

SOURCES



How to Heal Our Land  
and Reclaim Our Health

DAVID R. MONTGOMERY  
AND ANNE BIKLÉ



**W. W. NORTON & COMPANY**  
*Independent Publishers Since 1923*

## NOTE ON SOURCES

This document lists the references we consulted in researching and writing *What Your Food Ate*. They are organized by chapter and include studies mentioned in each chapter, fact sources, and background material that informed our understanding as we sought to evaluate the connections between soil, crop, animal, and human health.

While our research was by no means exhaustive, we tried to dig deep enough into the scientific and historical literature to test and explore these links. Readers interested in learning more about the subjects covered in *What Your Food Ate* will find our list of sources a useful starting point. And for those who prefer not to dive further into the scientific literature, we hope it gives you a sense of the interdisciplinary synthesis that the book unfolds.

Lastly, we thank the legion of researchers whose work we have drawn upon and hope that we have done justice to it, despite any sins of omission or inadvertent errors we may have introduced.

# TABLE OF CONTENTS

1. THE EDIBLE PUZZLE	3
2. ROCKS BECOME YOU	4
3. LIVING SOIL	6
4. CONVENTIONAL DILEMMA	6
5. THE FARMERS' DOCTOR	11
6. BOTANICAL BODIES	13
7. BIG GREEN THUMBS	16
8. COMPOST CONNECTIONS	17
9. OVERLOOKED GEMS	19
10. SILENT FIELDS	24
11. FAT OF THE LAND	30
12. WHAT'S IN YOUR BURGER?	33
13. BODY WISDOM	37
14. FLAVOR OF HEALTH	38
15. BALANCING ACT	41
16. FILLING EMPTY PLANTS	49
17. GROWING MEDICINE	53
18. HARVESTING HEALTH	56

# SOURCES

## 1: THE EDIBLE PUZZLE

- Bailey, R. L., K. P. West, and R. E. Black. 2015. The epidemiology of global micronutrient deficiencies. *Annals of Nutrition & Metabolism* 66 (supplement 2):22–33.
- Bauer, U. E., P. A. Briss, R. A. Goodman, and B. A. Bowman. 2014. Prevention of chronic disease in the 21st century: Elimination of the leading preventable causes of premature death and disability in the USA. *The Lancet* 384:45–52.
- Berner, L. A., D. R. Keast, R. L. Bailey, and J. T. Dwyer. 2014. Fortified foods are major contributors to nutrient intakes in diets of US children and adolescents. *Journal of the Academy of Nutrition and Dietetics* 114:1009–1022.
- Bird, J. K., R. A. Murphy, E. D. Ciappio, and M. I. McBurney. 2017. Risk of deficiency in multiple concurrent micronutrients in children and adults in the United States. *Nutrients* 9:655.
- Cawley, J., and C. Meyerhoefer. 2012. The medical care costs of obesity: An instrumental variables approach. *Journal of Health Economics* 31:219–230.
- Chen, J. 2007. Rapid urbanization in China: A real challenge to soil protection and food security. *Catena* 69:1–15.
- Drewnowski, A., 2009. Defining nutrient density: Development and validation of the nutrient rich foods index. *Journal of the American College of Nutrition* 28:421S–426S.
- Drewnowski, A., and V. L. Fulgoni, III. 2014. Nutrient density: Principles and evaluation tools. *American Journal of Clinical Nutrition* 99:1223S–1228S.
- Fulgoni, V. L., D. R. Keast, R. L. Bailey, and J. Dwyer. 2011. Foods, fortificants, and supplements: Where do Americans get their nutrients? *Journal of Nutrition* 141:1847–1854.
- Intergovernmental Science–Policy Platform on Biodiversity and Ecosystem Services (IPBES). 2018. *Summary for Policymakers of the Thematic Assessment Report on Land Degradation and Restoration of the Intergovernmental Science–Policy Platform on Biodiversity and Ecosystem Services*. Edited by R. Scholes et al. IPBES secretariat, Bonn, Germany.

## SOURCES

- Kibblewhite, M. G., K. Ritz, and M. J. Swift. 2008. Soil health in agricultural systems. *Philosophical Transactions of the Royal Society B* 363:685–701.
- Krajmalnik-Brown, R., Z.-E. Ilhan, D.-W. Kang, and J. K. DiBaise. 2012. Effects of gut microbes on nutrient absorption and energy regulation. *Nutrition in Clinical Practice* 27:201–214.
- Martínez Steele, E., et al. 2016. Ultra-processed foods and added sugars in the US diet: Evidence from a nationally representative cross-sectional study. *BMJ Open* 6:e009892.
- Monteiro, C. A., et al. 2013. Ultra-processed products are becoming dominant in the global food system. *Obesity Reviews* 14(S2):21–28.
- Montgomery, D. R. 2007. *Dirt: The Erosion of Civilizations*. University of California Press, Berkeley.
- Montgomery, D. R. 2017. *Growing a Revolution: Bringing Our Soil Back to Life*. W. W. Norton, New York.
- Montgomery, D. R., and A. Biklé. 2016. *The Hidden Half of Nature: The Microbial Roots of Life and Health*. W. W. Norton, New York.
- Morris, C. E., and D. C. Sands. 2006. The breeder's dilemma—yield or nutrition? *Nature Biotechnology* 24:1078–1080.
- Ogden, C. L., M. D. Carrol, and K. M. Flegal. 2008. High body mass index for age among U.S. children and adolescents, 2003–2006. *Journal of the American Medical Association* 299:2401–2405.
- Pimentel, D., et al. 1995. Environmental and economic costs of soil erosion and conservation benefits. *Science* 267:1117–1123.
- Putnam, J. 2000. Major trends in U.S. food supply—1909–1999. *Food Review* 23:8–15.
- Raghupathi, W., and V. Raghupathi. 2018. An empirical study of chronic diseases in the United States: A visual analytics approach to public health. *International Journal of Environmental Research and Public Health* 15:431.
- Rico-Campa, A., et al. 2019. Association between consumption of ultra-processed foods and all cause mortality: SUN prospective cohort study. *British Medical Journal* 365:11949.
- UN Food and Agriculture Organization. 2015. *Status of the World's Soil Resources, Technical Summary*. Intergovernmental Technical Panel on Soils, L. Montanarella (chair), Food and Agriculture Organization of the United Nations, Rome.
- Wrangham, R. 2009. *Catching Fire: How Cooking Made Us Human*. Basic Books, New York.

## 2: ROCKS BECOME YOU

- Baumhardt, R. L., B. A. Stewart, and U. M. Sainju. 2015. North American soil degradation: Processes, practices, and mitigating strategies. *Sustainability* 7:2936–2960.
- Berendsen, R. L., C. M. J. Pieterse, and P. A. H. M. Bakker. 2012. The rhizosphere microbiome and plant health. *Trends in Plant Science* 17:478–486.
- Bionutrient Food Association and Real Food Campaign. 2018 *RFC Final Report*. <https://lab.realfoodcampaign.org/reports/rfc-2018-final-report/>.
- Davis, D. R. 2009. Declining fruit and vegetable nutrient composition: What is the evidence? *Horticultural Science* 44:15–19.
- Davis, D. R., M. D. Epp, and H. D. Riordan. 2004. Changes in USDA food composi-

## SOURCES

- tion data for 43 garden crops, 1950–1999. *Journal of the American College of Nutrition* 23:669–682.
- Fan, M.-S., et al. 2008. Evidence of decreasing mineral density in wheat grain over the last 160 years. *Journal of Trace Elements in Medicine and Biology* 22:315–324.
- Farnham, M. W., M. A. Grusak, and M. Wang. 2000. Calcium and magnesium concentration of inbred and hybrid broccoli heads. *Journal of the American Society of Horticultural Science* 125:344–349.
- Garvin, D. F., R. M. Welch, and J. W. Finley. 2006. Historical shifts in the seed mineral micronutrient concentration of US hard red winter wheat germplasm. *Journal of the Science of Food and Agriculture* 86:2213–2220.
- Hodge, A., C. D. Campbell, and A. H. Fitter. 2001. An arbuscular mycorrhizal fungus accelerates decomposition and acquires nitrogen directly from organic material. *Nature* 413:297–299.
- Hu, L., et al. 2018. Root exudate metabolites drive plant-soil feedbacks on growth and defense by shaping the rhizosphere microbiota. *Nature Communications* 9:2738.
- Humphreys, C. P., et al. 2010. Mutualistic mycorrhiza-like symbiosis in the most ancient group of land plants. *Nature Communications* 1:103.
- Janzen, H. H. 2001. Soil science on the Canadian prairies—peering into the future from a century ago. *Canadian Journal of Soil Science* 81:489–503.
- Jarrell, W. M., and R. B. Beverly. 1981. The dilution effect in plant nutrition studies. *Advances in Agronomy* 34:197–224.
- Marles, R. J. 2017. Mineral nutrient composition of vegetables, fruits and grains: The context of reports of apparent historical declines. *Journal of Food Composition and Analysis* 56:93–103.
- Mayer, A.-M. 1997. Historical changes in the mineral content of fruits and vegetables. *British Food Journal* 99:207–211.
- Mosse, B. 1973. Advances in the study of vesicular-arbuscular mycorrhiza. *Annual Review of Phytopathology* 11:171–196.
- Murphy, K. M., P. G. Reeves, and S. S. Jones. 2008. Relationship between yield and mineral nutrient concentrations in historical and modern spring wheat cultivars. *Euphytica* 163:381–390.
- Remy, W., T. N. Taylor, H. Hass, and H. Kerp. 1994. Four hundred-million-year-old vesicular arbuscular mycorrhizae. *Proceedings of the National Academy of Sciences* 91:11,841–11,843.
- Song, Y. Y., et al. 2010. Interplant communication of tomato plants through underground common mycorrhizal networks. *PLoS One* 5:e13324.
- Stuiver, M. 1978. Atmospheric carbon dioxide and carbon reservoir changes. *Science* 199:253–258.
- Sturz, A. V., and B. R. Christie. 2003. Beneficial microbial allelopathies in the root zone: The management of soil quality and plant disease with rhizobacteria. *Soil Tillage Research* 72:107–123.
- Tiessen, H., E. Cuevas, and P. Chacon. 1994. The role of soil organic matter in sustaining soil fertility. *Nature* 371:783–785.
- Waksman, S., and R. Starkey. 1931. *The Soil and the Microbe*. John Wiley & Sons, New York.
- White, P. J., and M. R. Broadley. 2005. Historical variation in the mineral composition

## SOURCES

- tion of edible horticultural products. *Journal of Horticultural Science & Biotechnology* 80:660–667.
- Zahar Haichar, F. el, et al. 2008. Plant host habitat and root exudates shape soil bacterial community structure. *ISME Journal* 2:1221–1230.

### 3: LIVING SOIL

- Anon. 1939. Soil fertility and national health. *Journal of the Royal Society of Arts* 87:776–781.
- Balfour, E. B. 1943. *The Living Soil: Evidence of the Importance to Human Health of Soil Vitality, with Special Reference to National Planning*. Faber and Faber, London.
- Balfour, E. B. 1975. *The Living Soil and the Haughley Experiment*. Faber and Faber, London.
- Blakemore, R. J. 2000. Ecology of earthworms under the “Haughley Experiment” of organic and conventional management regimes. *Biological Agriculture and Horticulture* 18:141–159.
- Bomford, R. D. 1939. “Medical Testament” on nutrition. *British Medical Journal* 1 (4088, May 13):1004.
- Cheshire Panel Committee. 1939. Nutrition, soil fertility, and the national health. *British Medical Journal* 1 (4084, Supplement 1794, April 15):157–159.
- Howard, A. 1939. “Medical Testament” on nutrition. *British Medical Journal* 1 (4090, May 27):1106.
- Howard, A. 1940. *An Agricultural Testament*. Oxford University Press, Oxford.
- McSheehy, T. W., and J. A. Rawlings. 1973. The influence of three different farming systems on organic matter in the soils. *Qualitas Plantarum et Materiae Vegetabiles* 22:321–333.
- Picton, L. 1939. “Medical Testament” on nutrition. *British Medical Journal* 1(4090, May 27):1106.
- Soil Association. 1962. *The Haughley Experiment: The First Twenty-Five Years, 1938–62*. Soil Association, London.

### 4: CONVENTIONAL DILEMMA

- Ahemad, M., and Md. S. Khan. 2011. Toxicological effects of selective herbicides on plant growth promoting activities of phosphate solubilizing *Klebsiella* sp. strain PS19. *Current Microbiology* 62:532–538.
- Aristilde, L., et al. 2017. Glyphosate-induced specific and widespread perturbations in the metabolome of soil *Pseudomonas* species. *Frontiers in Environmental Science* 5:34.
- Aslam, T., M. A. Choudary, and S. Saggarr. 1999. Tillage impacts on soil microbial biomass C, N and P, earthworms and agronomy after two years of cropping following permanent pasture in New Zealand. *Soil and Tillage Research* 51:103–111.
- Bailey, D. C., et al. 2018. Chronic exposure to a glyphosate-containing pesticide leads to mitochondrial dysfunction and increased oxygen species production in *Caenorhabditis elegans*. *Environmental Toxicology and Pharmacology* 57:46–52.
- Bais, H. P., et al. 2006. The role of root exudates in rhizosphere interactions with plants and other organisms. *Annual Reviews of Plant Biology* 57:233–266.

## SOURCES

- Benbrook, C. M. 2016. Trends in glyphosate herbicide use in the United States and globally. *Environmental Sciences Europe* 28:3.
- Bender, S. F., C. Wagg, and M. G. A. van der Heijden. 2016. An underground revolution: Biodiversity and soil ecological engineering for agricultural sustainability. *Trends in Ecology and Evolution* 31:440–452.
- Betts, E. M. (ed.). 1953. *Thomas Jefferson's Farm Book*. Princeton University Press, Princeton.
- Blakemore, R. J. 2018. Critical decline of earthworms from organic origins under intensive, humic SOM-depleting agriculture. *Soil Systems* 2:33.
- Bolan, N. S. 1991. A critical review on the role of mycorrhizal fungi in the uptake of phosphorus by plants. *Plant and Soil* 134:189–207.
- Bott, S., et al. 2008. Glyphosate-induced impairment of plant growth and micro-nutrient status in glyphosate-resistant soybean (*Glycine max* L.). *Plant and Soil* 312:185–194.
- Bowles, T. M., L. E. Jackson, M. Loeher, and T. R. Cavagnaro. 2016. Ecological intensification and arbuscular mycorrhizas: A meta-analysis of tillage and cover crops effects. *Journal of Applied Ecology* 54:1785–1793.
- Carvalho, F. P., et al. 2014. Glyphosate drift affects arbuscular mycorrhizal association in coffee. *Planta Daninha* 32:783–789.
- Corkidi, L., D. L. Rowland, N. C. Johnson, and E. B. Allen. 2002. Nitrogen fertilization alters the functioning of arbuscular mycorrhizas at two semiarid grasslands. *Plant and Soil* 240:299–310.
- Darwin, C. 1881. *The Formation of Vegetable Mould Through the Action of Worms: With Observations on Their Habits*. John Murray, London.
- Davis, A. S., et al. 2012. Increasing cropping system diversity balances productivity, profitability and environmental health. *PLoS One* 7:e47149.
- Druille, M., M. N. Cabello, M. Omacini, and R. A. Golluscio. 2013. Glyphosate reduces spore viability and root colonization of arbuscular mycorrhizal fungi. *Applied Soil Ecology* 64:99–103.
- Druille, M., M. Omacini, R. A. Golluscio, and M. N. Cabello. 2013. Arbuscular mycorrhizal fungi are directly and indirectly affected by glyphosate application. *Applied Soil Ecology* 72:143–149.
- Duke, S. O., and S. B. Powles. 2009. Glyphosate-resistant crops and weeds: Now and in the future. *AgBioForum* 12:346–357.
- Duke, S. O., K. C. Vaughn, and R. D. Wauchop. 1985. Effects of glyphosate on uptake, translocation, and intracellular localization of metal cations in soybean (*Glycine max*) seedlings. *Pesticide Biochemistry and Physiology* 24:384–394.
- Egerton-Warburton, L. M., and E. B. Allen. 2000. Shifts in arbuscular mycorrhizal communities along an anthropogenic nitrogen gradient. *Ecological Applications* 10:484–496.
- Eisenhauer, N., et al. 2017. Root biomass and exudates link plant diversity with soil bacterial and fungal biomass. *Scientific Reports* 7:44641.
- Feng, P. C. C., et al. 2008. The control of Asian rust by glyphosate in glyphosate-resistant soybeans. *Pest Management Science* 64:353–359.
- Francis, G. S., and T. L. Knight. 1993. Long-term effects of conventional and no-tillage on selected soil properties and crop yields in Canterbury, New Zealand. *Soil and Tillage Research* 26:193–210.



## SOURCES

- Franzluebbers, A. J. 2018. Soil-test biological activity with the flush of CO<sub>2</sub>: III. Corn yield responses to applied nitrogen. *Soil Science Society of America Journal* 82:708–721.
- Gaupp-Berghausen, M., M. Hofer, B. Rewald, and J. G. Zaller. 2015. Glyphosate-based herbicides reduce the activity and reproduction of earthworms and lead to increased soil nutrient concentrations. *Scientific Reports* 5:12886.
- Grime, J. P. 1973. Competitive exclusion in herbaceous vegetation. *Nature* 242:344–347.
- Gryndler, M., et al. 2002. Interaction between arbuscular mycorrhizal fungi and cellulose in growth substrate. *Applied Soil Ecology* 19:279–288.
- Haddaway, N. R., et al. 2017. How does tillage intensity affect soil organic carbon? A systematic review. *Environmental Evidence* 6:30.
- Helander, M., et al. 2018. Glyphosate decreases mycorrhizal colonization and affects plant-soil feedback. *Science of the Total Environment* 642:285–291.
- Hendrix, J. W., B. Z. Guo, and Z.-Q. An. 1995. Divergence of mycorrhizal fungal communities in crop production systems. In *The Significance and Regulation of Soil Biodiversity*. Edited by H. P. Collins, G. P. Robertson, and M. J. Klug. Kluwer Academic Publishers, Dordrecht, Netherlands, pp. 131–140.
- Henneron, L., et al. 2015. Fourteen years of evidence for positive effects of conservation agriculture and organic farming on soil life. *Agronomy for Sustainable Development* 35: 169–181.
- Hobbs, P. R., K. Sayre, and R. Gupta. 2008. The role of conservation agriculture in sustainable agriculture. *Philosophical Transactions of the Royal Society B* 363:543–555.
- Hole, D. G., et al. 2005. Does organic farming benefit biodiversity? *Biological Conservation* 122:113–130.
- Huber, D. M., and R. D. Watson. 1974. Nitrogen form and plant disease. *Annual Reviews of Phytopathology* 12:139–165.
- Jansa, J., A. Wiemken, and E. Frossard. 2006. The effects of agricultural practices on arbuscular mycorrhizal fungi. In *Function of Soils for Human Societies and the Environment*. Edited by E. Frossard, W. E. H. Blum, and B. P. Warkentin. Geological Society, London, pp. 89–115.
- Johnson, N. C. 1993. Can fertilization of soil select less mutualistic mycorrhizae? *Ecological Applications* 3:749–757.
- Jordan, D., R. J. Miles, V. C. Hubbard, and T. Lorenz. 2004. Effect of management practices and cropping systems on earthworm abundance and microbial activity in Sanborn Field: A 115-year-old agricultural field. *Pedobiologia* 48:99–110.
- Kiers, E. T., S. A. West, and R. F. Denison. 2002. Mediating mutualisms: Farm management practices and evolutionary changes in symbiont co-operation. *Journal of Applied Ecology* 39:745–754.
- Kremer, R., N. Means, and S. Kim. 2005. Glyphosate affects soybean root exudation and rhizosphere micro-organisms. *International Journal of Environmental Analytical Chemistry* 85:1165–1174.
- Kuzyakov, Y., and Domanski, G. 2000. Carbon input by plants into the soil: Review. *Journal of Plant Nutrition and Soil Science* 163:421–431.
- Lancaster, S. H., E. B. Hollister, S. A. Senseman, and T. J. Gentry. 2010. Effects of repeated glyphosate applications on soil microbial community composition and the mineralization of glyphosate. *Pest Management Science* 66:59–64.
- Liang, C., J. P. Schimel, and J. D. Jastrow. 2017. The importance of anabolism in microbial control over soil carbon storage. *Nature Microbiology* 2:17105.

