-diethoxyethane, 1,8-cineole, 1-butanol, 1-hexanol, 1-hexen-3-ol, 1-isothiocyanato-butane, 1-nonanol, 1-octanol, 1-octen-3-ol, 1-pentanol, 1-penten-3-ol, 1-propanol, 2,6,6-trimethyl-1-cyclohexene-1-carboxaldehyde, 2-butanol, 2-butanone, 2-decanone, 2-hexen-1-ol (cis), 2-hexen-1-ol (trans), 2-hexenal, 2-hexenal (cis), 2-hexenal (trans), 2-hexyn-1-ol, 2-Isothiocyanatoethyl-benzene, 2-methyl-3-pentanone, 2-methyl-butanoic acid methyl ester, 2-nonanone, 2-pentenal, 2-undecanone, 3,7-dimethyl-1,6-octadien-3-ol (linalool), 3-carene, 3-ethoxy-1-propanol, 3-hexen-1-ol (cis), 3-methyl-1-pentanol, 3-methyl-2-butanone, 3-pentanone-1-(methylthio), 4,5-dimethyl-thiazole, 4-ethyl-5-methylthiazole, 4-ethylguaiacol, 4-ethylphenol, 4-hexen-1-ol, 4-isothiocyanato-1-butene, 4-methyl-1-pentanol, 4-methyl-1-undecene, 4-methylpentyl isothiocyanate, 5-methylfurfural, 6,10-dimethyl-5,9-undecadien-2-one (geranylacetone), Acetaldehyde, Acetaldehyde and derivatives, Acetic acid octyl ester, Acetoin, Allyl isothiocyanate, Alpha-humulene, Alpha-phellandrene, Alpha-pinene, Alpha-terpinene, Benzaldehyde, Benzene propanenitrile, Benzeneacetaldehyde, Benzyl alcohol, Benzyl nitrile, Beta-caryophyllene, Beta-murolene, Beta-myrcene, Beta-pinene, Bornyl acetate, Butanenitrile-4-(methylthio), Butanoic acid, Butanoic acid methyl ester, Butyl lactate, Butyl-4-(methylthio) isothiocyanate, Butylated hydroxytoluene, Cadina-3,9-dien, Camphene, Camphor, Cedrol, Decanal, Decanoic acid, Diethyl disulfide, Diethyl malate, Diethyl succinate, Dimethyl disulfide, Dimethyl pentasulfide, Dimethyl tetrasulfide, Dimethyl trisulfide, D-Limonene, Dodecanal, Esters (total), Ethanol, Ethyl 2-furoate, Ethyl 3-hydroxybutanoate, Ethyl acetate, Ethyl butanoate, Ethyl decanoate, Ethyl hexanoate, Ethyl lactate, Ethyl octanoate, Ethyl propanoate, Eugenol, Farnesol, Furfural (FUR), Furfuryl alcohol, Gamma-butyrolactone, Gamma-decalactone, Gamma-terpinene, Heptanal, Hexanal, Hexanoic acid, Isoamyl acetate, Isoamyl alcohols, Isobornyl acetate, Isobutanoic acid, Isobutanol, Isobutyl lactate, Isopinocarveol, Isothiocyanates (total), Isothiocyanato-cyclohexane, Lactones (total), Lauric acid, Lilial, Linalool, Menthol, Methanol, Methionol, Methyl chavicol, Methyl cinnamate, Methyl propionate, Methyl-(methylthio)-methyl disulfide, Monoethyl succinate, Myrcene, Nitriles (total), Octanal, Octanoic acid, Pantolactone, p-cymene, Pentanenitrile-5-(methylthio), Phenethyl acetate, Phenethyl alcohol, Phenethyl octanoate, Propanal-3-(methylthio), Propyl acetate, Propyl-3-(methylthio) isothiocyanate, Sabinene, Sulfides (total), Terpinen-4-acetat, Thiols, Valencene, Vanillin, Volatile compounds (total), Volatile phenols (total) |
| Other | (+)-catechin, (2R)eriocitrin, (2R)hesperidin, (2R)naringin, (2S)eriocitrin, (2S)hesperidin, (2S)naringin, 1,2-diacylglycerides, 1,3-diacylglycerides, 1-kestose, 2,4-dihydroxy-7-methoxy-1,4-benzoxazin-3-one (DIMBOA) glucoside, 2-aminoadipate, 3'-C-glucoside, 2',4',6',3,4-pentahydroxychalcone, 4-dihydroxy-7-methoxy-1,4-benzoxazin-3-one (DIMBOA), 4-hydroxyglucobrassicin, 4-methoxyglucobrassicin, 6',7'-dihydroxybergamottin, 6',7'-dihydroxybergamottin dimer 708, 6',7'-dihydroxybergamottin dimer 728, Acidity (free), Aconitic acid, Acylated derivatives of anthocyanins, Agmatin, Alcohols (total), Aldehydes (total), Aldehydic form of ligstroside aglycone, Aldehydic form of oleuropein aglycone, Alkaloids, Alliin (S-(2-propenyl)-L-cysteine sulfoxide; ACSO), Alpha-acids, Alpha-chaconine, Alpha-solanine, Angelicin (furanocoumarins), Arabinoxylans (soluble), Arabinoxylans (total), Arachidolylphosphatidylcholine, Aureusidin glucoside, Benzoxazinoids, Bergamottin, Bergapten (furanocoumarins), Bergaptol, Beta-acids, |

*Compounds for which number of comparisons organic vs. conventional was < 3.

Table 7 cont. List of composition parameters excluded from the statistical analyses.*

| Category | Parameters |
|-------------|---|
| Other cont. | Beta-glucan, Beta-sitosterol, Biothiols, Caffeine, Campestanol, Campesterol, Captopril (CAP), Catechins (total), Celulose, Cerebrosides, Chlorophyll (total), Chlorophyll a, Chlorophyll b, Cholesterol, Cl ⁻ ion, Clerosterol, Cyanidin, Cyanidin 3-galactoside, Cyanidin 3-glucoside, Cyanidin 3-glucoside-succinate, Cyanidin 3-o-rutinoside, Cyanidin-glycosides (other), Delphinidin, Delphinidin 3-arabinoside, Delphinidin 3-galactoside, Delphinidin 3-glucoside, Delphinidin 3-o-glucoside, Delphinidin 3-o-rutinoside, Delta-5,24-stigmastadienol ,Delta-5-avenasterol,Delta-7-avenasterol, Delta-7-stigmastenol, Desmethylxanthohumol (DMX), Dialdehydic form of oleuropein aglycone, Dimer catechin, Energy (gross), Energy (metabolizable), Epicatechin gallate, Epigallocatechin gallate,Epiprogoitrin, Eriocitrin (total), Eriodictyol (total), Falcarindiol (FaDOH), Falcarindiol-3-acetate (FaDOAc), Falcarinol (FaOH), Fumaric acid, Furanocoumarins (total), Galacturonic acid, Gallocatechin gallate, Gamma-aminobutyric acid (GABA), Gamma-glutamyl cysteine (GGC), Gangliosides, Globulin, Glucoalyssin, Glucobrassicinapin, Glucobrassicin, Glucoerucin, Glucoiberin, Gluconapin, Glucosinolates (Aliphatic), Glucosinolates (Indole), Glucosinolates (total), Glutathione (GSH), Glycoalkaloids, Glycoalkaloids (total), Hemicelulose, Hesperetin, Hesperidin, Hesperidin glycosides, Hop acids, Hydroxymethylfurfural (HMF), Hydroxytyrosol, Hyperoside, Inositol, Internal Ethylene Concentration (IEC), Isoalliin (trans-(+)-S-(1-propenyl)-L-cysteine sulfoxide; PESCO), Isobergapten (furanocoumarins), Isopimpinellin (furanocoumarins), K-pentaose, K-tetraose, L-homoserine, Lignin (acid detergent lignin, ADL), Lysophosphatidylinositol, Malvidin, Malvidin 3-arabinoside, Malvidin 3-galactoside, Malvidin 3-glucoside, Malvidin 3-o-glucoside, Malvidin 3-p-cumaroul-glucoside, Methiin ((+)-S-methyl-L-cysteine sulfoxide; MCSO), N-acetylcysteine (NAC), Naringenin (S-enantomer), Naringenin + naringin (R-enantomer), Naringenin + naringin (S-enantomer) ,Naringin, Naringin (R-enantomer), Naringin (S-enantomer), Narirutin, N-caffeoylputrescine, Neoglucobrassicin, o-Diphenols, Organic acids (total), Other defense compounds (total), Oxalate, Oxalic acid, Pectin, Pelargonidin 3-glucosidesuccinate, Pelargonidin-3-glucoside, Peonidin, Peonidin 3-glucoside, Peonidin 3-o-glucoside, Peonidin-3-galactoside, Petunidin 3-arabinoside, Petunidin 3-galactoside, Petunidin 3-glucoside, Phloretin + phloretin glycoside, Phloretin 2'-xyloglucose, Phloretin 2-xylosylglucoside, Phloridzin, Phloridzin glycosides, Phosphates (PO ₄ 3- ion), Phosphatidylethanolamine, Phosphatidylinositol, Phosphoric acid, Phytate-phosphorus, Phytic acid, Phytoalexins activity, Pinoresinol, Polyacetylenes, Procyanidin B1, Procyanidin B2, Procyanidin B2S, Procyanidin B3, Procyanidin B4, Procyanidin Bx, Procyanidin trimer, Procyanidins (other), Procyanidins (total), Progoitrin, Prolamin, Propiin ((+)-S-propyl-L-cysteine sulfoxide; PCSO), Psoralen (furanocoumarins), Putrescine, Pyruvic acid, Quinic acid, R(+)-eriodictyol, R(+)-hesperetin, Raffinose, R-naringenin aglycones, R-naringenin glycosides, S(-)-eriodictyol, S(-)-hesperetin, S(-)-naringenin, S-Alk(en)ylcysteine sulfoxides (ACSOs) (total), Shikimic acid, Sinigrin, S-naringenin aglycones, S-naringenin glycosides, SO ₂ , SO ₄ 2- ion, Solanidine, Sorbitol, Spermidine, Spermine, Sphondin, Sterol lipids, Sterols, Sterols (total), Sterols and stanols, Stigmasterol, Sulfides (total), Sulforaphane (SF), Sulphate, Synephrine, Taxifolin aglycones, Taxifolin glycosides, Trans-Resveratrol, Trans-resveratrol-3-o-β-glucoside, Triacylglycerides, Trigonelline, Truxinic acid sucrose ester (TASE), Tyrosol, Xanthohumol (X), Xanthotoxin (furanocoumarins), Xylose |

*Compounds for which number of comparisons organic vs. conventional was < 3.

2. ADDITIONAL METHODS DESCRIPTION, RESULTS AND DISCUSSION

METHODS

Calculations used for weighted meta-analyses

The SMD from a single study was calculated using standard formulas within “metafor” as follows:

$$SMD = \frac{\bar{X}_O - \bar{X}_C}{S_{within}} \times J$$

where \bar{X}_O is the mean value for experimental group (organic), \bar{X}_C is the mean value for control group (conventional), S_{within} is the pooled standard deviation of the two groups, and J is a factor used to correct for small sample size. J is calculated as:

$$J = 1 - \frac{3}{4 \times (n_C + n_O - 2) - 1}$$

where n_O and n_C are organic and conventional sample sizes.

S_{within} is calculated as:

$$S_{within} = \sqrt{\frac{(n_O - 1)S_O^2 + (n_C - 1)S_C^2}{n_O + n_C - 2}}$$

where S_O and S_C are the standard deviations in individual systems (organic and conventional) respectively.

The pooled SMD (SMD_{tot}) across all studies was calculated as:

$$SMD_{tot} = \frac{\sum_{i=1}^n (\frac{1}{v_i} \times SMD_i)}{\sum_{i=1}^n (\frac{1}{v_i})}$$

Where v_i is a sampling variance estimated as:

$$v_i = \frac{n_C + n_O}{n_C \times n_O} + \frac{SMD^2}{2 \times (n_C + n_O)}$$

The pooled or summary effect (SMD_{tot}) was calculated for all nutrient- and composition-related parameters reported in a minimum of 3 studies, following procedures advocated by Lipsey and Wilson (see references in the main manuscript).

Calculations used percentage mean differences (MPDs)

For each data-pair (\bar{X}_O , \bar{X}_C) extracted from the literature and used in the standard unweighted meta-analysis the percentage difference was calculated as:

$$+[(\bar{X}_O \times 100 / \bar{X}_C) - 100] \text{ for data sets where } \bar{X}_O > \bar{X}_C, \text{ or} \\ -[(\bar{X}_C \times 100 / \bar{X}_O) - 100] \text{ for data sets where } \bar{X}_C > \bar{X}_O$$

Calculations used for Odds ratios

Odds ratios (OR) were calculated as:

$$\ln(odds\ ratio) = \ln\left(\frac{a_i \times d_i}{b_i \times c_i}\right)$$

where a_i is a number of positive samples in organic crops, b_i is a number of negative samples in organic crops, c_i is a number of positive samples in conventional crops, and d_i is a number of negative samples in conventional crops.

RESULTS

Supplementary Table 8 shows the basic information/statistics on the publications/data used for meta-analyses of composition parameters included in [Fig. 3 and 4 in the main paper](#).

Supplementary Table 9 and 10 shows the mean percentage differences (MPD) and standard errors (SE) calculated using the data included in for standard unweighted and weighted meta-analyses of composition parameters shown in [Fig. 3 and 4 of the main paper](#) (MPDs are also shown as symbols in [Fig. 3 and 4](#)).

Supplementary Table 11 shows the meta-analysis results for addition composition parameters (volatiles, solids, titratable acidity, and the minerals Cr, Ga, Mg, Mn, Mo, Rb, Sr, Zn) for which significant differences were detected by the standard weighted and unweighted meta-analysis protocols. These were not included in the main paper, because there is very limited information on potential health impacts for these compounds from the relative changes in composition detected in this study.

[Supplementary Figures 3 to 4](#) show the forest plot and the results of the standard unweighted and weighted meta-analysis mixed-effect model with study type as moderator, for data from studies which compared the composition of organic and conventional crops and crop based foods.

[Supplementary Figures 5 to 40](#) show the forest plots comparing SMDs from standard weighted meta-analysis mixed-effect model for different products, for composition parameters for which significant difference between organic and conventional crops and crop based foods were found.

[Supplementary Figures 41](#) shows results of the standard weighted meta-analysis mixed-effect model with publication as moderator, for data from studies which compared the frequency of occurrence of pesticides in organic and conventional crops.

Supplementary Table 12 shows the results of the standard unweighted and weighted meta-analysis for parameters where none of the 8 meta-analysis protocols identified significant effects.

Supplementary Table 13 shows the results of the statistical test for publication bias reported in [Fig. 3 of the main paper](#).

DISCUSSION

Mineral composition

Results from the meta-analysis indicate that a switch from organic to conventional crop production has a very limited effect on mineral composition, especially with respect to minerals such as calcium (Ca), copper (Cu), magnesium (Mg), iron (Fe), selenium (Se), iodine (I) and zinc (Zn) for which insufficient intakes and deficiencies are thought to be relatively common and dietary

supplementation or biofortification of crops has been recommended^(1,2). For Ca, Cu, Fe no significant differences between organic and conventional crops were detected by meta-analyses (see Table 12), for Se only one of the sensitivity analyses detected significant difference, and for I there were insufficient data to carry out meta-analyses (Table 7).

For Zn and Mg unweighted meta-analysis detected slightly (<5%), but significantly higher concentrations in organic crops. Since dietary intakes of Mg and Zn are often lower than recommended and Zinc deficiency is a serious problem worldwide^(3,4) the observed increase in Zn and Mg concentrations is in principle desirable. However, such a small difference is unlikely to have a “significant” nutritional or health impact, particularly since the main sources of Mg and Zn in Western diets are of animal origin.

Chromium (Cr) has been recognised as a critical co-factor in the action of insulin and an essential mineral nutrient^(5,6). Chromium supplementation was shown to attenuate symptoms and reduce insulin requirements for patients with diabetes⁽⁷⁾. A reduction in chromium intake associated with the consumption of organic foods would therefore be undesirable for diabetics, but can be compensated by chromium supplementation. There is no evidence that the reduction in Cr intake with organic crops could affect non-diabetics, since chromium supplementation has not been linked to health benefits in non-diabetics⁽⁷⁾. The naturally occurring trivalent chromium compounds are considered essential nutrients and at typical dietary intake values (50 to 200µg day⁻¹) they are not considered to cause toxicity problem⁽⁸⁾. However, dietary intake and environmental exposure to hexavalent chromium compounds was linked to mutagenic, carcinogenic and toxic effects in both animals and human (e.g. workers in industries such as chromate pigment production and use, chromium plating, stainless steel welding, ferrochromium alloy production and leather tanning)^(6,9).

There is limited information on the potential health impacts of the other minerals (Ga, Mn, Mo, Rb, and Sr) for which significant composition differences were detected (Table 11). However, there is one report linking increased dietary Mo intakes to reduced reproductive health (lower sperm counts) in animals and humans⁽¹⁰⁾. Also oral administration of 2 g day⁻¹ of strontium raneate was shown to reduce vertebral fractures in women with osteoporosis⁽¹¹⁾. However, the evidence base is currently limited and it is impossible to extrapolate from these studies whether the differences in Mo and Sr intakes associated with a switch from conventional to organic crop consumption will result in significant health impacts.

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Table 8. Basic information/statistics on the publications/data used for meta-analyses of composition parameters included in Fig. 3 and 4 in the main paper.

| Parameter | Studies | <i>n</i> | No of ORG | No of CONV | Number of comparisons reporting that concentrations were | | | | | |
|--------------------------------|---------|----------|--------------|---------------|--|------|-----------|-------------------------|-------|------------------------------------|
| | | | | | Numerically higher in | | Identical | Significantly higher in | | Not significantly different‡ |
| | | | | | ORG | CONV | | ORG* | CONV† | |
| Antioxidant activity | 69 | 160 | 1163 | 1155 | 117 | 41 | 2 | 21 | 6 | 25 |
| FRAP | 9 | 14 | 108 | 108 | 11 | 3 | 0 | 1 | 0 | 7 |
| ORAC | 8 | 8 | 43 | 43 | 7 | 1 | 0 | 1 | 0 | 0 |
| TEAC | 18 | 22 | 402 | 406 | 19 | 3 | 0 | 3 | 0 | 3 |
| Phenolic compounds | 86 | 129 | 959 | 985 | 88 | 39 | 2 | 17 | 4 | 40 |
| Flavonoids (total) | 13 | 20 | 115 | 113 | 11 | 9 | 0 | 5 | 5 | 3 |
| Phenolic acids (total) | 7 | 9 | 176 | 176 | 7 | 1 | 1 | 1 | 0 | 0 |
| Phenolic acids§ | 52 | 154 | 1833 | 2000 | 95 | 57 | 2 | 11 | 9 | 6 |
| Chlorogenic acid | 21 | 24 | 245 | 256 | 15 | 9 | 0 | 4 | 2 | 0 |
| Flavanones | 12 | 76 | 581 | 581 | 48 | 28 | 0 | 24 | 14 | 11 |
| Stilbenes | 7 | 8 | 44 | 38 | 8 | 0 | 0 | 0 | 0 | 3 |
| Flavones and flavonols§ | 46 | 196 | 1562 | 1993 | 119 | 71 | 6 | 21 | 3 | 38 |
| Flavones§ | 9 | 27 | 249 | 249 | 16 | 10 | 1 | 0 | 0 | 10 |
| Flavonols§ | 44 | 169 | 1310 | 1744 | 103 | 61 | 5 | 21 | 3 | 28 |
| Quercetin | 20 | 23 | 172 | 172 | 15 | 7 | 1 | 3 | 2 | 6 |
| Rutin | 10 | 12 | 150 | 161 | 8 | 3 | 1 | 2 | 0 | 2 |
| Kaempferol | 11 | 14 | 147 | 147 | 11 | 2 | 1 | 5 | 0 | 3 |
| Anthocyanins (total) | 18 | 20 | 131 | 115 | 17 | 3 | 0 | 3 | 0 | 1 |
| Anthocyanins§ | 11 | 53 | 181 | 221 | 30 | 23 | 0 | 9 | 0 | 3 |

n, numbers of data-pairs (comparisons) included in the meta-analysis; ORG, organic samples; CONV, conventional samples; FRAP, ferric reducing antioxidant potential; ORAC, oxygen radical absorbance capacity method; TEAC, Trolox equivalent antioxidant capacity. *The number of comparisons in which statistically significant difference was found with higher level in ORG; †The number of comparisons in which statistically significant difference was found with higher level in CONV; ‡The number of comparisons in which there was no significant difference between ORG and CONV; §Data for different compounds within the same chemical group were included in the same meta-analyses.

Table 8 cont. Basic information/statistics on the publications/data used for meta-analyses of composition parameters included in Fig. 3 and 4 in the main paper.

| Parameter | Studies | n | No of ORG | No of CONV | Number of comparisons reporting that concentrations were | | | | | |
|------------------------------|---------|-----|-----------|------------|--|------|-----------|-------------------------|-------|------------------------------|
| | | | | | Numerically higher in | | Identical | Significantly higher in | | Not significantly different‡ |
| | | | | | ORG | CONV | | ORG* | CONV† | |
| Carotenoids (total) | 15 | 15 | 134 | 134 | 13 | 2 | 0 | 3 | 1 | 1 |
| Carotenoids§ | 55 | 167 | 1528 | 1594 | 97 | 66 | 4 | 17 | 16 | 34 |
| Xanthophylls | 18 | 70 | 735 | 741 | 46 | 21 | 3 | 9 | 6 | 10 |
| Lutein | 14 | 21 | 186 | 187 | 14 | 4 | 3 | 2 | 0 | 3 |
| Ascorbic acid | 45 | 65 | 1008 | 1065 | 43 | 22 | 0 | 10 | 2 | 21 |
| Vitamin E | 10 | 25 | 162 | 160 | 9 | 15 | 1 | 2 | 3 | 4 |
| Carbohydrates (total) | 41 | 60 | 562 | 655 | 37 | 22 | 1 | 11 | 0 | 18 |
| Carbohydrates§ | 53 | 112 | 1288 | 1545 | 63 | 46 | 3 | 14 | 4 | 39 |
| Sugars (reducing) | 18 | 20 | 188 | 188 | 12 | 7 | 1 | 2 | 0 | 4 |
| Protein (total) | 56 | 87 | 1773 | 1942 | 24 | 61 | 2 | 6 | 9 | 16 |
| Amino acids§ | 18 | 360 | 1875 | 1908 | 156 | 198 | 6 | 8 | 39 | 162 |
| Dry matter | 85 | 130 | 1447 | 1483 | 74 | 48 | 8 | 8 | 2 | 36 |
| Fibre | 7 | 19 | 239 | 235 | 4 | 11 | 4 | 0 | 2 | 11 |
| Nitrogen (N) | 55 | 88 | 2871 | 1181 | 26 | 59 | 3 | 2 | 11 | 16 |
| Nitrates | 40 | 80 | 1361 | 1596 | 24 | 56 | 0 | 3 | 12 | 17 |
| Nitrites | 7 | 15 | 105 | 113 | 2 | 13 | 0 | 0 | 0 | 2 |
| Cadmium (Cd) | 27 | 62 | 924 | 1087 | 16 | 45 | 1 | 1 | 2 | 15 |

n, numbers of data-pairs (comparisons) included in the meta-analysis; ORG, organic samples; CONV, conventional samples; FRAP, ferric reducing antioxidant potential; ORAC, oxygen radical absorbance capacity method; TEAC, Trolox equivalent antioxidant capacity. *The number of comparisons in which statistically significant difference was found with higher level in ORG; †The number of comparisons in which statistically significant difference was found with higher level in CONV; ‡The number of comparisons in which there was no significant difference between ORG and CONV; §Data for different compounds within the same chemical group were included in the same meta-analyses.

