

Laadukas raaka-aine, bioaktiiviset yhdisteet ja terveysvaikutukset



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Outline

- **What is healthy to eat?**
- Phytochemicals – what are they and why bother?
- Case whole grains and strawberries



Healthy (Nordic) diet

- Composed of:
 - **Plenty of vegetables, fruits (berries), whole grains, legumes, nuts, unsaturated oils**
 - Low to moderate amounts of seafood and poultry
 - No or low amounts of red meat, processed meat, added sugar, refined grains, starchy vegetables

The EAT-Lancet Commission on Food, Planet, Health brought together 37 world-leading scientists from across the globe to answer this question:
Can we feed a future population of 10 billion people a healthy diet within planetary boundaries?



Food in the Anthropocene: the EAT–Lancet Commission on healthy diets from sustainable food systems



Walter Willett, Johan Rockström, Brent Loken, Marco Springmann, Tim Lang, Sonja Vermeulen, Tara Garnett, David Tilman, Fabrice DeClerck, Amanda Wood, Malin Jonell, Michael Clark, Line J Gordon, Jessica Fanzo, Corinna Hawkes, Rami Zurayk, Juan A Rivera, Wim De Vries, Lindwe Majede Sibanda, Ashkan Afshin, Abhishek Chaudhary, Mario Herrera, Rina Agustina, Francesco Branca, Anna Lartey, Shenggen Fan, Beatrice Crona, Elizabeth Fox, Victoria Bignet, Max Troell, Therese Lindahl, Sudhvir Singh, Sarah E Cornell, K Srinath Reddy, Sunita Narain, Sania Nishtar, Christopher J L Murray

Lancet 2019; 393: 447–92

Published Online

January 16, 2019

[http://dx.doi.org/10.1016/](http://dx.doi.org/10.1016/S0140-6736(18)31788-4)

S0140-6736(18)31788-4



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Healthy diet is essential part of preventive healthcare

- Global adoption of healthy reference dietary pattern would provide major health benefits, including a large reduction in total mortality

The New York Times

Opinion

We Need Better Answers on Nutrition

The U.S. is overdue to establish an institute devoted to research on the top cause of poor health.

By Joon Yun, David A. Kessler and Dan Glickman

Dr. Yun, Dr. Kessler and Mr. Glickman have served to improve the nation's health as leaders in government, academia and the nonprofit sector.

Feb. 28, 2019



03-21-19 | WELL TO DO

“Prescribing” fruits and veggies would save \$100 billion in medical costs

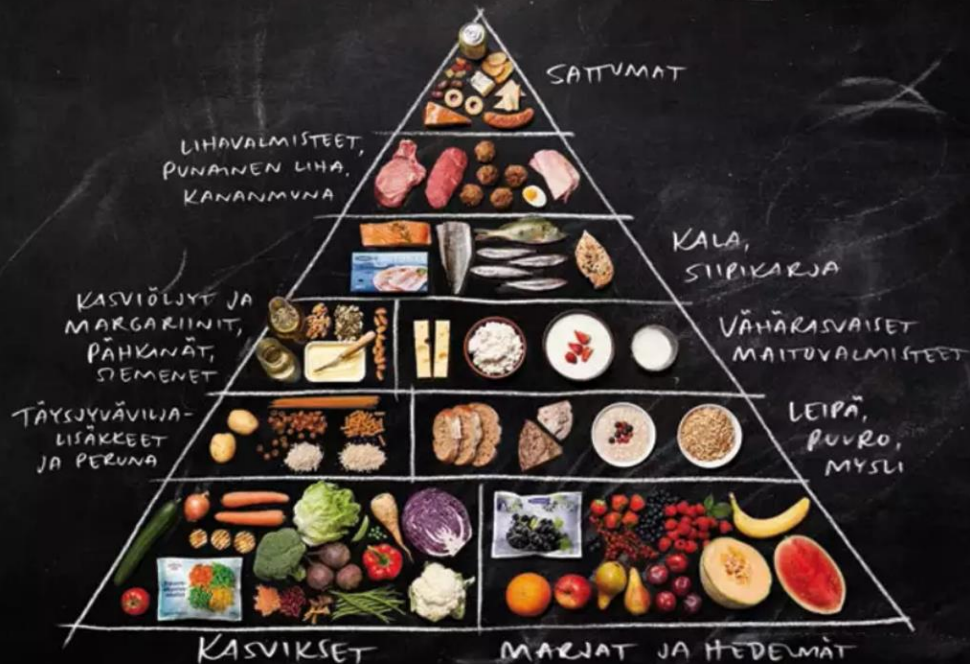
Researchers at Tufts University made the case that subsidized fruits and vegetables could prevent millions of cases of chronic diseases.



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TERVEYTTÄ RUOASTA!