## SOURCES

- Lori, M., et al. 2017. Organic farming enhances soil microbial abundance and activity—a meta-analysis and meta-regression. *PLoS One* 12:e0180442.
- Mäder, P. et al. 2002. Soil fertility and biodiversity in organic farming. *Science* 296:1694–1697.
- McDaniel, M. D., L. K. Tiemann, and A. S. Grandy. 2014. Does agricultural crop diversity enhance soil microbial biomass and organic matter dynamics? A meta-analysis. *Ecological Applications* 24:560–570.
- National Research Council, Committee on Genetically Engineered Crops. 2016. *Genetically Engineered Crops: Experiences and Prospects*. National Academy Press, Washington D.C.
- Nicolas, V., N. Oestreicher, and C. Vélot. 2016. Multiple effects of a commercial Roundup® formulation on the soil filamentous fungus *Aspergillus nidulans* at low doses: Evidence of an unexpected impact on energetic metabolism. *Environmental Science and Pollution Research* 23:14,393–14,404.
- Nielands, J. B. 1995. Siderophores: Structure and function of microbial iron transport compounds. *Journal of Biological Chemistry* 270:26,723–26,726.
- Nunes, M. R., et al. 2018. No-till and cropping system diversification improve soil health and crop yield. *Geoderma* 328:30–43.
- Nye, M., et al. 2014. Microbial community structure in soils amended with glyphosate-tolerant soybean residue. *Applied Ecology and Environmental Sciences* 2:74–81.
- Oliveira Ferreira, A. de, et al. 2016. Can no-till grain production restore soil organic carbon to levels natural grass in a subtropical Oxisol? *Agriculture, Ecosystems and Environment* 229:13–20.
- Öpik, M., M. Moora, J. Lõra, and M. Zobel. 2006. Composition of root-colonizing arbuscular mycorrhizal fungal communities in different ecosystems around the globe. *Journal of Ecology* 94:778–790.
- Peixota, F. 2005. Comparative effects of the Roundup and glyphosate on mitochondrial oxidative phosphorylation. *Chemosphere* 61:1115–1122.
- Pelosi, C., et al. 2013. Reduction of pesticide use can increase earthworm populations in wheat crops in a European temperate region. *Agriculture, Ecosystems and Environment* 181:223–230.
- Pereira, A. G., et al. 2018. Low-concentration exposure to glyphosate-based herbicide modulates the complexes of the mitochondrial respiratory chain and induces mitochondrial hyperpolarization in the *Danio rerio* brain. *Chemosphere* 209:353–362.
- Pittelkow, C. M., et al. 2015. Productivity limits and potentials of the principles of conservation agriculture. *Nature* 517:365–368.
- Powlson, D. S., et al. 2014. Limited potential of no-till agriculture for climate change mitigation. *Nature Climate Change* 4:678–683.
- Reeve, J. R., et al. 2016. Organic farming, soil health, and food quality: Considering possible links. *Advances in Agronomy* 137:319–366.
- Ross, C., et al. 2002. Soil quality under long-term cropping by no-tillage compared with conventional cultivation and permanent pasture in the Manawatu. In *Dairy Farm Soil Management*. Edited by L. D. Currie and P. Loganathan. Occasional Report 15, Fertilizer and Lime Research Centre, Massey University, Palmerston North, New Zealand, pp. 119–126.
- Schmidt, O., et al. 2001. Earthworm communities in conventional wheat monocrop-

## SOURCES

- ping and low-input wheat–clover intercropping systems. *Annals of Applied Biology* 138:377–388.
- Sengupta, A., and W. A. Dick. 2015. Bacterial community diversity in soil under two tillage practices as determined by pyrosequencing. *Microbial Ecology* 70:853–859.
- Tautges, N. E., et al. 2019. Deep soil inventories reveal that impacts of cover crops and compost on soil carbon sequestration differ in surface and subsurface soils. *Global Change Biology* 25:3753–3766.
- Tian, D., and S. Niu. 2015. A global analysis of soil acidification caused by nitrogen addition. *Environmental Research Letters* 10:024019.
- Tilman, D., D. Wedin, and J. Knops. 1996. Productivity and sustainability influenced by biodiversity in grassland ecosystems. *Nature* 379:718–720.
- Treseder, K. K., and P. M. Vitousek. 2001. Effects of soil nutrient availability on investment in acquisition of N and P in Hawaiian rain forests. *Ecology* 82:946–954.
- Van Groenigen, J. W., et al., 2014. Earthworms increase plant production: A meta-analysis. *Scientific Reports* 4:6365.
- Venter, Z. S., K. Jacobs, and H.-J. Hawkins. 2016. The impact of crop rotation on soil microbial diversity: A meta-analysis. *Pedobiologia* 59(4):1–9.
- Verbruggen, E., and E. T. Kiers. 2010. Evolutionary ecology of mycorrhizal functional diversity in agricultural systems. *Evolutionary Applications* 3:547–560.
- Verbruggen, E., et al., 2010. Positive effects of organic farming on below-ground mutualists: Large-scale comparison on mycorrhizal fungal communities in agricultural soils. *New Phytologist* 186:968–979.
- Verrell, P., and E. van Buskirk. 2004. As the worm turns: *Eisenia fetida* avoids soil contaminated by a glyphosate-based herbicide. *Bulletin of Environmental Contamination and Toxicology* 72:219–224.
- Verzeaux, J., et al. 2016. Cover crops prevent the deleterious effect of nitrogen fertilization on bacterial diversity by maintaining the carbon content of ploughed soil. *Geoderma* 281:49–57.
- Wallace, A. 1994. Soil acidification from use of too much fertilizer. *Communications in Soil Science and Plant Analysis* 25:87–92.
- Wardle, D. A. 1995. Impacts of disturbance on detritus food webs in agro-ecosystems of contrasting tillage and weed management practices. *Advances in Ecological Research* 26:105–185.
- Wolmarans, K., and W. J. Swart. 2104. Influence of glyphosate, other herbicides and genetically modified herbicide-resistant crops on soil microbiota: A review. *South African Journal of Plant and Soil* 31:177–186.
- Zaller, J. G., F. Heigl, L. Ruess, and A. Grabmaier. 2014. Glyphosate herbicide affects belowground interactions between earthworms and symbiotic mycorrhizal fungi in a model ecosystem. *Scientific Reports* 4:5634.
- Zobiolo, L. H. S., R. J. Kremer, R. S. Oliviera Jr., and J. Constantin. 2011. Glyphosate affects micro-organisms in rhizospheres of glyphosate-resistant soybeans. *Journal of Applied Microbiology* 110:118–127.
- Zuber, S. M., and M. B. Villamil. 2016. Meta-analysis approach to assess effect of tillage on microbial biomass and enzyme activities. *Soil Biology and Biochemistry* 97:176–187.

## SOURCES

### 5: THE FARMERS' DOCTOR

- Anonymous. 1948. Obituary: Lionel James Picton, O.B.E., B.M. *British Medical Journal* 1(4586, November 27):960.
- Armijo, R., and A. H. Coulson. 1975. Epidemiology of stomach cancer in Chile: The role of nitrogen fertilizers. *International Journal of Epidemiology* 4(4):3–11.
- Armstrong, E. F. 1939. The leader to perfect health: *The Englishman's Food*. *Nature* 144:264–265.
- Bogovski, P., and S. Bogovski. 1981. Animal species in which N-nitroso compounds induce cancer. *International Journal of Cancer* 27:471–474.
- Bollet, A. J. 1992. Politics and pellagra: The epidemic of pellagra in the U.S. in the early twentieth century. *Yale Journal of Biology and Medicine* 65:211–221.
- Boyd-Orr, J. 1952. Sir Jack Drummond, F.R.S. *Nature* 170:402.
- Brown, G. F. 1951. Nutrition and health: Thoughts on feeding. *Agronomy Journal* 43:152–153.
- Copping, A. M. 1964. Sir Jack Cecil Drummond, F.R.S.—a biographical sketch. *Journal of Nutrition* 82:3–9.
- Drummond, J. C., and A. Wilbraham. 1939. *The Englishman's Food: A History of Five Centuries of English Diet*. Jonathan Cape, London.
- Evans, C. L. 1952. Sir Jack Drummond, F.R.S. *Nature* 170:401–402.
- Fahmi, O. G., and M. J. Fahmi. 1976. Mutagenicity of N-O-acetoxyethyl-N-ethylnitrosamine and N,N-diethyl-nitrosamine in relation to the mechanisms of metabolic activation of dialkylnitrosamines. *Cancer Research* 36:4504–4512.
- Fraser, P., C. Chilvers, V. Beral, and M. J. Hill. 1980. Nitrate and human cancer: A review of the evidence. *International Journal of Epidemiology* 9:3–11.
- Hamner, K. C. 1945. Minor elements and vitamin content of plants. *Soil Science* 60:165–171.
- Hunt, C. H. 1927. *The Influence of Fertilizers on the Vitamin-B Content of Wheat*. Bulletin 415. Ohio Agricultural Experiment Station, Wooster, Ohio.
- Jones, W. W., C. W. Van Horn, and A. H. Finch. 1945. *The Influence of Nitrogen Nutrition of the Tree upon the Ascorbic Acid Content and Other Chemical and Physical Characteristics of Grapefruit*. Technical Bulletin 106. Agricultural Experiment Station, University of Arizona, Tucson.
- Jukes, T. H. 1989. Historical perspectives: The prevention and conquest of scurvy, beri-beri, and pellagra. *Preventive Medicine* 18:877–883.
- Keely, M. G., et al. 1966. Induction of hepatic cell carcinomas in monkeys with N-nitrosodiethylamine. *Journal of the National Cancer Institute* 36:323–351.
- Ma, L., L. Hu, X. Feng, and S. Wang. 2018. Nitrate and nitrite in health and disease. *Aging and Disease* 9:938–945.
- Magee, P. N., and J. M. Barnes. 1965. The production of malignant primary hepatic tumors in the rat by feeding dimethylnitrosamine. *British Journal of Cancer* 10:114–122.
- McCarrison, R. 1924. The relation of manure to the nutritive and vitamin value of certain grain. *British Medical Journal* 1(3300, March 29):567–569.
- McCarrison, R. 1924. Rice in relation to beri-beri in India. *British Medical Journal* 1(3297, March 8):414–420.

## SOURCES

- McCarrison, R. 1925. Problems of food, with special reference to India. *Journal of the Royal Society of Arts* 73:137–161.
- McCarrison, R., and R. Viswanath. 1926. The effect of manurial conditions on the nutritive and vitamin values of millet and wheat. *Indian Journal of Medical Research* 14:351–378.
- Morales-Suarez-Varela, M. M., A. Llopis-Gonzalez, and M. L. Tejerizo-Perez. 1995. Impact of nitrates in drinking water on cancer mortality in Valencia, Spain. *European Journal of Epidemiology* 11:15–21.
- Mozafar, A. 1993. Nitrogen fertilizers and the amount of vitamins in plants: A review. *Journal of Plant Nutrition* 16:2479–2506.
- Nolan, B. T., and J. D. Stoner. 2000. Nutrients in groundwaters of the conterminous United States, 1992–1995. *Environmental Science & Technology* 34:1156–1165.
- Pendleton, R. L. 1949. Nutrition and the soil: *Thoughts on Feeding* by Lionel James Picton. *Quarterly Review of Biology* 24:239.
- Petrosini, G. 1945. The action of mineral fertilization on the vitamin content of plants: Investigation of pepper pods. *Annali di Chimica Applicata* 35:81–93.
- Picton, L. J. 1946. *Thoughts on Feeding*. Faber and Faber, London.
- Puckett, L. J. 1995. Identifying the major sources of nutrient water pollution. *Environmental Science & Technology* 29:408–414.
- Rowlands, M. J., and B. Wilkinson. 1930. The vitamin B content of grass seeds in relationship to manures. *Biochemical Journal* 24:199–204.
- Sheets, O. A., et al. 1944. Effect of fertilizer, soil composition, and certain climatological conditions on the calcium and phosphorus content of turnip greens. *Journal of Agricultural Research* 68:1945–1990.
- Somers, G. F., and Beeson, K. C. 1948. The influence of climate and fertilizer practices upon the vitamin and mineral content of vegetables. *Advances in Food Research* 1:291–324.
- Speirs, M., et al. 1944. Effect of fertilizer and environment on the iron content of turnip greens. *Southern Cooperative Services Bulletin* 2:1–24.
- Sun, Q., et al. 2010. White rice, brown rice, and risk of type 2 diabetes in US men and women. *Archives of Internal Medicine* 170:961–969.
- Taylor, H. W., and W. Lijinski. 1975. Tumor induction in rats by feeding heptamethylamine and nitrite in water. *Cancer Research* 35:812–815.
- Villegas, R., et al. 2007. Prospective study of dietary carbohydrates, glycemic index, glycemic load, and incidence of type 2 diabetes mellitus in middle-aged Chinese women. *Archives of Internal Medicine* 167:2310–2316.
- Ward, M. H., et al. 2018. Drinking water nitrate and human health: An updated review. *International Journal of Environmental Research and Public Health* 15:1557.
- Weyer, P. J., et al. 2001. Municipal drinking water nitrate level and cancer risk in older women: The Iowa Women’s Health Study. *Epidemiology* 11:327–338.
- Wittwer, S. H., and H. R. Goff. 1946. Vegetable crops in relation to soil fertility: IV. Nutritional values of New Zealand spinach. *Journal of Nutrition* 31:59–65.
- Zaldívar, R. 1977. Nitrate fertilizers as environmental pollutants: Positive correlation between nitrates (NaNO<sub>3</sub> and KNO<sub>3</sub>) used per unit area and stomach cancer mortality rates. *Experientia* 33:264–265.
- Zaldívar, R., and W. H. Wetterstrand. 1975. Further evidence of a positive correlation

## SOURCES

between exposure to nitrate fertilizers ( $\text{NaNO}_3$  and  $\text{KNO}_3$ ) and gastric cancer death rates: Nitrites and nitrosamines. *Experientia* 31:1354–1355.

### 6: BOTANICAL BODIES

- Baranski, M., et al. 2014. Higher antioxidant and lower cadmium concentrations and lower incidence of pesticide residues in organically grown crops: A systematic literature review and meta-analyses. *British Journal of Nutrition* 112:794–811.
- Brandt, K., C. Leifert, R. Sanderson, and C. J. Seal. 2011. Agroecosystem management and nutritional quality of plant foods: The case of organic fruits and vegetables. *Critical Reviews in Plant Sciences* 30:177–197.
- Brandt, K., and J. P. Mølgaard. 2001. Organic agriculture: Does it enhance or reduce the nutritional value of plant foods? *Journal of the Science of Food and Agriculture* 81:924–931.
- Cakmak, I., A. Yazici, Y. Tutus, and K. Ozturk. 2009. Glyphosate reduced seed and leaf concentrations of calcium, manganese, magnesium, and iron in non-glyphosate resistant soybean. *European Journal of Agronomy* 31:114–119.
- Chassy, A. W., et al. 2006. Three-year comparison of the content of antioxidant microconstituents and several quality characteristics in organic and conventionally managed tomatoes and bell peppers. *Journal of Agricultural and Food Chemistry* 54:8244–8252.
- Cuevas, F. J., et al. 2015. Effect of organic and conventional management on bio-functional quality of thirteen plum cultivars (*Prunus salicina* Lindl.). *PLoS One* 10:e0136596.
- Crowder, D. W., and J. P. Reganold. 2015. Financial competitiveness of organic agriculture on a global scale. *Proceedings of the National Academy of Sciences* 112:7611–7616.
- Défago, G., and H. Kern. 1983. Induction of *Fusarium solani* mutants insensitive to tomatine, their pathogenicity and aggressiveness to tomato fruits and pea plants. *Physiological Plant Pathology* 22:29–37.
- Duke, S. O., K. C. Vaughn, and R. D. Wauchope. 1985. Effects of glyphosate on uptake, translocation, and intracellular localization of metal cations in soybean (*Glycine max*) seedlings. *Pesticide Biochemistry and Physiology* 24:384–394.
- Duke, S. O., et al. 2012. Glyphosate effects on plant mineral nutrition, crop rhizosphere microbiota, and plant disease in glyphosate-resistant crops. *Journal of Agricultural and Food Chemistry* 60:10,375–10,397.
- Eker, S., et al. 2006. Foliar-applied glyphosate substantially reduced uptake and transport of iron and manganese in sunflower plants. *Journal of Agriculture and Food Chemistry* 54:10,019–10,025.
- Fernandez, M. R., et al. 2009. Glyphosate associates with cereal diseases caused by *Fusarium* spp. in the Canadian prairies. *European Journal of Agronomy* 31:133–143.
- Fernandez, M. R., et al. 2007. Impacts of crop production factors on common root rot of barley in Eastern Saskatchewan. *Crop Science* 47:1585–1595.
- Fess, T. L., and V. A. Benedito. 2018. Organic versus conventional cropping sustainability: A comparative system analysis. *Sustainability* 10:272.
- Glen, D. M., H. Jones, and J. K. Fieldsend. 1990. Damage to oilseed rape seedlings by the field slug *Deroceras reticulatum* in relation to glucosinolate concentration. *Annals of Applied Biology* 117:197–207.

## SOURCES

- Gordon, B. 2007. Manganese nutrition of glyphosate-resistant and conventional soybeans. *Better Crops* 91:12–13.
- Hajslová, J., et al. 2005. Quality of organically and conventionally grown potatoes: Four-year study of micronutrients, metals, secondary metabolites, enzymic browning and organoleptic properties. *Food Additives & Contaminants* 22:514–534.
- Harborne, J. B., and C. A. Williams. 2000. Advances in flavonoid research since 1992. *Phytochemistry* 55:481–504.
- Hendrix, J. W., B. Z. Guo, and Z.-Q. An. 1995. Divergence of mycorrhizal fungal communities in crop production systems. In *The Significance and Regulation of Soil Biodiversity*. Edited by H. P. Collins, G. P. Robertson, and M. J. Klug. Kluwer Academic Publishers, Dordrecht, Netherlands, pp. 131–140.
- Hepperly, P. R., E. Omondi, and R. Seidel. 2018. Soil regeneration increases crop nutrients, antioxidants and adaptive responses. *MOJ Food Processing & Technology* 6:196–203.
- Hunter, D., et al. 2011. Evaluation of the micronutrient composition of plant foods produced by organic and conventional agricultural methods. *Critical Reviews in Food Science and Nutrition* 51:571–582.
- Johal, G. S., and D. M. Huber. 2009. Glyphosate effects on diseases of plants. *European Journal of Agronomy* 31:144–152.
- Johal, G. S., and J. E. Rahe. 1988. Glyphosate, hypersensitivity and phytoalexin accumulation in the incompatible bean anthracnose host-parasite interaction. *Physiological and Molecular Plant Pathology* 32: 267–281.
- Kremer, R., and N. Means. 2009. Glyphosate and glyphosate-resistant crop interactions with rhizosphere microorganisms. *European Journal of Agronomy* 31:153–161.
- Larson, R. L., et al. 2006. Influence of glyphosate on Rhizoctonia and Fusarium root rot in sugar beet. *Pest Management Science* 62:1182–1192.
- Leclerc, J., M. L. Miller, E. Joliet, and G. Rocquelin. 1991. Vitamin and mineral contents of carrot and celeriac grown under mineral or organic fertilization. *Biological Agriculture and Horticulture* 7:339–348.
- Lévesque, C. A., and J. E. Rahe. 1992. Herbicide interactions with fungal root pathogens, with special reference to glyphosate. *Annual Review of Phytopathology* 30:579–602.
- Lévesque, C. A., J. E. Rahe, and D. M. Eaves. 1987. Effects of glyphosate on *Fusarium* spp.: Its influence on root colonization of weeds, propagule density in the soil, and crop emergence. *Canadian Journal of Microbiology* 33:354–360.
- Lombardo, S., G. Pandino, and G. Mauromicale. 2012. Nutritional and sensory characteristics of “early” potato cultivars under organic and conventional cultivation systems. *Food Chemistry* 133:1249–1254.
- Meriles, J. M., et al. 2006. Glyphosate and previous crop residue effect on deleterious and beneficial soil-borne fungi from peanut-corn-soybean rotations. *Journal of Phytopathology* 154:309–316.
- Mitchell, A. E., et al. 2007. Ten-year comparison of the influence of organic and conventional crop management practices on the content of flavonoids in tomatoes. *Journal of Agricultural and Food Chemistry* 55:6154–6159.
- Ozturk, L., et al. 2008. Glyphosate inhibition of ferric reductase activity in iron deficient sunflower roots. *New Phytologist* 177:899–906.
- Pittaway, P. A. 1995. Opportunistic association between *Pythium* species and weed resi-

## SOURCES

- dues causing seedling emergence failure in cereals. *Australian Journal of Agricultural Research* 46:655–662.
- Poniso, L. C., et al. 2015. Diversification practices reduce organic to conventional yield gap. *Proceedings of the Royal Society B* 282:20141396.
- Reganold, J. P., et al. 2010. Fruit and soil quality of organic and conventional strawberry agroecosystems. *PLoS One* 5:e12346.
- Ren, H., H. Endo, and T. Hayashi. 2001. Antioxidative and antimutagenic activities and polyphenol content of pesticide-free and organically cultivated green vegetable using water-soluble chitosan as a soil modifier and leaf surface spray. *Journal of the Science of Food and Agriculture* 81:1426–1432.
- Rosa, E. A. S., R. K. Heaney, R. G. Fenwick, and C. A. M. Portas. 1997. Glucosinolates in crop plants. *Horticultural Review* 19:99–215.
- Rudrappa, T., et al. 2008. Root-secreted malic acid recruits beneficial soil bacteria. *Plant Physiology* 148:1547–1556.
- Rühmann, S., C. Leser, M. Bannert, and D. Treutter. 2002. Relationship between growth, secondary metabolism, and resistance of apple. *Plant Biology* 4:137–143.
- Ryan, M. H., J. W. Derrick, and P. R. Dann. 2004. Grain mineral concentrations and yield of wheat grown under organic and conventional management. *Journal of the Science of Food and Agriculture* 84:207–216.
- Schreiner, M. 2005. Vegetable crop management strategies to increase the quantity of phytochemicals. *European Journal of Nutrition* 44:85–94.
- Schuphan, W. 1974. Nutritional value of crops as influenced by organic and inorganic fertilizer treatments. *Qualitatas Plantarum* 23:333–358.
- Smith, B. 1993. Organic foods vs supermarket foods: Element levels. *Journal of Applied Nutrition* 45:35–39.
- Smith-Spangler, C., et al. 2012. Are organic foods safer or healthier than conventional alternatives? A systematic review. *Annals of Internal Medicine* 157:348–366.
- Stanhill, G. 1990. The comparative productivity of organic agriculture. *Agriculture, Ecosystems and Environment* 30:1–26.
- Svec, L. V., C. A. Thoroughgood, and H. C. S. Mok. 1976. Chemical evaluation of vegetables grown with conventional or organic amendments. *Communications in Soil Science and Plant Analysis* 7:213–228.
- Tesfamariam, T., et al. 2009. Glyphosate in the rhizosphere: Role of waiting times and different glyphosate binding forms in soils for phytotoxicity to non-target plants. *European Journal of Agronomy* 31:126–132.
- van Bruggen, A. H. C. Plant disease severity in high-input compared to reduced-input and organic farming systems. *Plant Disease* 79:976–984.
- Verkerk, R., et al. 2009. Glucosinolates in *Brassica* vegetables: The influence of the food supply chain on intake, bioavailability and human health. *Molecular Nutrition and Food Research* 53:S219–S265.
- Vogtmann, H. 1988. From healthy soil to healthy food: An analysis of the quality of food produced under contrasting agricultural systems. *Nutrition and Health* 6:21–35.
- Vogtmann, H., et al. 1984. Accumulation of nitrates in leafy vegetables grown under contrasting agricultural systems. *Biological Agriculture and Horticulture* 2:51–68.
- Wander, M. M., S. J. Traina, B. R. Stinner, and S. E. Peters. 1994. Organic and conven-



## SOURCES

- tional management effect on biologically active soil organic matter pools. *Soil Science Society of America Journal* 58:1130–1134.
- Wang, S. Y., et al. 2008. Fruit quality, antioxidant capacity, and flavonoid content of organically and conventionally grown blueberries. *Journal of Agriculture and Food Chemistry* 56:5788–5794.
- Warman, P. R. 1998. Results of the long-term vegetable crop production trials: Conventional vs compost-amended soils. *Acta Horticulturae* 469:333–341.
- Woese, K., D. Lang, C. Boess, and K. W. Bogl. 1997. A comparison of organically and conventionally grown foods—results of a review of the relevant literature. *Journal of the Science of Food and Agriculture* 74:281–293.
- Wolmarans, K., and W. J. Swart. 2014. Influence of glyphosate, other herbicides and genetically modified herbicide-resistant crops on soil microbiota: A review. *South African Journal of Plant and Soil* 31:177–186.
- Worthington, V. 2001. Nutritional quality of organic versus conventional fruits, vegetables and grains. *Journal of Alternative and Complementary Medicine* 7:161–173.
- Yamada, T., R. J. Kremer, P. R. Carmargo e Castro, and B. W. Wood. 2009. Glyphosate interactions with physiology, nutrition, and diseases of plants: Threat to agricultural sustainability? *European Journal of Agronomy* 31:111–113.
- Zobiolo, L. H. S., et al. 2010. Glyphosate affects lignin content and amino acid production in glyphosate-resistant soybean. *Acta Physiologiae Plantarum* 32:831–837.
- Zobiolo, L. H. S., et al. 2010. Glyphosate reduces shoot concentrations of mineral nutrients in glyphosate-resistant soybeans. *Plant and Soil* 328:57–69.
- Zobiolo, L. H. S., et al. 2010. Water use efficiency and photosynthesis of glyphosate-resistant soybean as affected by glyphosate. *Pesticide Biochemistry and Physiology* 97:182–193.
- Zobiolo, L. H. S., R. J. Kremer, R. S. Oliveira Jr., and J. Constantin. 2010. Glyphosate affects micro-organisms in rhizospheres of glyphosate-resistant soybeans. *Journal of Applied Microbiology* 110:118–127.
- Zobiolo, L. H. S., R. J. Kremer, R. S. Oliveira Jr., and J. Constantin. 2012. Glyphosate effects on photosynthesis, nutrient accumulation, and nodulation in glyphosate-resistant soybean. *Journal of Plant Nutrition and Soil Science* 175:319–330.