Table 9. Mean percentage differences (MPD) and confidence intervals (CI) calculated using the data included in for standard unweighted and weighted meta-analyses of composition parameters shown in [Fig. 3 of the main paper](#) (MPDs are also shown as symbols in [Fig. 3](#)).

| Parameter | Calculated based on data included in | | | | | |
|-----------------------------------|--------------------------------------|--------|-----------------|------------------------|--------|----------------|
| | unweighted meta-analysis | | | weighted meta-analysis | | |
| | <i>n</i> | MPD* | 95% CI | <i>n</i> | MPD* | 95% CI |
| Antioxidant activity | 160 | 17.89 | 10.81, 24.96 | 66 | 17.38 | 2.52, 32.24 |
| FRAP | 14 | 14.95 | 2.45, 27.45 | 5 | 11.96 | 1.64, 22.27 |
| ORAC | 8 | 18.15 | 4.95, 31.34 | 4 | 21.01 | 1.87, 40.15 |
| TEAC | 22 | 26.63 | 8.78, 44.47 | 7 | 29.20 | -21.82, 80.21 |
| Phenolic compounds (total) | 129 | 23.27 | 8.19, 38.35 | 58 | 25.83 | -3.51, 55.16 |
| Flavonoids (total) | 20 | -15.64 | -51.28, 20.00 | 8 | 29.36 | 8.79, 49.94 |
| Phenolic acids (total) | 9 | 33.48 | 3.05, 63.91 | 3 | 4.63 | 3.25, 6.02 |
| Phenolic acids† | 153 | 21.09 | -7.16, 49.35 | 89 | 18.85 | 5.05, 32.65 |
| Chlorogenic acid | 24 | 38.34 | 6.86, 69.82 | 14 | 35.64 | -13.97, 85.26 |
| Flavanones† | 75 | 23.64 | -34.65, 81.93 | 54 | 68.79 | 12.96, 124.62 |
| Stilbenes | 8 | 212.31 | 7.20, 417.42 | 4 | 27.94 | 11.71, 44.17 |
| Flavones and flavonols | 194 | 24.69 | -10.49, 59.87 | 134 | 45.82 | 27.01, 64.63 |
| Flavones | 27 | 17.09 | -3.74, 37.91 | 23 | 25.55 | 3.01, 48.08 |
| Flavonols† | 168 | 43.92 | -9.79, 97.63 | 111 | 50.02 | 27.85, 72.19 |
| Quercetin | 23 | 29.14 | 0.10, 58.18 | 17 | 18.72 | -7.89, 45.32 |
| Rutin | 12 | 54.39 | 1.37, 107.41 | 9 | 19.86 | -4.67, 44.4 |
| Kaempferol | 14 | 46.79 | 6.64, 86.94 | 13 | 45.93 | 2.61, 89.26 |
| Anthocyanins (total) | 20 | 31.60 | 6.00, 57.2 | 10 | 44.38 | -2.54, 91.31 |
| Anthocyanins | 53 | 30.53 | 8.25, 52.82 | 22 | 51.16 | 16.60, 85.72 |
| Carotenoids (total) | 15 | 21.88 | 6.51, 37.25 | 4 | 17.30 | 0.44, 34.16 |
| Carotenoids† | 163 | 18.96 | 7.49, 30.43 | 82 | 14.50 | -2.60, 31.61 |
| Xanthophylls† | 66 | 25.02 | 11.14, 38.91 | 33 | 11.71 | -4.26, 27.68 |
| Lutein | 21 | 16.64 | 0.39, 32.90 | 13 | 4.88 | -3.25, 13.01 |
| Ascorbic acid | 65 | 28.78 | -9.19, 66.74 | 30 | 5.91 | -3.07, 14.88 |
| Vitamin E | 25 | -9.15 | -30.12, 11.81 | 15 | -15.20 | -49.04, 18.65 |
| Carbohydrates (total) | 60 | 13.00 | 2.32, 23.68 | 16 | 24.84 | 4.57, 45.12 |
| Carbohydrates† | 111 | 11.62 | 4.05, 19.20 | 53 | 11.12 | 2.04, 20.21 |
| Sugars (reducing) | 20 | 28.14 | -0.15, 56.43 | 3 | 7.14 | 3.56, 10.73 |
| Protein (total) | 87 | -9.18 | -13.90, -4.45 | 26 | -15.17 | -27.08, -3.26 |
| Amino acids† | 332 | -3.01 | -4.84, -1.19 | 117 | -10.75 | -14.05, -7.46 |
| Dry matter† | 129 | 2.99 | 1.06, 4.91 | 24 | 2.46 | -0.76, 5.68 |
| Fibre | 19 | -7.32 | -13.43, -1.21 | 15 | -8.13 | -14.35, -1.90 |
| Nitrogen (N) | 88 | -6.75 | -10.99, -2.52 | 35 | -9.77 | -15.33, -4.22 |
| Nitrate† | 79 | -44.89 | -91.62, 1.84 | 29 | -30.09 | -143.99, 83.81 |
| Nitrite | 15 | -80.73 | -149.22, -12.25 | 7 | -86.53 | -224.63, 51.57 |
| Cadmium (Cd) | 62 | -69.07 | -146.52, 8.39 | 25 | -47.85 | -111.61, 15.90 |

n, number of data points included in the comparison; MPD, mean percentage difference; FRAP, ferric reducing antioxidant potential; ORAC, oxygen radical absorbance capacity method; TEAC, Trolox equivalent antioxidant capacity. *Magnitude of difference between organic (ORG) and conventional (CONV) samples (value <0 indicate higher concentration in CONV, value >0 indicate higher concentration in ORG); †Outlying data-pairs for which the MPD between ORG and CONV was over 50 times higher than the mean value were removed.

Table 10. Mean percentage differences (MPD) and confidence intervals (CI) calculated using the data included in for standard unweighted and weighted meta-analyses of composition parameters shown in **Fig. 4 of the main paper** (MPDs are also shown as symbols in **Fig. 4**).

| Parameter* | Calculated based on data included in | | | | | |
|-----------------------------------|--------------------------------------|--------|----------------|------------------------|--------|---------------|
| | unweighted meta-analysis | | | weighted meta-analysis | | |
| | <i>n</i> | MPD† | 95% CI | <i>n</i> | MPD† | 95% CI |
| Antioxidant activity | | | | | | |
| Fruits | 93 | 24.19 | 15.58, 32.80 | 39 | 20.16 | 3.03, 37.28 |
| Vegetables | 58 | 5.96 | -7.15, 19.07 | 25 | 10.83 | -17.74, 39.40 |
| Other‡ | 5 | 32.80 | 22.11, 43.49 | - | - | - |
| Phenolic compounds (total) | | | | | | |
| Fruits | 58 | 26.94 | -2.26, 56.13 | 30 | 33.61 | -18.66, 85.87 |
| Vegetables | 61 | 10.39 | 2.72, 18.05 | 25 | 7.65 | -3.44, 18.74 |
| Cereals | 6 | 64.74 | -38.78, 168.25 | - | - | - |
| Phenolic acids§ | | | | | | |
| Fruits | 83 | 18.62 | 4.35, 32.88 | 47 | 21.89 | 1.47, 42.32 |
| Vegetables | 48 | 26.46 | 2.40, 50.52 | 30 | 17.26 | -7.80, 42.32 |
| Cereals | 21 | 4.10 | -6.65, 14.85 | 12 | 10.90 | -5.97, 27.77 |
| Flavanones§ | | | | | | |
| Fruits | 59 | 18.31 | -27.40, 64.02 | 40 | 74.17 | 1.34, 147 |
| Vegetables | 16 | 50.68 | -0.62, 101.99 | 14 | 53.43 | -5.33, 112.19 |
| Flavones and flavonols | | | | | | |
| Fruits | 87 | 1.68 | -6.65, 10.02 | 47 | 13.75 | -2.18, 29.68 |
| Vegetables | 98 | 44.08 | 13.82, 74.33 | 78 | 67.38 | 37.37, 97.4 |
| Cereals | 9 | 26.39 | 16.39, 36.39 | 9 | 26.39 | 16.39, 36.39 |
| Carotenoids§ | | | | | | |
| Fruits | 36 | 61.56 | 25.55, 97.57 | 19 | 60.87 | -3.01, 124.74 |
| Vegetables | 101 | 7.17 | -4.03, 18.38 | 39 | -0.43 | -6.47, 5.61 |
| Cereals | 14 | 2.40 | -2.42, 7.22 | 14 | 2.40 | -2.42, 7.22 |
| Compound food | 12 | 9.71 | -33.32, 52.74 | 10 | -19.84 | -44.84, 5.15 |
| Xanthophylls§ | | | | | | |
| Fruits | 20 | 64.36 | 37.77, 90.95 | 9 | 39.84 | -1.31, 80.98 |
| Vegetables | 26 | 16.92 | -4.16, 37.99 | 5 | 34.84 | 0.22, 69.47 |
| Cereals | 14 | 2.40 | -2.42, 7.22 | 14 | 2.40 | -2.42, 7.22 |
| Compound food | 6 | -18.17 | -66.40, 30.05 | 5 | -35.98 | -76.75, 4.80 |
| Carbohydrates (total) | | | | | | |
| Fruits | 24 | 2.39 | -2.58, 7.35 | 6 | 2.64 | -3.45, 8.72 |
| Vegetables | 31 | 19.67 | 0.93, 38.40 | 6 | 39.23 | -0.72, 79.17 |
| Cereals | 4 | 27.88 | -32.86, 88.62 | - | - | - |

n, number of data points included in the comparison; MPD, mean percentage difference; FRAP, ferric reducing antioxidant potential; ORAC, oxygen radical absorbance capacity method; TEAC, Trolox equivalent antioxidant capacity. *The summary results and product groups for which *n*≤3 were removed (for summary results see Table 9.), †Magnitude of difference between organic (ORG) and conventional (CONV) samples (value <0 indicate higher concentration in CONV, value >0 indicate higher concentration in ORG); ‡Tea (leaves), §Outlying data-pairs for which the MPD between ORG and CONV was over 50 times higher than the mean value were removed, ||Laboratory rat feed, baby food (berry-based dessert, chicken and vegetable dinner), whole diet.

Table 10 cont. Mean percentage differences (MPD) and confidence intervals (CI) calculated using the data included in for standard unweighted and weighted meta-analyses of composition parameters shown in [Fig. 4 of the main paper](#) (MPDs are also shown as symbols in [Fig. 4](#)).

| Parameter* | Calculated based on data included in | | | | | |
|------------------------|--------------------------------------|---------|-----------------|------------------------|---------|-----------------|
| | unweighted meta-analysis | | | weighted meta-analysis | | |
| | <i>n</i> | MPD† | 95% CI | <i>n</i> | MPD† | 95% CI |
| Protein (total) | | | | | | |
| Fruits | 7 | -4.91 | -25.01, 15.20 | - | - | - |
| Vegetables | 34 | 0.79 | -3.75, 5.33 | 8 | 2.98 | -12.37, 18.34 |
| Cereals | 43 | -18.08 | -24.76, -11.39 | 15 | -25.89 | -42.96, -8.82 |
| Amino acids§ | | | | | | |
| Fruits | 38 | 2.70 | 1.62, 3.77 | 18 | 5.25 | -0.08, 10.58 |
| Vegetables | 152 | 1.38 | -1.23, 3.99 | 18 | -7.10 | -19.17, 4.97 |
| Cereals | 121 | -7.97 | -11.06, -4.88 | 63 | -15.35 | -19.33, -11.36 |
| Compound food | 21 | -8.76 | -10.43, -7.10 | 18 | -9.54 | -11.12, -7.96 |
| Nitrogen (N) | | | | | | |
| Fruits | 19 | -3.91 | -14.40, 6.58 | 7 | -9.85 | -20.03, 0.33 |
| Vegetables | 42 | -10.26 | -16.49, -4.04 | 20 | -5.82 | -13.37, 1.72 |
| Cereals | 14 | -14.31 | -21.91, -6.72 | 7 | -21.92 | -33.21, -10.63 |
| Herbs and spices | 12 | 9.55 | 3.64, 15.47 | - | - | - |
| Cadmium (Cd) | | | | | | |
| Fruits | 4 | -288.82 | -786.51, 208.87 | - | - | - |
| Vegetables | 34 | -77.02 | -138.52, -15.52 | 10 | 75.35 | -272.91, 423.60 |
| Cereals | 17 | -86.26 | -141.88, -30.64 | 8 | -151.25 | -248.93, -53.57 |

n, number of data points included in the comparison; MPD, mean percentage difference; FRAP, ferric reducing antioxidant potential; ORAC, oxygen radical absorbance capacity method; TEAC, Trolox equivalent antioxidant capacity. *The summary results and product groups for which $n \leq 3$ were removed (for summary results see Table 9.), †Magnitude of difference between organic (ORG) and conventional (CONV) samples (value <0 indicate higher concentration in CONV, value >0 indicate higher concentration in ORG); ‡Tea (leaves), §Outlying data-pairs for which the MPD between ORG and CONV was over 50 times higher than the mean value were removed, ||Laboratory rat feed, baby food (berry-based dessert, chicken and vegetable dinner), whole diet.

Table 11. Meta-analysis results for addition composition parameters (volatiles, solids, titratable acidity, and the minerals Cr, Ga, Mg, Mn, Mo, Rb, Sr, Zn) for which significant differences were detected by the standard weighted and unweighted meta-analysis protocols.

| Parameter | Unweighted meta-analysis | | | | | Weighted meta-analysis | | | | | | |
|--------------------|--------------------------|-----------|------------|--------|----------------|------------------------|-------|--------------|------------|----------------|--------|----------------|
| | <i>n</i> | Ln ratio* | <i>P</i> † | MPD‡ | 95% CI | <i>n</i> | SMD | 95% CI | <i>P</i> † | Heterogeneity§ | MPD‡ | 95% CI |
| Volatile compounds | 193 | 4.65 | 0.043 | 4.80 | -1.06, 10.66 | 101 | -0.73 | -1.29, -0.18 | 0.010 | Yes (86%) | -6.99 | -15.34, 1.36 |
| Solids | 83 | 4.61 | 0.238 | 0.69 | -1.39, 2.77 | 29 | 0.35 | 0.07, 0.62 | 0.013 | Yes (75%) | 2.20 | -0.58, 4.98 |
| Solids (soluble) | 79 | 4.61 | 0.216 | 0.76 | -1.33, 2.85 | 27 | 0.27 | 0.01, 0.52 | 0.043 | Yes (70%) | 1.51 | -1.31, 4.33 |
| Titratable acidity | 48 | 4.65 | 0.028 | 5.41 | -0.11, 10.92 | 17 | 0.41 | 0.00, 0.81 | 0.049 | Yes (81%) | 6.99 | 1.55, 12.42 |
| Chromium (Cr) | 18 | 4.32 | 0.041 | -53.13 | -122.84, 16.57 | 14 | -2.00 | -3.68, -0.31 | 0.020 | Yes (98%) | -58.84 | -147.36, 29.67 |
| Gallium (Ga) | 7 | 4.25 | 0.024 | -56.92 | -122.30, 8.46 | 7 | -5.62 | -15.02, 3.78 | 0.241 | Yes (100%) | -56.92 | -122.30, 8.46 |
| Magnesium (Mg) | 97 | 4.67 | <0.001 | 8.16 | 3.75, 12.58 | 33 | 0.15 | -0.12, 0.42 | 0.284 | Yes (84%) | 4.06 | -4.69, 12.80 |
| Manganese (Mn) | 44 | 4.54 | 0.001 | -6.74 | -10.68, -2.79 | 20 | -0.36 | -0.67, -0.04 | 0.028 | Yes (80%) | -8.38 | -13.29, -3.48 |
| Molybdenum (Mo) | 20 | 4.96 | <0.001 | 52.58 | 23.13, 82.03 | 7 | 1.26 | 0.46, 2.06 | 0.002 | Yes (90%) | 65.39 | 26.13, 104.66 |
| Rubidium (Rb) | 14 | 4.94 | 0.004 | 54.71 | 8.87, 100.54 | 8 | 1.04 | 0.26, 1.83 | 0.009 | Yes (90%) | 81.52 | 5.59, 157.46 |
| Strontium (Sr) | 15 | 4.46 | 0.005 | -18.09 | -30.80, -5.38 | 8 | -0.40 | -0.73, -0.07 | 0.016 | Yes (66%) | -25.53 | -44.93, -6.13 |
| Zinc (Zn) | 88 | 4.70 | 0.001 | 12.03 | 3.87, 20.20 | 37 | 0.20 | -0.16, 0.57 | 0.268 | Yes (91%) | 4.65 | -5.92, 15.22 |

n, number of data points included in the comparison; MPD, mean percentage difference; SMD, standardised mean difference of fixed-effect model.*Ln ratio = $\text{Ln}(\text{ORG}/\text{CONV} \times 100\%)$; †*P* value <0.05 indicates significance of the difference in composition between organic and conventional crop/crop based food; ‡Magnitude of difference between organic (ORG) and conventional (CONV) samples (value <0 indicate higher concentration in CONV, value >0 indicate higher concentration in ORG); §Heterogeneity and the *I*² Statistic; ||Outlying data-pairs for which the % difference between ORG and CONV was over 50 times higher than the mean value were removed.

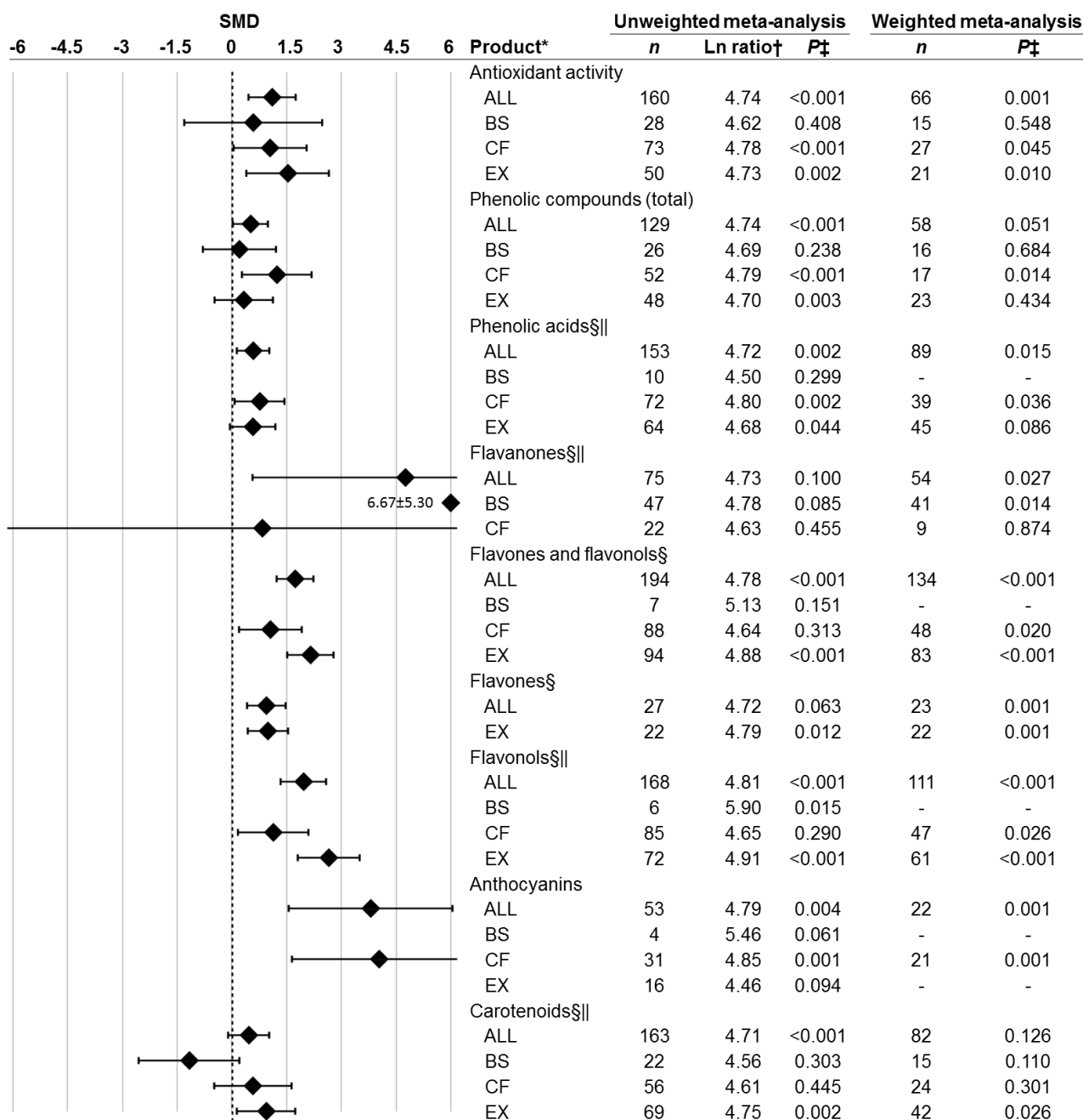


Figure 3. Results of the standard unweighted and weighted meta-analyses for different study types for antioxidant activity, plant secondary metabolites with antioxidant activity. SMD, standardised mean difference (error bars indicate 95% confidence intervals); n, number of data points included in meta-analyses. *for parameters where $n \leq 3$ for specific study type results from weighted meta-analyses are not shown, †Ln ratio = $\ln(\text{ORG}/\text{CONV} \times 100\%)$, ‡P value <0.05 indicates a significant difference between ORG and CONV, §data for different compounds within the same chemical group were included in the same meta-analyses, ||outlying data points (where the % difference between ORG and CONV was more than 50 times higher than the mean value including the outliers) were removed.