## 7: BIG GREEN THUMBS

- Bona, E., et al. 2015. AM fungi and PGP pseudomonads increase flowering, fruit production, and vitamin content in strawberry grown at low nitrogen and phosphorus levels. *Mycorrhiza* 25:181–193.
- Chabbi, A., et al. 2017. Aligning agriculture and climate policy. *Nature Climate Change* 7:307–309.
- Chun, O. K., et al. 2005. Daily consumption of phenolics and total antioxidant capacity from fruit and vegetables in the American diet. *Journal of the Science of Food and Agriculture* 85:1715–1724.
- Mokhtari, R. B., et al. 2018. The role of sulforaphane in cancer chemoprevention and health benefits: A mini-review. *Journal of Cell Communication and Signalling* 12:91–101.

## SOURCES

- Mondy, N. I., C. Metcalf, and R. L. Plaisted. 1971. Potato flavor as related to chemical composition: 1. Polyphenols and ascorbic acid. *Journal of Food Science* 36:459–461.
- Montgomery, D. R., and A. Biklé. 2016. *The Hidden Half of Nature: The Microbial Roots of Life and Health*. W. W. Norton, New York.
- O'Hara, B. 2020. *No-Till Intensive Vegetable Farming: Pesticide-Free Methods for Restoring Soil and Growing Nutrient-Rich, High-Yielding Crops*. Chelsea Green Publishing, White River Junction, Vermont.
- Sun, H., et al. 2016. Soil microbial community and microbial residues respond positively to minimum tillage under organic farming in southern Germany. *Applied Soil Ecology* 108:16–24.
- Williams, H., T. Colombi, and T. Keller. 2020. The influence of soil management on soil health: An on-farm study in southern Sweden. *Geoderma* 360:114010.
- Wszelaki, A. L., et al. 2005. Sensory quality and mineral and glycoalkaloid concentrations in organically and conventionally grown redskin potatoes (*Solanum tuberosum*). *Journal of the Science of Food and Agriculture* 85:720–726.

## 8: COMPOST CONNECTIONS

- AbdElgawad, H., et al. 2019. Utilization of actinobacteria to enhance the production and quality of date palm (*Phoenix dactylifera* L.) fruits in a semi-arid environment. *Science of the Total Environment* 665:690–697.
- Aghili, F., et al. 2014. Green manure addition to soil increases grain zinc concentration in bread wheat. *PLoS One* 9:e0101487.
- Albrechtova, J. 2012. Dual inoculation with mycorrhizal and saprotrophic fungi applicable in sustainable cultivation improves the yield and nutritive value of onion. *Scientific World Journal* 2012:374091.
- Antunes, P. M., et al. 2012. Linking soil biodiversity and human health: Do arbuscular mycorrhizal fungi contribute to food nutrition? In *Soil Ecology and Ecosystem Services*. Edited by D. H. Wall et al. Oxford University Press, Oxford, pp. 153–172.
- Baslam, M., R. Esteban, J. I. Garcia-Plazaola, and N. Goicoechea. 2013. Effectiveness of arbuscular mycorrhizal fungi (AMF) for inducing the accumulation of major carotenoids, chlorophylls and tocopherol in green and red leaf lettuces. *Applied Microbiology and Biotechnology* 97:3119–3128.
- Baslam, M., I. Garmendia, and N. Goicoechea. 2011. Arbuscular mycorrhizal fungi (AMF) improved growth and nutritional quality of greenhouse-grown lettuce. *Journal of Agricultural and Food Chemistry* 59:5504–5515.
- Berta, G., et al. 2014. Maize development and grain quality are differentially affected by mycorrhizal fungi and a growth-promoting pseudomonad in the field. *Mycorrhiza* 24:161–170.
- Bona, E., et al. 2017. Arbuscular mycorrhizal fungi and plant growth-promoting pseudomonads improve yield, quality and nutritional value of tomato: A field study. *Mycorrhiza* 27:1–11.
- Bona, E., et al. 2018. Combined bacterial and mycorrhizal inocula improve tomato quality at reduced fertilization. *Scientia Horticulturae* 234:160–165.
- Borde, M., M. Dudhane, and P. K. Jite. 2009. Role of bioinoculant (AM fungi) increas-

## SOURCES

- ing growth, flavor content and yield in *Allium sativum* L. under field condition. *Notulae Botanicae Horti Agrobotanici Cluj-Napoca* 37:124–128.
- Cavagnaro, T. R., et al. 2006. Arbuscular mycorrhizas, microbial communities, nutrient availability, and soil aggregates in organic tomato production. *Plant and Soil* 282:209–225.
- Ceccarelli, N., et al. 2010. Mycorrhizal colonization impacts on phenolic content and antioxidant properties of artichoke leaves and flower heads two years after field transplant. *Plant and Soil* 335:311–323.
- Copetta, A., L. Bardi, E. Bertolone, and G. Berta. 2011. Fruit production and quality of tomato plants (*Solanum lycopersicum* L.) are affected by green compost and arbuscular mycorrhizal fungi. *Plant Biosystems* 145:106–115.
- Corkidi, L., D. L. Rowland, N. C. Johnson, and E. B. Allen. 2002. Nitrogen fertilization alters the functioning of arbuscular mycorrhizas at two semiarid grasslands. *Plant and Soil* 240:299–310.
- de Brito Alvarez, M., S. Gagne, and H. Antoun. 1995. Effect of compost rhizosphere microflora of the tomato and on the incidence of plant growth-promoting rhizobacteria. *Applied Environmental Microbiology* 61:194–199.
- Devi, M. C., and M. N. Reddy 2002. Phenolic acid metabolism of groundnut (*Arachis hypogaea* L.) plants inoculated with VAM fungus and *Rhizobium*. *Plant Growth Regulation* 37:151–156.
- Douds, D. D., et al. 2005. On-farm production and utilization of arbuscular mycorrhizal fungus inoculum. *Canadian Journal of Plant Science* 85:15–21.
- Gartler, J., B. Robinson, K. Burton, and L. Clucas. 2013. Carbonaceous soil amendments to biofortify crop plants with zinc. *Science of the Total Environment* 465:308–313.
- Giovannetti, M., et al. 2012. Nutraceutical value and safety of tomato fruits produced by mycorrhizal plants. *British Journal of Nutrition* 107:242–251.
- Hoitink, H. A. J., and M. J. Boehm. 1999. Biocontrol within the context of soil microbial communities: A substrate-dependent phenomenon. *Annual Reviews of Phytopathology* 37:427–446.
- Johnson, N. C. 1993. Can fertilization of soil select less mutualistic mycorrhizae? *Ecological Applications* 3:749–757.
- Krause, M. S., et al. 2003. Isolation and characterization of rhizobacteria from compost that suppress the severity of bacterial leaf spot of radish. *Phytopathology* 93:1292–1300.
- Lingua, G., et al. 2013. Arbuscular mycorrhizal fungi and plant growth-promoting pseudomonads increases anthocyanin concentration in strawberry fruits (*Fragaria x ananassa* var. Selva) in conditions of reduced fertilization. *International Journal of Molecular Sciences* 14:16,207–16,225.
- Liu, I., et al. 2009. Immobilization and phytotoxicity of Cd in contaminated soil amended with chicken manure compost. *Journal of Hazardous Materials* 163:563–567.
- Nautiyal, C. S., R. Govindarajan, M. Lavania, and P. Pushpangadan. 2008. Novel mechanism of modulating natural antioxidants in functional foods: Involvement of plant growth promoting rhizobacteria NRRL B-30488. *Journal of Agricultural and Food Chemistry* 56:4474–4481.
- Ordookhani, K., K. Khavazi, A. Moezzi, and F. Rejali. 2010. Influence of PGPR and

## SOURCES

- AMF on antioxidant activity, lycopene and potassium contents in tomato. *African Journal of Agricultural Research* 5:1108–1116.
- Ortega-García, J. G., et al. 2015. Effect of *Trichoderma asperellum* applications and mineral fertilization on growth promotion and the content of phenolic compounds and flavonoids in onions. *Scientia Horticulturae* 195:8–16.
- Rana, A., et al. 2012. Biofortification of wheat through inoculation of plant growth promoting rhizobacteria and cyanobacteria. *European Journal of Soil Biology* 50:118–126.
- Reeve, J. R., et al. 2016. Organic farming, soil health, and food quality: Considering possible links. *Advances in Agronomy* 137:319–366.
- Singh, A., et al. 2014. Beneficial compatible microbes enhance antioxidants in chickpea edible parts through synergistic interactions. *LWT—Food Science and Technology* 56:390–397.
- Subramanian, K. S., P. Santhanakrishnan, and P. Balasubramanian. 2006. Responses of field grown tomato plants to arbuscular mycorrhizal fungal colonization under varying intensities of drought stress. *Scientia Horticulturae* 107:245–253.
- Toussaint, J. P., F. A. Smith, and S. E. Smith. 2007. Arbuscular mycorrhizal fungi can induce the production of phytochemicals in sweet basil irrespective of phosphorus nutrition. *Mycorrhiza* 17:291–297.
- Vierheilig, H., H. Gagnon, D. Strack, and W. Maier. 2000. Accumulation of cyclohexenone derivatives in barley, wheat and maize roots in response to inoculation with different arbuscular mycorrhizal fungi. *Mycorrhiza* 9:291–293.
- Yao, M. K., et al. 2003. Effect of mycorrhization on the accumulation of rishitin and solavetivone in potato plantlets challenged with *Rhizoctonia solani*. *Mycorrhiza* 13:333–336.

## 9: OVERLOOKED GEMS

- Ahn, J., et al. 2008. The anti-obesity effect of quercetin is mediated by the AMPK and MAPK signaling pathways. *Biochemical and Biophysical Research Communications* 373:545–549.
- Ali, M., and S. C. S. Tsou. 1997. Combating micronutrient deficiencies through vegetables—a neglected food frontier in Asia. *Food Policy* 22:17–38.
- Aune, D., et al. 2017. Fruit and vegetable intake and the risk of cardiovascular disease, total cancer and all-cause mortality—a systematic review and dose-response meta-analysis of prospective studies. *International Journal of Epidemiology* 46:1029–1056.
- Baur, J. A., and D. A. Sinclair. 2006. Therapeutic potential of resveratrol: The *in vivo* evidence. *Nature Reviews Drug Discovery* 5:493–506.
- Bazzano, L. A., et al. 2002. Fruit and vegetable intake and risk of cardiovascular disease in US adults: The first National Health and Nutrition Examination Survey epidemiologic follow-up study. *American Journal of Clinical Nutrition* 76:93–99.
- Bhat, K. P. L., and J. M. Pezzuto. 2002. Cancer chemopreventive activity of resveratrol. *Annals of the New York Academy of Sciences* 957:210–229.
- Block, G., B. Patterson, and A. Subar. 1992. Fruit, vegetables, and cancer prevention: A review of the epidemiological evidence. *Nutrition and Cancer* 18:1–29.

## SOURCES

- Boeing, H., et al. 2012. Critical review: Vegetables and fruit in the prevention of chronic diseases. *European Journal of Nutrition* 51:637–663.
- Bonnesen, C., I. M. Eggleston, and J. D. Hayes. 2001. Dietary indoles and isothiocyanates that are generated from cruciferous vegetables can both stimulate apoptosis and confer protection against DNA damage in human colon cell lines. *Cancer Research* 61:6120–6130.
- Bruce, B., G. A. Spiller, L. M. Klevay, and S. K. Gallagher. 2000. A diet high in whole and unrefined foods favorably alters lipids, antioxidant defenses, and colon function. *Journal of the American College of Nutrition* 19:61–67.
- Büchner, P. L., et al. 2010. Variety in fruit and vegetable consumption and the risk of lung cancer in the European prospective investigation into cancer and nutrition. *Cancer Epidemiology, Biomarkers & Prevention* 19:2278–2286.
- Buitrago-Lopez, A., et al. 2011. Chocolate consumption and cardiometabolic disorders: Systematic review and meta-analysis. *British Medical Journal* 343:d4488.
- Canene-Adams, K., et al. 2005. The tomato as a functional food. *Journal of Nutrition* 135:1226–1230.
- Cheyrier, V. 2012. Phenolic compounds: From plants to foods. *Phytochemical Review* 11:153–177.
- Chung, M. J., S. H. Lee, and N. J. Sung. 2002. Inhibitory effect of whole strawberries, garlic juice or kale juice on endogenous formation of N-nitrosodimethylamine in humans. *Cancer Letters* 182:1–10.
- Commenges, D., et al. 2000. Intake of flavonoids and risk of dementia. *European Journal of Epidemiology* 16:357–363.
- Craig, W. J. 1997. Phytochemicals: Guardians of our health. *Journal of the American Dietetic Association* 97:S199–S204.
- David, A. V. A., R. Arulmoli, and S. Parasuraman. 2016. Overviews of biological importance of quercetin: A bioactive flavonoid. *Pharmacognosy Review* 10:84–89.
- De Whalley, C. V., et al. 1990. Flavonoids inhibit the oxidative modification of low density lipoproteins by macrophages. *Biochemical Pharmacology* 39:1743–1750.
- Del Rio, D., et al. 2013. Dietary (poly)phenolics in human health: Structures, bioavailability, and evidence of protective effects against chronic diseases. *Antioxidants & Redox Signaling* 18:1818–1892.
- Di Mascio, P., S. Kaiser, and H. Sies. 1989. Lycopene as the most efficient biological carotenoid singlet oxygen quencher. *Archives of Biochemistry and Biophysics* 274:532–538.
- D’Incalci, M., W. P. Steward, and A. J. Gescher. 2005. Use of cancer chemopreventive phytochemicals as antineoplastic agents. *The Lancet Oncology* 6:899–904.
- Drewnowski, A., and C. Gomez-Carneros. 2000. Bitter taste, phytonutrients, and the consumer: A review. *American Journal of Clinical Nutrition* 72:1424–1435.
- Egert, S., et al. 2008. Daily quercetin supplementation dose-dependently increases plasma quercetin concentrations in healthy humans. *Journal of Nutrition* 138:1615–1621.
- Fryer, M. J. 1992. The antioxidant effects of thylakoid vitamin E ( $\alpha$ -tocopherol). *Plant Cell & Environment* 15:381–392.
- Gan, Y., et al. 2015. Consumption of fruit and vegetable and risk of coronary heart disease: A meta-analysis of prospective cohort studies. *International Journal of Cardiology* 183:129–137.

## SOURCES

- Gey, K. F., G. B. Brubacher, and H. B. Stähelin. 1987. Plasma levels of antioxidant vitamins in relation to ischemic heart disease and cancer. *American Journal of Clinical Nutrition* 45:1368–1377.
- Gutteridge, J. M. C. 1993. Free radicals in disease processes—a compilation of cause and consequence—invited review. *Free Radical Research Communications* 19:141–158.
- Haddad, A. Q., et al. 2006. Novel antiproliferative flavonoids induce cell cycle arrest in human prostate cancer cell lines. *Prostate Cancer and Prostatic Diseases* 9:68–76.
- Halliwell, B. 1996. Antioxidants in human health and disease. *Annual Review of Nutrition* 16:33–50.
- Harman, D. 1956. Aging: A theory based on free radical and radiation chemistry. *Journal of Gerontology* 12:257–263.
- Harman, D. 1994. Free radical theory of aging: Increasing the functional life span. *Annals of the New York Academy of Sciences* 717:1–15.
- He, F. J., C. A. Nowson, M. Lucas, and G. A. MacGregor. 2007. Increased consumption of fruit and vegetables is related to a reduced risk of coronary heart disease: Meta-analysis of cohort studies. *Journal of Human Hypertension* 21:717–728.
- Herman-Antosiewicz, A., and S. V. Singh. 2004. Signal transduction pathways leading to cell cycle arrest and apoptosis induction in cancer cells by *Allium* vegetable-derived organosulfur compounds: A review. *Mutation Research* 555:121–131.
- Hertog, M. G., et al. 1993. Dietary antioxidant flavonoids and risk of coronary heart disease: The Zutphen Elderly Study. *The Lancet* 342:1007–1011.
- Hirayama, T. 1979. Diet and cancer. *Nutrition and Cancer* 1:67–81.
- Hollman, P. C. H., and M. B. Katan. 1999. Dietary flavonoids: Intake, health effects and bioavailability. *Food and Chemical Toxicology* 37:937–942.
- Hounsome, N., B. Hounsome, D. Tomos, and G. Edwards-Jones. 2008. Plant metabolites and nutritional quality of vegetables. *Journal of Food Science* 73:R48–R65.
- Hu, D., et al. 2014. Fruits and vegetables consumption and risk of stroke: A meta-analysis of prospective cohort studies. *Stroke* 45:1613–1619.
- Hu, F. B., et al. 2000. Prospective study of major dietary patterns and risk of coronary heart disease in men. *American Journal of Clinical Nutrition* 72:912–921.
- Jang, M., et al. 1997. Cancer chemopreventive activity of resveratrol, a natural product derived from grapes. *Science* 275:218–220.
- Jankun, J., S. H. Selman, R. Swieroz, and E. S. Jankun. 1997. Why drinking green tea could prevent cancer. *Nature* 387:561.
- Jenkins, D. J., et al. 2005. Direct comparison of a dietary portfolio of cholesterol-lowering foods with a statin in hypercholesterolemic participants. *American Journal of Clinical Nutrition* 81:380–387.
- Jenner, P. 1994. Oxidative damage in neurodegenerative disease. *The Lancet* 344:796–798.
- Johnson, I. T. 2002. Anticarcinogenic effects of diet-related apoptosis in the colorectal mucosa. *Food and Chemical Toxicology* 40:1171–1178.
- Kale, A., S. Gawande, and S. Kotwal. 2008. Cancer phytotherapeutics: Role for flavonoids at the cellular level. *Phytotherapy Research* 22:567–577.
- Kang, N. H., S. H. Shin, H. J. Lee, and K. W. Lee. 2011. Polyphenols as small molecular inhibitors of signaling cascades in carcinogenesis. *Pharmacology & Therapeutics* 130:310–324.
- Karlovsky, P. (ed.). 2008. *Secondary Metabolites in Soil Ecology*. Springer-Verlag, Berlin.

## SOURCES

- Katz, D. L., K. Doughty, and A. Ali. 2011. Cocoa and chocolate in human health and disease. *Antioxidants & Redox Signaling* 15:2779–2811.
- Kitani, K., T. Yokozawa, and T. Osawa. 2004. Interventions in aging and age-associated pathologies by means of nutritional approaches. *Annals of the New York Academy of Sciences* 1019:424–426.
- Knekt, P., et al. 1997. Dietary flavonoids and the risk of lung cancer and other malignant neoplasms. *American Journal of Epidemiology* 146:223–230.
- Knekt, P., et al. 2002. Flavonoid intake and risk of chronic diseases. *American Journal of Clinical Nutrition* 76:560–568.
- Koushki, M., N. A. Dashatan, and R. Meshkani. 2018. Effect of resveratrol supplementation on inflammatory markers: A systematic review and meta-analysis of randomized controlled trials. *Clinical Therapeutics* 40:1180–1192.
- Lévesque, C. A., and J. E. Rahe. 1992. Herbicide interactions with fungal root pathogens, with special reference to glyphosate. *Annual Review of Phytopathology* 30:579–602.
- Li, M., et al. 2014. Fruit and vegetable intake and risk of type 2 diabetes mellitus: Meta-analysis of prospective cohort studies. *BMJ Open* 2014:e005497.
- Linseisen, J., et al. 2007. Fruit and vegetable consumption and lung cancer risk: Updated information from the European Prospective Investigation into Cancer and Nutrition (EPIC). *International Journal of Cancer* 121:1103–1114.
- Medeiros Pinheiro, M., et al. 2011. Antioxidant intake among Brazilian adults—the Brazilian Osteoporosis Study (BRAZOS): A cross-sectional study. *Nutrition Journal* 10:39.
- Messina, M. J., V. Persky, K. D. R. Setchell, and S. Barnes. 1994. Soy intake and cancer risk: A review of the *in vitro* and *in vivo* data. *Nutrition and Cancer* 21:113–131.
- Middleton, E., C. Kandaswami, and T. C. Theoharides. 2000. The effects of plant flavonoids on mammalian cells: Implications for inflammation, heart disease, and cancer. *Pharmacological Reviews* 52:673–751.
- Murthy, N. S., S. Mukherjee, G. Ray, and A. Ray. 2009. Dietary factors and cancer chemoprevention: An overview of obesity-related malignancies. *Journal of Postgraduate Medicine* 55:45–54.
- Nijveldt, R. J., et al. 2001. Flavonoids: A review of probable mechanisms of action and potential applications. *American Journal of Clinical Nutrition* 74:418–425.
- Olsson, M. E., et al. 2004. Inhibition of cancer cell proliferation *in vitro* by fruit and berry extracts and correlations with antioxidant levels. *Journal of Agricultural and Food Chemistry* 52:7264–7271.
- Olsson, M. E., et al. 2006. Antioxidant levels and inhibition of cancer cell proliferation *in vitro* by extracts from organically and conventionally cultivated strawberries. *Journal of Agricultural and Food Chemistry* 54:1248–1255.
- Oude Griep, L. M., et al. 2010. Raw and processed fruit and vegetable consumption and 10-year coronary heart disease incidence in a population-based cohort study in the Netherlands. *PLoS One* 5:e13609.
- Pandey, K. B., et al. 2009. Plant polyphenols as dietary antioxidants in human health and disease. *Oxidative Medicine and Cellular Longevity* 2:270–278.
- Patterson, B. H. 1990. Fruit and vegetables in the American diet: Data from the NHANES II survey. *American Journal of Public Health* 80:1443–1449.
- Pedone-Bonfim, M. V., F. S. Barbosa da Silva, and L. Costa Maia. 2015. Production of

## SOURCES

- secondary metabolites by mycorrhizal plants with medicinal or nutritional potential. *Acta Physiologiae Plantarum* 37:27.
- Perez-Vizcaino, F., and J. Duarte. 2010. Flavonols and cardiovascular disease. *Molecular Aspects of Medicine* 31:478–494.
- Provenza, F. D. 1996. Acquired aversions as the basis for varied diets of ruminants foraging on rangelands. *Journal of Animal Science* 74:2010–2020.
- Quinones, M., M. Miguel, and A. Aleixandre. 2013. Beneficial effects of polyphenols on cardiovascular disease. *Pharmacology Research* 86:125–131.
- Rao, A. V., and S. Agarwal. 1999. Role of lycopene as antioxidant carotenoid in the prevention of chronic diseases: A review. *Nutrition Research* 19:305–323.
- Rein, D., et al. 2000. Cocoa inhibits platelet activation and function. *American Journal of Clinical Nutrition* 72:30–35.
- Ren, H., H. Endo, and T. Hayashi. 2001. The superiority of organically cultivated vegetables to general ones regarding antimutagenic activities. *Mutation Research* 496:83–88.
- Rodríguez-Daza, M. C., et al. 2021. Polyphenol-mediated gut microbiota modulation: Toward prebiotics and further. *Frontiers in Nutrition* 8:689456.
- Schonhof, I., A. Krumbein, and B. Brückner. 2004. Genotypic effects on glucosinolates and sensory properties of broccoli and cauliflower. *Molecular Nutrition and Food Research* 48:25–33.
- Silaste, M.-L., et al. 2007. Tomato juice decreases LDL cholesterol levels and increases LDL resistance to oxidation. *British Journal of Nutrition* 98:1251–1258.
- Sirerol, J. A., et al. 2016. Role of natural stilbenes in the prevention of cancer. *Oxidative Medicine and Cellular Longevity* 2016:3128951.
- Stacewicz-Sapuntzakis, M., and P. E. Bowen. 2005. Role of lycopene and tomato products in prostate health. *Biochimica et Biophysica Acta* 1740:202–205.
- Steimetz, K., and J. D. Potter. 1996. Vegetables, fruit, and cancer prevention: A review. *Journal of the American Dietetic Association* 96:1027–1039.
- Tapiero, H., D. M. Townsend, and K. D. Tew. 2004. Organosulfur compounds from Alliaceae in the prevention of human pathologies. *Biomedicine & Pharmacotherapy* 58:183–193.
- Thomasset, S. C., et al. 2006. Dietary polyphenolic phytochemicals: Promising cancer chemopreventive agents in humans? A review of their clinical properties. *International Journal of Cancer* 120:451–458.
- Trichopoulou, A., et al. 2005. Modified Mediterranean diet and survival: EPIC-elderly prospective cohort study. *British Medical Journal* 330:991.
- Verkerk, R., et al. 2009. Glucosinolates in *Brassica* vegetables: The influence of the food supply chain on intake, bioavailability and human health. *Molecular Nutrition and Food Research* 53:S219–S265.
- Vermeer, I. T., et al. 1999. Effect of ascorbic acid and green tea on endogenous formation of N-nitrosodimethylamine and N-nitrosopiperidine in humans. *Mutation Research* 428:353–361.
- Vogtmann, H., et al. 1984. Accumulation of nitrates in leafy vegetables grown under contrasting agricultural systems. *Biological Agriculture and Horticulture* 2:51–68.
- Voorrips, L. E., et al. 2000. Vegetable and fruit consumption and risks of colon and rectal cancer in a prospective cohort study: The Netherlands Cohort Study on Diet and Cancer. *American Journal of Epidemiology* 152:1081–1092.



## SOURCES

- Wang, S., et al. 2011. Can phytochemical antioxidant rich foods act as anti-cancer agents? *Food Research International* 44:2545–2554.
- Wang, S., et al. 2014. Novel insights of dietary polyphenols and obesity. *Journal of Nutritional Biochemistry* 25:1–18.
- Warshafsky, S., R. S. Kamer, and S. L. Sivak. 1993. Effect of garlic on total serum cholesterol: A meta-analysis. *Annals of Internal Medicine* 119:599–605.
- Weisberger, A. S., and J. Pinsky. 1958. Tumor inhibition by a sulfhydryl-blocking agent related to an active principle of garlic (*Allium sativum*). *Cancer Research* 18:1301–1308.
- Weisberger, J. H. 1991. Nutritional approach to cancer prevention with emphasis on vitamins, antioxidants, and carotenoids. *American Journal of Clinical Nutrition* 53:226–237.
- Weisburger, J. H., et al. 1980. Inhibition of carcinogenesis: Vitamin C and the prevention of gastric cancer. *Preventive Medicine* 9:352–361.
- Willcox, J. K., G. L. Catignana, and S. Lazarus. 2003. Tomatoes and cardiovascular health. *Critical Reviews in Food Science* 43:1–18.
- Woo, H.-M., et al. 2007. Active spice-derived components can inhibit inflammatory responses of adipose tissue in obesity by suppressing inflammatory actions of macrophages and release of monocyte chemoattractant protein-1 from adipocytes. *Life Sciences* 80:926–931.
- Wu, S., et al. 2020. Carotenoid intake and circulating carotenoids are inversely associated with the risk of bladder cancer: A dose-response meta-analysis. *Advances in Nutrition* 11:630–643.
- Yang, C. S., and Z.-Y. Wang. 1993. Tea and cancer. *Journal of the National Cancer Institute* 85:1038–1049.
- Yang, F., et al., 2015. Quercetin in prostate cancer: Chemotherapeutic and chemopreventive effects, mechanisms and clinical application potential (review). *Oncology Reports* 33:2659–2668.
- Yeh, T.-S., et al. 2021. Long-term dietary flavonoid intake and subjective cognitive decline in US men and women. *Neurology* 97:e1041–e1056.
- Zanotti, I., et al. 2015. Atheroprotective effects of (poly)phenols: A focus on cell cholesterol metabolism. *Food & Function* 6:13.
- Zhang, Y.-J., et al. 2015. Antioxidant phytochemicals for the prevention and treatment of chronic diseases. *Molecules* 20:21,138–21,156.
- Zhou, Y., and A. S. Lee. 1998. Mechanism for the suppression of the mammalian stress response by genistein, an anticancer phytoestrogen from soy. *Journal of the National Cancer Institute* 90:381–388.

## 10: SILENT FIELDS

- Abawi, G. S., and T. L. Widmer. 2000. Impact of soil health management practices on soilborne pathogens, nematodes and root diseases of vegetable crops. *Applied Soil Ecology* 15:37–47.
- Ackermann, W., et al. 2014. The influence of glyphosate on the microbiota and production of botulinum neurotoxin during ruminal fermentation. *Current Microbiology* 70:374–382.
- Adgate, J. L., et al. 2001. Measurement of children's exposure to pesticides: Analysis of

## SOURCES

- urinary metabolite levels in a probability-based sample. *Environmental Health Perspectives* 109:583–590.
- Anway, M. D., A. S. Cupp, M. Uzumcu, and M. K. Skinner. 2005. Epigenetic transgenerational actions of endocrine disruptors and male fertility. *Science* 308:1466–1469.
- Baker, B. P., C. M. Benbrook, E. Groth III, and K. Lutz Benbrook. 2002. Pesticide residues in conventional, integrated pest management (IPM)-grown and organic foods: Insights from three US data sets. *Food Additives and Contaminants* 19:427–446.
- Battaglin, W. A., M. T. Meyer, K. M. Kuivila, and J. E. Dietze. 2014. Glyphosate and its degradation product AMPA occur frequently and widely in U.S. soils, surface water, groundwater, and precipitation. *Journal of the American Water Resources Association* 50:275–290.
- Benachour, N., and G. E. Séralini. 2009. Glyphosate formulations induce apoptosis and necrosis in human umbilical, embryonic, and placental cells. *Chemical Research in Toxicology* 22:97–105.
- Benachour, N., et al. 2007. Time- and dose-dependent effects of Roundup on human embryonic and placental cells. *Archives of Environmental Contamination and Toxicology* 53:126–133.
- Benedetti, A. L., et al. 2004. The effects of sub-chronic exposure of Wistar rats to the herbicide Glyphosate-Biocarb®. *Toxicology Letters* 153:227–232.
- Bengtsson, J., J. Ahnstrom, and A. C. Weibull. 2005. The effects of organic agriculture on biodiversity and abundance: A meta-analysis. *Journal of Applied Ecology* 42:261–269.
- Betarbet, R., et al. 2000. Chronic systemic pesticide exposure reproduces features of Parkinson's disease. *Nature Neuroscience* 3:1301–1306.
- Beuret, C. J., F. Zirulnik, and M. S. Giménez. 2005. Effect of the herbicide glyphosate on liver lipoperoxidation in pregnant rats and their fetuses. *Reproductive Toxicology* 19:501–504.
- Bøhn, T., et al. 2014. Compositional differences in soybean on the market: Glyphosate accumulates in Roundup Ready GM soybeans. *Food Chemistry* 153:207–215.
- Bouchard, M. F., D. C. Bellinger, R. O. Wright, and M. G. Weisskopf. 2010. Attention-deficit/hyperactivity disorder and urinary metabolites of organophosphate pesticides. *Pediatrics* 125:e1270–e1277.
- Bradman, A., et al. 2003. Measurement of pesticides and other toxicants in amniotic fluid as a potential biomarker of pre-natal exposure: A validation study. *Environmental Health Perspectives* 111:1779–1782.
- Bradman, A., et al. 2005. Organophosphate urinary metabolite levels during pregnancy and after delivery in women living in an agricultural community. *Environmental Health Perspectives* 113:1802–1807.
- Bredeson, M. M., and J. G. Lundgren. 2015. Thiamethoxam seed treatments have no impact on pest numbers or yield in cultivated sunflowers. *Journal of Economic Entomology* 108:2665–2671.
- Brown, M. W., and T. Tworowski. 2004. Pest management benefits of compost mulch in apple orchards. *Agriculture Ecosystems & Environment* 103:465–472.
- Brown, P. D., and M. J. Morra. 1997. Control of soil-borne plant pests using glucosinolate-containing plants. *Advances in Agronomy* 61:167–231.
- Buckley, J. D., et al. 2000. Pesticide exposures in children with non-Hodgkin lymphoma. *Cancer* 89:2315–2321.

## SOURCES

- Carles, L., et al. 2019. Meta-analysis of glyphosate contamination in surface waters and dissipation by biofilms. *Environment International* 124:284–293.
- Cuhra, M., T. Traavik, and T. Bøhn. 2013. Clone- and age-dependent toxicity of a glyphosate commercial formulation and its active ingredient in *Daphnia magna*. *Ecotoxicology* 22:251–262.
- Curl, C. L., et al. 2015. Estimating pesticide exposure from dietary intake and organic food choices: The Multi-Ethnic Study of Atherosclerosis (MESA). *Environmental Health Perspectives* 123:475–483.
- Curl, C. L., R. A. Fenske, and K. Elgethun. 2003. Organophosphorus pesticide exposure of urban and suburban preschool children with organic and conventional diets. *Environmental Health Perspectives* 111:377–382.
- Dainese, M. et al. 2019. A global synthesis reveals biodiversity-mediated benefits for crop production. *Science Advances* 5:eaax0121.
- Damgaard, I. N., et al. 2006. Persistent pesticides in human breast milk and cryptorchidism. *Environmental Health Perspectives* 114:1133–1138.
- Defarge, N., et al. 2016. Co-formulants in glyphosate-based herbicides disrupt aromatase activity in human cells below toxic levels. *International Journal of Environmental Research and Public Health* 13:264.
- De Roos, A. J., et al. 2003. Integrative assessment of multiple pesticides as risk factors for non-Hodgkin's lymphoma among men. *Occupational & Environmental Medicine* 60(9):e11.
- Dirzo, R., et al. 2014. Defaunation in the Anthropocene. *Science* 345:401–406.
- Drinkwater, L. E., et al. 1995. Fundamental differences between conventional and organic tomato agroecosystems in California. *Ecological Applications* 5:1098–1112.
- El Fantroussi, S., L. Verschuere, W. Verstraete, and E. M. Top. 1999. Effect of phenylurea herbicides on soil microbial communities estimated by analysis of 16S rRNA gene fingerprints and community-level physiological profiles. *Applied and Environmental Microbiology* 65:982–988.
- Eriksson, M., L. Hardell, M. Carlberg, and M. Åkerman. 2008. Pesticide exposure as risk factor for non-Hodgkin lymphoma including histopathological subgroup analysis. *International Journal of Cancer* 123:1657–1663.
- Eskenazi, B., et al. 2007. Organophosphate pesticide exposure and neurodevelopment in young Mexican-American children. *Environmental Health Perspectives* 115:792–798.
- Fess, T. L., and V. A. Benedito. 2018. Organic versus conventional cropping sustainability: A comparative system analysis. *Sustainability* 10:272.
- Gasnier, C., et al. 2009. Glyphosate based herbicides are toxic and endocrine disruptors in human cell lines. *Toxicology* 262:184–191.
- Gunstone, T., et al. 2021. Pesticides and soil invertebrates: A hazard assessment. *Frontiers in Environmental Science* 9:643847.
- Hardoim, P. R., L. van Overbeek, and J. D. van Elsas. 2008. Properties of bacterial endophytes and their proposed role in plant growth. *Trends in Microbiology* 16:463–471.
- Hill, R. H., S. L. Head Jr., and S. Baker. 1995. Pesticide residues in urine of adults living in the United States: Reference range concentrations. *Environmental Research* 71:99–108.
- Hoffman, R. S., P. D. Capel, and S. J. Larson. 2000. Comparison of pesticides in eight U.S. urban streams. *Environmental Toxicology and Chemistry* 19:2249–2258.

## SOURCES

- Houlahan, J. E., et al. 2000. Quantitative evidence for global amphibian population declines. *Nature* 404:752–755.
- Hunt, D. W. A., C. F. Drury, and H. E. L. Marv. 1992. Influence of nitrogen on the performance of Colorado potato beetle (Coleoptera: Chrysomelidae) on tomatoes. *Environmental Entomology* 21:817–821.
- Jansa, J., A. Wiemken, and E. Frossard. 2006. The effects of agricultural practices on arbuscular mycorrhizal fungi. In *Function of Soils for Human Societies and the Environment*. Edited by E. Frossard, W. E. H. Blum, and B. P. Warkentin. Geological Society, London, pp. 89–115.
- Johansson, E., et al. 2014. Contribution of organically grown crops to human health. *International Journal of Environmental Research and Public Health* 11:3870–3893.
- Kremen, C., N. M. Williams, and R. W. Thorp. 2002. Crop pollination from native bees at risk from agricultural intensification. *Proceedings of the National Academy of Sciences* 99:16,812–16,816.
- Krüger, M., A. A. Shehata, W. Schrödl, and A. Rodloff. 2013. Glyphosate suppresses the antagonistic effect of *Enterococcus* spp. on *Clostridium botulinum*. *Anaerobe* 20:74–78.
- LaCanne, C., and J. Lundgren. 2018. Regenerative agriculture: Merging farming and natural resource conservation profitably. *PeerJ* 6:e4428.
- Landau-Ossondo, M., et al. 2009. Why pesticides could be a common cause of prostate and breast cancers in the French Caribbean Island, Martinique: An overview on key mechanisms of pesticide-induced cancer. *Biomedicine & Pharmacotherapy* 63:383–395.
- Lee, K. H., and H. G. Song. 2007. Growth promotion of tomato seedlings by application of *Bacillus* sp. isolated from rhizosphere. *Korean Journal of Microbiology* 43:279–284.
- Leino, L., et al. 2020. Classification of the glyphosate target enzyme (5-enolpyruvylshikimate-3-phosphate synthase) for assessing sensitivity of organisms to the herbicide. *Journal of Hazardous Materials* 408:124556.
- Lenzemo, V. W., T. W. Kuyper, M. J. Kropff, and A. van Ast. 2005. Field inoculation with arbuscular mycorrhizal fungi reduces *Striga hermonthica* performance on cereal crops and has the potential to contribute to integrated *Striga* management. *Field Crops Research* 91:51–61.
- Levine, H., et al. 2017. Temporal trends in sperm count: A systematic review and meta-regression analysis. *Human Reproduction Update* 23:646–659.
- Lu, C., et al. 2006. Organic diets significantly lower children's dietary exposure to organophosphorus pesticides. *Environmental Health Perspectives* 114:260–263.
- Lu, C., D. E. Knutson, J. Fisker-Andersen, and R. A. Fenske. 2001. Biological monitoring of organophosphorus pesticide exposure among preschool children in the Seattle metropolitan area. *Environmental Health Perspectives* 109:299–303.
- Lundgren, J. G., and S. W. Fausti. 2015. Trading biodiversity for pest problems. *Science Advances* 1:e1500558.
- Lundgren, J. G., L. S. Hesler, and R. L. Anderson. 2017. Preceding crop affects soybean aphid abundance and predator-prey dynamics in soybean. *Journal of Applied Entomology* 141:669–676.
- Ma, X., et al. 2002. Critical windows of exposure to household pesticides and risk of childhood leukemia. *Environmental Health Perspectives* 110:955–960.
- Mashavakure, N., et al. 2019. Spider community shift in response to farming practices

## SOURCES

- in a sub-humid agroecosystem of southern Africa. *Agriculture, Ecosystems and Environment* 272:237–245.
- Mattina, M. J. I., W. Iannucci-Berger, and L. Dykas. 2000. Chlordane uptake and its translocation in food crops. *Journal of Agriculture and Food Chemistry* 48:1909–1915.
- Mayak, S., T. Tirosh, and B. R. Glick. 2004. Plant growth-promoting bacteria that confer resistance to water stress in tomatoes and peppers. *Plant Science* 166:525–530.
- McKinlay, R., J. A. Plant, J. N. Bell, and N. Voulvoulis. 2008. Endocrine disrupting pesticides: Implications for risk assessment. *Environment International* 34:168–183.
- Mesnage, R., B. Bernay, and G.-E. Seralini. 2013. Ethoxylated adjuvants of glyphosate-based herbicides are active principles of human cell toxicity. *Toxicology* 313:122–128.
- Mineau, P., and M. Whiteside. 2013. Pesticide acute toxicity is a better correlate of U.S. grassland bird declines than agricultural intensification. *PLoS One* 8:e57457.
- Minkenber, O. P. J., and J. J. G. W. Ottenheim. 1990. Effect of leaf nitrogen content of tomato plants on preferences and performance of a leafmining fly. *Oecologia* 83:291–298.
- Mnif, W., et al. 2011. Effect of endocrine disruptor pesticides: A review. *International Journal of Environmental Research in Public Health* 8:2265–2303.
- Mogren, C. L., and J. G. Lundgren. 2016. Neonicotinoid-contaminated pollinator strips adjacent to cropland reduce honey bee nutritional status. *Scientific Reports* 6:29608.
- Mostafalou, S., and M. Abdollahi. 2013. Pesticides and human chronic diseases: Evidences, mechanisms, and perspectives. *Toxicology and Applied Pharmacology* 268:157–177.
- National Research Council. 1993. *Pesticides in the Diets of Infants and Children*. National Academy Press, Washington, D.C.
- Nicolopoulou-Stamati, P., et al. 2016. Chemical pesticides and human health: The urgent need for a new concept in agriculture. *Frontiers in Public Health* 4:148.
- Oates, L., et al. 2014. Reduction in urinary organophosphate pesticide metabolites in adults after a week-long organic diet. *Environmental Research* 132:105–111.
- Oliveira, A. G., et al. 2007. Effects of the herbicide Roundup on the epididymal region of drakes *Anas platyrhynchos*. *Reproductive Toxicology* 23:182–191.
- Paganelli, A., et al. 2010. Glyphosate-based herbicides produce teratogenic effects on vertebrates by impairing retinoic acid signaling. *Chemical Research in Toxicology* 23:1586–1595.
- Pearce, N., and D. McLean. 2005. Agricultural exposures and non-Hodgkin's lymphoma. *Scandinavian Journal of Work, Environment & Health* 31(S1):18–25.
- Pelosi, C., et al. 2021. Residues of currently used pesticides in soils and earthworms: A silent threat? *Agriculture, Ecosystems and Environment* 305:107167.
- Peterson Meyers, J., et al. 2016. Concerns over use of glyphosate-based herbicides and risks associated with exposures: A consensus statement. *Environmental Health* 15:19.
- Poletta, G. L., A. Larriera, E. Kleinsorge, and M. D. Mudry. 2009. Genotoxicity of the herbicide formulation of Roundup (glyphosate) in broad-snouted caiman (*Caiman latirostris*) evidenced by the Comet assay and the micronucleus test. *Mutation Research* 672:95–102.
- Postma, J., M. T. Schilder, J. Bloem, and W. K. van Leeuwen-Haagsma. 2008. Soil

## SOURCES

- suppressiveness and functional diversity of the soil microflora in organic farming systems. *Soil Biology and Biochemistry* 40:2394–2406.
- Raaijmakers, J. M., et al. 2009. The rhizosphere: A playground and battlefield for soil-borne pathogens and beneficial microorganisms. *Plant and Soil* 321:341–361.
- Reddy, N. S., S. Dash, and Sontakke. 1997. Effect of spraying selected pesticides on the contents of specified minerals in cabbage. *Plant Foods for Human Nutrition* 51:357–363.
- Relyea, R. A. 2005. The lethal impact of Roundup on aquatic and terrestrial amphibians. *Ecological Applications* 15:1118–1124.
- Relyea, R. A., and D. K. Jones. 2009. The toxicity of Roundup Original Max® to 13 species of larval amphibians. *Environmental Toxicology and Chemistry* 28:2004–2008.
- Roeleveld, N., and R. Bretveld. 2008. The impact of pesticides on male fertility. *Current Opinion in Obstetrics and Gynecology* 20:229–233.
- Rossiter, M., J. C. Schultz, and I. T. Baldwin. 1986. Relationships among defoliation, red oak phenolics, and gypsy moth growth and reproduction. *Ecology* 69:267–277.
- Ryan, S. D., et al. 2013. Isogenic human iPSC Parkinson's model shows nitrosative stress-induced dysfunction in MEF2-PGC1 $\alpha$  transcription. *Cell* 155:1652–1653.
- Schultz, J. C., and I. T. Baldwin. 1982. Oak leaf quality declines in response to defoliation by gypsy moth larvae. *Science* 217:149–150.
- Schütz, K., M. Bondowski, and S. Scheu. 2008. Effects of Collembola and fertilizers on plant performance (*Triticum aestivum*) and aphid reproduction (*Rhopalosiphum padi*). *Basic and Applied Ecology* 9:182–188.
- Seagraves, M. P., and J. G. Lundgren. 2012. Effects of neonicotinoid seed treatments on soybean aphid and its natural enemies. *Journal of Pest Science* 85:125–132.
- Schinasi, L., and M. E. Leon. 2014. Non-Hodgkin lymphoma and occupational exposure to agricultural pesticide chemical groups and active ingredients: A systematic review and meta-analysis. *International Journal of Environmental Research and Public Health* 11:4449–4527.
- Schrödl, W., et al. 2014. Possible effects of glyphosate on *Mucorales* abundance in the rumen of dairy cows in Germany. *Current Microbiology* 69:817–823.
- Shehata, A. A., et al. 2013. The effect of glyphosate on potential pathogens and beneficial members of poultry microbiota in vitro. *Current Microbiology* 66:350–358.
- Soler Gamborena, R., et al. 2005. Root herbivore effects on aboveground herbivore, parasitoid and hyperparasitoid performance via changes in plant quality. *Journal of Animal Ecology* 74:1121–1134.
- Staley, J. T., et al. 2007. Summer drought alters plant-mediated competition between foliar- and root-feeding insects. *Global Change Biology* 13:866–877.
- Stinner, B. R., and G. J. House. 1990. Arthropods and other invertebrates in conservation tillage agriculture. *Annual Reviews of Entomology* 35:299–318.
- Stur, E., et al. 2019. Glyphosate-based herbicides at low doses affect canonical pathways in estrogen positive and negative breast cancer cell lines. *PLoS One* 14:e0219610.
- Thom, M. D., et al. 2016. Nectar production in oilseeds: Food for pollinators in an agricultural landscape. *Crop Science* 56:727–739.
- Thongprakaisang, S. 2013. Glyphosate induces human breast cancer cells growth via estrogen receptors. *Food Chemistry and Toxicology* 59:129–136.
- Winchester, P. D., J. Huskins, and J. Ying. 2009. Agrichemicals in surface water and birth defects in the United States. *Acta Paediatrica* 98:664–669.