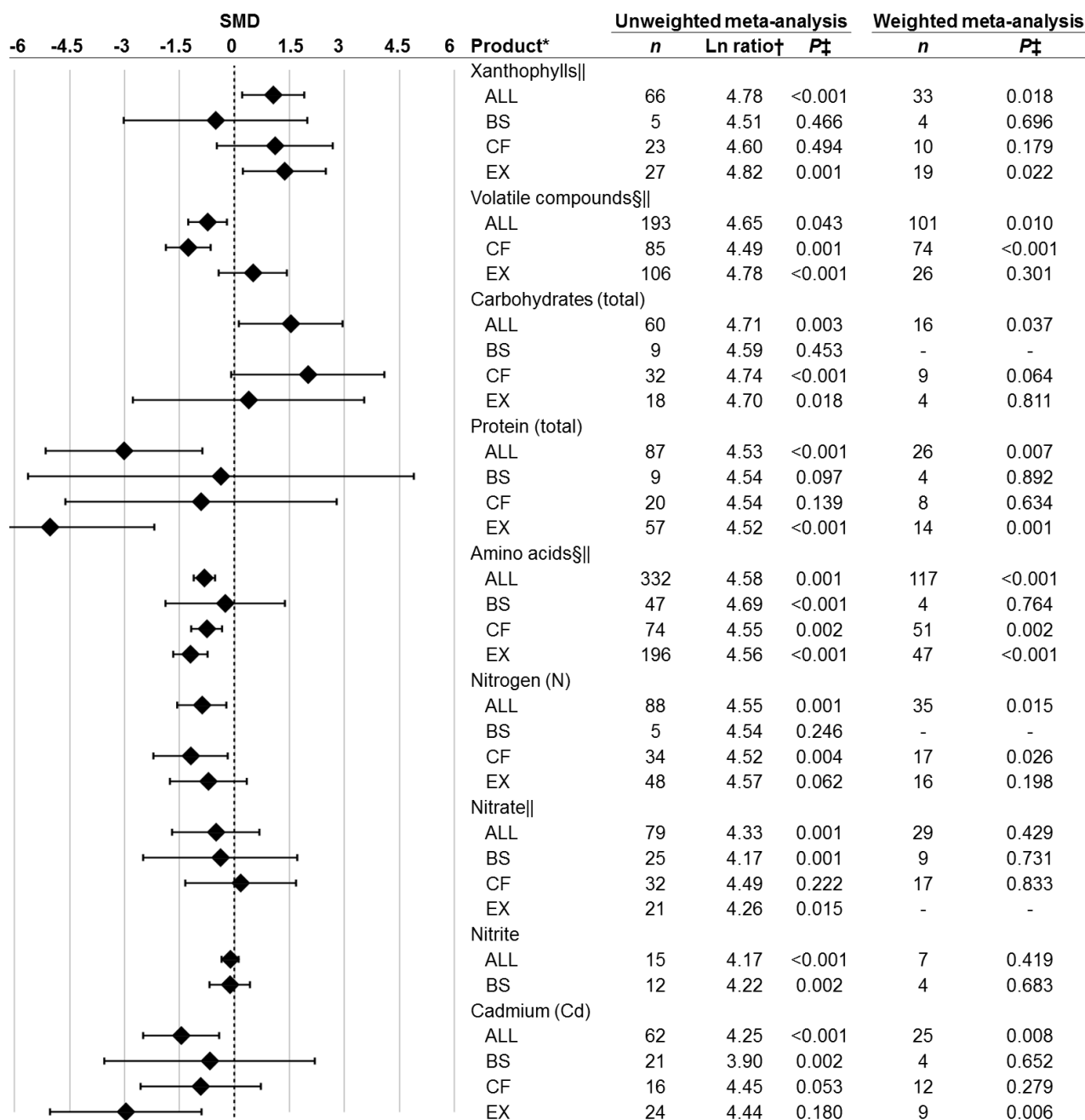


Figure 4. Results of the standard unweighted and weighted meta-analyses for different study types for plant secondary metabolites with antioxidant activity, volatile compounds, macronutrients, nitrogen compounds and cadmium. SMD, standardised mean difference (error bars indicate 95% confidence intervals); n, number of data points included in meta-analyses. *for parameters where $n \leq 3$ for specific study type results from weighted meta-analyses are not shown, †Ln ratio = $\ln(\text{ORG}/\text{CONV} \times 100\%)$, ‡P value <0.05 indicates a significant difference between ORG and CONV, §data for different compounds within the same chemical group were included in the same meta-analyses, ||outlying data points (where the % difference between ORG and CONV was more than 50 times higher than the mean value including the outliers) were removed.

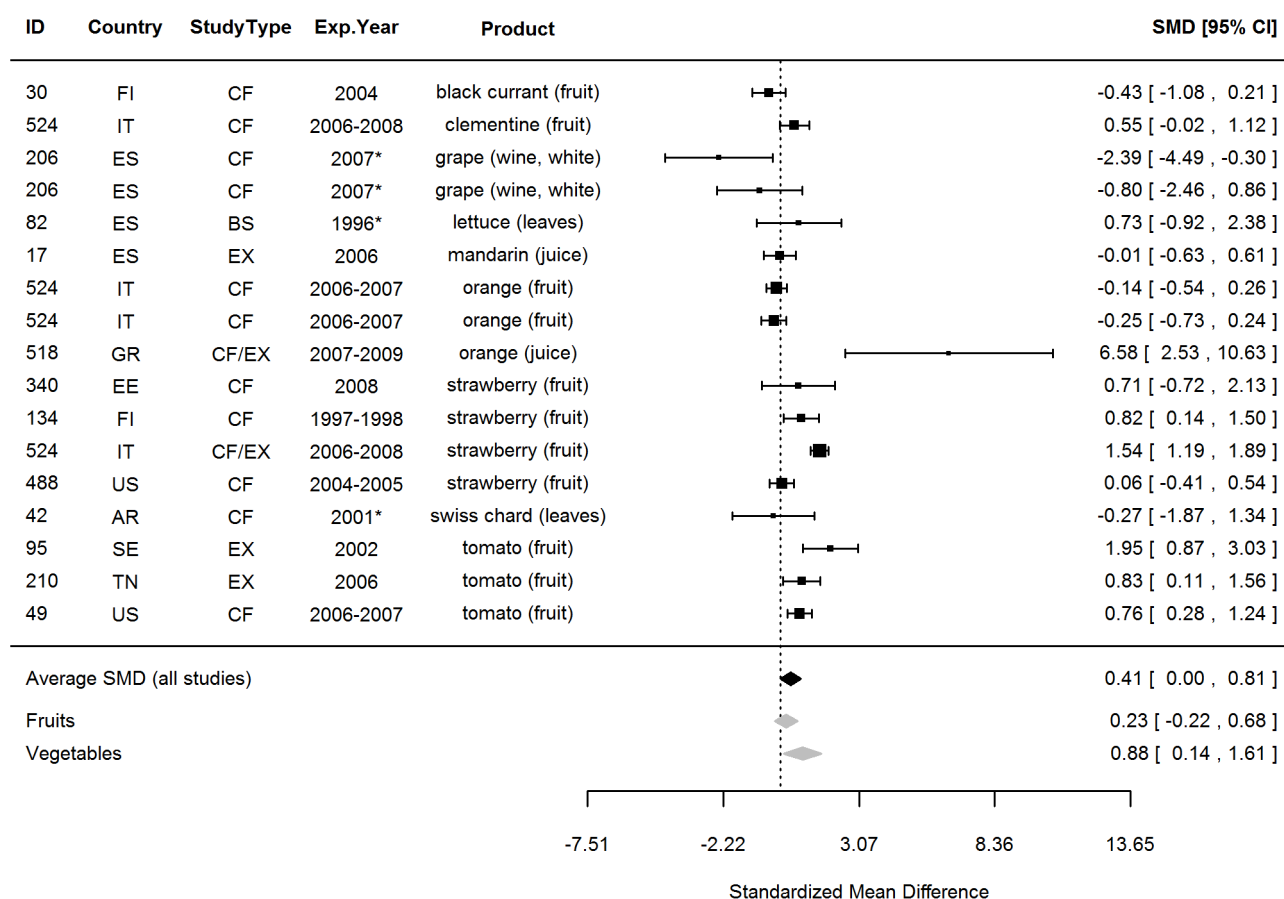


Figure 5. Forest plot showing the results of the comparison of titratable acidity between organic and conventional plant foods using standardised mean differences (SMDs) with 95% confidence intervals (CI), for studies included in standard weighted meta-analysis. The estimated average SMD for all studies and SMDs for different product groups are indicated at the bottom of the figure. Sign of the SMD indicates if the analysed parameter is higher (+) or lower (-) in organic foods. ID, Paper unique identification number (see Table 2 for references). *No information about the experimental year (estimated as publication year - 2).

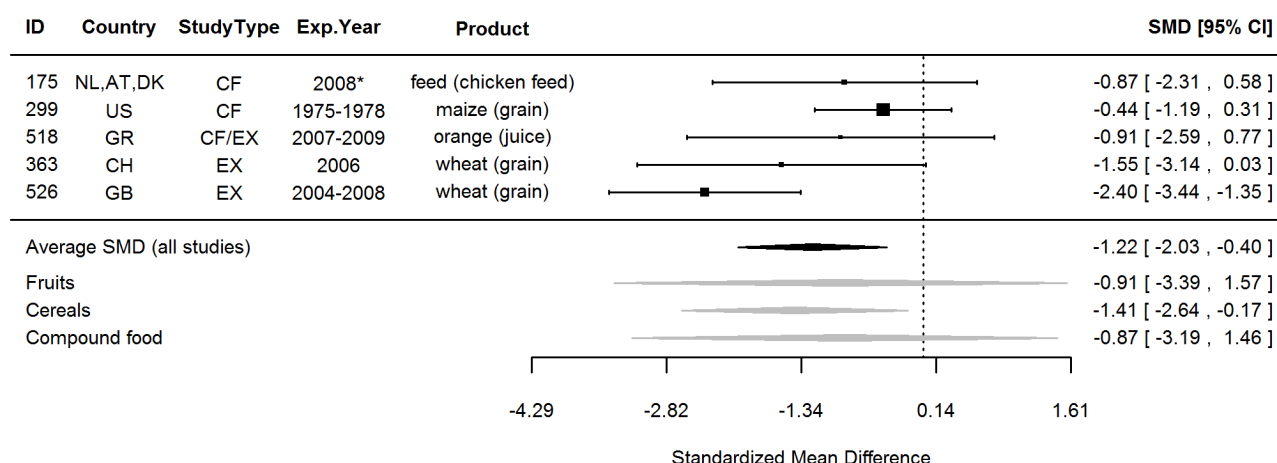


Figure 6. Forest plot showing the results of the comparison of arginine (Arg) between organic and conventional plant foods using standardised mean differences (SMDs) with 95% confidence intervals (CI), for studies included in standard weighted meta-analysis. The estimated average SMD for all studies and SMDs for different product groups are indicated at the bottom of the figure. Sign of the SMD indicates if the analysed parameter is higher (+) or lower (-) in organic foods. ID, Paper unique identification number (see Table 2 for references). *No information about the experimental year (estimated as publication year - 2).

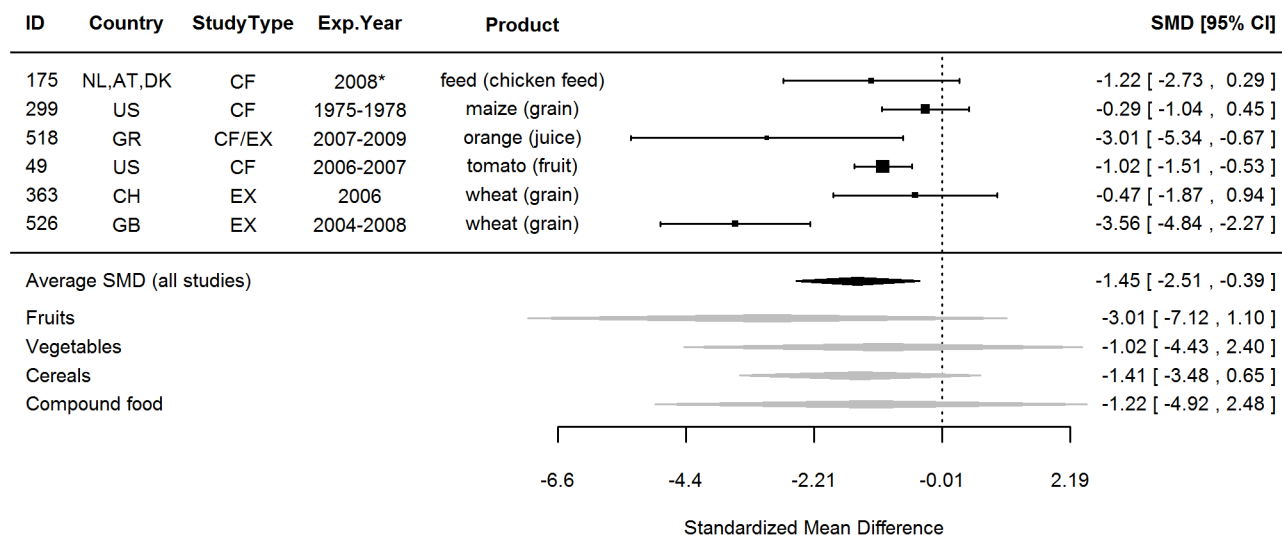


Figure 7. Forest plot showing the results of the comparison of histidine (His) between organic and conventional plant foods using standardised mean differences (SMDs) with 95% confidence intervals (CI), for studies included in standard weighted meta-analysis. The estimated average SMD for all studies and SMDs for different product groups are indicated at the bottom of the figure. Sign of the SMD indicates if the analysed parameter is higher (+) or lower (-) in organic foods. ID, Paper unique identification number (see Table 2 for references). *No information about the experimental year (estimated as publication year - 2).

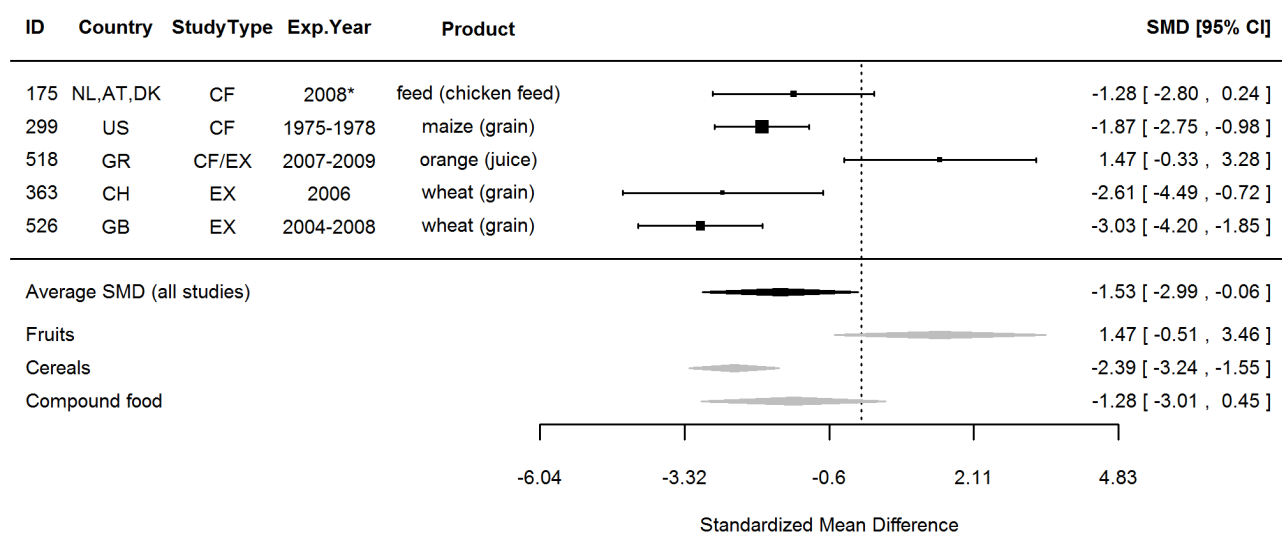


Figure 8. Forest plot showing the results of the comparison of isoleucine (Ile) between organic and conventional plant foods using standardised mean differences (SMDs) with 95% confidence intervals (CI), for studies included in standard weighted meta-analysis. The estimated average SMD for all studies and SMDs for different product groups are indicated at the bottom of the figure. Sign of the SMD indicates if the analysed parameter is higher (+) or lower (-) in organic foods. ID, Paper unique identification number (see Table 2 for references). *No information about the experimental year (estimated as publication year - 2).

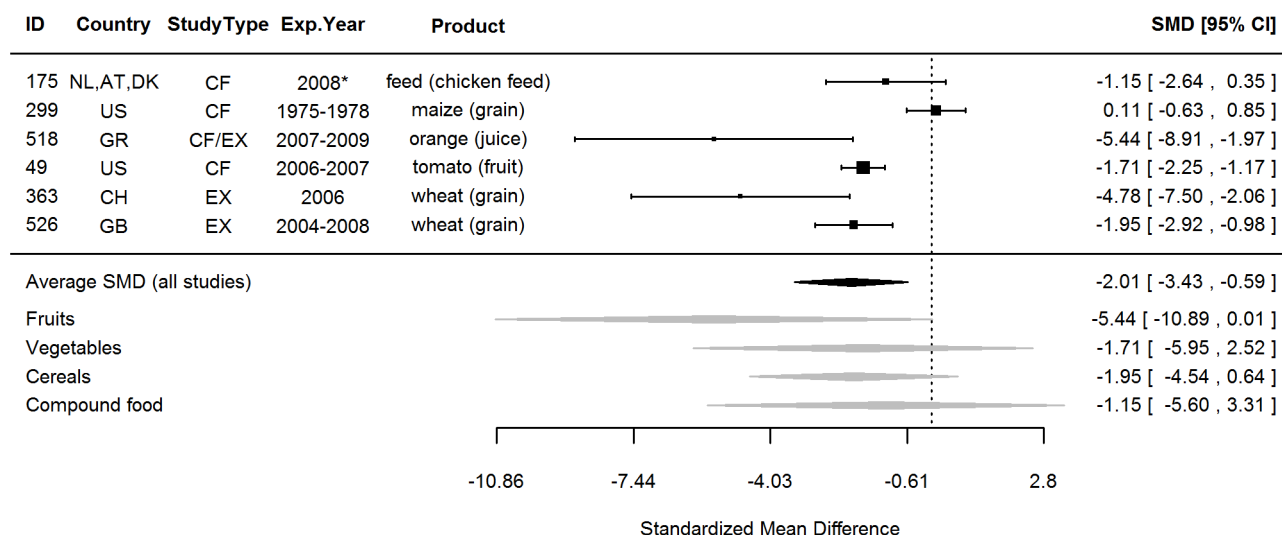


Figure 9. Forest plot showing the results of the comparison of lysine (Lys) between organic and conventional plant foods using standardised mean differences (SMDs) with 95% confidence intervals (CI), for studies included in standard weighted meta-analysis. The estimated average SMD for all studies and SMDs for different product groups are indicated at the bottom of the figure. Sign of the SMD indicates if the analysed parameter is higher (+) or lower (-) in organic foods. ID, Paper unique identification number (see Table 2 for references). *No information about the experimental year (estimated as publication year - 2).

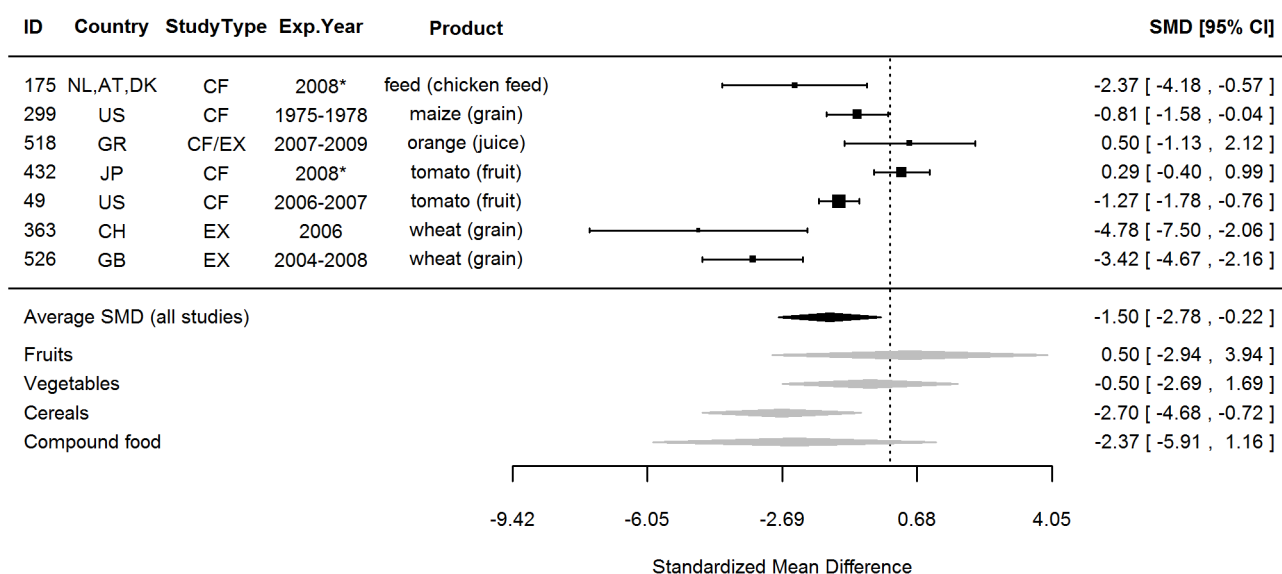


Figure 10. Forest plot showing the results of the comparison of phenylalanine (Phe) between organic and conventional plant foods using standardised mean differences (SMDs) with 95% confidence intervals (CI), for studies included in standard weighted meta-analysis. The estimated average SMD for all studies and SMDs for different product groups are indicated at the bottom of the figure. Sign of the SMD indicates if the analysed parameter is higher (+) or lower (-) in organic foods. ID, Paper unique identification number (see Table 2 for references). *No information about the experimental year (estimated as publication year - 2).

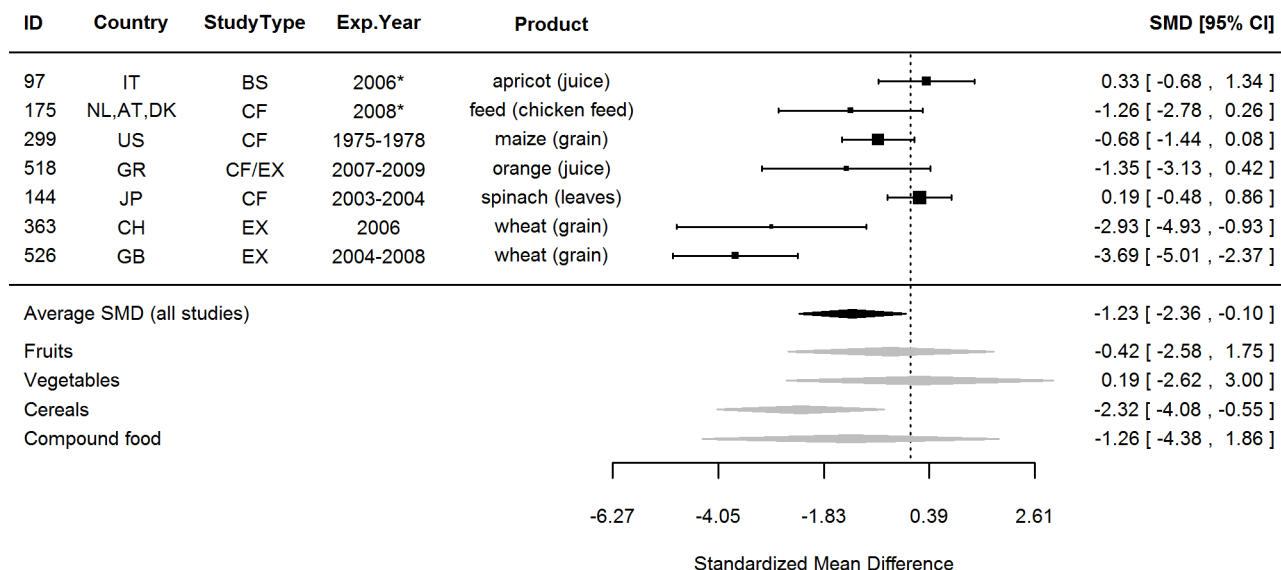


Figure 11. Forest plot showing the results of the comparison of proline (Pro) between organic and conventional plant foods using standardised mean differences (SMDs) with 95% confidence intervals (CI), for studies included in standard weighted meta-analysis. The estimated average SMD for all studies and SMDs for different product groups are indicated at the bottom of the figure. Sign of the SMD indicates if the analysed parameter is higher (+) or lower (-) in organic foods. ID, Paper unique identification number (see Table 2 for references). *No information about the experimental year (estimated as publication year - 2).