## SOURCES

- Winter, C. K. 2015. Chronic dietary exposure to pesticide residues in the United States. *International Journal of Food Contamination* 2:11.
- Winter, C. K., and J. M. Katz. 2011. Dietary exposure to pesticide residues from commodities alleged to contain the highest contamination levels. *Journal of Toxicology* 2011:589674.
- Yousef, M. I., et al. 1995. Toxic effects of carbofuran and glyphosate on semen characteristics in rabbits. *Journal of Environmental Science and Health B* 30:513–534.
- Zhang, L., et al. 2019. Exposure to glyphosate-based herbicides and risk for non-Hodgkin lymphoma: A meta-analysis and supporting evidence. *Mutation Research/Reviews in Mutation Research* 781:186–206.
- Ziska, L. H., et al. 2016. Rising atmospheric CO<sub>2</sub> is reducing the protein concentration of a floral pollen source essential for North American bees. *Proceedings of the Royal Society B* 283:20160414.
- Zobiole, L. H. S., et al. 2010. Glyphosate affects lignin content and amino acid production in glyphosate-resistant soybean. *Acta Physiologiae Plantarum* 32:831–837.

### 11: FAT OF THE LAND

- Alothman, M., et al. 2019. The “grass-fed” milk story: Understanding the impact of pasture feeding on the composition and quality of bovine milk. *Foods* 8:350.
- Bargo, F., et al. 2006. Supplementing total mixed rations with pasture increase the content of conjugated linoleic acid in milk. *Animal Feed Science and Technology* 131:226–240.
- Baumann, C. A., H. Steenbock, W. M. Beeson, and I. W. Rupel. 1934. The influence of breed and diet of cows on the carotene and vitamin A content of butter. *Journal of Biological Chemistry* 105:167–176.
- Benbrook, C. M., et al. 2018. Enhancing the fatty acid profile of milk through forage-based rations, with nutrition modeling of diet outcomes. *Food Science & Nutrition* 6:681–700.
- Benbrook, C., et al. 2013. Organic production enhances milk nutritional quality by shifting fatty acid composition: A United States-wide, 18-month study. *PLoS One* 8:e82429.
- Besle, J. M., et al. 2010. Ultraviolet-absorbing compounds in milk are related to forage polyphenols. *Journal of Dairy Science* 93:2846–2856.
- Bugaud, C., S. Buchin, A. Hauwuy, and J.-B. Coulon. 2001. Relationships between flavor and chemical composition of Abondance cheese derived from different types of pastures. *Le Lait* 81:757–773.
- Burow, E., P. T. Thomsen, J. T. Sørensen, and T. Rousing. 2011. The effect of grazing on cow mortality in Danish dairy herds. *Preventive Veterinary Medicine* 100:237–241.
- Butler, G., et al. 2011. The effects of dairy management and processing on quality characteristics of milk and dairy products. *NJAS—Wagenigen Journal of Life Sciences* 58:97–102.
- Chew, B. P. 1995. Antioxidant vitamins affect food animal immunity and health. *Journal of Nutrition* 125:1804S–1808S.
- Chew, B. P., L. L. Hollen, J. K. Hillers, and M. L. Herlugson. 1982. Relationship between vitamin A and beta-carotene in blood plasma and milk and mastitis in Holsteins. *Journal of Dairy Science* 65:2111–2118.

## SOURCES

- Coppa, M., et al. 2013. Prediction of bulk milk fatty acid composition based on farming practices collected through on-farm surveys. *Journal of Dairy Science* 96:4197–4211.
- Couvreur, S., et al. 2006. The linear relationship between the proportion of fresh grass in the cow diet, milk fatty acid composition, and butter properties. *Journal of Dairy Science* 89:1956–1969.
- Croissant, A. E., S. P. Washburn, L. L. Dean, and M. A. Drake. 2007. Chemical properties and consumer perception of fluid milk from conventional and pasture-based production systems. *Journal of Dairy Science* 90:4942–4953.
- Dewhurst, R. J., and P. J. King. 1998. Effects of extended wilting, shading and chemical additives on the fatty acids in laboratory grass silages. *Grass and Forage Science* 53:219–224.
- Dewhurst, R. J., K. J. Shingfield, M. R. F. Lee, and N. D. Scollan. 2006. Increasing the concentrations of beneficial polyunsaturated fatty acids in milk produced by dairy cows in high-forage systems. *Animal Feed Science and Technology* 131:168–206.
- Dhiman, T. R., G. R. Anand, L. D. Satter, and M. W. Pariza. 1999. Conjugated linoleic acid content of milk from cows fed different diets. *Journal of Dairy Science* 82:2146–2156.
- Elgersma, A. 2015. Grazing increases the unsaturated fatty acid concentration of milk from grass-fed cows: A review of the contributing factors, challenges and future perspectives. *European Journal of Lipid Science and Technology* 117:1345–1369.
- Elgersma, A., et al., 2004. Quick changes in milk fat composition after transition from fresh grass to a silage diet and effects on consumer health benefits. *Animal Feed Science and Technology* 117:13–27.
- Elgersma, A., S. Tamminga, and G. Ellen. 2006. Modifying milk composition through forage. *Animal Feed Science and Technology* 131:207–225.
- Esposito, G., et al. 2014. Fatty acid and sensory profiles of Caciocavallo cheese as affected by management system. *Journal of Dairy Science* 97:1918–1928.
- Foditsch, C., et al. 2016. Lameness prevalence and risk factors in large dairy farms in upstate New York: Model development for the prediction of claw horn disruption lesions. *PLoS One* 11:e0146718.
- Gedi, M. A., et al. 2017. Component analysis of nutritionally rich chloroplasts: Recovery from conventional and unconventional green plant species. *Journal of Food Science and Technology* 54:2746–2757.
- Hackman, T. J., and J. N. Spain. 2010. Ruminant ecology and evolution: Perspectives useful to ruminant livestock research and production. *Journal of Dairy Science* 93:1320–1334.
- Hansen, L. B. 2000. Consequences of selection for milk yield from a geneticist's viewpoint. *Journal of Dairy Science* 83:1145–1150.
- Haskell, J. M., et al. 2002. Housing system, milk production and zero-grazing effects on lameness and leg injury in dairy cows. *Journal of Dairy Science* 89:4259–4266.
- Hofmann, R. R. 1989. Evolutionary steps of ecophysiological adaptation and diversification of ruminants: A comparative view of their digestive system. *Oecologia* 78:443–457.
- Hofstetter, P., et al. 2014. Dairy farming: Indoor v. pasture-based feeding. *Journal of Agricultural Science* 152:994–1011.
- Jahreis, G., J. Fritsche, and H. Steinhart. 1997. Conjugated linoleic acid in milk fat: High variation depending on production system. *Nutrition Research* 17:1479–1484.



## SOURCES

- Jensen, R. G., A. M. Ferris, C. J. Lammi-Keefe, and R. A. Henderson. 1990. Lipids of bovine and human milks: A comparison. *Journal of Dairy Science* 73:223–240.
- Kelley, M. L., et al. 1998. Effect of intake of pasture on concentrations of conjugated linoleic acid in milk of lactating cows. *Journal of Dairy Science* 81:1630–1636.
- Khiaosa-Ard, R., M. Kreuzer, and F. Leiber. 2015. Apparent recovery of C18 polyunsaturated fatty acids from feed in cow milk: A meta-analysis of the importance of dietary fatty acids and feeding regimens in diets without fat supplementation. *Journal of Dairy Science* 98:6399–6414.
- Knaus, W. 2009. Dairy cows trapped between performance demands and adaptability. *Journal of the Science of Food and Agriculture* 89:1107–1114.
- Knaus, W. 2016. Perspectives on pasture versus indoor feeding of dairy cows. *Journal of the Science of Food and Agriculture* 96:9–17.
- Lucy, M. C. 2001. Reproductive loss in high-producing dairy cattle: Where will it end? *Journal of Dairy Science* 84:1277–1293.
- Lucy, M. C. 2005. Fertility traits in New Zealand versus North American Holsteins. *Advances in Dairy Technology* 17:311–318.
- Maia, M. R. G., et al. 2010. Toxicity of unsaturated fatty acids to the biohydrogenating ruminal bacterium, *Butyrivibrio fibrisolvens*. *BMC Microbiology* 10:52.
- McCarthy, B., et al. 2011. Meta-analysis of the impact of stocking rate on the productivity of pasture-based milk production systems. *Animal* 5:784–794.
- Mitani, T., K. Kobayashi, K. Ueda, and S. Kondo. 2016. Discrimination of “grazing milk” using milk fatty acid profile in the grassland dairy area in Hokkaido. *Animal Science Journal* 87:233–241.
- Nozière, P., et al. 2006. Carotenoids for ruminants: From forages to dairy products. *Animal Feed Science and Technology* 131:418–450.
- O’Callaghan, T. F., et al. 2016. Quality characteristics, chemical composition, and sensory properties of butter from cows on pasture versus indoor feeding systems. *Journal of Dairy Science* 99:9441–9460.
- O’Callaghan, T. F., et al. 2017. Effect of pasture versus indoor feeding systems on quality characteristics, nutritional composition, and sensory and volatile properties of full-fat Cheddar cheese. *Journal of Dairy Science* 100:6053–6073.
- Olmos, G., et al. 2009. Hoof disorders, locomotion ability and lying times of cubicle-housed compared to pasture-based dairy cows. *Livestock Science* 125:199–207.
- Owens, F. N., D. S. Secrist, W. J. Hill, and D. R. Gill. 1998. Acidosis in cattle: A review. *Journal of Animal Science* 76:275–286.
- Palupi, E., A. Jayanegara, A. Ploeger, and J. Kahl. 2012. Comparison of nutritional quality between conventional and organic dairy products: A meta-analysis. *Journal of the Science of Food and Agriculture* 92:2774–2781.
- Plaizier, J. C., D. O. Krause, G. N. Gozho, and B. W. McBride. 2009. Subacute ruminal acidosis in dairy cows: The physiological causes, incidence and consequences. *Veterinary Journal* 176:21–31.
- Rego, O. A., et al. 2016. Changes in milk production and milk fatty acid composition of cows switched from pasture to a total mixed ration diet and back to pasture. *Italian Journal of Animal Science* 15:76–86.
- Russell, J. B., and J. L. Rychlik. 2001. Factors that alter rumen microbial ecology. *Science* 292:1119–1122.
- Segato, S., et al. 2017. Identification of lipid biomarkers to discriminate between the

## SOURCES

- different production systems for Asiago PDO cheese. *Journal of Agricultural and Food Chemistry* 65:9887–9892.
- Skibieli, A., L. M. Downing, T. J. Orr, and W. R. Hood. 2013. The evolution of the nutrient composition of mammalian milks. *Journal of Animal Ecology* 82:1254–1264.
- Tunick, M. H., et al. 2016. Case study: Comparison of milk composition from adjacent organic and conventional farms in the USA. *International Journal of Dairy Technology* 69:137–142.
- Von Keyserlingk, M. A. G., et al. 2012. Benchmarking cow comfort on North American freestall dairies: Lameness leg injuries, tying time, facility design, and management for high producing Holstein dairy cows. *Journal of Dairy Science* 95:7399–7408.
- Walsh, S. W., E. J. Williams, and A. C. O. Evans. 2011. A review of the causes of poor fertility in high milk producing dairy cows. *Animal Reproduction Science* 123:127–138.
- Washburn, P. S., S. L. White, J. T. Green, and G. A. Benson. 2002. Reproduction, mastitis, and body condition of seasonally calved Holstein and Jersey cows in confinement or pasture systems. *Journal of Dairy Science* 85:105–111.

### 12: WHAT'S IN YOUR BURGER?

- Alagawany, M., et al. 2019. Omega-3 and omega-6 fatty acids in poultry nutrition: Effect on production performance and health. *Animals* 9:573.
- Avra, T. D., et al. 2017. A retrospective analysis of risk factors associated with bovine respiratory disease treatment failure in feedlot cattle. *Journal of Animal Science* 95:1521–1527.
- Bang, H.O., J. Dyerberg, and N. Hjørne. 1976. The composition of food consumed by Greenland Eskimos. *Acta Medica Scandinavica* 200:69–73.
- Bang, H. O., J. Dyerberg, and H. M. Sinclair. 1980. The composition of the Eskimo food in north western Greenland. *American Journal of Clinical Nutrition* 33:2657–2661.
- Blanchet, C., et al. 2005. Fatty acid composition of wild and farmed Atlantic salmon (*Salmo salar*) and rainbow trout (*Onchorhynchus mykiss*). *Lipids* 40:529–531.
- Brenna, J. T. 2002. Efficiency of conversion of  $\alpha$ -linolenic acid to long chain n-3 fatty acids in man. *Current Opinion in Clinical Nutrition and Metabolic Care* 5:127–132.
- Bronkema, S. M., et al. 2019. A nutritional survey of commercially available grass-finished beef. *Meat and Muscle Biology* 3:116–126.
- Burdge, G. C., A. E. Jones, and S. A. Wootton. 2002. Eicosapentaenoic and docosapentaenoic acids are the principle products of alpha-linolenic acid metabolism in young men. *British Journal of Nutrition* 88:355–363.
- Burdge, G. C., and S. A. Wootton. 2002. Conversion of alpha-linolenic acid to eicosapentaenoic, docosapentaenoic and docosahexaenoic acids in young women. *British Journal of Nutrition* 88:411–420.
- Chail, A., et al. 2016. Legume finishing provides beef with positive human dietary fatty acid ratios and consumer preference comparable with grain-finished beef. *Journal of Animal Science* 94:2184–2197.
- Chail, A., et al. 2017. Consumer sensory evaluation and chemical composition of beef gluteus medius and triceps brachii steaks from cattle finished on forage or concentrate diets. *Journal of Animal Science* 95:1553–1564.
- Chastant, S., and M. Saint-Dizier. 2019. Inflammation: Friend or foe of bovine reproduction? *Animal Reproduction* 16:539–547.

## SOURCES

- Cheng, K.-J., et al. 1998. A review of bloat in feedlot cattle. *Journal of Animal Science* 76:299–308.
- Cladis, D. P., A. C. Kleiner, H. H. Freiser, and C. R. Santerre. 2014. Fatty acid profiles of commercially available finfish fillets in the United States. *Lipids* 49:1005–1018.
- Corah, L. R. 2008. Development of a corn-based beef industry. *Journal of Animal Science* 86:3635–3639.
- Cronin, D. A., R. Powell, and R. Gormley. 1991. An examination of the n-3 and n-6 polyunsaturated fatty acid status of wild and farmed Atlantic salmon (*Salmo salar*). *Irish Journal of Food Science and Technology* 15:53–62.
- Dal Bosco, A., et al. 2016. Transfer of bioactive compounds from pasture to meat in organic free-range chickens. *Poultry Science* 95:2464–2471.
- Daley, C. A., et al. 2010. A review of fatty acid profiles and antioxidant content in grass-fed and grain-fed beef. *Nutrition Journal* 9:10.
- Dalli, J., R. A. Colas, and C. N. Serhan. 2013. Novel n-3 immunoresolvents: Structures and actions. *Scientific Reports* 3:1940.
- De la Fuente, J., et al. 2009. Fatty acid and vitamin E composition of intramuscular fat in cattle reared in different production systems. *Meat Science* 82:331–337.
- Diez-Gonzalez, F., T. R. Callaway, M. G. Kizoulis, and J. B. Russell. 1998. Grain feeding and the dissemination of acid-resistant *Escherichia coli* from cattle. *Science* 281:1666–1678.
- Drouin, G., V. Rioux, and P. Legrand. 2019. The n-3 docosapentaenoic acid (DPA): A new player in the n-3 long chain polyunsaturated fatty acid family. *Biochimie* 159:36–48.
- Duckett, S. K., et al. 2013. Effects of forage species or concentrate finishing on animal performance, carcass and meat quality. *Journal of Animal Science* 91:1454–1467.
- Edwards, A. J. 1996. Respiratory diseases of feedlot cattle in the central USA. *Bovine Practitioner* 30:5–7.
- French, P., et al. 2000. Fatty acid composition, including conjugated linoleic acid, of intramuscular fat from steers offered grazed grass, grass silage, or concentrate-based diets. *Journal of Animal Science* 78:2849–2855.
- Galyean, M. L., L. J. Perino, and G. C. Duff. 1999. Interaction of cattle health/immunity and nutrition. *Journal of Animal Science* 77:1120–1134.
- Gifford, C. A., et al. 2012. Impacts of inflammation on cattle growth and carcass merit. *Journal of Animal Science* 90:1438–1451.
- Hamilton, M. C., et al. 2005. Lipid composition and contaminants in farmed and wild salmon. *Environmental Science & Technology* 39:8622–8629.
- Hammershøj, M., and N. F. Johansen. 2016. Review: The effect of grass and herbs in organic egg production on egg fatty acid composition, egg yolk colour and sensory properties. *Livestock Science* 194:37–43.
- Howe, P., J. Buckley, and B. Meyer. 2007. Long-chain omega-3 fatty acids in red meat. *Nutrition & Dietetics* 64:S135–S139.
- Hymøller, L., and S. K. Jensen. 2010. Vitamin D<sub>3</sub> synthesis in the entire skin surface of dairy cows despite hair coverage. *Journal of Dairy Science* 93:2025–2029.
- Keys, A. 1953. Atherosclerosis: A problem in newer public health. *Journal of the Mount Sinai Hospital, N. Y.* 20:118–139.
- Keys, A., et al. 1966. Epidemiological studies related to coronary heart disease: Characteristics of men aged 40–59 in seven countries. *Acta Medica Scandinavica* 180:1–392.

## SOURCES

- Kühn, J., et al. 2014. Free-range farming: A natural alternative to produce vitamin D-enriched eggs. *Nutrition* 30:481–484.
- Kurmann, A., and H. Indyk. 1994. The endogenous vitamin D content of bovine milk: Influence of season. *Food Chemistry* 50:75–81.
- Lopez-Bote, C. J., et al. 1998. Effect of free-range feeding on *n*-3 fatty acid and  $\alpha$ -tocopherol content and oxidative stability of eggs. *Animal Feed Science Technology* 72:33–40.
- Lorenzen, C. L., et al. 2007. Conjugated linoleic acid content of beef differs by feeding regime and muscle. *Meat Science* 75:159–167.
- Martin, S. W., et al. 1982. Factors associated with mortality and treatment costs in feedlot calves: The Bruce County beef project, years 1978, 1979, 1980. *Canadian Journal of Comparative Medicine* 46:341–349.
- Martin, S. W., G. Darlington, K. Bateman, and J. Holt. 1988. Undifferentiated bovine respiratory disease (shipping fever): Is it communicable? *Preventive Veterinary Medicine* 6:27–35.
- Mavangira, V., and L. M. Sordillo. 2018. Role of lipid mediators in the regulation of oxidative stress and inflammatory responses in dairy cattle. *Research in Veterinary Science* 116:4–14.
- McAfee, A. J., et al. 2011. Red meat from animals offered a grass diet increases plasma and platelet *n*-3 PUFA in healthy consumers. *British Journal of Nutrition* 105:80–89.
- Naber, E. C. 1993. Modifying vitamin composition of eggs: A review. *Journal of Applied Poultry Research* 2:385–393.
- Nagaraja, T. G., and M. M. Chengappa. 1998. Liver abscesses in feedlot cattle: A review. *Journal of Animal Science* 76:287–298.
- Nagaraja, T. G., and E. C. Titgemeyer. 2007. Ruminal acidosis in beef cattle: The current microbiological and nutritional outlook. *Journal of Dairy Science* 90:E17–E38.
- Nimalaratne, C., and J. Wu. 2015. Hen egg as an antioxidant food commodity: A review. *Nutrients* 7:8274–8293.
- Patterson, E., et al. 2012. Health implications of high dietary omega-6 polyunsaturated fatty acids. *Journal of Nutrition and Metabolism* 2012:539426.
- Plochberger, K. 1989. Feeding experiments: A criterion for quality estimation of biologically and conventionally produced foods. *Agriculture, Ecosystems and Environment* 27:419–428.
- Priolo, A., D. Micol, and J. Agabriel. 2001. Effects of grass feeding systems on ruminant meat colour and flavor: A review. *Animal Research* 50:185–200.
- Ramsden, C. E., et al. 2013. Use of dietary linoleic acid for secondary prevention of coronary heart disease and death: Evaluation of recovered data from the Sydney Diet Heart Study and updated meta-analysis. *British Medical Journal* 346:e8707.
- Ramsden, C. E., et al. 2016. Re-evaluation of the traditional diet-heart hypothesis: Analysis of recovered data from Minnesota Coronary Experiment (1968–73). *British Medical Journal* 353:i1246.
- Razminowicz, R. H., M. Kreuzer, and M. R. L. Scheeder. 2006. Quality of retail beef from two grass-based production systems in comparison with conventional beef. *Meat Science* 73:351–361.
- Salem, N., Jr., and M. Eggersdorfer. 2015. Is the world supply of omega-3 fatty acids

## SOURCES

- adequate for optimal human nutrition? *Current Opinion in Clinical Nutrition and Metabolic Care* 18:147–154.
- Scollan, N., et al. 2006. Innovations in beef production systems that enhance the nutritional and health value of beef lipids and their relationship with meat quality. *Meat Science* 74:17–33.
- Scott, M. A., et al. 2020. Whole blood transcriptomic analysis of beef cattle at arrival identifies potential predictive molecules and mechanisms that indicate animals that naturally resist bovine respiratory disease. *PLoS One* 15:e0227507.
- Shindou, H., et al. 2017. Docosahexaenoic acid preserves visual function by maintaining correct disc morphology in retinal photoreceptor cells. *Journal of Biological Chemistry* 292:12,054–12,064.
- Simopoulos, A. P. 1991. Omega-3 fatty acids in health and disease and in growth and development. *American Journal of Clinical Nutrition* 54:438–463.
- Simopoulos, A. P., and N. Salem Jr. 1989. N-3 fatty acids in eggs from range-fed Greek chickens. *New England Journal of Medicine* 321:1412.
- Skrivan, M., and M. Englmaierová. 2014. The deposition of carotenoids and  $\alpha$ -tocopherol in hen eggs produced under a combination of sequential feeding and grazing. *Animal Feed Science and Technology* 190:79–86.
- Sordillo, L. M. 2018. Oxylipids and the regulation of bovine mammary inflammatory responses. *Journal of Dairy Science* 101:5629–5641.
- Sprague, M., J. R. Dick, and D. R. Tocher. 2016. Impact of sustainable feeds on omega-3 long-chain fatty acid levels in farmed Atlantic salmon, 2006–2015. *Scientific Reports* 6:21892.
- Srednicka-Tober, et al. 2016. Composition differences between organic and conventional meat: A systematic literature review and meta-analysis. *British Journal of Nutrition* 115:994–1011.
- Stark, K. D., et al. 2016. Global survey of the omega-3 fatty acids, docosahexaenoic acid and eicosapentaenoic acid in the blood stream of healthy adults. *Progress in Lipid Research* 63:132–152.
- Tallima, H., and R. El Ridi. 2018. Arachidonic acid: Physiological roles and potential health benefits—a review. *Journal of Advanced Research* 11:33–41.
- Taylor, J. D., et al. 2010. The epidemiology of bovine respiratory disease: What is the evidence for preventive measures? *Canadian Veterinary Journal* 51:1351–1359.
- Van Elswyk, M. E., and S. H. McNeill. 2014. Impact of grass/forage feeding versus grain finishing on beef nutrients and sensory quality: The U.S. experience. *Meat Science* 96:535–540.
- Ventola, C. L. 2015. The antibiotic resistance crisis: Part 1—Causes and threats. *Pharmacy and Therapeutics* 40:277–283.
- Wang, Y., C. Lehane, K. Ghebremeskel, and M. A. Crawford. 2009. Modern organic and broiler chickens sold for human consumption provide more energy from fat than protein. *Public Health Nutrition* 13:400–408.
- Wilson, S. H., T. L. Church, and S. D. Acres. 1985. The influence of feedlot management on an outbreak of bovine respiratory disease. *Canadian Veterinary Journal* 26:335–341.
- Wood, J. D., and M. Enser. 1997. Factors influencing fatty acids in meat and the role of antioxidants in improving meat quality. *British Journal of Nutrition* 78:S49–S60.

## 13: BODY WISDOM

- Agabriel, C., et al. 2007. Tanker milk variability according to farm feeding practices: Vitamins A and E, carotenoids, color, and terpenoids. *Journal of Dairy Science* 90:4884–4896.
- Aiken, G. E., and J. R. Strickland. 2013. Forages and pastures symposium: Managing the tall fescue-fungal endophyte symbiosis for optimum forage-animal production. *Journal of Animal Science* 91:2369–2378.
- Atwood, S. B., F. D. Provenza, R. D. Wiedmeier, and R. E. Banner. 2001. Influence of free-choice vs mixed-ration diets on food intake and performance of fattening calves. *Journal of Animal Science* 12:3034–3040.
- Besier, R. B., L. P. Kahn, N. D. Sargison, and J. A. Van Wyk. 2016. Diagnosis, treatment and management of *Haemonchus contortus* in small ruminants. *Advances in Parasitology* 93:181–238.
- Canty M. J., et al. 2014. Ergot alkaloid intoxication in perennial ryegrass (*Lolium perenne*): An emerging animal health concern in Ireland? *Irish Veterinary Journal* 67:21.
- Delgadillo-Puga, C., et al. 2019. Goats' feeding supplementation with *Acacia farnesiana* pods and their relationship with milk composition: Fatty acids, polyphenols, and antioxidant activity. *Animals* 9:515.
- Distel, R. A., and F. D. Provenza. 1991. Experience early in life affects voluntary intake of blackbrush by goats. *Journal of Chemical Ecology* 17:431–450.
- Engel, C. 2002. *Wild Health*. Houghton Mifflin, Boston.
- Filho, L. C. P. M. 2014. Productive and economic responses in grazing dairy cows to grain supplementation on family farms in the south of Brazil. *Animals* 4:463–475.
- Gessner, D. K., R. Ringseis, and K. Eder. 2017. Potential of plant polyphenols to combat oxidative stress and inflammatory processes in farm animals. *Journal of Animal Physiology and Animal Nutrition* 101:605–628.
- Guerre, P. 2015. Ergot alkaloids produced by endophytic fungi of the genus *Epicloë*. *Toxins (Basel)* 7:773–790.
- Huang, Q., et al. 2018. Potential and challenges of tannins as an alternative to in-feed antibiotics for farm animal production. *Animal Nutrition* 4:137–150.
- Kopittke, P. M., and N. W. Menzies. 2007. A review of the use of the basic cation saturation ratio and the “ideal” soil. *Soil Science Society of America Journal* 71:259–265.
- Larick, D. K., et al. 1987. Flavor constituents of beef as influenced by forage- and grain-feeding. *Journal of Food Science* 52:245–251.
- Lyman, T. D., F. D. Provenza, J. J. Villalba, and R. D. Wiedmeier. 2012. Phytochemical complementarities among endophyte-infected tall fescue, reed canarygrass, birdsfoot trefoil and alfalfa affect cattle foraging. *Animal* 6:676–682.
- Owens, J., F. D. Provenza, R. D. Wiedmeier, and J. J. Villalba. 2012. Supplementing endophyte-infected tall fescue or reed canarygrass with alfalfa or birdsfoot trefoil increases forage intake and digestibility by sheep. *Journal of the Science of Food and Agriculture* 92:987–992.
- Provenza, F. 2018. *Nourishment: What Animals Can Teach Us About Rediscovering Our Nutritional Wisdom*. Chelsea Green Publishing, White River Junction, Vermont.
- Provenza, F. D. 2008. What does it mean to be locally adapted and who cares anyway? *Journal of Animal Science* 86:E271–E284.

## SOURCES

- Provenza F. D., P. Gregorini, and P. C. F. Carvalho. 2015. Synthesis: Foraging decisions link plants, herbivores and human beings. *Animal Production Science* 55:411–425.
- Provenza, F. D., S. L. Kronberg, and P. Gregorini. 2019. Is grassfed meat and dairy better for human and environmental health? *Frontiers in Nutrition* 6:26.
- Provenza, F. D., M. Meuret, and P. Gregorini. 2015. Our landscapes, our livestock, ourselves: Restoring broken linkages among plants, herbivores, and humans with diets that nourish and satiate. *Appetite* 95:500–519.
- Provenza, F. D., and J. J. Villalba. 2010. The role of natural plant products in modulating the immune system: An adaptable approach for combating disease in grazing animals. *Small Ruminant Research* 89:131–139.
- Rodríguez E., and R. Wrangham. 1993. Zoopharmacognosy: The use of medicinal plants by animals. In *Phytochemical Potential of Tropical Plants*. Edited by K. R. Downum, J. T. Romeo, and H. A. Stafford. Springer, New York, pp. 89–105.
- Schatzker, M. 2015. *The Dorito Effect: The Surprising New Truth About Food and Flavor*. Simon & Schuster, New York.
- Shurkin, J. 2014. Animals that self-medicate. *Proceedings of the National Academy of Sciences* 111:17339–17341.
- Van Vliet, S., F. D. Provenza, and S. L. Kronberg. 2021. Health-promoting compounds are higher in grass-fed meat and milk. *Frontiers in Sustainable Food Systems* 4:555426.
- Villalba, J. J., M. Costes-Thiré, and C. Ginane. 2017. Phytochemicals in animal health: Diet selection and trade-offs between costs and benefits. *Proceedings of the Nutrition Society* 76:113–121.
- Voisin, A. 1959 (1957). *Grass Productivity*. Philosophical Library, New York.
- Voisin, A. 1959. *Soil, Grass and Cancer*. Philosophical Library, New York.

### 14: FLAVOR OF HEALTH

- Agabriel, C., et al. 2007. Tanker milk variability according to farm feeding practices: Vitamins A and E, carotenoids, color, and terpenoids. *Journal of Dairy Science* 90:4884–4896.
- Akaberi, D., et al. 2020. Mitigation of the replication of SARS-CoV-2 by nitric oxide in vitro. *Redox Biology* 37:101734.
- Aleksic, V., et al. 2014. Synergistic effect of *Myrtus communis* L. essential oils and conventional antibiotics against multi-drug resistant *Acinetobacter baumannii* wound isolates. *Phytomedicine* 21:1666–1674.
- Aleksic Sabo, V., I. Nikolic, N. Mimica-Dukic, and P. Knezevic. 2020. Anti-*Acinetobacter baumannii* activity of selected phytochemicals alone, in binary combinations and in combinations with conventional antibiotics. *Natural Product Research* 35:5964–5967.
- Archer, E., G. A. Hand, and S. N. Blair. 2013. Validity of U.S. nutritional surveillance: National Health and Nutrition Examination Survey caloric energy intake data, 1971–2010. *PLoS One* 8:e76632.
- Archer, E., C. J. Lavie, and J. O. Hill. 2018. The failure to measure dietary intake engendered a fictional discourse on diet-disease relations. *Frontiers in Nutrition* 5:105.
- Astrup, A., et al. 2020. Saturated fats and health: A reassessment and proposal for food-based recommendations. *Journal of the American College of Cardiology* 76:844–857.

## SOURCES

- Avau, B., and I. Depoortere. 2016. The bitter truth about bitter taste receptors: Beyond sensing bitter in the oral cavity. *Acta Physiologica* 216:407–420.
- Barham, H. P., et al. 2021. Association between bitter taste receptor phenotype and clinical outcomes among patients with COVID-19. *JAMA Network Open* 4:e2111410.
- Børge, G. I., E. Sandberg, J. Oyaas, and R. K. Abrahamsen. 2016. Variation of terpenes in milk and cultured cream from Norwegian alpine rangeland-fed and in-door fed cows. *Food Chemistry* 199:195–202.
- Bushdid, C., M. O. Magnasco, L. B. Vosshall, and A. Keller. 2014. Humans can discriminate more than 1 trillion olfactory stimuli. *Science* 343:1370–1372.
- Busse, D., et al. 2014. A synthetic sandalwood odorant induces wound-healing processes in human keratinocytes via the olfactory receptor OR2AT4. *Journal of Investigative Dermatology* 134:2823–2832.
- Carey, R. M., and R. J. Lee. 2019. Taste receptors in upper airway innate immunity. *Nutrients* 11:2017.
- Cha, J. H., et al. 2017. Anti-inflammatory effect of lycopene in SW480 human colorectal cancer cells. *Nutrition Research and Practice* 11:90–96.
- Chan, D. S., et al. 2011. Red and processed meat and colorectal cancer incidence: Meta-analysis of prospective studies. *PLoS One*:e20456.
- De Onis, M., M. Blössner, and E. Borghi. 2010. Global prevalence and trends of overweight and obesity among preschool children. *American Journal of Clinical Nutrition* 92:1257–1264.
- Eberhardt, M. V., C. Y. Lee, and R. H. Liu. 2000. Antioxidant activity of fresh apples. *Nature* 405:903–904.
- Freund, J. R., and R. J. Lee. 2018. Taste receptors in the upper airway. *World Journal of Otorhinolaryngology-Head and Neck Surgery* 4:67–76.
- Geithe, C., G. Andersen, A. Malki, and D. Krautwurst. 2015. A butter aroma recombine activates human class-I odorant receptors. *Journal of Agricultural and Food Chemistry* 63:9410–9420.
- Goff, S. A., and H. J. Klee. 2006. Plant volatile compounds: Sensory cues for health and nutritional value? *Science* 311:815–819.
- Gorelik, S., et al. 2005. Lipid peroxidation and coupled vitamin oxidation in simulated and human gastric fluid inhibited by dietary polyphenols: Health implications. *Journal of Agricultural and Food Chemistry* 53:3397–3402.
- Gorelik, S., M. Ligumsky, R. Kohe, and J. A. Kanner. 2008. A novel function of red wine polyphenols in humans: Prevention of absorption of cytotoxic lipid peroxidation products. *FASEB Journal* 22:41–46.
- Hall, K. D., et al. 2019. Ultra-processed diets cause excess calorie intake and weight gain: An inpatient randomized controlled trial of *Ad Libitum* food intake. *Cell Metabolism* 30:67–77.
- Hariri, B. M., et al. 2017. Plant flavones enhance antimicrobial activity of respiratory epithelial cell secretions against *Pseudomonas aeruginosa*. *PLoS One* 12:e0185203.
- Huang, Y., et al. 2015. Visible spectroscopy on carcass fat combined with chemometrics to distinguish pasture-fed, concentrate-fed and concentrate-finished pasture-fed lambs. *Meat Science* 101:5–12.
- Jacobs, D. R., M. A. Pereira, K. A. Meyer, and L. H. Kushi. 2000. Fiber from whole grains, but not refined grains, is inversely associated with all-cause mortality in older



## SOURCES

- women: The Iowa Women's Health Study. *Journal of the American College of Nutrition* 19:326S–330S.
- Keck, A. S., Q. Qiao, and E. H. Jeffery. 2003. Food matrix effects on bioactivity of broccoli-derived sulforaphane in liver and colon of F344 rats. *Journal of Agricultural and Food Chemistry* 51:3320–3327.
- Kilcawley, K. N., et al. 2018. Factors influencing the flavor of bovine milk and cheese from grass based versus non-grass based milk production systems. *Foods* 7:37.
- Kimura, I., A. Ichimura, R. Ohue-Kitano, and M. Igarashi. 2020. Free fatty acid receptors in health and disease. *Physiological Reviews* 100:171–210.
- Kris-Etherton, P. M., et al. 2002. Bioactive compounds in foods: Their role in the prevention of cardiovascular disease and cancer. *American Journal of Medicine* 113:71–88.
- Larick, D. K., et al. 1987. Flavor constituents of beef as influenced by forage- and grain-feeding. *Journal of Food Science* 52:245–251.
- Lee, R. J., et al. 2012. T2R38 taste receptor polymorphisms underlie susceptibility to upper respiratory infection. *Journal of Clinical Investigation* 122:4145–4159.
- Liu, Q., et al. 2015. Synergy among thymol, eugenol, berberine, cinnamaldehyde and streptomycin against planktonic and biofilm-associated food-borne pathogens. *Letters in Applied Microbiology* 60:421–430.
- Lu, P., C.-H. Zhang, L. M. Lifshitz, and R. ZhuGe. 2017. Extraoral bitter taste receptors in health and disease. *Journal of General Physiology* 149:181–197.
- Maina, I. W., A. D. Workman, and N. A. Cohen. 2018. The role of bitter and sweet taste receptors in upper airway innate immunity: Recent advances and future directions. *World Journal of Otorhinolaryngology-Head and Neck Surgery* 4:200–208.
- Majnooni, M. B., et al. 2020. Phytochemicals: Potential therapeutic interventions against coronavirus-associated lung injury. *Frontiers in Pharmacology* 11:588467.
- Mennella, J. A., and G. K. Beauchamp. 2005. Understanding the origin of flavor preferences. *Chemical Senses* 30:i242–i243.
- Mennella, J. A., C. P. Jagnow, and G. K. Beauchamp. 2001. Prenatal and postnatal flavor learning by human infants. *Pediatrics* 107:e88.
- Micha, R., G. Michas, and D. Mozaffarian. 2012. Unprocessed red and processed meats and risk of coronary artery disease and type 2 diabetes: An updated review of the evidence. *Current Atherosclerosis Reports* 14:515–524.
- Miyamoto, J., et al. 2016. Nutritional signaling via free fatty acid receptors. *International Journal of Molecular Sciences* 17:450.
- Mouritsen, O. G., and K. Styrbæk. 2014. *Umami: Unlocking the Secrets of the Fifth Taste*. Columbia University Press, New York.
- Moodie, R., et al. 2013. Profits and pandemics: Prevention of harmful effects of tobacco, alcohol, and ultra-processed food and drink industries. *The Lancet* 381: 670–679.
- Mozaffarian, D. 2016. Dietary and policy priorities for cardiovascular disease, diabetes, and obesity. *Circulation* 133:187–225.
- Natarajan, N., and J. L. Pluznick. 2016. Olfaction in the kidney: “Smelling” gut microbial metabolites. *Experimental Physiology* 101:478–481.
- Needham, B. D., R. Kaddurah-Daouk, and S. K. Mazmanian. 2020. Gut microbial molecules in behavioural and neurodegenerative conditions. *Nature Reviews Neuroscience* 21:717–731.
- Ninomiya, K. 2015. Science of umami taste: Adaptation to gastronomic culture. *Flavour* 4:13.

## SOURCES

- Provenza, F. D., S. L. Kronberg, and P. Gregorini. 2019. Is grassfed meat and dairy better for human and environmental health? *Frontiers in Nutrition* 6:26.
- Rosato, A., et al. 2007. Antibacterial effect of some essential oils administered alone or in combination with Norfloxacin. *Phytomedicine* 14:727–732.
- Running, C. A., B. A. Craig, and R. D. Mattes. 2015. Oleogustus: The unique taste of fat. *Chemical Senses* 40:507–516.
- Salas-Salvadó, J., et al. 2014. Prevention of diabetes with Mediterranean diets. *Annals of Internal Medicine* 160:1–10.
- Sandell, M. A., and P. A. S. Breslin. 2006. Variability in a taste-receptor gene determines whether we taste toxins in food. *Current Biology* 16:R792–R794.
- Scollan, N., et al. 2006. Innovations in beef production systems that enhance the nutritional and health value of beef lipids and their relationship with meat quality. *Meat Science* 74:17–33.
- Traka, M. 2016. Health benefits of glucosinolates. *Advances in Botanical Research* 80:247–279.
- Triantafyllou, V., A. D. Workman, M. A. Kohanski, and N. A. Cohen. 2018. Taste receptor polymorphisms and immune response: A review of receptor genotypic-phenotypic variations and their relevance to chronic rhinosinusitis. *Frontiers in Cellular and Infection Microbiology* 8:64.
- Turner, A., et al. 2018. Interactions between bitter taste, diet and dysbiosis: Consequences for appetite and obesity. *Nutrients* 10:1336.
- Weisburger, J. H. 2002. Lycopene and tomato products in health promotion. *Experimental Biology and Medicine* 227:924–927.
- Zhong, V. W., et al. 2020. Associations of processed meat, unprocessed red meat, poultry, or fish intake with incident cardiovascular disease and all-cause mortality. *JAMA Internal Medicine* 180:503–512.

## 15: BALANCING ACT

- Abdelmagid, S. A., J. L. MacKinnon, S. M. Janssen, and D. W. L. Ma. 2016. Role of n-3 polyunsaturated fatty acids and exercise in breast cancer prevention: Identifying common targets. *Nutrition and Metabolic Insights* 9:71–84.
- Adam, O., et al. 2003. Anti-inflammatory effects of a low arachidonic acid diet and fish oil in patients with rheumatoid arthritis. *Rheumatology International* 23:27–36.
- Adler, A. I., et al. 1994. Lower prevalence of impaired glucose tolerance and diabetes associated with daily seal oil or salmon consumption among Alaska Natives. *Diabetes Care* 17:1498–1501.
- Ailhaud, G., et al. 2006. Temporal changes in dietary fats: Role of n-6 polyunsaturated fatty acids in excessive adipose tissue development and relationship to obesity. *Progress in Lipid Research* 45:203–236.
- Ailhaud, G., P. Guesnet, and S. C. Cunnane. 2008. An emerging risk factor for obesity: Does disequilibrium of polyunsaturated fatty acid metabolism contribute to excessive adipose tissue development? *British Journal of Nutrition* 100:461–470.
- Albert, C. M., et al. 2002. Blood levels of long-chain n-3 fatty acids and the risk of sudden death. *New England Journal of Medicine* 346:1113–1118.
- Arterburn, L. M., E. B. Hall, and H. Oken. 2006. Distribution, interconversion, and

- dose response of n-3 fatty acids in humans. *American Journal of Clinical Nutrition* 83:1467S–1476S.
- Avallone, R., G. Vitale, and M. Bertolotti. 2019. Omega-3 fatty acids and neurodegenerative diseases: New evidence in clinical trials. *International Journal of Molecular Sciences* 20:4256.
- Barceló-Cogliijn, G., and E. J. Murphy. 2009. Alpha-linolenic acid and its conversion to longer chain n-3 fatty acids: Benefits for human health and a role in maintaining tissue n-3 fatty acid levels. *Progress in Lipid Research* 48:355–374.
- Basil, M. C., and B. D. Levy. 2016. Specialized pro-resolving mediators: Endogenous regulators of infection and inflammation. *Nature Reviews Immunology* 16:51–67.
- Belluzzi, A. 1996. Effect of an enteric-coated fish-oil preparation on relapses in Crohn's disease. *New England Journal of Medicine* 334:1557–1560.
- Benbrook, C. M., et al. 2018. Enhancing the fatty acid profile of milk through forage-based rations, with nutrition modeling of diet outcomes. *Food Science & Nutrition* 6:681–700.
- Brigham, E. P., et al. 2019. Omega-3 and omega-6 intake modifies asthma severity and response to indoor air pollution in children. *American Journal of Respiratory and Critical Care Medicine* 199:1478–1486.
- Broadhurst, C. L., S. C. Cunnane, and M. A. Crawford. 1998. Rift Valley lake fish and shellfish provided brain-specific nutrition for early Homo. *British Journal of Nutrition* 79:3–21.
- Brostow, D. P., et al. 2011. Omega-3 fatty acids and incident type 2 diabetes: The Singapore Chinese Health Study. *American Journal of Clinical Nutrition* 94:520–526.
- Buckley, J. D., and P. R. C. Howe. 2009. Anti-obesity effects of long-chain omega-3 polyunsaturated fatty acids. *Obesity Reviews* 10:648–659.
- Calder, P. C. 2008. Polyunsaturated fatty acids, inflammatory processes and inflammatory bowel diseases. *Molecular Nutrition & Food Research* 52:885–897.
- Calder, P. C. 2017. Omega-3 fatty acids and inflammatory processes: From molecules to man. *Biochemical Society Transactions* 45:1105–1115.
- Calder, P. C. 2020. Nutrition, immunity and COVID-19. *BMJ Nutrition, Prevention & Health* 3:74–92.
- Chandrasekharan, J. A., and N. Sharma-Walia. 2015. Lipoxins: Nature's way to resolve inflammation. *Journal of Inflammation Research* 8:181–192.
- Chapkin, R. S., et al. 2007. Immunomodulatory effects of (n-3) fatty acids: Putative link to inflammation and colon cancer. *Journal of Nutrition* 137:200S–204S.
- Chavarro, J. E., et al. 2008. A 22-y prospective study of fish intake in relation to prostate cancer incidence and mortality. *American Journal of Clinical Nutrition* 88:1297–1303.
- Chowdhury, R., et al. 2014. Association of dietary, circulating, and supplement fatty acids with coronary risk: A systematic review and meta-analysis. *Annals of Internal Medicine* 160:398–406.
- Crawford, M. A., et al. 2003. The potential role for arachidonic and docosahexaenoic acids in protection against some central nervous system injuries in preterm infants. *Lipids* 38:303–315.
- Curtis, C. L., et al. 2000. N-3 fatty acids specifically modulate catabolic factors involved in articular cartilage degradation. *Journal of Biological Chemistry* 275:721–724.
- De Vriese, S. R., A. B. Christophe, and M. Maes. 2003. Lowered serum n-3 polyunsaturated fatty acid (PUFA) levels predict the occurrence of postpartum depression:

## SOURCES

- Further evidence that lowered n-PUFAs are related to major depression. *Life Sciences* 73:3181–3187.
- Delavar, M. A., et al. 2009. Dietary patterns and the metabolic syndrome in middle aged women, Babol, Iran. *Asia Pacific Journal of Clinical Nutrition* 18:285–292.
- den Hartigh, L. J. 2019. Conjugated linoleic acid effects on cancer, obesity, and atherosclerosis: A review of pre-clinical and human trials with current perspectives. *Nutrients* 11:370.
- Duvall, M. G., and B. D. Levy. 2016. DHA- and EPA-derived resolvins, protectins, and maresins in airway inflammation. *European Journal of Pharmacology* 785:144–155.
- Eaton, S. B., M. J. Konner, and L. Cordain. 2010. Diet-dependent acid load, Paleolithic nutrition, and evolutionary health promotion. *American Journal of Clinical Nutrition* 91:295–297.
- Ebbesson, S. O., et al. 1999. Diabetes is related to fatty acid imbalance in Eskimos. *International Journal of Circumpolar Health* 58:108–119.
- Ebbesson, S. O. E., et al. 2005. Omega-3 fatty acids improve glucose tolerance and components of the metabolic syndrome in Alaskan Eskimos: The Alaska Siberia Project. *International Journal of Circumpolar Health* 64:396–408.
- Epstein, M. M., et al. 2012. Dietary fatty acid intake and prostate cancer survival in Örebro County, Sweden. *American Journal of Epidemiology* 176:240–252.
- Fattori, V., et al. 2020. Specialized pro-resolving lipid mediators: A new class of non-immunosuppressive and non-opioid analgesic drugs. *Pharmacological Research* 151:104549.
- Ferrucci, L., et al. 2006. Relationship of plasma polyunsaturated fatty acids to circulating inflammatory markers. *Journal of Clinical Endocrinology & Metabolism* 91:439–446.
- Ge, Y., et al. 2002. Effects of adenoviral gene transfer of *C. Elegans* n-3 fatty acid desaturase on the lipid profile and growth of human breast cancer cells. *Anticancer Research* 22:537–543.
- Gesch, C. B., et al. 2002. Influence of supplementary vitamins, minerals and essential fatty acids on the antisocial behavior of young adult prisoners: Randomised, placebo-controlled trial. *British Journal of Psychiatry* 181:22–28.
- Gianni, M. L., et al. 2018. An infant formula containing dairy lipids increased red blood cell membrane omega 3 fatty acids in 4 month-old healthy newborns: A randomized controlled trial. *BMC Pediatrics* 18:53.
- Ginsberg, H. N., et al. 1998. Effects of reducing dietary saturated fatty acids on plasma lipids and lipoproteins in healthy subjects: The DELTA Study, protocol 1. *Arteriosclerosis, Thrombosis, and Vascular Biology* 18:441–449.
- Grammatikos, S. I., P. V. Subbaian, T. A. Victor, and W. M. Miller. 1994. N-3 and n-6 fatty acid processing and growth effects in neoplastic and non-cancerous human mammary epithelial cell lines. *British Cancer Journal* 70:219–227.
- Griffin, B. A. 2008. How relevant is the ratio of dietary n-6 to n-3 polyunsaturated fatty acids to cardiovascular disease risk? Evidence from the OPTILIP study. *Current Opinion in Lipidology* 19:57–62.
- Grosso, G., et al. 2014. Role of omega-3 fatty acids in the treatment of depressive disorders: A comprehensive meta-analysis of randomized clinical trials. *PLoS One* 9:e96905.