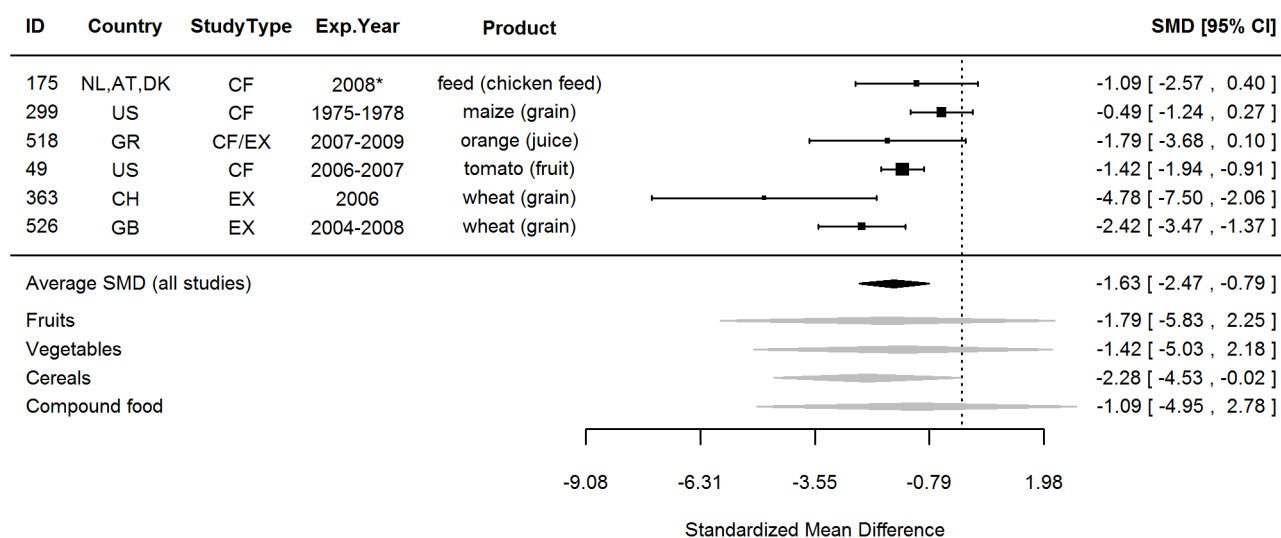


Figure 12. Forest plot showing the results of the comparison of threonine (Thr) between organic and conventional plant foods using standardised mean differences (SMDs) with 95% confidence intervals (CI), for studies included in standard weighted meta-analysis. The estimated average SMD for all studies and SMDs for different product groups are indicated at the bottom of the figure. Sign of the SMD indicates if the analysed parameter is higher (+) or lower (-) in organic foods. ID, Paper unique identification number (see Table 2 for references). *No information about the experimental year (estimated as publication year - 2).

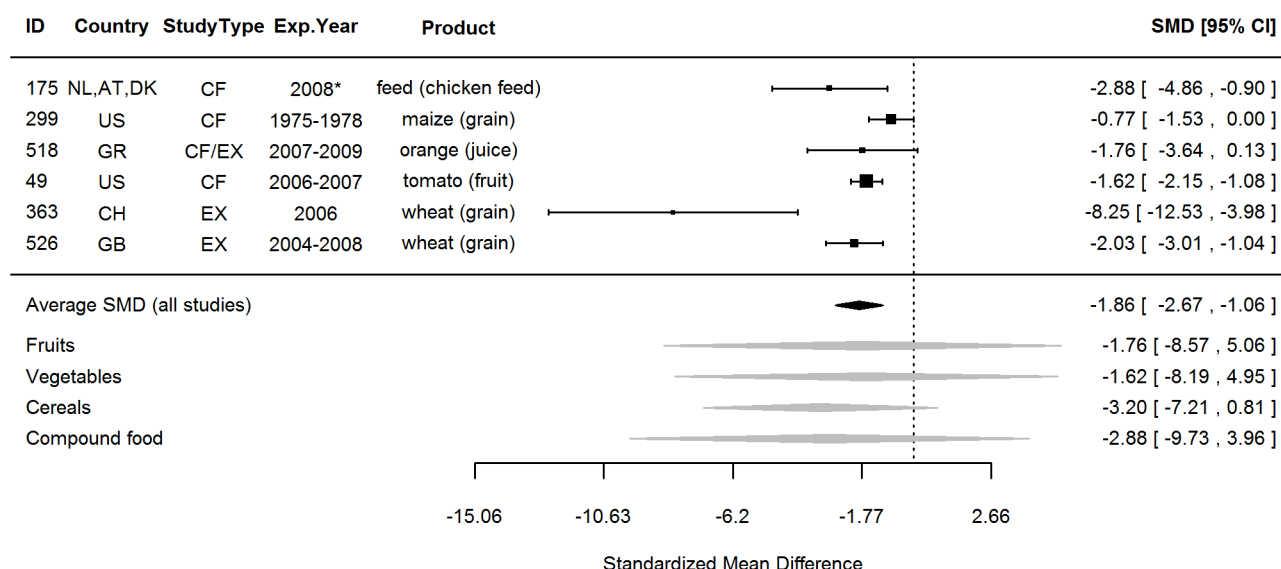


Figure 13. Forest plot showing the results of the comparison of tyrosine (Tyr) between organic and conventional plant foods using standardised mean differences (SMDs) with 95% confidence intervals (CI), for studies included in standard weighted meta-analysis. The estimated average SMD for all studies and SMDs for different product groups are indicated at the bottom of the figure. Sign of the SMD indicates if the analysed parameter is higher (+) or lower (-) in organic foods. ID, Paper unique identification number (see Table 2 for references). *No information about the experimental year (estimated as publication year - 2).

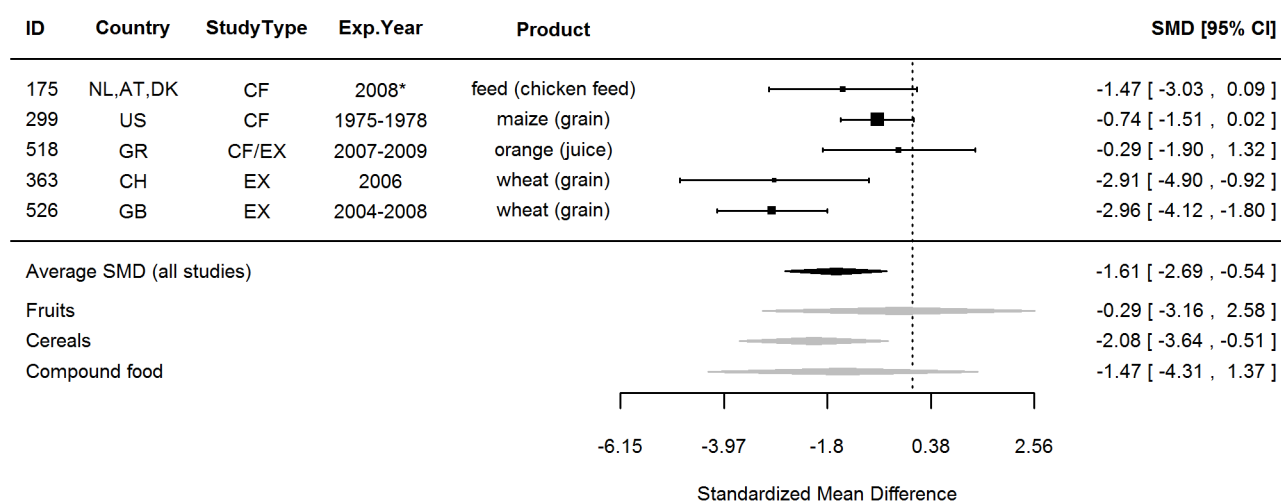


Figure 14. Forest plot showing the results of the comparison of valine (Val) between organic and conventional plant foods using standardised mean differences (SMDs) with 95% confidence intervals (CI), for studies included in standard weighted meta-analysis. The estimated average SMD for all studies and SMDs for different product groups are indicated at the bottom of the figure. Sign of the SMD indicates if the analysed parameter is higher (+) or lower (-) in organic foods. ID, Paper unique identification number (see Table 2 for references). *No information about the experimental year (estimated as publication year - 2).

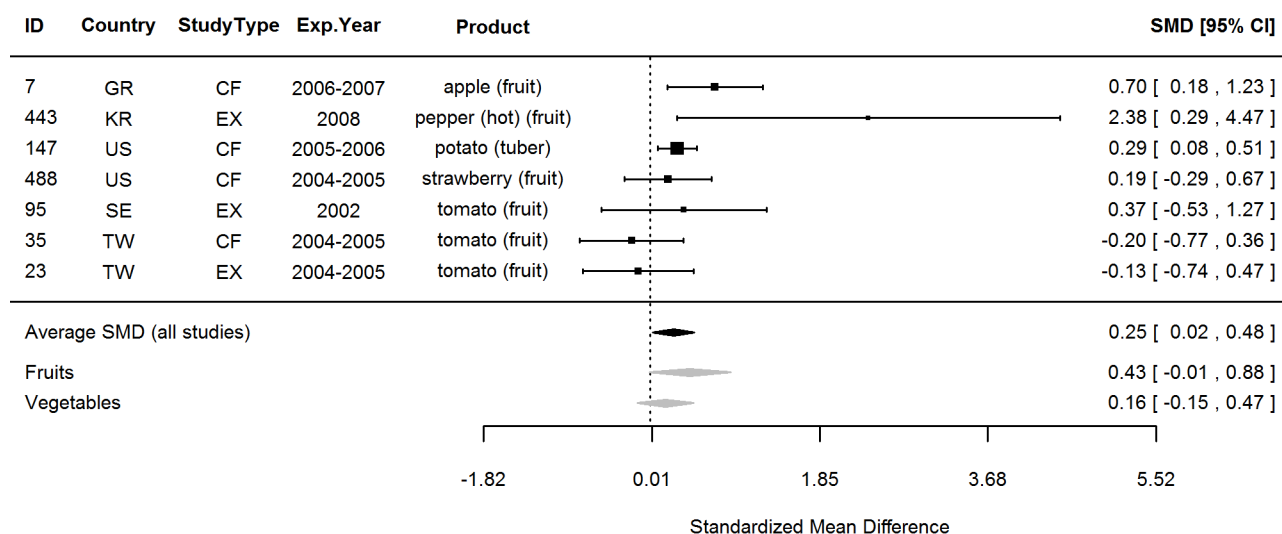


Figure 15. Forest plot showing the results of the comparison of antioxidant activity (TEAC) between organic and conventional plant foods using standardised mean differences (SMDs) with 95% confidence intervals (CI), for studies included in standard weighted meta-analysis. The estimated average SMD for all studies and SMDs for different product groups are indicated at the bottom of the figure. Sign of the SMD indicates if the analysed parameter is higher (+) or lower (-) in organic foods. ID, Paper unique identification number (see Table 2 for references).

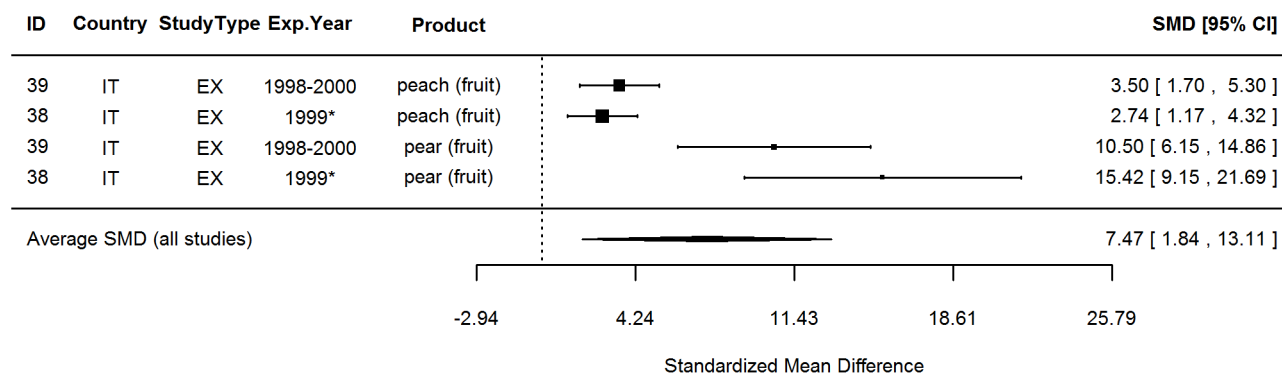


Figure 16. Forest plot showing the results of the comparison of polyphenoloxidase (PPO) activity (towards chlorogenic acid) between organic and conventional plant foods using standardised mean differences (SMDs) with 95% confidence intervals (CI), for studies included in standard weighted meta-analysis. The estimated average SMD for all studies is indicated at the bottom of the figure. Sign of the SMD indicates if the analysed parameter is higher (+) or lower (-) in organic foods. ID, Paper unique identification number (see Table 2 for references). *No information about the experimental year (estimated as publication year - 2).

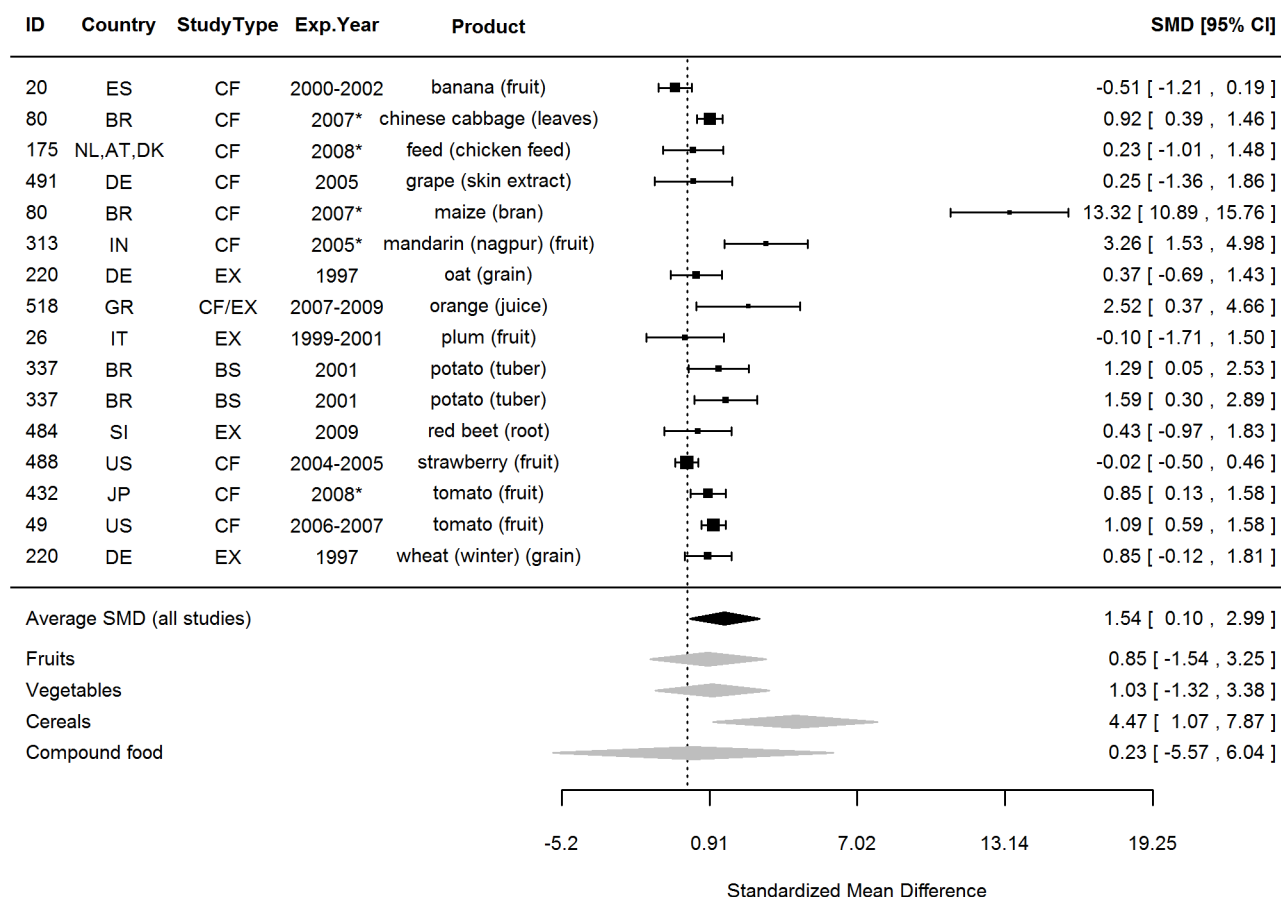


Figure 17. Forest plot showing the results of the comparison of carbohydrates (total) between organic and conventional plant foods using standardised mean differences (SMDs) with 95% confidence intervals (CI), for studies included in standard weighted meta-analysis. The estimated average SMD for all studies and SMDs for different product groups are indicated at the bottom of the figure. Sign of the SMD indicates if the analysed parameter is higher (+) or lower (-) in organic foods. ID, Paper unique identification number (see Table 2 for references). *No information about the experimental year (estimated as publication year - 2).

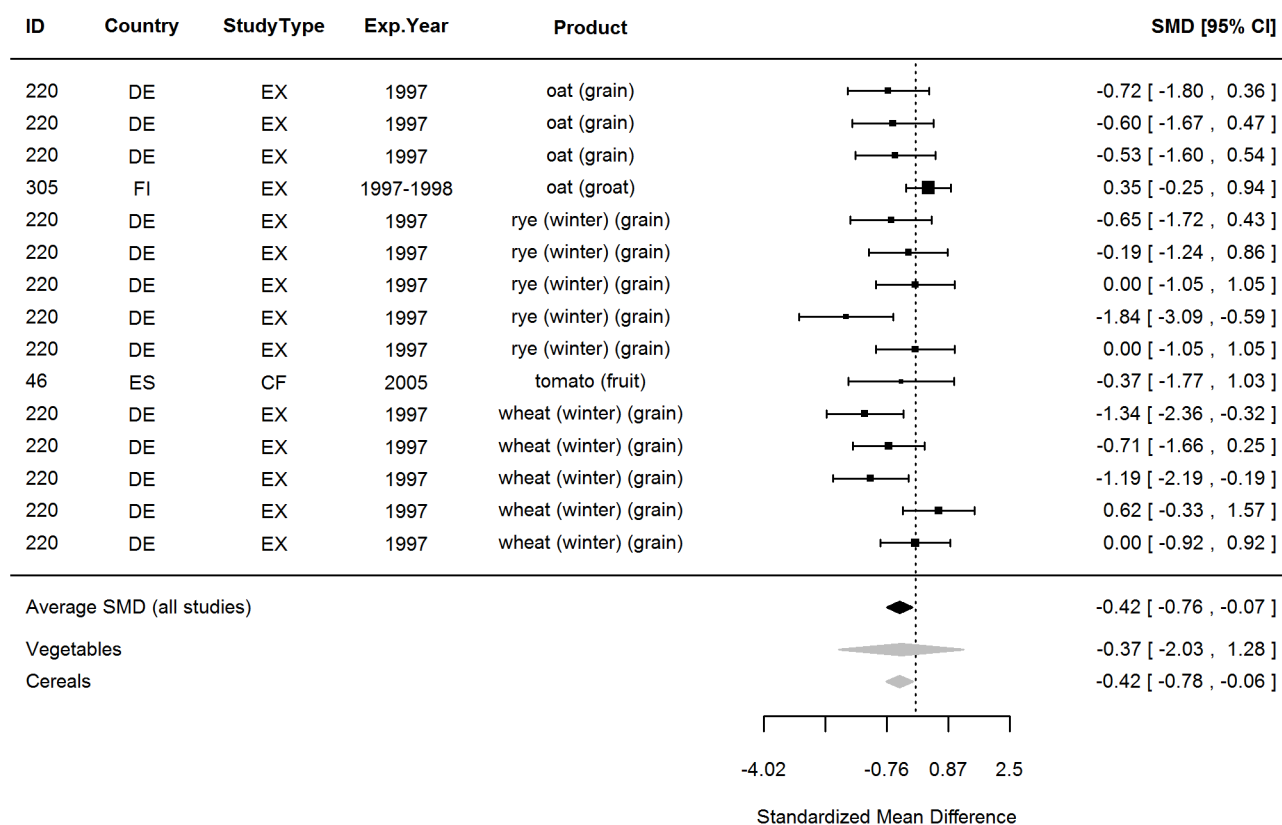


Figure 18. Forest plot showing the results of the comparison of fibre between organic and conventional plant foods using standardised mean differences (SMDs) with 95% confidence intervals (CI), for studies included in standard weighted meta-analysis. The estimated average SMD for all studies and SMDs for different product groups are indicated at the bottom of the figure. Sign of the SMD indicates if the analysed parameter is higher (+) or lower (-) in organic foods. ID, Paper unique identification number (see Table 2 for references).

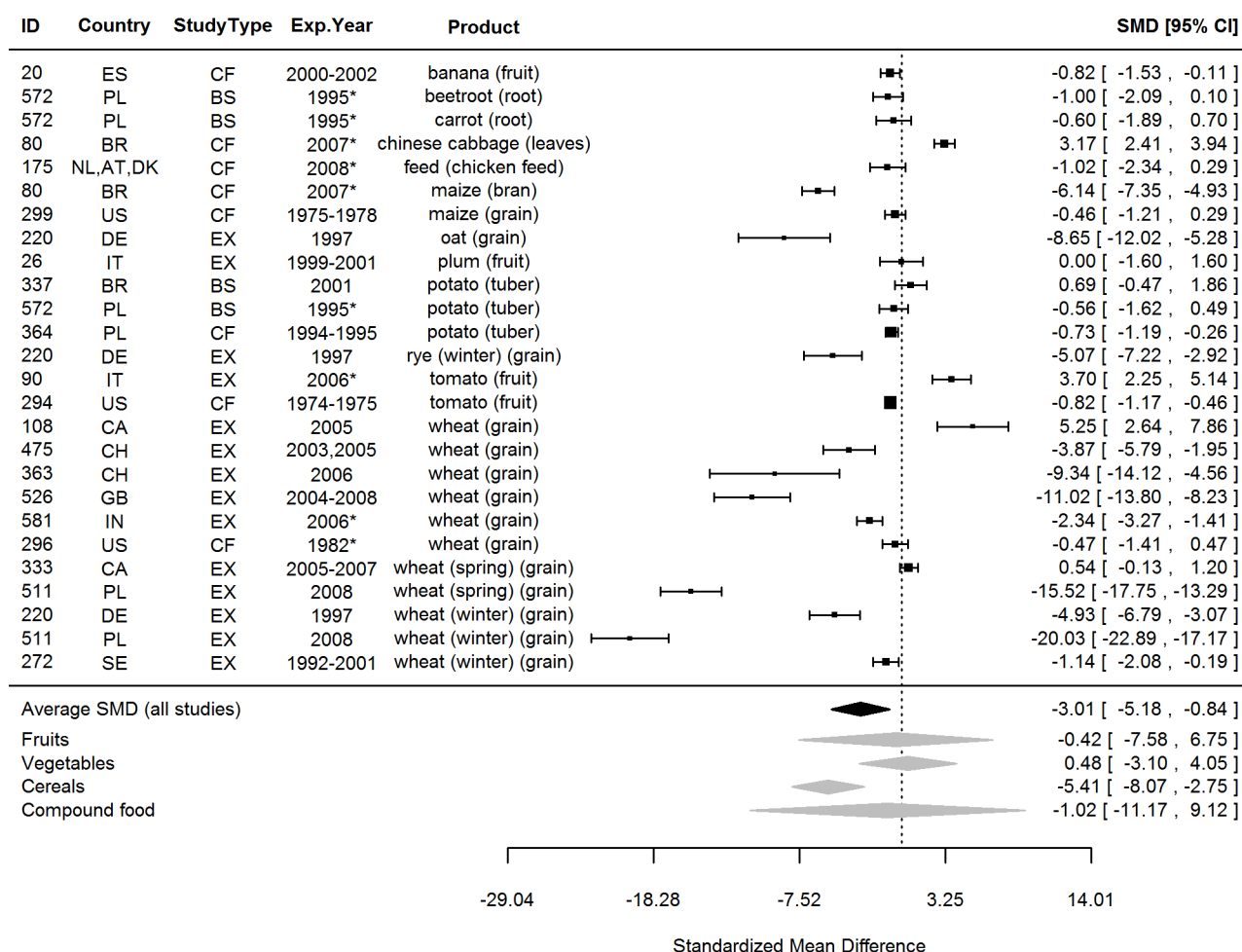


Figure 19. Forest plot showing the results of the comparison of protein (total) between organic and conventional plant foods using standardised mean differences (SMDs) with 95% confidence intervals (CI), for studies included in standard weighted meta-analysis. The estimated average SMD for all studies and SMDs for different product groups are indicated at the bottom of the figure. Sign of the SMD indicates if the analysed parameter is higher (+) or lower (-) in organic foods. ID, Paper unique identification number (see Table 2 for references). *No information about the experimental year (estimated as publication year - 2).

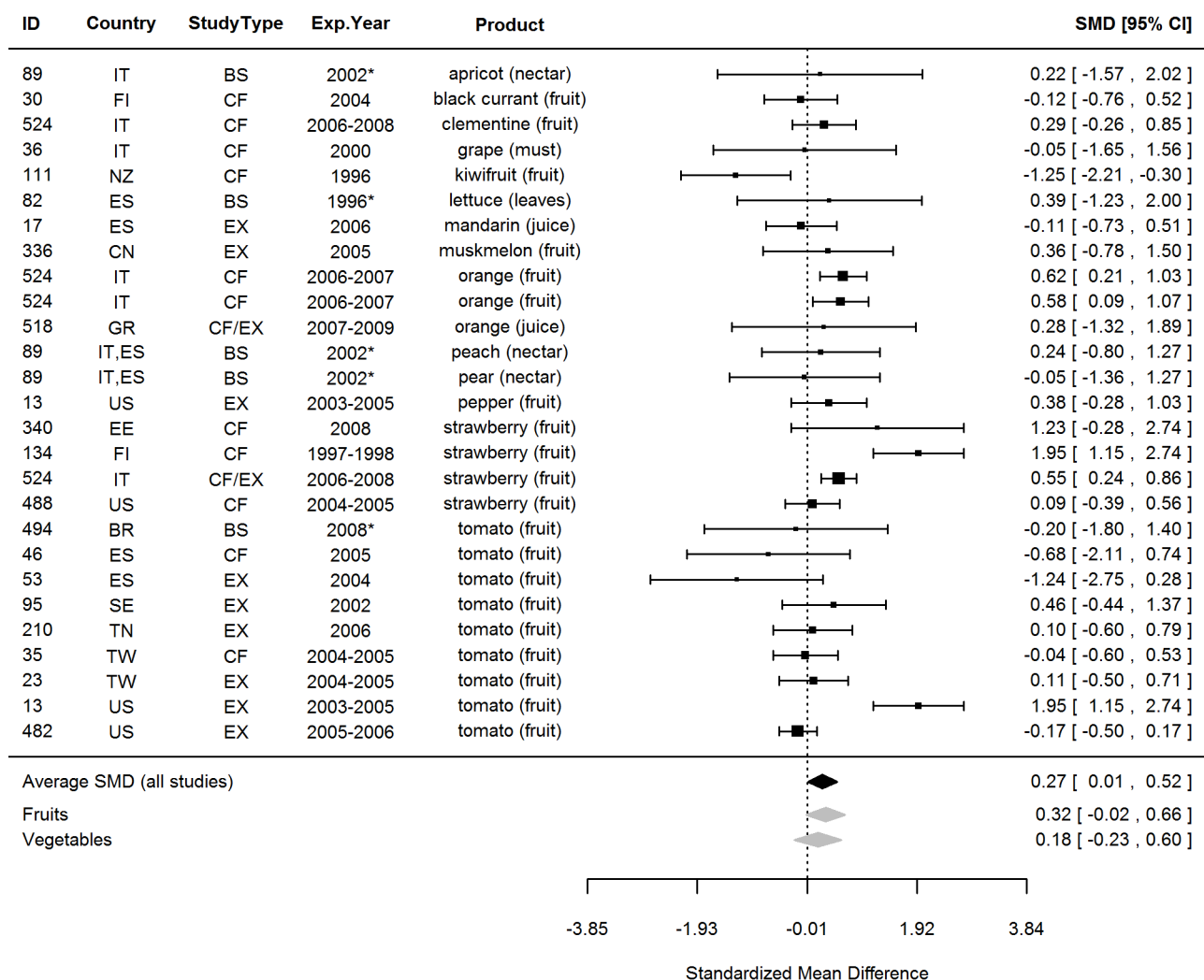


Figure 20. Forest plot showing the results of the comparison of solids (soluble) between organic and conventional plant foods using standardised mean differences (SMDs) with 95% confidence intervals (CI), for studies included in standard weighted meta-analysis. The estimated average SMD for all studies and SMDs for different product groups are indicated at the bottom of the figure. Sign of the SMD indicates if the analysed parameter is higher (+) or lower (-) in organic foods. ID, Paper unique identification number (see Table 2 for references). *No information about the experimental year (estimated as publication year - 2).

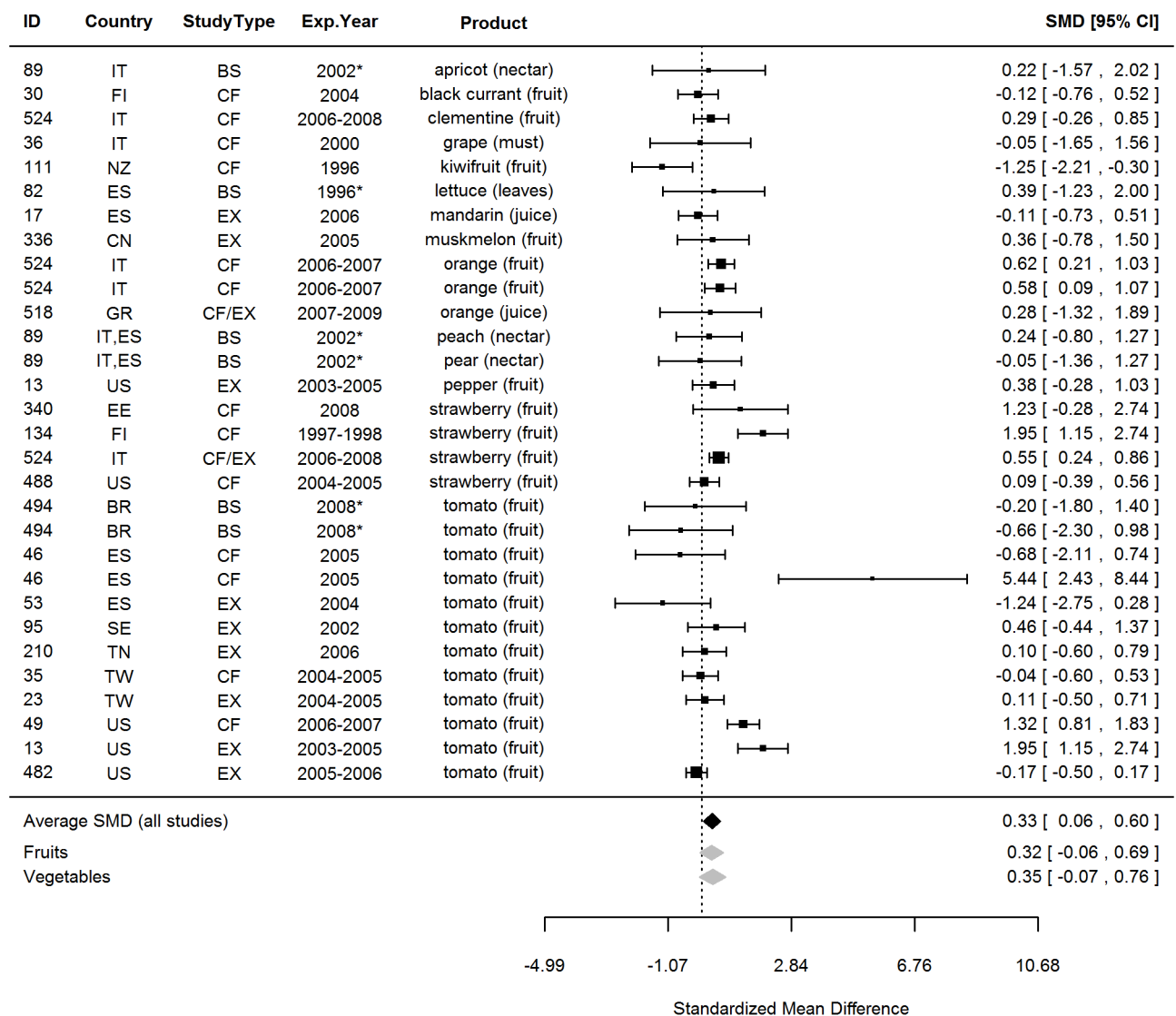


Figure 21. Forest plot showing the results of the comparison of solids between organic and conventional plant foods using standardised mean differences (SMDs) with 95% confidence intervals (CI), for studies included in standard weighted meta-analysis. The estimated average SMD for all studies and SMDs for different product groups are indicated at the bottom of the figure. Sign of the SMD indicates if the analysed parameter is higher (+) or lower (-) in organic foods. ID, Paper unique identification number (see Table 2 for references). *No information about the experimental year (estimated as publication year - 2).

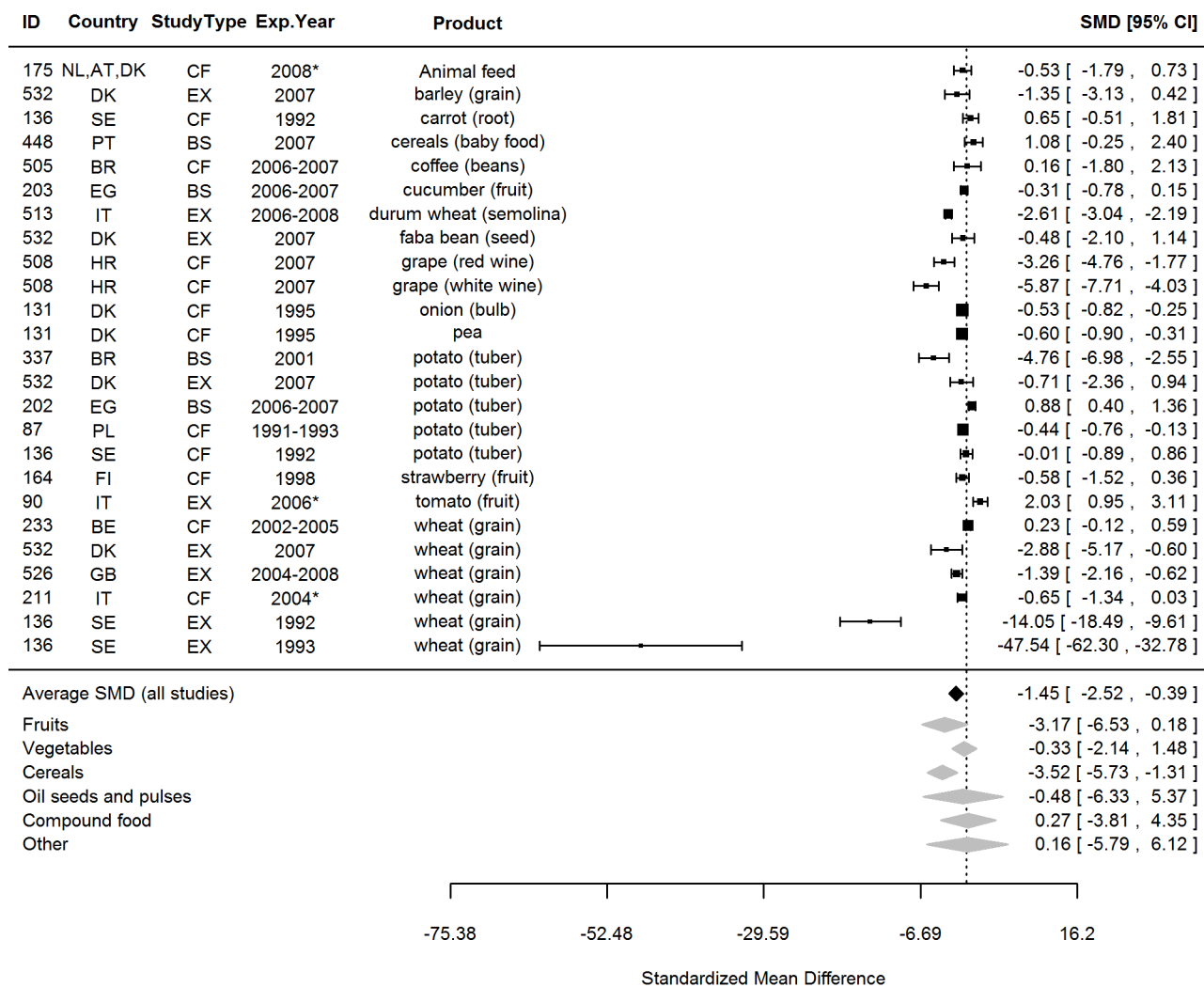


Figure 22. Forest plot showing the results of the comparison of cadmium (Cd) between organic and conventional plant foods using standardised mean differences (SMDs) with 95% confidence intervals (CI), for studies included in standard weighted meta-analysis. The estimated average SMD for all studies and SMDs for different product groups are indicated at the bottom of the figure. Sign of the SMD indicates if the analysed parameter is higher (+) or lower (-) in organic foods. ID, Paper unique identification number (see Table 2 for references). *No information about the experimental year (estimated as publication year - 2).

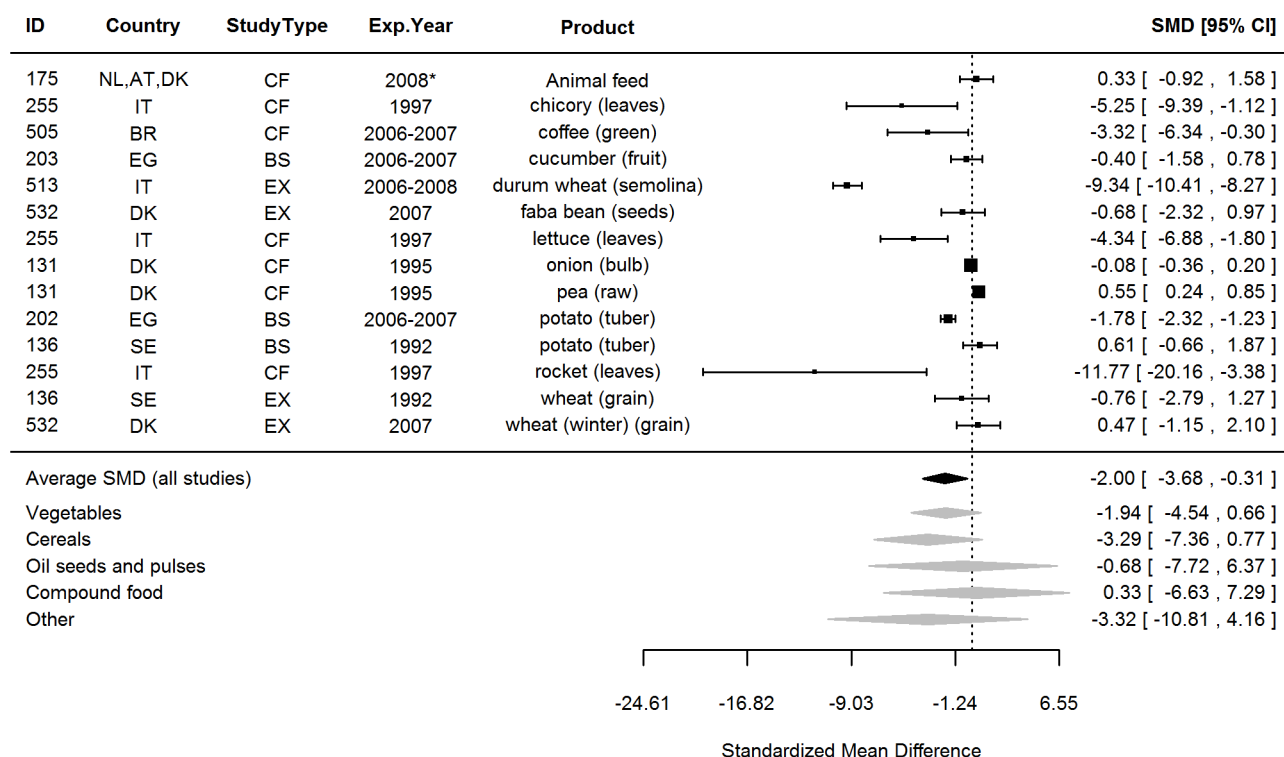


Figure 23. Forest plot showing the results of the comparison of chromium (Cr) between organic and conventional plant foods using standardised mean differences (SMDs) with 95% confidence intervals (CI), for studies included in standard weighted meta-analysis. The estimated average SMD for all studies and SMDs for different product groups are indicated at the bottom of the figure. Sign of the SMD indicates if the analysed parameter is higher (+) or lower (-) in organic foods. ID, Paper unique identification number (see Table 2 for references). *No information about the experimental year (estimated as publication year - 2).

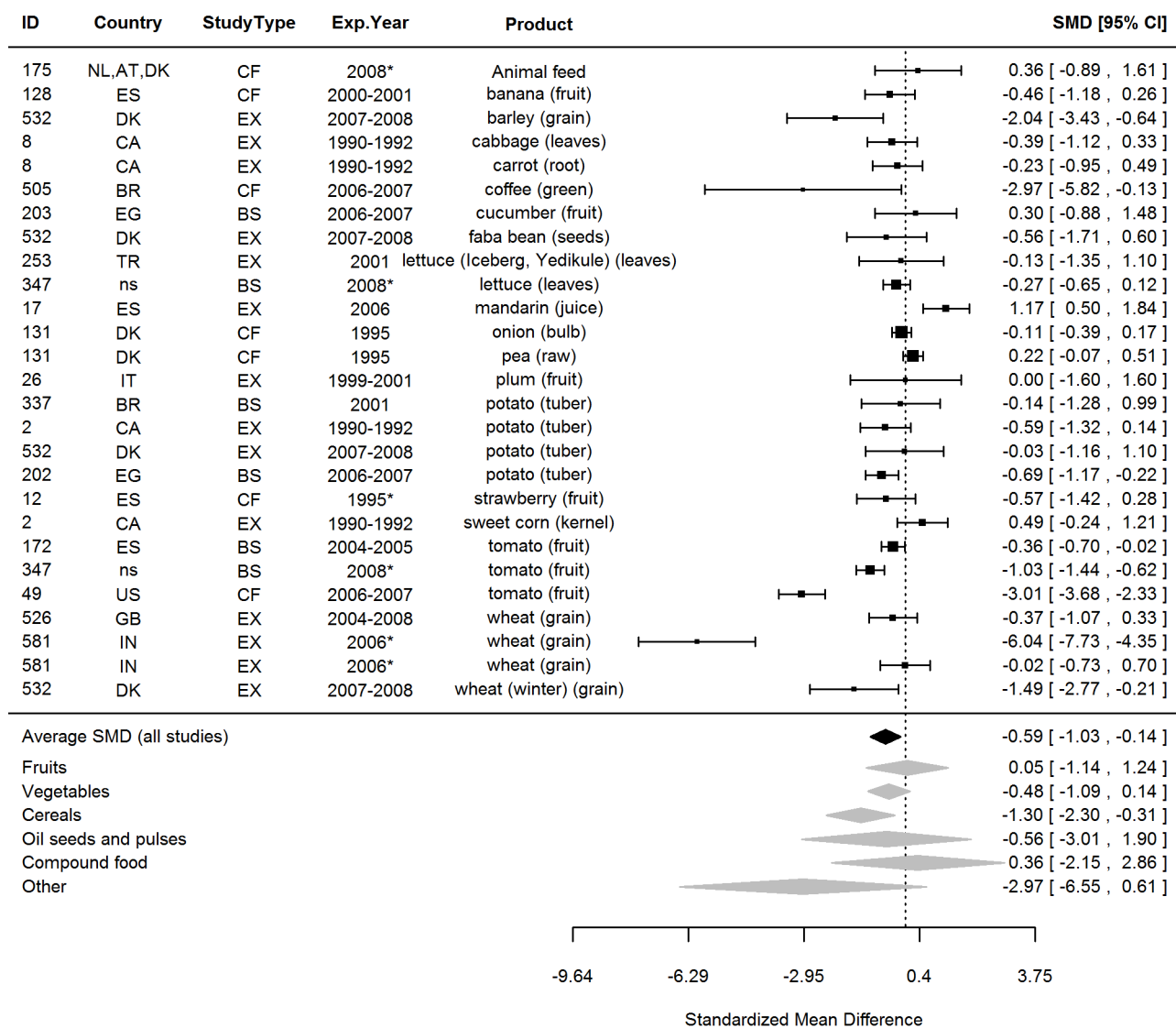


Figure 24. Forest plot showing the results of the comparison of manganese (Mn) between organic and conventional plant foods using standardised mean differences (SMDs) with 95% confidence intervals (CI), for studies included in standard weighted meta-analysis. The estimated average SMD for all studies and SMDs for different product groups are indicated at the bottom of the figure. Sign of the SMD indicates if the analysed parameter is higher (+) or lower (-) in organic foods. ID, Paper unique identification number (see Table 2 for references). *No information about the experimental year (estimated as publication year - 2).

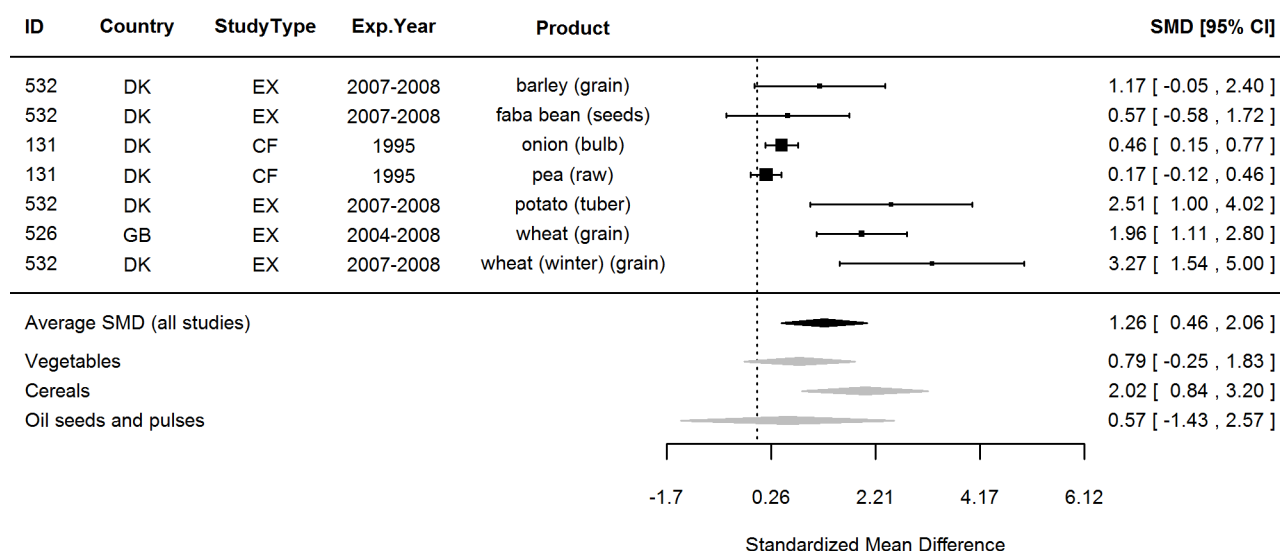


Figure 25. Forest plot showing the results of the comparison of molybdenum (Mo) between organic and conventional plant foods using standardised mean differences (SMDs) with 95% confidence intervals (CI), for studies included in standard weighted meta-analysis. The estimated average SMD for all studies and SMDs for different product groups are indicated at the bottom of the figure. Sign of the SMD indicates if the analysed parameter is higher (+) or lower (-) in organic foods. ID, Paper unique identification number (see Table 2 for references).