## SOURCES

- Ha, Y. L., N. K. Grimm, and M. W. Pariza. 1987. Anticarcinogens from fried ground beef: Heat-altered derivatives of linoleic acid. *Carcinogenesis* 8:1881–1887.
- Hall, M. N. 2008. A 22-year prospective study of fish, *n*-3 fatty acid intake, and colorectal cancer risk in men. *Cancer Epidemiology, Biomarkers & Prevention* 17:1136–1143.
- Hang, S., et al. 2017. Dietary linoleic acid intake and blood inflammatory markers: A systematic review and meta-analysis of randomized controlled trials. *Food & Function* 8:3091–3103.
- Hang, S., et al. 2018. Effect of dietary alpha-linolenic acid on blood inflammatory markers: A systematic review and meta-analysis of randomized controlled trials. *European Journal of Nutrition* 57:877–891.
- Harris, W. S., et al. 2021. Blood *n*-3 fatty acid levels and total and cause-specific mortality from 17 prospective studies. *Nature Communications* 12:2329.
- Helland, I. B., et al. 2003. Maternal supplementation with very-long-chain *n*-3 fatty acids during pregnancy and lactation augments children's IQ at 4 years of age. *Pediatrics* 111:e39–44.
- Hennessy, A. A., P. R. Ross, G. F. Fitzgerald, and C. Stanton. 2016. Sources and bioactive properties of conjugated dietary fatty acids. *Lipids* 51:377–397.
- Hibbeln, J. R. 2006. Healthy intakes of *n*-3 and *n*-6 fatty acids: Estimations considering worldwide diversity. *American Journal of Clinical Nutrition* 83:1483S–1493S.
- Hibbeln, J. R., L. R. G. Nieminen, and W. E. M. Lands. 2004. Increasing homicide rates and linoleic acid consumption among five Western countries, 1961–2000. *Lipids* 39:1207–1213.
- James, M. J., R. A. Gibson, and L. G. Cleland. 2000. Dietary polyunsaturated fatty acids and inflammatory mediator production. *American Journal of Clinical Nutrition* 71:343S–348S.
- Jeyaraman, M. M., et al. 2019. Dairy product consumption and development of cancer: An overview of reviews. *BMJ Open* 9:e023625.
- Johnson G. G., and K. Fritsche. 2012. Effect of dietary linoleic acid on markers of inflammation in healthy persons: A systematic review of randomized controlled trials. *Journal of the Academy of Nutrition and Dietetics* 112:1029–1041.
- Kalmijn, S., et al. 2004. Dietary intake of fatty acids and fish in relation to cognitive performance at middle age. *Neurology* 62:275–280.
- Kalogeropoulou, N., et al. 2010. Unsaturated fatty acids are inversely associated and *n*-6/*n*-3 ratios are positively related to inflammation and coagulation markers in plasma of apparently healthy adults. *Clinica Chimica Acta* 411:584–591.
- Kantor, E. D., et al. 2014. Long-chain omega-3 polyunsaturated fatty acid intake and risk of colorectal cancer. *Nutrition and Cancer* 66:716–727.
- Kelavkar, U., et al. 2006. Prostate tumor growth and recurrence can be modulated by the  $\omega$ -6: $\omega$ -3 ratio in diet: Athymic mouse xenograft model simulating radical prostatectomy. *Neoplasia* 8:112–124.
- Kiecolt-Glaser, J. K., et al. 2007. Depressive symptoms, *n*-6:*n*-3 fatty acids, and inflammation in older adults. *Psychosomatic Medicine* 69:217–224.
- Kitani, K., T. Yokozawa, and T. Osawa. 2004. Interventions in aging and age-associated pathologies by means of nutritional approaches. *Annals of the New York Academy of Sciences* 1019:424–426.
- Knopp, R.H., et al. 2000. One-year effects of increasingly fat-restricted, carbohydrate-

- enriched diets on lipoprotein levels in free-living subjects. *Proceedings of the Society for Experimental Biology and Medicine* 225:191–199.
- Kraguljac, N. V. 2009. Efficacy of omega-3 fatty acids in mood disorders: A systematic review and metaanalysis. *Psychopharmacology Bulletin* 42:39–54.
- Kwak, S. M., et al. 2012. Efficacy of omega-3 fatty acid supplements (eicosapentaenoic acid and docosahexaenoic acid) in the secondary prevention of cardiovascular disease: A meta-analysis of randomized, double-blind, placebo-controlled trials. *Archives of Internal Medicine* 172:686–694.
- Lands, W. E. M. 2003. Diets could prevent many diseases. *Lipids* 38:317–321.
- Lands, W. E., et al. 1992. Maintenance of lower proportion of (*n*-6) eicosanoid precursors in phospholipids of human plasma in response to added dietary (*n*-3) fatty acids. *Biochimica et Biophysica Acta* 1180:147–162.
- Lee, L. K., S. Shahar, A. V. Chin, and N. A. Yusoff. 2013. Docosahexaenoic acid-concentrated fish oil supplementation in subjects with mild cognitive impairment (MCI): A 12-month randomized, double-blind, placebo-controlled trial. *Psychopharmacology* 225:605–612.
- Levy, B., et al. 2001. Lipid mediator class switching during acute inflammation: Signals in resolution. *Nature Immunology* 2:612–619.
- Liang, P., et al. 2019. Role of host GPR120 in mediating dietary omega-3 fatty acid inhibition of prostate cancer. *Journal of the National Cancer Institute* 111:52–59.
- Libby, P. 2021. The changing landscape of atherosclerosis. *Nature* 592:524–533.
- Liu, Z., et al. 2015. Omega-3 fatty acids and other FFA4 agonists inhibit growth factor signaling in human prostate cancer cells. *Journal of Pharmacology and Experimental Therapeutics* 352:380–394.
- Long, S.-J., and D. Benton. 2013. A double-blind trial of the effect of docosahexaenoic acid and vitamin and mineral supplementation on aggression, impulsivity, and stress. *Human Psychopharmacology* 28:238–247.
- MacLennan, M. B., et al. 2013. Mammary tumor development is directly inhibited by lifelong *n*-3 polyunsaturated fatty acids. *Journal of Nutritional Biochemistry* 24:388–395.
- Maillard, V., et al. 2002. *N*-3 and *N*-6 fatty acids in breast adipose tissue and relative risk of breast cancer in a case-control study in Tours, France. *International Journal of Cancer* 98:78–83.
- Marangell, L. B., et al. 2003. A double-blind, placebo-controlled study of the omega-3 fatty acid docosahexaenoic acid in the treatment of major depression. *American Journal of Psychiatry* 160:996–998.
- Markhus, M. W., et al. 2013. Low omega-3 index in pregnancy is a possible biological risk factor for postpartum depression. *PLoS One* 8:e67617.
- Markworth, J. F., et al. 2016. Divergent shifts in lipid mediator profile following supplementation with *n*-3 docosapentaenoic acid and eicosapentaenoic acid. *FASEB Journal* 30:3714–3725.
- Mazaffarian, D., and J. H. Y. Wu. 2011. Omega-3 fatty acids and cardiovascular disease: Effects on risk factors, molecular pathways, and clinical events. *Journal of the American College of Cardiology* 58:2047–2067.
- McAuliffe, S., et al. 2020. Dietary micronutrients in the wake of COVID-19: An appraisal of evidence with a focus on high-risk groups and preventative healthcare. *BMJ Nutrition, Prevention & Health* 3:93–99.

## SOURCES

- Meyer, B. J. 2003. Dietary intakes and food sources of omega-6 and omega-3 polyunsaturated fatty acids. *Lipids* 38:391–398.
- Meyer, B. J., et al. 2015. Baseline omega-3 index correlates with aggressive and attention deficit disorder behaviours in adult prisoners. *PLoS One* 10:e0120220.
- Miles, L., et al. 2018. Effect of omega-3 fatty acids on offending behavior in repeat violent offenders: A randomized controlled trial feasibility study. *Journal of Psychiatry and Behavioral Sciences* 1:1002.
- Molfino, A., M. I. Amabile, M. Monti, and M. Muscaritoli. 2017. Omega-3 polyunsaturated fatty acids in critical illness: Anti-inflammatory, proresolving, or both? *Oxidative Medicine and Cellular Longevity* 2017:5987082.
- Morita, M., et al. 2013. The lipid mediator protectin D1 inhibits influenza virus replication and improves severe influenza. *Cell* 153:112–125.
- Mossink, J. P. 2020. Zinc as nutritional intervention and prevention measure for COVID-19 disease. *BMJ Nutrition, Prevention & Health* 3:111–117.
- Mozaffarian, D. 2016. Dietary and policy priorities for cardiovascular disease, diabetes, and obesity. *Circulation* 133:187–225.
- Mozaffarian, D., I. Rosenberg, and R. Uauy. 2018. History of modern nutrition science: Implications for current research, dietary guidelines, and food policy. *British Medical Journal* 361:k2392.
- Muramatsu T., et al. 2010. Higher dietary intake of alpha-linolenic acid is associated with lower insulin resistance in middle-aged Japanese. *Preventive Medicine* 50:272–276.
- National Research Council (NRC). 1996. *Carcinogens and Anticarcinogens in the Human Diet*. National Academy Press, Washington, D.C.
- National Research Council Food and Nutrition Board. 1980. *Toward Healthful Diets*. National Academy Press, Washington D.C.
- Ness, A. R., G. Davey Smith, and C. Hart. 2001. Milk, coronary heart disease and mortality. *Journal of Epidemiology and Community Health* 55:379–382.
- O’Rahilly, S. 2009. Human genetics illuminates the paths to metabolic disease. *Nature* 462:307–314.
- Pariza, M. W., S. H. Ashoor, F. S. Chu, and D. B. Lund. 1979. Effects of temperature and time on mutagen formation in pan-fried hamburger. *Cancer Letters* 7:63–69.
- Paschos, G. K., et al. 2007. Dietary supplementation with flaxseed oil lowers blood pressure in dyslipidaemic patients. *European Journal of Clinical Nutrition* 61:1201–1206.
- Patel, P. S., et al. 2009. Association between type of dietary fish and seafood intake and the risk of incident type 2 diabetes. *Diabetes Care* 32:1857–1863.
- Patterson, A. C., et al. 2015. Omega-3 polyunsaturated fatty acid blood biomarkers increase linearly in men and women after tightly controlled intakes of 0.25, 0.5 and 1 g/d of EPA + DHA. *Nutrition Research* 35:1040–1051.
- Patterson, E., et al. 2012. Health implications of high dietary omega-6 polyunsaturated fatty acids. *Journal of Nutrition and Metabolism* 2012:539426.
- Peet, M., B. Murphy, J. Shay, and D. Horrobin. 1998. Depletion of omega-3 fatty acid levels in red blood cell membranes of depressive patients. *Biological Psychiatry* 43:315–319.
- Penedo, L. A., et al. 2013. Intake of butter naturally enriched with *cis*9,*trans*11 conjugated linoleic acid reduces systemic inflammatory mediators in healthy young adults. *Journal of Nutritional Biochemistry* 24:2144–2151.
- Pereira, M. A., et al. 2002. Dairy consumption, obesity, and the insulin resistance syn-

## SOURCES

- drome in young adults: The CARDIA study. *Journal of the American Medical Association* 287:2081–2089.
- Pischon, T., et al. 2003. Habitual dietary intake of n-3 and n-6 fatty acids in relation to inflammatory markers among US men and women. *Circulation* 15:155–160.
- Pottala, J. V., et al. 2012. Red blood cell fatty acids are associated with depression in a case-control study of adolescents. *Prostaglandins, Leukotrienes and Essential Fatty Acids* 86:161–165.
- Poudel-Tandukar, K., et al. 2009. Dietary intakes of alpha-linolenic and linoleic acids are inversely associated with serum C-reactive protein levels among Japanese men. *Nutrition Research* 29:363–370.
- Priante, G. 2002. Fatty acids and cytokine mRNA expression in human osteoblastic cells: A specific effect of arachidonic acid. *Clinical Science* 102:403–409.
- Raheja, B. S., S. M. Sadikot, R. B. Phatak, and M. B. Rao. 1993. Significance of the n-6/n-3 ratio for insulin action in diabetes. *Annals of the New York Academy of Sciences* 683:258–271.
- Raine, A., et al. 2015. Reduction in behavior problems with omega-3 supplementation in children aged 8–16 years: A randomized, double-blind, placebo-controlled, stratified, parallel-group trial. *Journal of Child Psychology and Psychiatry* 56:509–520.
- Raper, N. R., F. J. Cronin, and J. Exler. 1992. Omega-3 fatty acid content of the US food supply. *Journal of the American College of Nutrition* 11:304–308.
- Sabri Enattah, N., et al. 2002. Identification of a variant associated with adult-type hypolactasia. *Nature Genetics* 30:233–237.
- Schaefer, E. J., et al. 2006. Plasma phosphatidylcholine docosahexaenoic acid content and risk of dementia and Alzheimer disease: The Framingham Heart Study. *Archives of Neurology* 63:1545–1550.
- Schoggins, J. W., and G. Randall. 2013. Lipids in innate antiviral defense. *Cell Host & Microbe* 14:379–385.
- Serhan, C. N. 2017. Treating inflammation and infection in the 21st century: New hints from decoding resolution mediators and mechanisms. *Federation of American Societies for Experimental Biology Journal* 31:1273–1288.
- Serhan, C. N., and N. A. Petasis. 2011. Resolvins and protectins in inflammation resolution. *Chemical Reviews* 111:5922–5943.
- Simopoulos, A. P. 2006. Evolutionary aspects of diet, the omega-6/omega-3 ratio and genetic variation: Nutritional implications for chronic diseases. *Biomedicine & Pharmacotherapy* 60:502–507.
- Simopoulos, A. P. 2008. The importance of the omega-6/omega-3 fatty acid ratio in cardiovascular disease and other chronic diseases. *Experimental Biology and Medicine* 233:674–688.
- Simopoulos, A. P. 2011. Evolutionary aspects of diet: The omega-6/omega-3 ratio and the brain. *Molecular Neurobiology* 44:203–215.
- Simopoulos, A. P. 2016. An increase in the omega-6/omega-3 fatty acid ratio increases the risk for obesity. *Nutrients* 8:128.
- Siri-Tarino, P. W., Q. Sun, F. B. Hu, and R. M. Krauss. 2010. Meta-analysis of prospective cohort studies evaluating the association of saturated fat with cardiovascular disease. *American Journal of Clinical Nutrition* 91:535–546.
- Siscovick, D. S., et al. 1995. Dietary intake and cell membrane levels of long-chain n-3



- polyunsaturated fatty acids and the risk of primary cardiac arrest. *Journal of the American Medical Association* 274:1363–1367.
- Stoll, A. L., et al. 1999. Omega 3 fatty acids in bipolar disorder: A preliminary double-blind, placebo-controlled trial. *Archives of General Psychiatry* 56:407–412.
- Strandberg, T. 2005. Roots of the Atkins diet. *British Medical Journal* 330:132.
- Strazzullo, P., et al. 2007. Do statins reduce blood pressure? A meta-analysis of randomized, controlled trials. *Hypertension* 49:792–798.
- Su, K.-P., S.-Y. Huang, C.-C. Chiu, and W. W. Shen. 2003. Omega-3 fatty acids in major depressive disorder: A preliminary double-blind, placebo-controlled trial. *European Neuropsychopharmacology* 13:267–271.
- Tan, Z. S., et al. 2012. Red blood cell omega-3 fatty acid levels and markers of accelerated brain aging. *Neurology* 78:658–664.
- Taubes, G. 2001. The soft science of dietary fat. *Science* 291:2536–2545.
- Thorup, A. C., S. Gregersen, and P. B. Jeppesen. 2014. Ancient wheat diet delays diabetes development in a type 2 diabetes animal model. *Review of Diabetic Studies* 11:245–257.
- Toelzer, C., et al. 2020. Free fatty acid binding pocket in the locked structure of SARS-CoV-2 spike protein. *Science* 370:725–730.
- Torfadottir, J. E., et al. 2013. Consumption of fish products across the lifespan and prostate cancer risk. *PLoS One* 8:e59799.
- Tørris, C., M. Molin, and M. Cvancarova Småstuen. 2016. Associations between fish consumption and metabolic syndrome: A large cross-sectional study from the Norwegian Tromsø Study—Tromsø 4. *Diabetology & Metabolic Syndrome* 8:18.
- Turnbaugh, P. J., and J. I. Gordon. 2009. The core gut microbiome, energy balance and obesity. *Journal of Physiology* 587:4153–4158.
- Velimirov, A., K. Plochberger, U. Huspeka, and W. Schott. 1992. The influence of biologically and conventionally cultivated food on the fertility of rats. *Biological Agriculture and Horticulture* 8:325–337.
- Viladomiu, M., R. Hontecillas, and J. Bassaganya-Riera. 2016. Modulation of inflammation and immunity by dietary conjugated linoleic acid. *European Journal of Pharmacology* 785:87–95.
- Virág, L., E. Szabó, P. Gergely, and C. Szabó. 2003. Peroxynitrite-induced cytotoxicity: Mechanism and opportunities for intervention. *Toxicology Letters* 111:113–124.
- Vogtmann, H. 1988. From healthy soil to healthy food: An analysis of the quality of food produced under contrasting agricultural systems. *Nutrition and Health* 6:21–35.
- Walden, C.E., et al. 2000. Differential effect of National Cholesterol Education Program (NCEP) Step II diet on HDL cholesterol, its subfractions, and apoprotein A-I levels in hypercholesterolemic women and men after 1 year: The beFIT Study. *Arteriosclerosis, Thrombosis, and Vascular Biology* 20:1580–1587.
- Waterlow, J. C., and P. R. Payne. 1975. The protein gap. *Nature* 258:113–117.
- Wijga, A. H., et al. 2003. Association of consumption of products containing milk fat with reduced asthma risk in pre-school children: The PIAMA birth cohort study. *Thorax* 58:567–572.
- Yan, B., et al. 2019. Characterization of the lipidomic profile of human coronavirus-infected cells: Implications for lipid metabolism remodeling upon coronavirus replication. *Viruses* 11:73.

## SOURCES

- Zamroziewicz, M. K., E. J. Paul, C. E. Zwillig, and A. K. Barbey. 2018. Determinants of fluid intelligence in healthy aging: Omega-3 polyunsaturated fatty acid status and frontoparietal cortex structure. *Nutritional Neuroscience* 21:570–579.
- Zhang, Y.-F., H. F. Gao, A.-J. Hou, and Y.-H. Zhou. 2014. Effect of omega-3 fatty acid supplementation on cancer incidence, non-vascular death, and total mortality: A meta-analysis of randomized controlled trials. *BMC Public Health* 14:204.
- Zhao, G., et al. 2007. Dietary  $\alpha$ -linolenic acid inhibits proinflammatory cytokine production by peripheral blood mononuclear cells in hypercholesterolemic subjects. *American Journal of Clinical Nutrition* 85:385–391.
- Zhengling, L., et al. 2003. Men and women differ in lipoprotein response to dietary saturated fat and cholesterol restriction. *Journal of Nutrition* 133:3428–3433.

### 16: FILLING EMPTY PLANTS

- Adak, A., et al. 2016. Micronutrient enrichment mediated by plant-microbe interactions and rice cultivation practices. *Journal of Plant Nutrition* 39:1216–1232.
- Anderson, J. W., T. J. Hanna, X. Peng, and R. J. Kryscio. 2000. Whole grain foods and heart disease risk. *Journal of the American College of Nutrition* 19:291S–299S.
- Anon. 2017. Strategies for survival. *Nature Plants* 3:907.
- Antunes, P. M., et al. 2012. Linking soil biodiversity and human health: Do arbuscular mycorrhizal fungi contribute to food nutrition? In *Soil Ecology and Ecosystem Services*. Edited by D. H. Wall et al., Oxford University Press, Oxford, pp. 153–172.
- Arzani, A., and M. Ashraf. 2017. Cultivated ancient wheats (*Triticum* spp.): A potential source of health-beneficial food products. *Comprehensive Reviews in Food Science and Food Safety* 16:477–488.
- Barrett, C. B., and L. E. M. Bevis. 2015. The self-reinforcing feedback between low soil fertility and chronic poverty. *Nature Geoscience* 8:907–912.
- Behall, K. M., D. Scholfield, and J. Hallfrisch. 2006. Whole-grain diets reduce blood pressure in mildly hypercholesterolemic men and women. *Journal of the Academy of Nutrition and Dietetics* 106:1445–1449.
- Bouis, H. E., and A. Saltzman. 2017. Improving nutrition through biofortification: A review of evidence from HarvestPlus, 2003 through 2016. *Global Food Security* 12:49–58.
- Cakmak, I., and U. B. Kutman. 2018. Agronomic biofortification of cereals with zinc: A review. *European Journal of Soil Science* 69:172–180.
- Chatenoud, L., et al. 1998. Whole grain food intake and cancer risk. *International Journal of Cancer* 77:24–28.
- Curwen-McAdams, C., et al. 2017. Toward a taxonomic definition of perennial wheat: A new species *xTritipyrum aaseae* described. *Genetic Resources and Crop Evolution* 64:1651–1659.
- Dass, A., et al. 2017. Agronomic fortification of rice grains with secondary and micronutrients under different crop management and soil moisture regimes in the north Indian plains. *Paddy and Water Environment* 15:745–760.
- de Valença, A. W., A. Bake, I. D. Brouwer, and K. E. Giller. 2017. Agronomic biofortification of crops to fight hidden hunger in sub-Saharan Africa. *Global Food Security* 12:8–14.
- DeFries, R., et al. 2015. Metrics for land-scarce agriculture. *Science* 349:238–240.