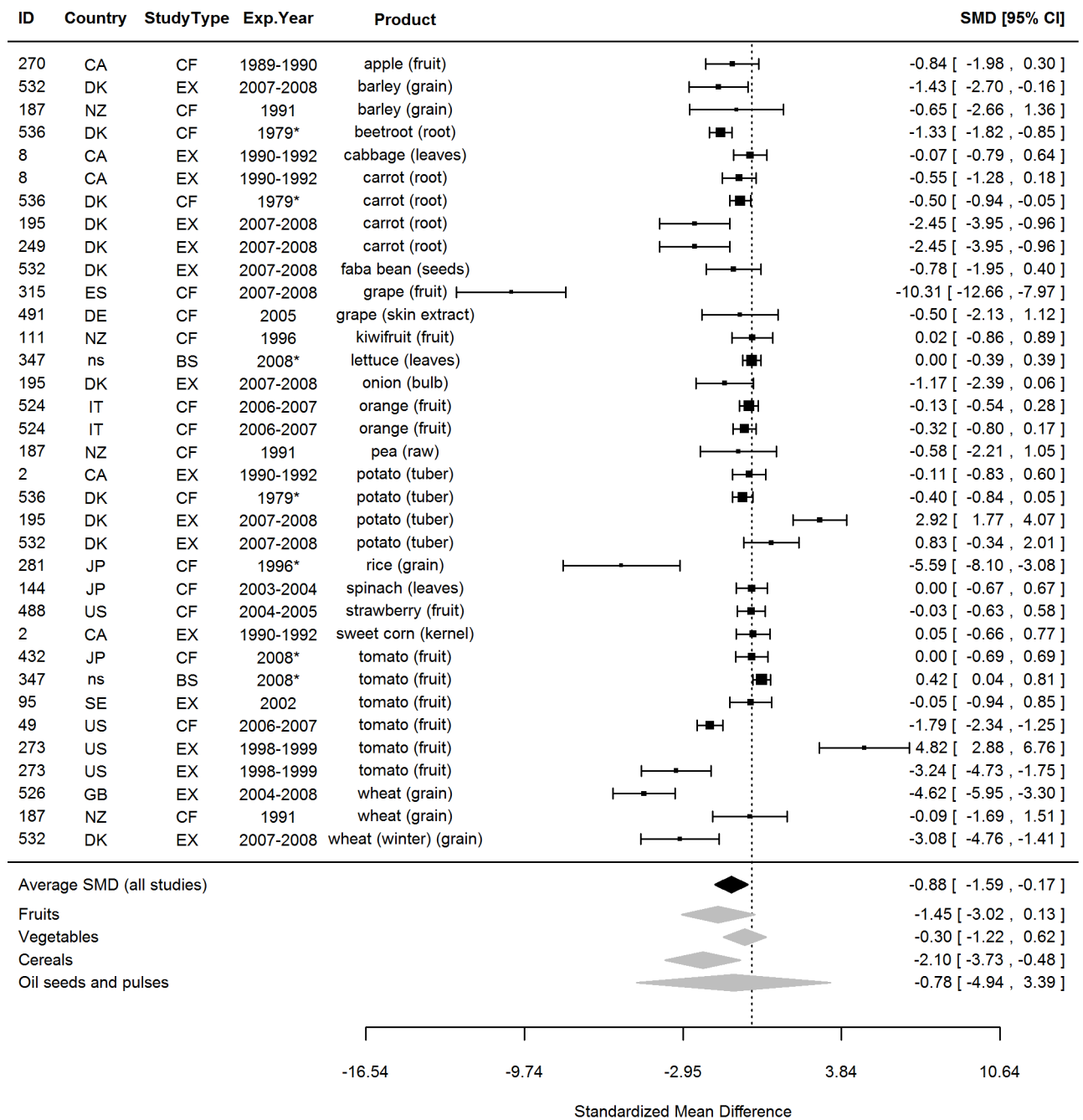


Figure 26. Forest plot showing the results of the comparison of nitrogen (N) between organic and conventional plant foods using standardised mean differences (SMDs) with 95% confidence intervals (CI), for studies included in standard weighted meta-analysis. The estimated average SMD for all studies and SMDs for different product groups are indicated at the bottom of the figure. Sign of the SMD indicates if the analysed parameter is higher (+) or lower (-) in organic foods. ID, Paper unique identification number (see Table 2 for references). *No information about the experimental year (estimated as publication year - 2).

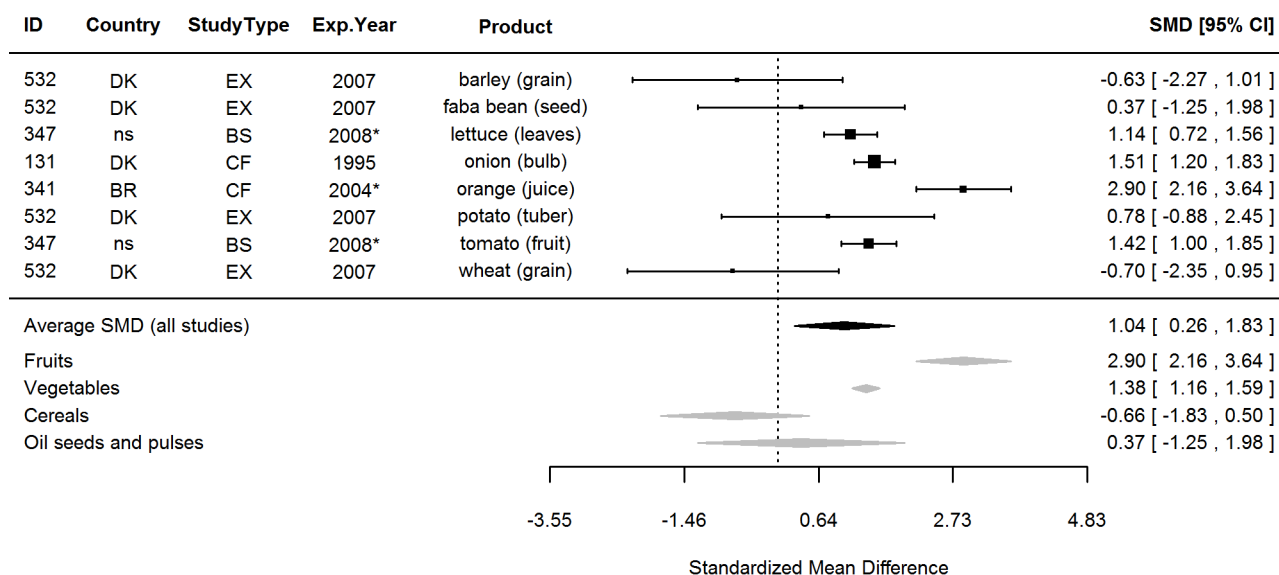


Figure 27. Forest plot showing the results of the comparison of rubidium (Rb) between organic and conventional plant foods using standardised mean differences (SMDs) with 95% confidence intervals (CI), for studies included in standard weighted meta-analysis. The estimated average SMD for all studies and SMDs for different product groups are indicated at the bottom of the figure. Sign of the SMD indicates if the analysed parameter is higher (+) or lower (-) in organic foods. ID, Paper unique identification number (see Table 2 for references). *No information about the experimental year (estimated as publication year - 2).

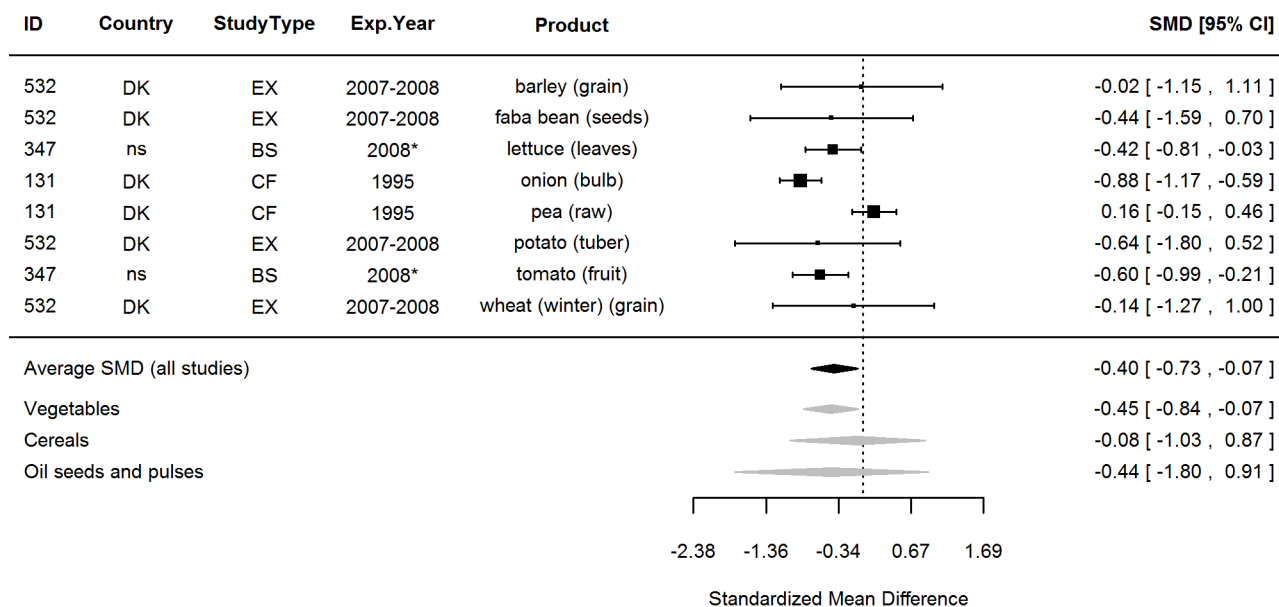


Figure 28. Forest plot showing the results of the comparison of strontium (Sr) between organic and conventional plant foods using standardised mean differences (SMDs) with 95% confidence intervals (CI), for studies included in standard weighted meta-analysis. The estimated average SMD for all studies and SMDs for different product groups are indicated at the bottom of the figure. Sign of the SMD indicates if the analysed parameter is higher (+) or lower (-) in organic foods. ID, Paper unique identification number (see Table 2 for references). *No information about the experimental year (estimated as publication year - 2).

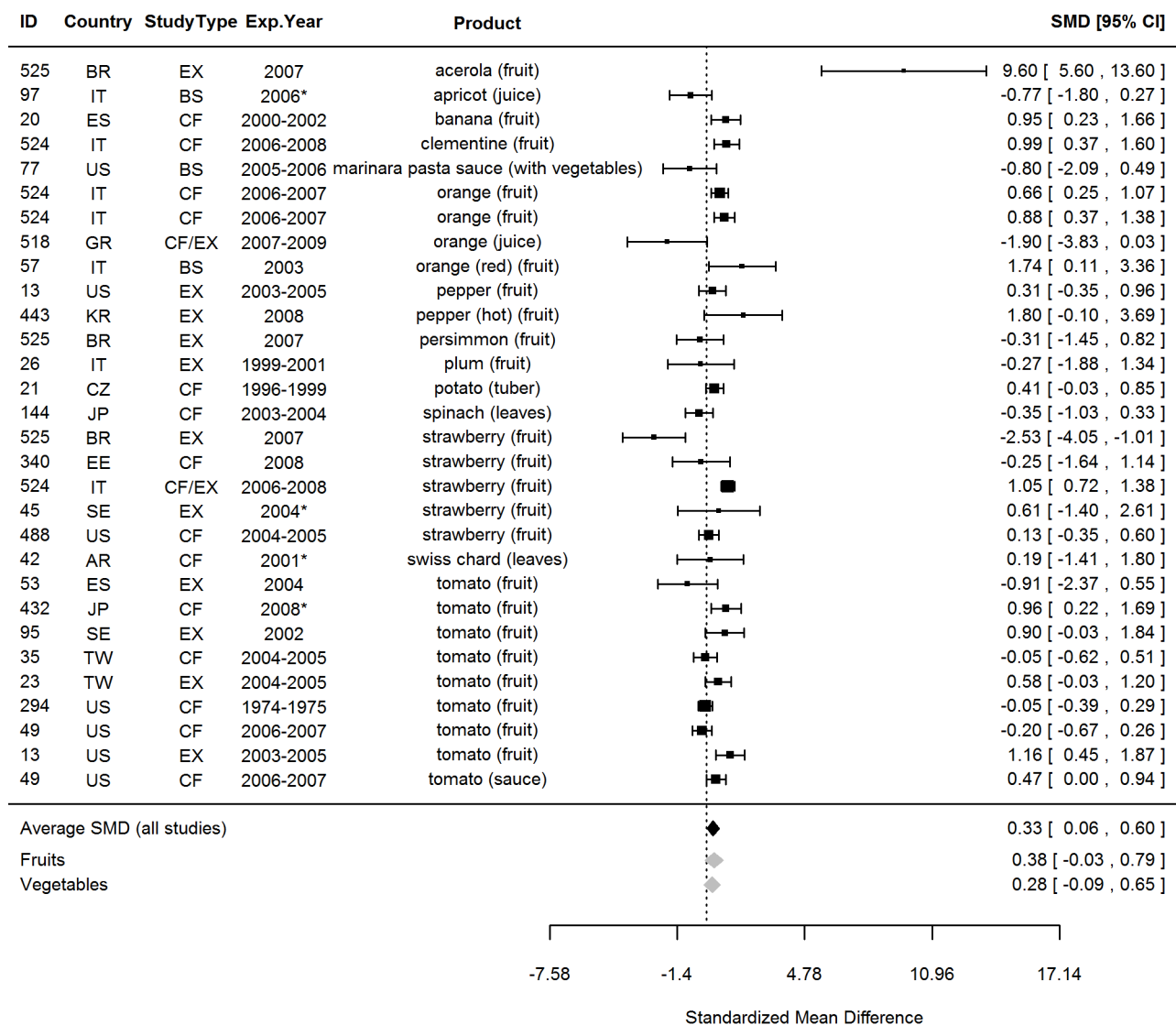


Figure 29. Forest plot showing the results of the comparison of ascorbic acid between organic and conventional plant foods using standardised mean differences (SMDs) with 95% confidence intervals (CI), for studies included in standard weighted meta-analysis. The estimated average SMD for all studies and SMDs for different product groups are indicated at the bottom of the figure. Sign of the SMD indicates if the analysed parameter is higher (+) or lower (-) in organic foods. ID, Paper unique identification number (see Table 2 for references). *No information about the experimental year (estimated as publication year - 2).

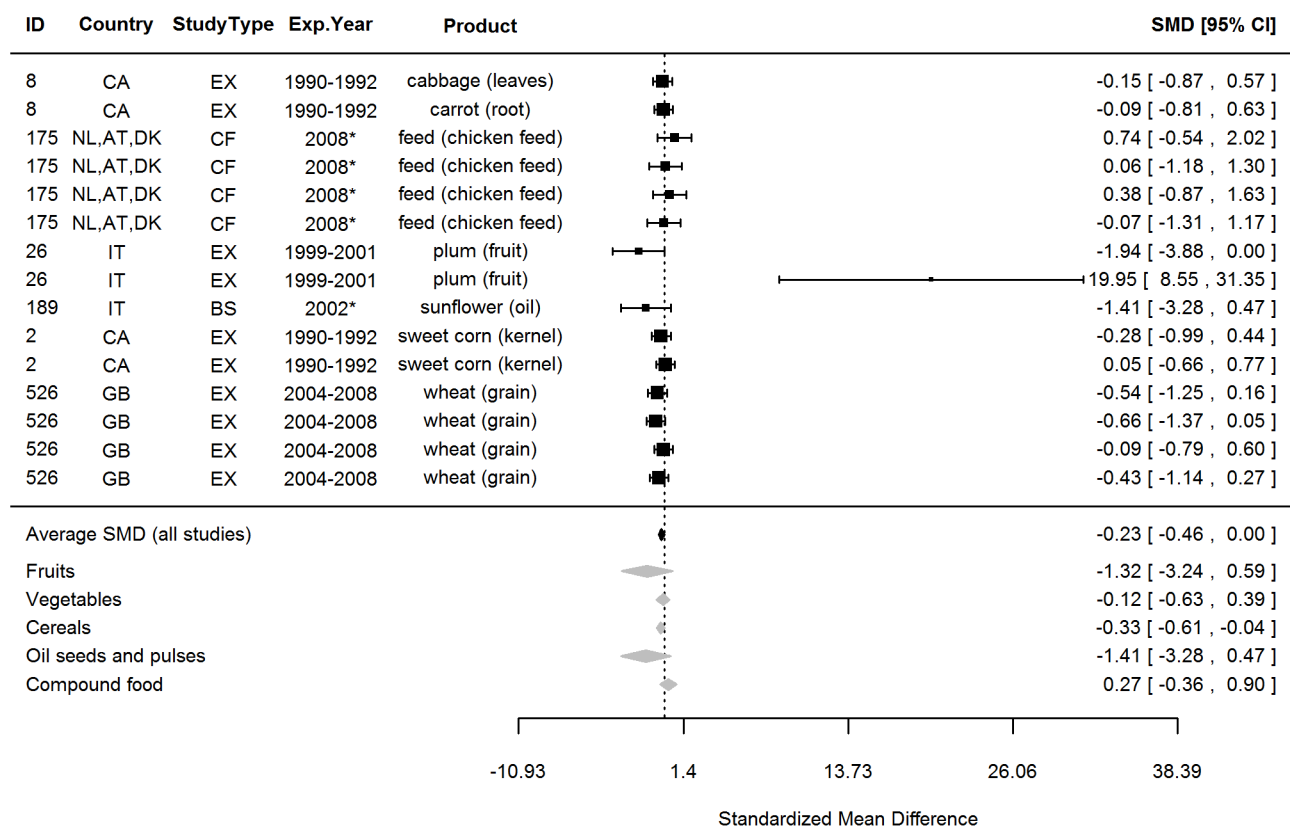


Figure 30. Forest plot showing the results of the comparison of vitamin E between organic and conventional plant foods using standardised mean differences (SMDs) with 95% confidence intervals (CI), for studies included in standard weighted meta-analysis. The estimated average SMD for all studies and SMDs for different product groups are indicated at the bottom of the figure. Sign of the SMD indicates if the analysed parameter is higher (+) or lower (-) in organic foods. ID, Paper unique identification number (see Table 2 for references). *No information about the experimental year (estimated as publication year - 2).

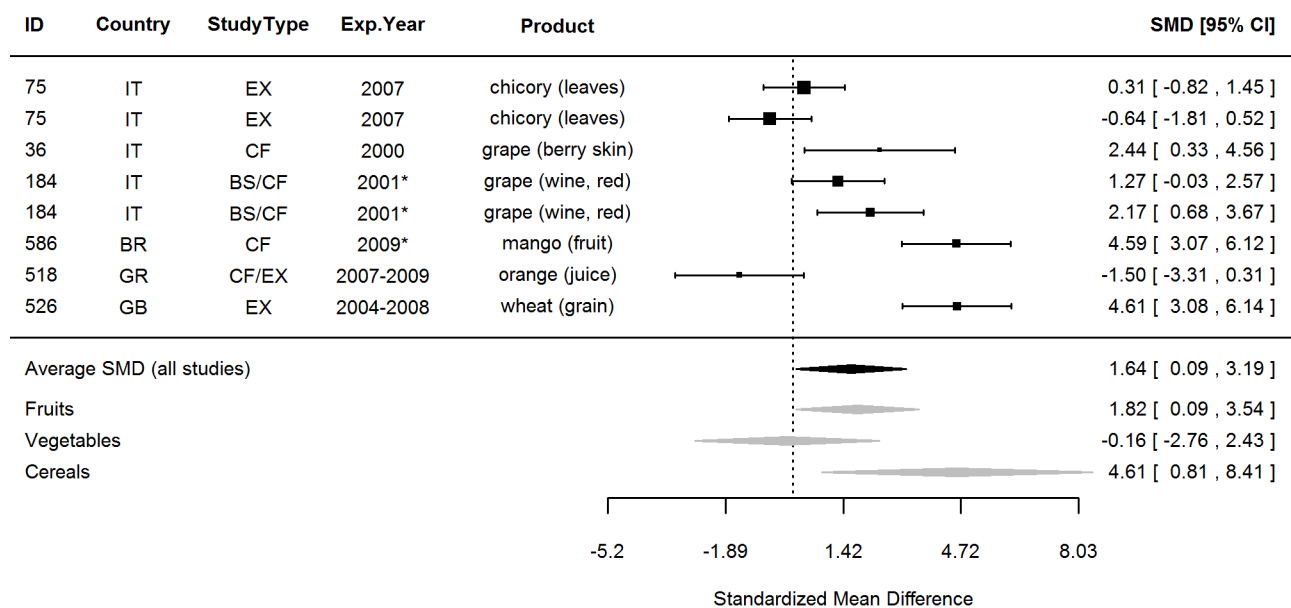


Figure 31. Forest plot showing the results of the comparison of flavonoids (total) between organic and conventional plant foods using standardised mean differences (SMDs) with 95% confidence intervals (CI), for studies included in standard weighted meta-analysis. The estimated average SMD for all studies and SMDs for different product groups are indicated at the bottom of the figure. Sign of the SMD indicates if the analysed parameter is higher (+) or lower (-) in organic foods. ID, Paper unique identification number (see Table 2 for references). *No information about the experimental year (estimated as publication year - 2).

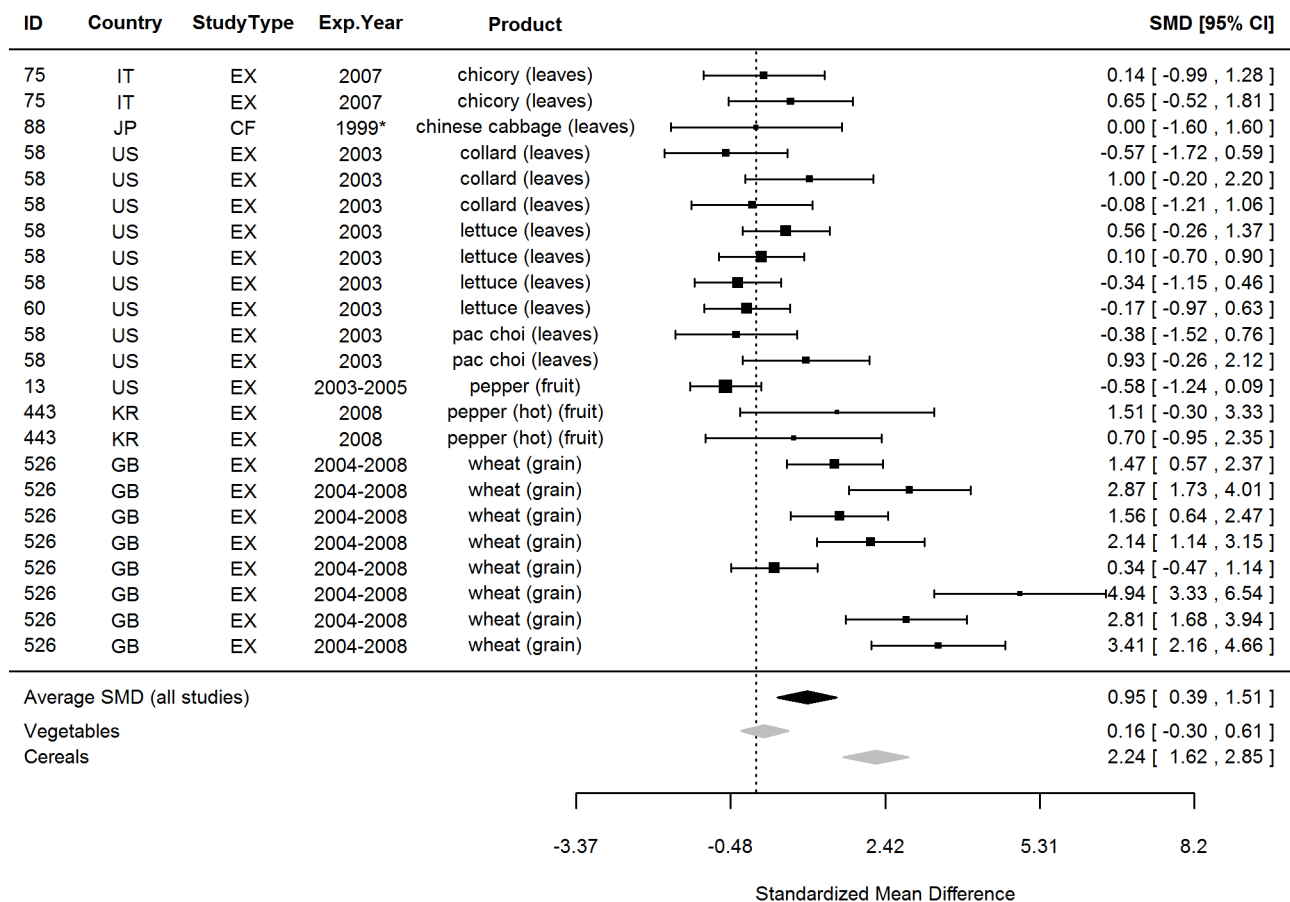


Figure 32. Forest plot showing the results of the comparison of flavones between organic and conventional plant foods using standardised mean differences (SMDs) with 95% confidence intervals (CI), for studies included in standard weighted meta-analysis. The estimated average SMD for all studies and SMDs for different product groups are indicated at the bottom of the figure. Sign of the SMD indicates if the analysed parameter is higher (+) or lower (-) in organic foods. ID, Paper unique identification number (see Table 2 for references). *No information about the experimental year (estimated as publication year - 2).

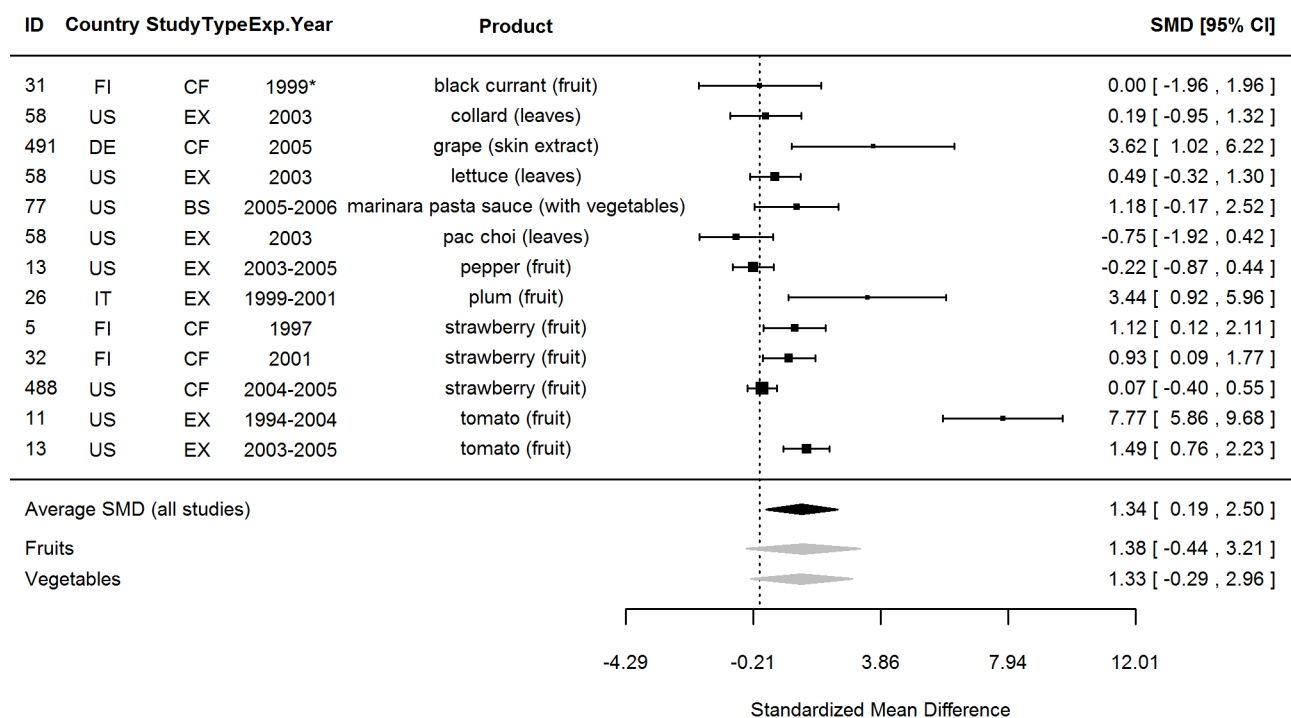


Figure 33. Forest plot showing the results of the comparison of kaempferol between organic and conventional plant foods using standardised mean differences (SMDs) with 95% confidence intervals (CI), for studies included in standard weighted meta-analysis. The estimated average SMD for all studies and SMDs for different product groups are indicated at the bottom of the figure. Sign of the SMD indicates if the analysed parameter is higher (+) or lower (-) in organic foods. ID, Paper unique identification number (see Table 2 for references). *No information about the experimental year (estimated as publication year - 2).

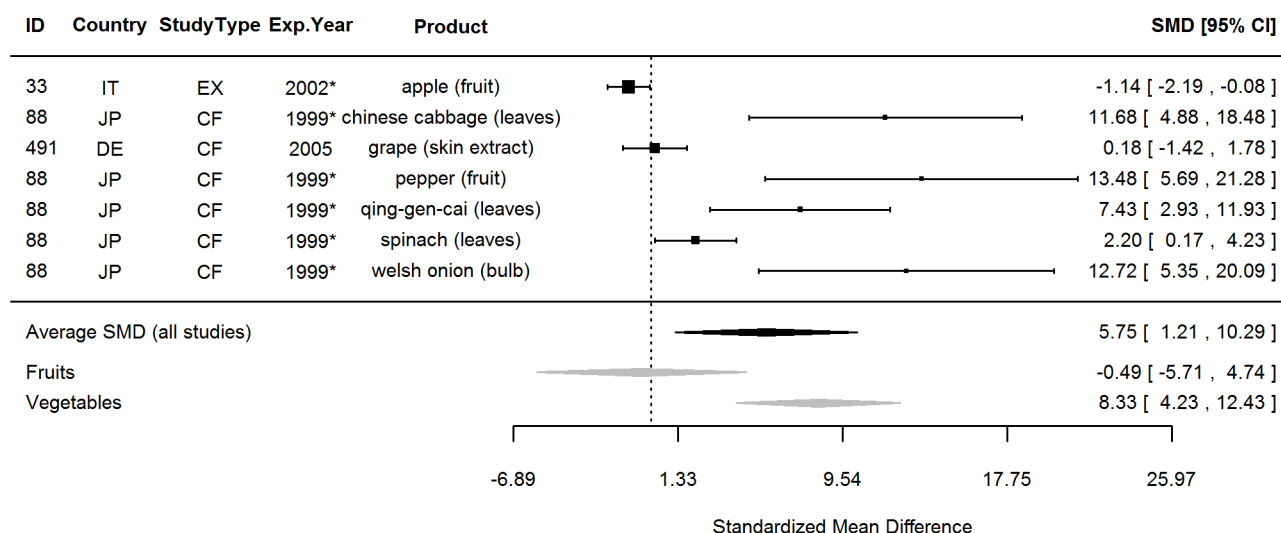


Figure 34. Forest plot showing the results of the comparison of quercetin 3-rhamnoside between organic and conventional plant foods using standardised mean differences (SMDs) with 95% confidence intervals (CI), for studies included in standard weighted meta-analysis. The estimated average SMD for all studies and SMDs for different product groups are indicated at the bottom of the figure. Sign of the SMD indicates if the analysed parameter is higher (+) or lower (-) in organic foods. ID, Paper unique identification number (see Table 2 for references). *No information about the experimental year (estimated as publication year - 2).

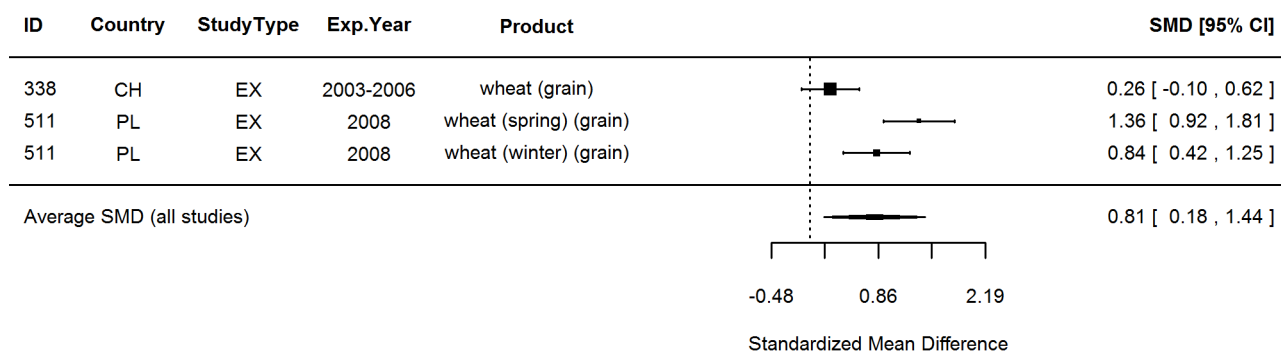


Figure 35. Forest plot showing the results of the comparison of phenolic acids (total) between organic and conventional plant foods using standardised mean differences (SMDs) with 95% confidence intervals (CI), for studies included in standard weighted meta-analysis. The estimated average SMD for all studies is indicated at the bottom of the figure. Sign of the SMD indicates if the analysed parameter is higher (+) or lower (-) in organic foods. ID, Paper unique identification number (see Table 2 for references).

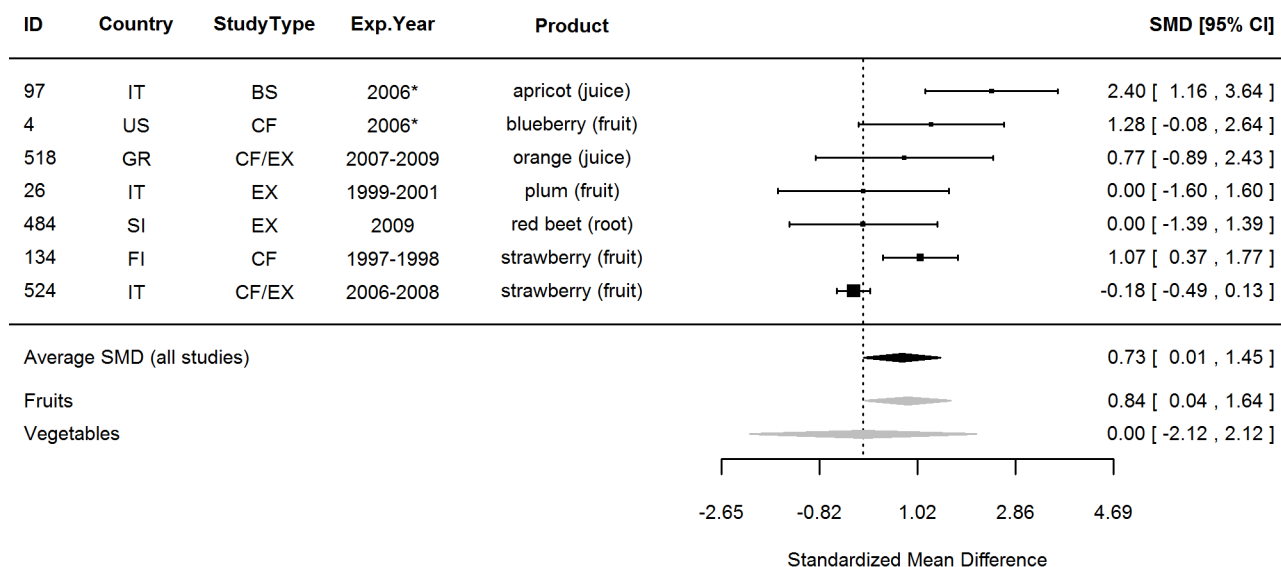


Figure 36. Forest plot showing the results of the comparison of malic acid between organic and conventional plant foods using standardised mean differences (SMDs) with 95% confidence intervals (CI), for studies included in standard weighted meta-analysis. The estimated average SMD for all studies and SMDs for different product groups are indicated at the bottom of the figure. Sign of the SMD indicates if the analysed parameter is higher (+) or lower (-) in organic foods. ID, Paper unique identification number (see Table 2 for references). *No information about the experimental year (estimated as publication year - 2).

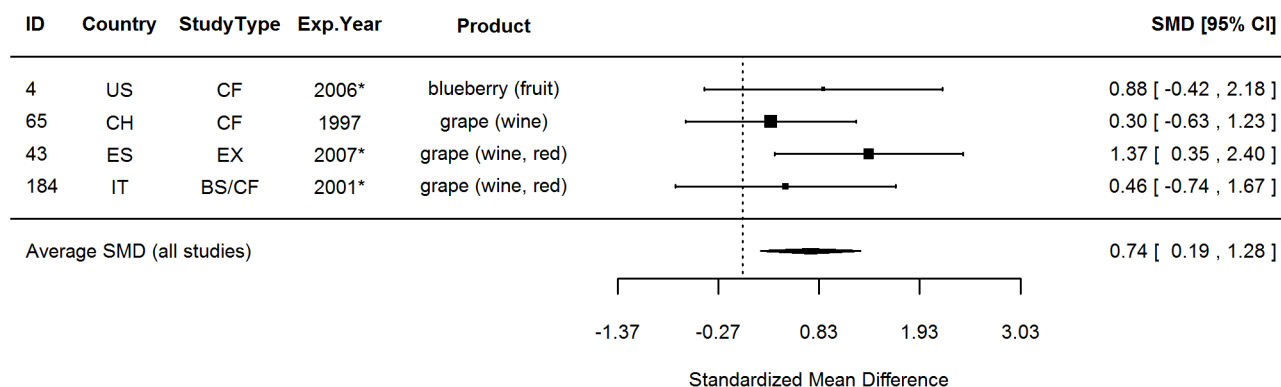


Figure 37. Forest plot showing the results of the comparison of stilbenes between organic and conventional plant foods using standardised mean differences (SMDs) with 95% confidence intervals (CI), for studies included in standard weighted meta-analysis. The estimated average SMD for all studies is indicated at the bottom of the figure. Sign of the SMD indicates if the analysed parameter is higher (+) or lower (-) in organic foods. ID, Paper unique identification number (see Table 2 for references). *No information about the experimental year (estimated as publication year - 2).

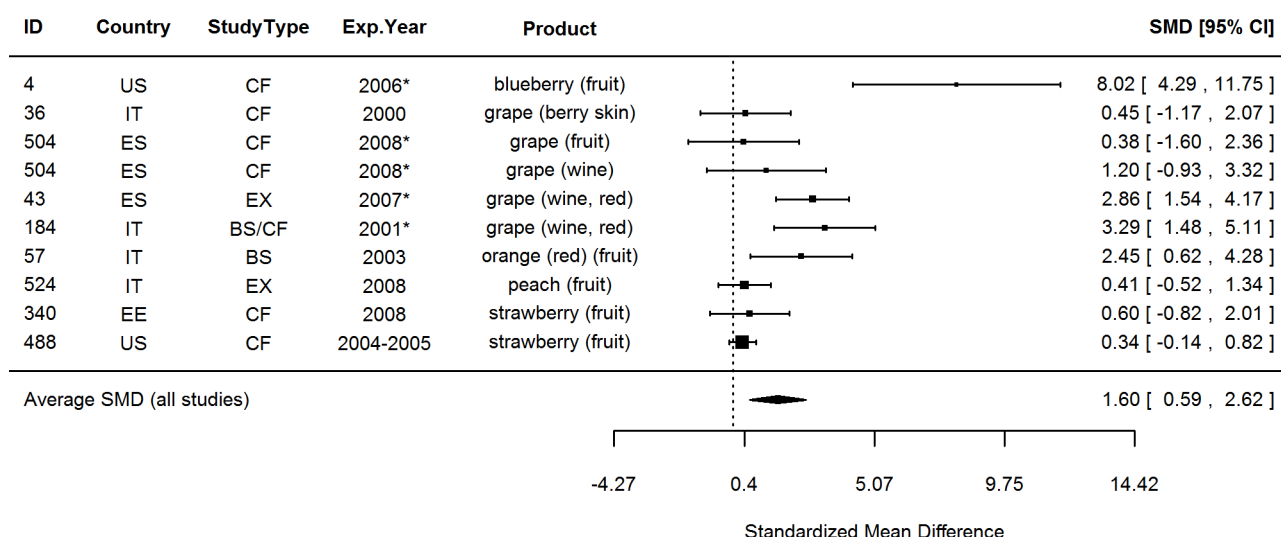


Figure 38. Forest plot showing the results of the comparison of other non-defense compounds (total) between organic and conventional plant foods using standardised mean differences (SMDs) with 95% confidence intervals (CI), for studies included in standard weighted meta-analysis. The estimated average SMD for all studies is indicated at the bottom of the figure. Sign of the SMD indicates if the analysed parameter is higher (+) or lower (-) in organic foods. ID, Paper unique identification number (see Table 2 for references). *No information about the experimental year (estimated as publication year - 2).

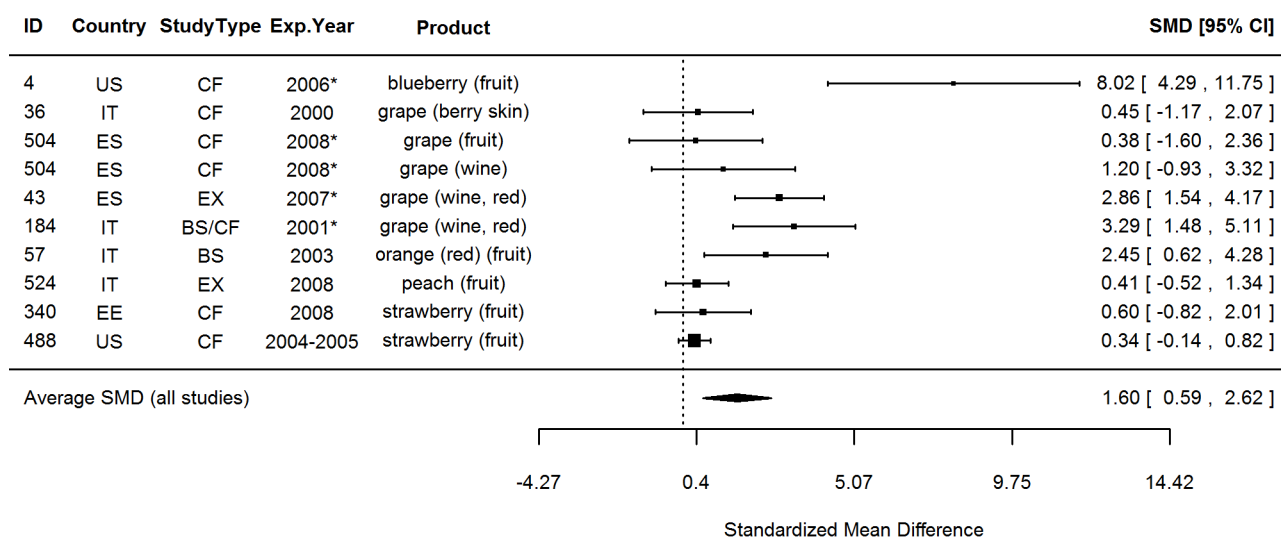


Figure 39. Forest plot showing the results of the comparison of anthocyanins (total) between organic and conventional plant foods using standardised mean differences (SMDs) with 95% confidence intervals (CI), for studies included in standard weighted meta-analysis. The estimated average SMD for all studies is indicated at the bottom of the figure. Sign of the SMD indicates if the analysed parameter is higher (+) or lower (-) in organic foods. ID, Paper unique identification number (see Table 2 for references). *No information about the experimental year (estimated as publication year - 2).

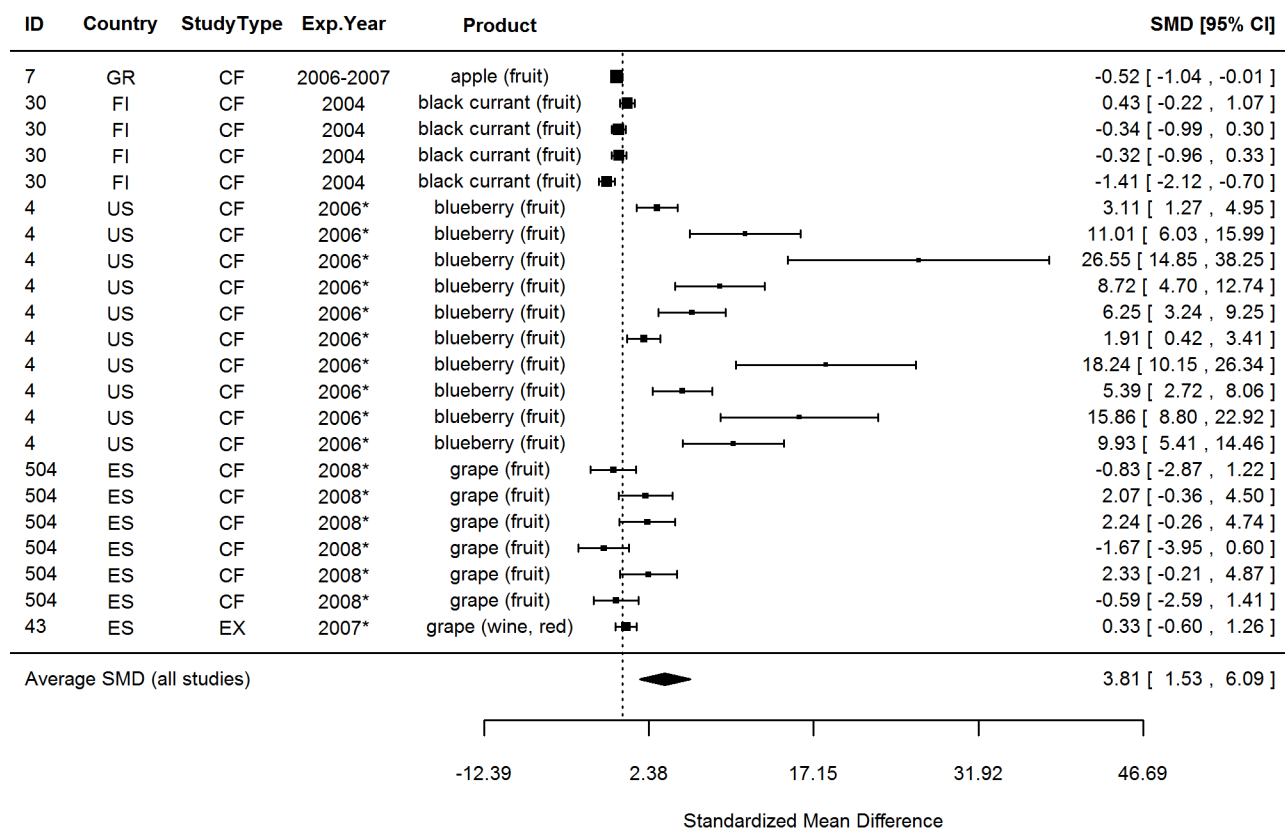


Figure 40. Forest plot showing the results of the comparison of anthocyanins between organic and conventional plant foods using standardised mean differences (SMDs) with 95% confidence intervals (CI), for studies included in standard weighted meta-analysis. The estimated average SMD for all studies is indicated at the bottom of the figure. Sign of the SMD indicates if the analysed parameter is higher (+) or lower (-) in organic foods. ID, Paper unique identification number (see Table 2 for references). *No information about the experimental year (estimated as publication year - 2).