- DeFries, R., et al. 2016. Synergies and trade-offs for sustainable agriculture: Nutritional yields and climate-resilience for cereal crops in central India. *Global Food Security* 11:44–53.
- Doni, F., et al. 2017. A simple, efficient, and farmer-friendly *Trichoderma*-based bio-fertilizer evaluated with the SRI Rice Management System. *Organic Agriculture* 8:207–223.
- Fung, T. T., et al. 2002. Whole-grain intake and the risk of type 2 diabetes: A prospective study in men. *American Journal of Clinical Nutrition* 76:535–540.
- Gómez, M. I. 2013. Post-green revolution food systems and the triple burden of malnutrition. *Food Policy* 42:129–138.
- Graham, R. D., M. Knez, and R. M. Welch. 2012. How much nutritional iron deficiency in humans globally is due to an underlying zinc deficiency? *Advances in Agronomy* 115:1–40.
- Grusak, M. A., and D. DellaPenna. 1999. Improving the nutrient composition of plants to enhance human nutrition and health. *Annual Reviews of Plant Physiology and Plant Molecular Biology* 50:133–161.
- Helfenstein, J., et al. 2016. Organic wheat farming improves grain zinc concentration. *PLoS One* 11:e0160729.
- Hidalgo, A., and A. Brandolini. 2014. Nutritional properties of einkorn wheat (*Triticum monococcum* L.). *Journal of the Science of Food and Agriculture* 94:601–612.
- Hobbs, P. R., K. Sayre, and R. Gupta. 2008. The role of conservation agriculture in sustainable agriculture. *Philosophical Transactions of the Royal Society B* 363:543–555.
- Jacobs, B. F., J. D. Kingston, and L. L. Jacobs. 1999. The origin of grass-dominated ecosystems. *Annual Review of Ecology and Systematics* 86:590–643.
- Jansa, J., et al. 2003. Soil tillage affects the community structure of mycorrhizal fungi in maize roots. *Ecological Applications* 13:1164–1176.
- Jansa, J., A. Wiemken, and E. Frossard. 2006. The effects of agricultural practices on arbuscular mycorrhizal fungi. In *Function of Soils for Human Societies and the Environment*. Edited by E. Frossard, W. E. H. Blum, and B. P. Warkentin. Geological Society, London, pp. 89–115.
- Kasum, C. M., et al. 2001. Whole grain intake and incident endometrial cancer: The Iowa Women's Health Study. *Nutrition and Cancer* 39:180–186.
- Kellogg, E. A. 2001. Evolutionary history of the grasses. *Plant Physiology* 125:1198–1205.
- Khadka, R. B., and N. Uphoff. 2019. Effects of *Trichoderma* seedling treatment with System of Rice Intensification management and with conventional management of transplanted rice. *PeerJ* 7:e5877.
- Kiers, E. T., M. G. Hutton, and R. F. Denison. 2007. Human selection and the relaxation of legume defences against ineffective rhizobia. *Proceedings of the Royal Society B* 274:3119–3126.
- Konecny, J., et al. 2019. Correlative evidence for co-regulation of phosphorus and carbon exchanges with symbiotic fungus in the arbuscular mycorrhizal *Medicago truncatula*. *PLoS One* 14:e0224938.
- Lambert, D. H., D. E. Baker, and H. Cole Jr. 1979. The role of mycorrhizae in the interactions of P with Zn, Cu and other elements. *Soil Science Society of America Journal* 43:976–980.
- Lammerts van Bueren, E. T., P. C. Struik, and E. Jacobsen. 2002. Ecological concepts

## SOURCES

- in organic farming and their consequences for an organic crop ideotype. *Netherlands Journal of Agricultural Science* 50:1–26.
- Lehmann, A., S. D. Versoglou, E. F. Leifheit, and M. C. Rillig. 2014. Arbuscular mycorrhizal influence on zinc nutrition in crop plants: A meta-analysis. *Soil Biology & Biochemistry* 69:123–131.
- Liu, S., et al. 2000. A prospective study of whole-grain intake and risk of type 2 diabetes mellitus in US women. *American Journal of Public Health* 90:1409–1415.
- Loladze, I. 2002. Rising atmospheric CO<sub>2</sub> and human nutrition: Toward globally imbalanced plant stoichiometry? *Trends in Ecology and Evolution* 17:457–461.
- Longin, C. F. H., and T. Wurschum. 2016. Back to the future: Tapping into ancient grains for food diversity. *Trends in Plant Science* 21:731–737.
- Marschner, H., and B. Dell. 1994. Nutrient uptake in mycorrhizal symbiosis. *Plant and Soil* 159:89–102.
- Miller, M. H. 2000. Arbuscular mycorrhizae and the phosphorus nutrition of maize: A review of Guelph studies. *Canadian Journal of Plant Science* 80:47–52.
- Montonen, J., et al. 2003. Whole-grain and fiber intake and the incidence of type 2 diabetes. *American Journal of Clinical Nutrition* 77:622–629.
- Murphy, S. P., G. H. Beaton, and D. H. Calloway. 1992. Estimated mineral intakes of toddlers: Predicted prevalence of inadequacy in village populations in Egypt, Kenya, and Mexico. *American Journal of Clinical Nutrition* 56:565–572.
- Oghabaei, M., and J. Parkash. 2016. Effect of primary processing of cereals and legumes on its nutritional quality: A comprehensive review. *Cogent Food & Agriculture* 2:1136015.
- Oliver, M. A., and P. J. Gregory. 2015. Soil, food security and human health: A review. *European Journal of Soil Science* 66:257–276.
- Peck, N. H., D. L. Grunes, R. M. Welch, and G. E. MacDonald. 1980. Nutritional quality of vegetable crops as affected by phosphorus and zinc fertilizers. *Agronomy Journal* 72:528–534.
- Reeve, J. R., et al. 2016. Organic farming, soil health, and food quality: Considering possible links. *Advances in Agronomy* 137:319–366.
- Rengel, Z., G. D. Batten, and D. E. Crowley. 1999. Agronomic approaches for improving the micronutrient density in edible portions of field crops. *Field Crops Research* 60:27–40.
- Ryan, M. H., J. K. McInerney, I. R. Record, and J. F. Angus. 2008. Zinc bioavailability in wheat grain in relation to phosphorus fertilizer, crop sequence and mycorrhizal fungi. *Journal of the Science of Food and Agriculture* 88:1208–1216.
- Sawers, R. J., C. Gutjahr, and U. Paszkowski. 2006. Cereal mycorrhiza: An ancient symbiosis in modern agriculture. *Trends in Plant Science* 13:93–97.
- Sheehy, J. E., et al. 2005. Fantastic yields in the system of rice intensification: Fact or fallacy? *Field Crops Research* 88:1–8.
- Shuman, L. M. 1997. Micronutrient fertilizers. *Journal of Crop Production* 1:165–195.
- Sinclair, T. R. 2004. Agronomic UFOs waste valuable scientific resources. *Rice Today* 3(3):43.
- Smith, S. E., I. Jokobsen, M. Grønland, and F. A. Smith. 2011. Roles of arbuscular mycorrhizas in plant phosphorus nutrition: Interactions between pathways of phosphorus uptake in arbuscular mycorrhizal roots have important implications

- for understanding and manipulating plant phosphorus acquisition. *Plant Physiology* 156:1050–1057.
- Stukenholtz, D. D., R. J. Olsen, G. Gogan, and R. A. Olson. 1966. On the mechanism of phosphorus-zinc interaction in corn nutrition. *Soil Science Society of America Journal* 30:759–763.
- Suchowilska, E., M. Wiwart, W. Kandler, and R. Krska. 2012. A comparison of macro- and microelement concentrations in the whole grain of four *Triticum* species. *Plant, Soil and Environment* 58:141–147.
- Thakur, A. K., K. G. Mandal, and S. Raychaudhuri. 2020. Impact of crop and nutrient management on crop growth and yield, nutrient uptake and content in rice. *Paddy and Water Engineering* 18:139–151.
- Uphoff, N. 2004. System of rice intensification responds to 21st century needs. *Rice Today* 3(3):42.
- Uphoff, N. 2012. Supporting food security in the 21st century through resource-conserving increases in agricultural production. *Agriculture & Food Security* 1:18.
- Vaishampayan, A., et al. 2001. Cyanobacterial biofertilizers in rice agriculture. *Botanical Review* 6:453–516.
- Watson, C. A., et al. 2012. Using soil and plant properties and farm management practices to improve the micronutrient composition of food and feed. *Journal of Geochemical Exploration* 121:15–24.
- Welch, R. M., and R. D. Graham. 1999. A new paradigm for world agriculture: Meeting human needs—productive, sustainable, nutritious. *Field Crops Research* 60:1–10.
- Welch, R. M., and R. D. Graham. 2002. Breeding crops for enhanced micronutrient content. *Plant and Soil* 245:205–214.
- Welch, R. M., and R. D. Graham. 2004. Breeding for micronutrients in staple food crops from a human nutrition perspective. *Journal of Experimental Botany* 55:353–364.
- White, P. J., and M. R. Broadley. 2005. Biofortifying crops with essential mineral elements. *Trends in Plant Science* 10:586–593.
- White, P. J., and M. R. Broadley. 2009. Biofortification of crops with seven mineral elements often lacking in human diets—iron, zinc, copper, calcium, magnesium, selenium and iodine. *New Phytologist* 182:49–84.
- Wolfe, M. S., et al. 2008. Developments in breeding cereals for organic agriculture. *Euphytica* 163:323–346.
- Wood, S. A., and R. Baudron. 2018. Soil organic matter underlies crop nutritional quality and productivity in smallholder agriculture. *Agriculture, Ecosystems and Environment* 266:100–108.
- Xue, Y., et al. 2016. Crop acquisition of phosphorus, iron and zinc from soil in cereal/legume intercropping systems: A critical review. *Annals of Botany* 117:363–377.
- Yang, X.-E., W.-R. Chen, and Y. Feng. 2007. Improving human micronutrient nutrition through biofortification in the soil–plant system: China as a case study. *Environmental Geochemistry and Health* 29:413–428.
- Zhang, Y.-Q., et al. 2012. The reduction in zinc concentration of wheat grain upon increased phosphorus-fertilization and its mitigation by foliar zinc application. *Plant and Soil* 361:143–152.
- Zhu, Y.-G., S. E. Smith, A. R. Barritt, and F. A. Smith. 2001. Phosphorus (P) efficiencies and mycorrhizal responsiveness of old and modern wheat cultivars. *Plant and Soil* 237:249–255.

## SOURCES

- Ziegler, J. U., et al. 2016. Lipophilic antioxidants in wheat (*Triticum* spp.): A target for breeding new varieties for future functional cereal products. *Journal of Functional Foods* 20:594–605.
- Zuo, Y., and F. Zhang. 2009. Iron and zinc biofortification strategies in dicot plants by intercropping with gramineous species: A review. *Agronomy for Sustainable Development* 29:63–71.

### 17: GROWING MEDICINE

- Akagawa, M., M. Nakano, and K. Ikemoto. 2016. Recent progress in studies on the health benefits of pyrroloquinoline quinone. *Bioscience, Biotechnology, and Biochemistry* 80:13–22.
- Alfven, T., et al. 2006. Allergic diseases and atopic sensitization in children related to farming and anthroposophic lifestyle: The PARSIFAL study. *Allergy* 61:414–421.
- Alloway, B. J. 2009. Soil factors associated with zinc deficiency in crops and humans. *Environmental Geochemistry and Health* 31:537–548.
- Alm, J. S., et al. 1999. Atopy in children of families with an anthroposophic lifestyle. *The Lancet* 353:1485–1488.
- Ames, B. N. 2006. Low micronutrient intake may accelerate the degenerative diseases of aging through allocation of scarce micronutrients by triage. *Proceedings of the National Academy of Sciences* 103:17,589–17,594.
- Ames, B. N. 2018. Prolonging healthy aging: Longevity vitamins and proteins. *Proceedings of the National Academy of Sciences* 115:10,836–10,844.
- Anderson, V. P., et al. 2008. Co-existing micronutrient deficiencies among stunted Cambodian infants and toddlers. *Asia Pacific Journal of Clinical Nutrition* 17:72–79.
- Anon. 1939. Nutrition and physical degeneration. *Journal of Pediatrics* 15:611.
- Avio, L., A. Turrini, M. Giovannetti, and C. Sbrana. 2018. Designing the ideotype mycorrhizal symbionts for the production of healthy food. *Frontiers in Plant Science* 9:1089.
- Ba, D. M., et al. 2021. Higher mushroom consumption is associated with lower risk of cancer: A systematic review and meta-analysis of observational studies. *Advances in Nutrition* 12:1691–1704.
- Baudry, J., et al. 2018. Association of frequency of organic food consumption with cancer risk: Findings from the NutriNet-Santé Prospective Cohort Study. *JAMA Internal Medicine* 178:1597–1606.
- Beelman, R. B., et al. 2021. Soil disturbance impact on crop ergothioneine content connects soil and human health. *Agronomy* 11:2278.
- Beelman, R. B., M. D. Kalaras, A. T. Phillips, and J. P. Richie Jr. 2020. Is ergothioneine a “longevity vitamin” limited in the American diet? *Journal of Nutritional Science* 9:e52.
- Beelman, R. B., M. D. Kalaras, and J. P. Richie Jr. 2019. Micronutrients and bioactive compounds in mushrooms: A recipe for healthy aging? *Nutrition Today* 54:16–22.
- Borodina, I., et al. 2020. The biology of ergothioneine, an antioxidant nutraceutical. *Nutrition Research Reviews* 33:190–217.
- Bourre, J. M. 2006. Effects of nutrients (in food) on the structure and function of the nervous system: Update on dietary requirements for brain. Part 1—Micronutrients. *Journal of Nutrition, Health & Aging* 5:377–385.

## SOURCES

- Brevik, E. C., and T. J. Sauer. The past, present, and future of soils and human health studies. *SOIL* 1:35–46.
- Chang, S., et al. 2010. Supplementing iron and zinc: Double blind, randomized evaluation of separate or combined delivery. *European Journal of Clinical Nutrition* 64:153–160.
- Chatin, A. 1850. Recherches sur l'iode des eaux douces: De la présence de ce corps dans les plantes et les animaux terrestres. *Comptes Rendus de l'Académie des Sciences* 31:280–283.
- Cheah, I. K., and B. Halliwell. 2012. Ergothioneine: Antioxidant potential, physiological function and role in disease. *Biochimica et Biophysica Acta* 1822:784–793.
- Cheah, I. K., et al. 2016. Ergothioneine levels in an elderly population decrease with age and incidence of cognitive decline: A risk factor for neurodegeneration? *Biochemical and Biophysical Research Communications* 478:162–167.
- Choi, O., et al. 2008. Pyrroloquinoline quinone is a plant growth promotion factor produced by *Pseudomonas fluorescens* B16. *Plant Physiology* 146:657–668.
- Cordain, L. 1999. Cereal grains: Humanity's double-edged sword. *World Review of Nutrition and Dietetics* 84:19–73.
- Devine, C. M., W. S. Wolfe, E. A. Frongillo Jr., and C. A. Bisogni. 1999. Life-course events and experiences: Association with fruit and vegetable consumption in 3 ethnic groups. *Journal of the American Dietetic Association* 99:309–314.
- Fergus, C., D. Barnes, M. A. Alqasem, and V. P. Kelly. 2015. The queuine micronutrient: Charting a course from microbe to man. *Nutrients* 7:2897–2929.
- Gabbai, Dr., Dr. Lisbonne, and Dr. Pourquier. 1951. Ergot poisoning at Pont St. Esprit. *British Medical Journal* 2:650–651.
- Grinder-Pedersen, L., et al. 2003. Effect of diets based on foods from conventional versus organic production on intake and excretion of flavonoids and markers of antioxidative defense in humans. *Journal of Agricultural and Food Chemistry* 51:5671–5676.
- Guo, Q.-L. 2016. Gastrolatathioneine, an unusual ergothioneine derivative from an aqueous extract of “tian ma”: A natural product co-produced by plant and symbiotic fungus. *Chinese Chemical Letters* 27:1577–1581.
- Curvey, J., et al. 2013. Examining health care costs among MANNA clients and a comparison group. *Journal of Primary Care & Community Health* 4:311–317.
- Halliwell, B., I. K. Cheah, and R. M. Y. Tang. 2018. Ergothioneine: A diet-derived antioxidant with therapeutic potential. *FEBS Letters* 592:3357–3366.
- Hatano, T. 2016. Identification of novel biomarkers for Parkinson's disease by metabolomics technologies. *Journal of Neurology, Neurosurgery & Psychiatry* 87:295–301.
- Hurst, R., et al. 2013. Soil-type influences human selenium status and underlies widespread selenium deficiency risks in Malawi. *Scientific Reports* 3:1425.
- Jensen, T. K., et al. 1996. Semen quality among members of organic food associations in Zealand, Denmark. *The Lancet* 347:1844.
- Johansson, E., et al. 2014. Contribution of organically grown crops to human health. *International Journal of Environmental Research and Public Health* 11:3870–3893.
- Juhler, R. K., et al. 1999. Human semen quality in relation to dietary pesticide exposure and organic diet. *Archives of Environmental Contamination and Toxicology* 37:415–423.
- Kalaras, M. D., J. P. Richie, A. Calcagnotto, and R. B. Beelman. 2017. Mushrooms: A rich source of the antioxidants ergothioneine and glutathione. *Food Chemistry* 233:429–433.

## SOURCES

- Kato, Y., et al. 2010. Gene knockout and metabolome analysis of carnitine/organic cation transporter CTN1. *Pharmaceutical Research* 27:832–840.
- Kirkwood, T. B. L. 2008. Understanding ageing from an evolutionary perspective. *Journal of Internal Medicine* 263:117–127.
- Ley, R. E., et al. 2008. Worlds within worlds: Evolution of the vertebrate gut microbiota. *Nature Reviews Microbiology* 6:776–788.
- Li, J., et al. 2020. Dietary inflammatory potential and risk of cardiovascular disease among men and women in the U.S. *Journal of the American College of Cardiology* 76:2181–2193.
- Melville, D. B. 1959. Ergothioneine. *Vitamins & Hormones* 17:155–204.
- Oliver, M. A. 1997. Soil and human health: A review. *European Journal of Soil Science* 48:573–592.
- Oliver, M. A., and P. J. Gregory. 2015. Soil, food security and human health: A review. *European Journal of Soil Science* 66:257–276.
- Palar, K. 2017. Comprehensive and medically appropriate food support is associated with improved HIV and diabetes health. *Journal of Urban Health* 94:87–99.
- Park, E.-J. 2010. Ergothioneine accumulation in a medicinal plant *Gastrodia elata*. *Journal of Medicinal Plants Research* 4:1141–1147.
- Paul, B. D., and S. H. Snyder. 2010. The unusual amino acid L-ergothioneine is a physiologic cytoprotectant. *Cell Death and Differentiation* 17:1134–1140.
- Pepper, I. L. 2013. The soil health-human health nexus. *Critical Reviews in Environmental Science and Technology* 43:2617–2652.
- Prasad, A. S. 2008. Zinc in human health: Effect of zinc on immune cells. *Molecular Medicine* 14:353–357.
- Price, W. A. 1939. *Nutrition and Physical Degeneration: A Comparison of Primitive and Modern Diets and Their Effects*. Paul B. Hoeber, Inc., and Harper & Brothers, New York.
- Ratcliffe, M. M., K. A. Merrigan, B. L. Rogers, and J. P. Goldberg. 2011. The effects of school garden experience on middle school-aged students' knowledge, attitudes and behaviors associated with vegetable consumption. *Health Promotion Practice* 12:36–43.
- Smith, E., et al. 2020. Ergothioneine is associated with reduced mortality and decreased risk of cardiovascular disease. *Heart* 106:691–697.
- Stein, M. M., et al. 2016. Innate immunity and asthma risk in Amish and Hutterite farm children. *New England Journal of Medicine* 375:411–421.
- Strobel, G., and B. Daisey. 2003. Bioprospecting for microbial endophytes and their natural products. *Microbiology and Molecular Biology Reviews* 67:491–502.
- Tanret, C. 1909. Sur une base nouvelle retirée du seigle ergoté, l'ergothiodine. *Annales de Chimie et de Physique* 18:114–124.
- Vinayak, M., and C. Pathak. 2009. Queuosine modification of tRNA: Its divergent role in cellular machinery. *Bioscience Reports* 30:135–148.
- Welch, R. M., and R. D. Graham. 2004. Breeding for micronutrients in staple food crops from a human nutrition perspective. *Journal of Experimental Botany* 55:353–364.
- Willett, W., et al. 2019. Food in the Anthropocene: The EAT–Lancet Commission on healthy diets from sustainable food systems. *The Lancet* 393:447–492.
- Zallot, R., et al. 2014. Plant, animal, and fungal micronutrient queuosine is salvaged by members of the DUF2419 protein family. *American Chemical Society Chemical Biology* 9:1812–1825.



## SOURCES

### 18: HARVESTING HEALTH

- Abrahams, P. W. 2002. Soils: Their implications to human health. *Science of the Total Environment* 291:1–32.
- Amundson, R., et al. 2015. Soil and human security in the 21st century. *Science* 348:647.
- Foley, J. A., et al. 2011. Solutions for a cultivated planet. *Nature* 478:337–342.
- Goel, G., and H. P. S. Makkar. 2012. Methane mitigation from ruminants using tannins and saponins. *Tropical Animal Health and Production* 44:729–739.
- Hristov, A. N., et al. 2013. Mitigation of methane and nitrous oxide emissions from animal operations: I. A review of enteric methane mitigation options. *Journal of Animal Science* 91:5045–5069.
- Montgomery, D. R. 2017. *Growing a Revolution: Bringing Our Soil Back to Life*. W. W. Norton, New York.
- Oldfield, E. E., M. A. Bradford, and S. A. Wood. 2019. Global meta-analysis of the relationship between soil organic matter and crop yields. *SOIL* 5:15–32.
- Pepper, I. L., C. P. Gerba, D. T. Newby, and C. W. Rice. 2009. Soil: A public health threat or savior? *Critical Reviews in Environmental Science and Technology* 39:416–432.
- Rowntree, J. E., et al. 2020. Ecosystem impacts and productive capacity of a multi-species pastured livestock system. *Frontiers in Sustainable Food Systems* 4:544984.
- Steffan, J. J., E. C. Brevik, L. C. Burgess, and A. Cerdà. 2017. The effect of soil on human health: An overview. *European Journal of Soil Science* 69:159–171.
- Wall, D. H., U. N. Nielsen, and J. Six. 2015. Soil biodiversity and human health. *Nature* 528:69–76.
- Woodward, S. L., G. C. Waghorn, and P. G. Laboyrie. 2004. Condensed tannins in birdsfoot trefoil (*Lotus corniculatus*) reduce methane emissions from dairy cows. *Proceedings of the New Zealand Society of Animal Production* 64:160–164.