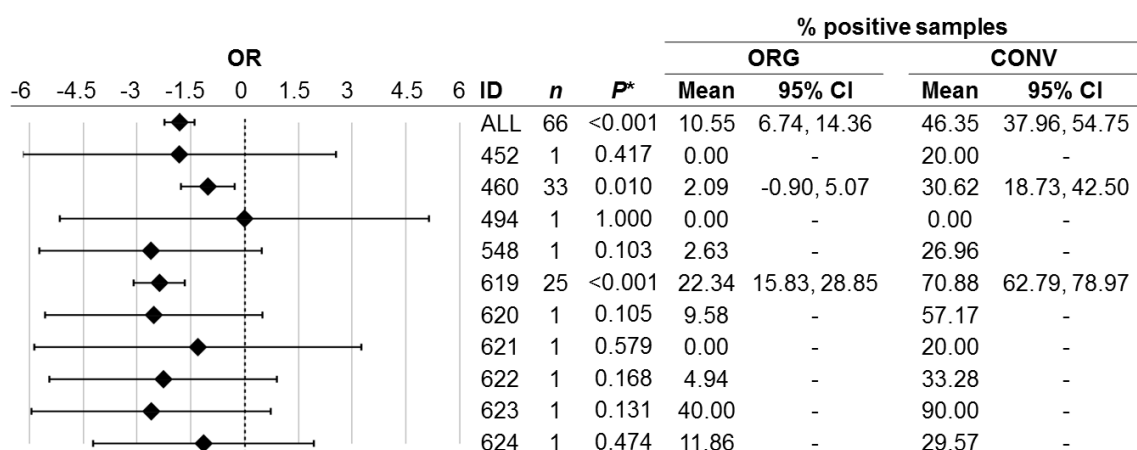


Figure 41. Results of the standard weighted meta-analysis comparing odds ratios with 95% confidence intervals for the frequency of pesticide residues in organic and conventional crops. A mixed-effect model with publication as moderator was used. OR, odds ratio for each product group (error bars indicate 95% confidence intervals); ORG, organic samples; CONV, conventional samples; *n*, number of data points included in meta-analyses. **P* value <0.05 indicates a significant difference between ORG and CONV.

Table 12. Results of the standard unweighted and weighted meta-analysis for parameters where none of the 8 meta-analysis protocols identified significant effects.

| Parameter | Unweighted meta-analysis | | | Weighted meta-analysis | | | | |
|---|--------------------------|-----------|------------|------------------------|-------|-------------|------------|----------------|
| | <i>n</i> | Ln ratio* | <i>P</i> † | <i>n</i> | SMD | 95% CI | <i>P</i> † | Heterogeneity‡ |
| Acidity (total) | 20 | 4.57 | 0.375 | 7 | -0.04 | -0.37, 0.30 | 0.835 | No (0%) |
| Acidity (volatile) | 4 | 4.75 | 0.254 | 3 | -0.54 | -2.03, 0.94 | 0.472 | Yes (66%) |
| Acids (total) | 5 | 4.55 | 0.402 | 3 | -1.46 | -6.46, 3.54 | 0.568 | Yes (92%) |
| Antioxidant activity (DPPH) | 46 | 4.62 | 0.391 | 23 | 0.79 | -0.95, 2.53 | 0.373 | Yes (94%) |
| Polyphenoloxidase (PPO) activity (towards caffeic acid) | 4 | 4.70 | 0.252 | 4 | 1.20 | -1.70, 4.10 | 0.417 | Yes (93%) |
| Phenolic compounds | 21 | 4.68 | 0.183 | 16 | -0.08 | -0.46, 0.29 | 0.663 | Yes (50%) |
| Hydroxycinnamic acids (total) | 7 | 4.49 | 0.173 | 4 | -1.03 | -2.78, 0.72 | 0.249 | Yes (87%) |
| Caffeic acid | 15 | 4.65 | 0.335 | 8 | 0.54 | -0.53, 1.61 | 0.326 | Yes (73%) |
| p-coumaric acid (pCA) | 11 | 4.67 | 0.365 | 5 | 0.21 | -2.37, 2.78 | 0.875 | Yes (99%) |
| Ferulic acid | 8 | 4.79 | 0.243 | 4 | 0.39 | -1.93, 2.70 | 0.743 | Yes (97%) |
| Sinapic acid (SA) | 5 | 4.67 | 0.442 | 3 | -0.74 | -1.74, 0.27 | 0.153 | Yes (88%) |
| 5-o-Caffeoylquinic acid (5-CQA) | 4 | 4.77 | 0.188 | 3 | 0.35 | -0.49, 1.18 | 0.412 | Yes (62%) |
| Ellagic acid | 5 | 4.81 | 0.063 | 4 | 1.93 | -1.31, 5.18 | 0.243 | Yes (97%) |
| Gallic acid | 8 | 4.83 | 0.070 | 5 | 0.07 | -0.52, 0.67 | 0.809 | Yes (51%) |
| Salicylic acid | 5 | 5.54 | 0.094 | 4 | 1.06 | -0.19, 2.32 | 0.095 | Yes (61%) |
| Apigenin | 6 | 4.63 | 0.476 | 5 | 0.14 | -0.47, 0.76 | 0.652 | No (23%) |
| Luteolin | 6 | 4.96 | 0.091 | 5 | 0.28 | -0.39, 0.95 | 0.413 | Yes (54%) |
| Myricetin 3-o-glucoside | 4 | 4.52 | 0.372 | 3 | 0.15 | -1.79, 2.09 | 0.879 | Yes (87%) |
| Quercetin 3-galactoside | 6 | 5.11 | 0.145 | 3 | 1.12 | -0.54, 2.78 | 0.184 | Yes (87%) |
| Quercetin 3-glucoside | 10 | 5.01 | 0.105 | 5 | 0.31 | -0.48, 1.10 | 0.446 | Yes (58%) |
| Quercetin malonylglucoside | 3 | 4.69 | 0.372 | 3 | 0.20 | -0.34, 0.75 | 0.462 | No (15%) |

n, number of data points included in the comparison; SMD, standardised mean difference of fixed-effect model. *Ln ratio = $\ln(\text{ORG}/\text{CONV} \times 100\%)$; †*P* value <0.05 indicates significance of the difference in composition between organic and conventional crop/crop based food; ‡Heterogeneity and the *I*² Statistic.

Table 12 cont. Results of the standard unweighted and weighted meta-analysis for parameters where none of the 8 meta-analysis protocols identified significant effects.

| Parameter | Unweighted meta-analysis | | | Weighted meta-analysis | | | | |
|---------------------------|--------------------------|-----------|------------|------------------------|-------|--------------|------------|----------------|
| | <i>n</i> | Ln ratio* | <i>P</i> † | <i>n</i> | SMD | 95% CI | <i>P</i> † | Heterogeneity‡ |
| Flavanols (total) | 7 | 4.59 | 0.437 | 3 | -0.58 | -2.05, 0.89 | 0.441 | Yes (86%) |
| Flavanols | 28 | 4.61 | 0.494 | 15 | -0.15 | -0.91, 0.61 | 0.693 | Yes (94%) |
| Naringenin | 6 | 4.67 | 0.384 | 4 | 1.41 | -1.54, 4.35 | 0.349 | Yes (96%) |
| Naringenin (R-enantiomer) | 5 | 4.67 | 0.344 | 5 | 1.55 | -2.17, 5.28 | 0.413 | Yes (96%) |
| Chalcones | 21 | 4.57 | 0.500 | 13 | 0.28 | -0.26, 0.83 | 0.302 | Yes (87%) |
| Dihydrochalcones | 4 | 4.64 | 0.305 | 3 | -0.08 | -1.00, 0.84 | 0.866 | Yes (67%) |
| Phloridzin | 7 | 4.79 | 0.200 | 4 | 0.09 | -1.16, 1.35 | 0.883 | Yes (94%) |
| Procyanidins | 16 | 4.45 | 0.144 | 5 | -2.04 | -4.43, 0.36 | 0.096 | Yes (97%) |
| Glucosinolates | 30 | 4.59 | 0.437 | 18 | 0.21 | -0.31, 0.74 | 0.427 | Yes (93%) |
| Glucoraphanin | 4 | 4.69 | 0.193 | 3 | 0.20 | -0.28, 0.68 | 0.403 | Yes (39%) |
| Alpha-carotene | 6 | 4.74 | 0.189 | 4 | 0.14 | -0.83, 1.12 | 0.773 | Yes (77%) |
| Lycopene | 27 | 4.68 | 0.338 | 14 | 0.30 | -0.18, 0.78 | 0.217 | Yes (79%) |
| Beta-cryptoxanthin | 6 | 4.60 | 0.488 | 3 | 2.08 | -3.46, 7.61 | 0.462 | Yes (98%) |
| Zeaxanthin | 14 | 4.29 | 0.164 | 11 | -0.05 | -1.09, 0.99 | 0.927 | Yes (94%) |
| Dehydroascorbic acid | 7 | 4.16 | 0.134 | 6 | -0.60 | -1.71, 0.50 | 0.282 | Yes (92%) |
| Alpha-tocopherol | 12 | 4.50 | 0.240 | 7 | -0.28 | -0.62, 0.05 | 0.095 | No (0%) |
| Gamma-tocopherol | 6 | 4.61 | 0.467 | 3 | 5.39 | -6.24, 17.03 | 0.363 | Yes (99%) |
| Vitamin B | 13 | 4.76 | 0.072 | 9 | 0.54 | -0.22, 1.30 | 0.161 | Yes (73%) |
| Vitamin B ₁ | 4 | 4.76 | 0.252 | 3 | 0.45 | -0.39, 1.28 | 0.296 | Yes (50%) |
| Glucose | 19 | 4.65 | 0.263 | 11 | 0.77 | -0.53, 2.08 | 0.243 | Yes (95%) |
| Sucrose | 18 | 4.72 | 0.091 | 11 | 0.06 | -0.24, 0.37 | 0.685 | Yes (31%) |
| Fibre (soluble) | 4 | 4.56 | 0.061 | 4 | -0.55 | -1.10, 0.01 | 0.054 | No (0%) |
| Fibre (insoluble) | 5 | 4.60 | 0.443 | 5 | -0.26 | -0.97, 0.44 | 0.466 | Yes (57%) |

n, number of data points included in the comparison; SMD, standardised mean difference of fixed-effect model. *Ln ratio = Ln(ORG/CONV × 100%); †*P* value <0.05 indicates significance of the difference in composition between organic and conventional crop/crop based food; ‡Heterogeneity and the I² Statistic.

Table 12 cont. Results of the standard unweighted and weighted meta-analysis for parameters where none of the 8 meta-analysis protocols identified significant effects.

| Parameter | Unweighted meta-analysis | | | Weighted meta-analysis | | | | |
|----------------------------------|--------------------------|-----------|------------|------------------------|-------|-------------|------------|----------------|
| | <i>n</i> | Ln ratio* | <i>P</i> † | <i>n</i> | SMD | 95% CI | <i>P</i> † | Heterogeneity‡ |
| Asparagine (ASP) | 14 | 4.62 | 0.374 | 5 | -0.39 | -2.43, 1.65 | 0.709 | Yes (92%) |
| Aspartic acid | 10 | 4.57 | 0.240 | 5 | -0.38 | -1.40, 0.64 | 0.465 | Yes (85%) |
| Glutamine (Gln) | 11 | 4.64 | 0.407 | 4 | -0.71 | -1.75, 0.32 | 0.177 | Yes (86%) |
| Glycine (GLY) | 17 | 4.62 | 0.383 | 5 | -0.57 | -2.51, 1.37 | 0.566 | Yes (92%) |
| Serine (SER) | 18 | 4.59 | 0.280 | 6 | -0.63 | -1.64, 0.38 | 0.220 | Yes (81%) |
| Energy | 6 | 4.63 | 0.286 | 4 | 1.44 | -1.70, 4.58 | 0.370 | Yes (96%) |
| Fat | 23 | 4.63 | 0.235 | 10 | 0.39 | -0.67, 1.46 | 0.472 | Yes (92%) |
| Fatty acids | 94 | 4.55 | 0.115 | 60 | 0.00 | -0.22, 0.22 | 0.998 | Yes (49%) |
| Saturated fatty acids | 37 | 4.61 | 0.484 | 24 | 0.06 | -0.23, 0.35 | 0.681 | No (23%) |
| Saturated fatty acids (total) | 6 | 4.71 | 0.157 | 5 | 0.72 | -0.71, 2.15 | 0.323 | Yes (81%) |
| 16.0 fatty acid (palmitic acid) | 12 | 4.63 | 0.356 | 7 | 0.07 | -0.54, 0.69 | 0.817 | Yes (43%) |
| 18.0 fatty acid (stearic acid) | 12 | 4.70 | 0.291 | 8 | -0.08 | -0.96, 0.81 | 0.867 | Yes (72%) |
| 20.0 fatty acid (arachidic acid) | 7 | 4.58 | 0.358 | 5 | 0.00 | -0.46, 0.46 | 0.991 | No (0%) |
| 18.1 fatty acid (oleic acid) | 9 | 4.59 | 0.462 | 7 | -0.07 | -0.47, 0.33 | 0.725 | No (0%) |
| Polyunsaturated fatty acids | 32 | 4.66 | 0.193 | 23 | 0.10 | -0.33, 0.54 | 0.639 | Yes (68%) |
| 18.2 fatty acid (linoleic acid) | 11 | 4.56 | 0.319 | 8 | -0.11 | -0.91, 0.69 | 0.782 | Yes (67%) |
| 18.3 fatty acid (linolenic acid) | 9 | 4.74 | 0.139 | 5 | 0.17 | -1.00, 1.33 | 0.779 | Yes (79%) |

n, number of data points included in the comparison; SMD, standardised mean difference of fixed-effect model.*Ln ratio = $\ln(\text{ORG/CONV} \times 100\%)$; †*P* value <0.05 indicates significance of the difference in composition between organic and conventional crop/crop based food; ‡Heterogeneity and the *I*² Statistic.

Table 12 cont. Results of the standard unweighted and weighted meta-analysis for parameters where none of the 8 meta-analysis protocols identified significant effects.

| Parameter | Unweighted meta-analysis | | | Weighted meta-analysis | | | | |
|----------------|--------------------------|-----------|------------|------------------------|--------|---------------|------------|----------------|
| | <i>n</i> | Ln ratio* | <i>P</i> † | <i>n</i> | SMD | 95% CI | <i>P</i> † | Heterogeneity‡ |
| Aluminium (Al) | 10 | 4.64 | 0.336 | 4 | -0.02 | -0.59, 0.55 | 0.953 | Yes (83%) |
| Arsenic (As) | 3 | 4.52 | 0.374 | 3 | -40.77 | -108.34, 26.8 | 0.237 | Yes (100%) |
| Barium (Ba) | 13 | 4.53 | 0.121 | 6 | -0.05 | -0.24, 0.14 | 0.629 | No (0%) |
| Boron (B) | 25 | 4.66 | 0.314 | 11 | 1.20 | -1.72, 4.12 | 0.422 | Yes (100%) |
| Bromine (Br) | 6 | 4.97 | 0.222 | 5 | 0.91 | -0.72, 2.54 | 0.274 | Yes (85%) |
| Calcium (Ca) | 110 | 4.62 | 0.236 | 41 | 0.11 | -0.14, 0.35 | 0.390 | Yes (83%) |
| Carbon (C) | 8 | 4.60 | 0.395 | 5 | -0.08 | -0.56, 0.40 | 0.756 | No (0%) |
| Cerium (Ce) | 3 | 4.28 | 0.374 | 3 | -0.57 | -1.22, 0.09 | 0.091 | Yes (27%) |
| Chloride (Cl) | 6 | 4.48 | 0.062 | 5 | -0.42 | -1.10, 0.27 | 0.231 | No (0%) |
| Cobalt (Co) | 22 | 4.60 | 0.505 | 10 | -0.01 | -0.74, 0.72 | 0.978 | Yes (93%) |
| Copper (Cu) | 74 | 4.59 | 0.379 | 28 | -0.07 | -0.40, 0.26 | 0.672 | Yes (86%) |
| Iron (Fe) | 79 | 4.61 | 0.465 | 30 | -0.18 | -0.59, 0.22 | 0.379 | Yes (93%) |
| Lanthanum (La) | 3 | 4.73 | 0.369 | 3 | 0.28 | -0.72, 1.27 | 0.586 | Yes (96%) |
| Lead (Pb) | 34 | 4.58 | 0.432 | 16 | 0.38 | -7.42, 8.18 | 0.924 | Yes (100%) |
| Rhenium (Re) | 3 | 4.05 | 0.375 | 3 | 0.28 | -2.50, 3.06 | 0.843 | Yes (99%) |
| Sodium (Na) | 58 | 4.65 | 0.130 | 21 | 0.18 | -0.27, 0.62 | 0.443 | Yes (91%) |
| Sulphur (S) | 29 | 4.59 | 0.364 | 14 | -0.46 | -1.16, 0.24 | 0.197 | Yes (91%) |
| Thallium (Tl) | 4 | 4.68 | 0.250 | 4 | 0.62 | -1.28, 2.53 | 0.519 | Yes (98%) |
| Tin (Sn) | 3 | 4.40 | 0.252 | 3 | -11.43 | -29.58, 6.73 | 0.217 | Yes (100%) |
| Wolfram (W) | 5 | 4.97 | 0.092 | 5 | 0.27 | -0.03, 0.57 | 0.079 | No (0%) |

n, number of data points included in the comparison; SMD, standardised mean difference of fixed-effect model.*Ln ratio = $\ln(\text{ORG/CONV} \times 100\%)$; †*P* value <0.05 indicates significance of the difference in composition between organic and conventional crop/crop based food; ‡Heterogeneity and the *I*² Statistic.

Table 13. Results of the statistical test for publication bias reported in **Fig. 3 of the main paper.**

| Parameter | Trim and fill test* | | No of missing <i>n</i> in Rosenthal's Fail-safe N test† | No of missing <i>n</i> in Orwin's Fail-safe N test‡ | <i>P</i> from Egger's test for funnel plot asymmetry§ |
|-----------------------------------|------------------------|------------------|---|---|---|
| | No of missing <i>n</i> | funnel plot side | | | |
| Antioxidant activity | 0 | left | 1549 | 66 | 0.386 |
| FRAP | 2 | right | 24 | 5 | 0.069 |
| ORAC | 0 | left | 21 | 4 | 0.003 |
| TEAC | 1 | left | 17 | 7 | 0.180 |
| Phenolic compounds (total) | 0 | left | 615 | 58 | <0.001 |
| Flavonoids (total) | 0 | left | 95 | 8 | 0.597 |
| Phenolic acids (total) | 2 | left | 45 | 3 | <0.001 |
| Phenolic acids | 0 | left | 1601 | 89 | <0.001 |
| Chlorogenic acid | 0 | left | 149 | 14 | <0.001 |
| Flavanones | 0 | left | 457 | 54 | <0.001 |
| Stilbenes | 0 | left | 7 | 4 | 0.827 |
| Flavones and flavonols | 0 | left | 23198 | 134 | <0.001 |
| Flavones | 0 | left | 471 | 23 | 0.040 |
| Flavonols | 0 | left | 16927 | 111 | <0.001 |
| Quercetin | 5 | right | 54 | 17 | 0.426 |
| Rutin | 3 | right | 170 | 9 | 0.668 |
| Kaempferol | 0 | left | 189 | 13 | 0.010 |
| Anthocyanins (total) | 0 | left | 134 | 10 | 0.004 |
| Anthocyanins | 0 | left | 471 | 22 | <0.001 |
| Carotenoids (total) | 0 | left | 93 | 4 | <0.001 |
| Carotenoids | 0 | left | 1616 | 82 | 0.246 |

*The method used to estimate the number of data points missing from a meta-analysis due to the suppression of the most extreme results on one side of the funnel plot; †Number of missing data points that need to be retri ved and incorporate in the meta-analysis before the results become nonsignificant; ‡Number of missing data point that need to be retri ved and incorporate in the meta-analysis before the estimated value of the standardised mean (SMD) difference reaches a specified level (here SMD/2); §*P* value <0.05 indicates funnel plot asymmetry; ||Outlying data-pairs for which the mean percentage difference between organic and conventional samples was over 50 times higher than the mean value including outliers were removed.

Table 13 cont. Results of the statistical test for publication bias reported in [Fig. 3 of the main paper](#).

| Parameter | Trim and fill test* | | No of missing <i>n</i> in Rosenthal's Fail-safe N test† | No of missing <i>n</i> in Orwin's Fail-safe N test‡ | <i>P</i> from Egger's test for funnel plot asymmetry§ |
|------------------------------|------------------------|------------------|---|---|---|
| | No of missing <i>n</i> | funnel plot side | | | |
| Xanthophylls | 0 | left | 1064 | 33 | 0.001 |
| Lutein | 4 | right | 83 | 13 | 0.603 |
| Ascorbic acid | 0 | left | 307 | 30 | 0.745 |
| Vitamin E | 1 | left | 0 | 15 | 0.058 |
| Carbohydrates (total) | 0 | left | 392 | 16 | 0.001 |
| Carbohydrates | 0 | left | 313 | 53 | <0.001 |
| Sugars (reducing) | 2 | left | 0 | 3 | 0.287 |
| Protein (total) | 0 | right | 1913 | 26 | <0.001 |
| Amino acids | 26 | right | 9089 | 117 | 0.001 |
| Dry matter | 0 | left | 212 | 24 | <0.001 |
| Fibre | 0 | right | 41 | 15 | 0.012 |
| Nitrogen (N) | 0 | right | 861 | 35 | 0.004 |
| Nitrate | 0 | right | 243 | 29 | 0.001 |
| Nitrite | 1 | right | 0 | 7 | 0.603 |
| Cadmium (Cd) | 0 | right | 996 | 25 | <0.001 |

*The method used to estimate the number of data points missing from a meta-analysis due to the suppression of the most extreme results on one side of the funnel plot; †Number of missing data points that need to be retri ved and incorporate in the meta-analysis before the results become nonsignificant; ‡Number of missing data point that need to be retri ved and incorporate in the meta-analysis before the estimated value of the standardised mean (SMD) difference reaches a specified level (here SMD/2); §*P* value <0.05 indicates funnel plot asymmetry; ||Outlying data-pairs for which the mean percentage difference between organic and conventional samples was over 50 times higher than the mean value including outliers were removed.