HYVÄN RUOKAVALION AINEKSIA



VALTION RAVITSEMUSNEUVOTTELUKUNTA



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Harva syö riittävästi kasviksia, hedelmiä ja marjoja

Suosituksen (500 g/vrk) ylittäneiden osuus



IKÄRYHMÄ: 18–74-vuotiaat

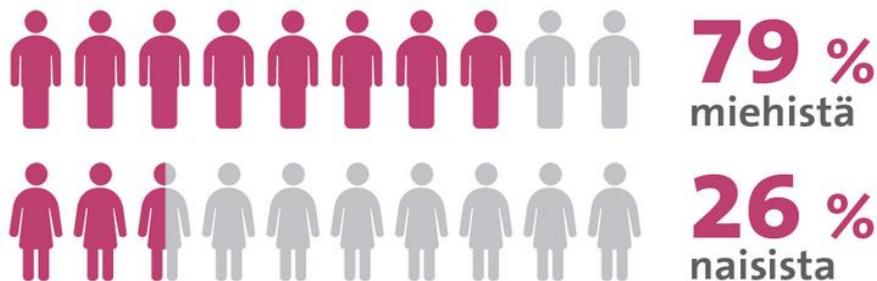
Keskimääräinen kulutus





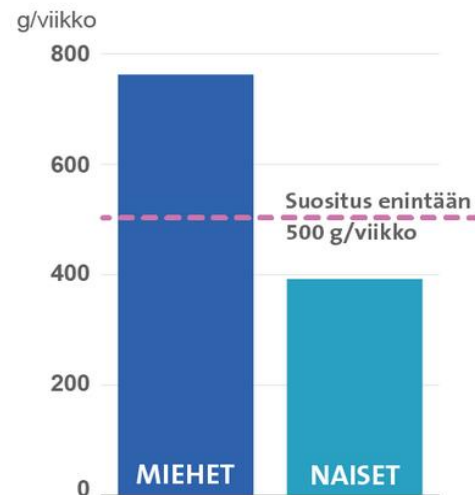
Valtaosa miehistä syö liikaa punaista ja prosessoitua lihaa

Suosituksen (500 g/viikko) ylittäneiden osuus



IKÄRYHMÄ: 18–74-vuotiaat

Keskimääräinen kulutus



Outline

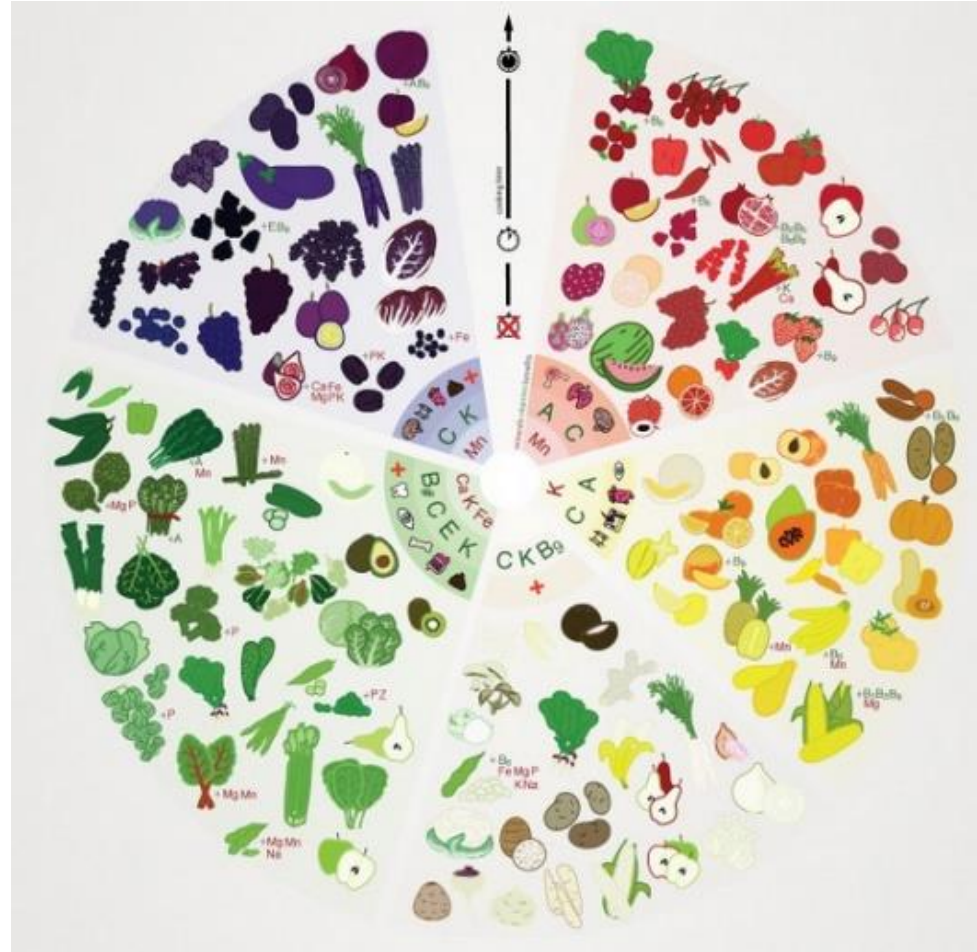
- What is healthy to eat?
- **Phytochemicals – what are they and why bother?**
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What makes plant-based food healthy?

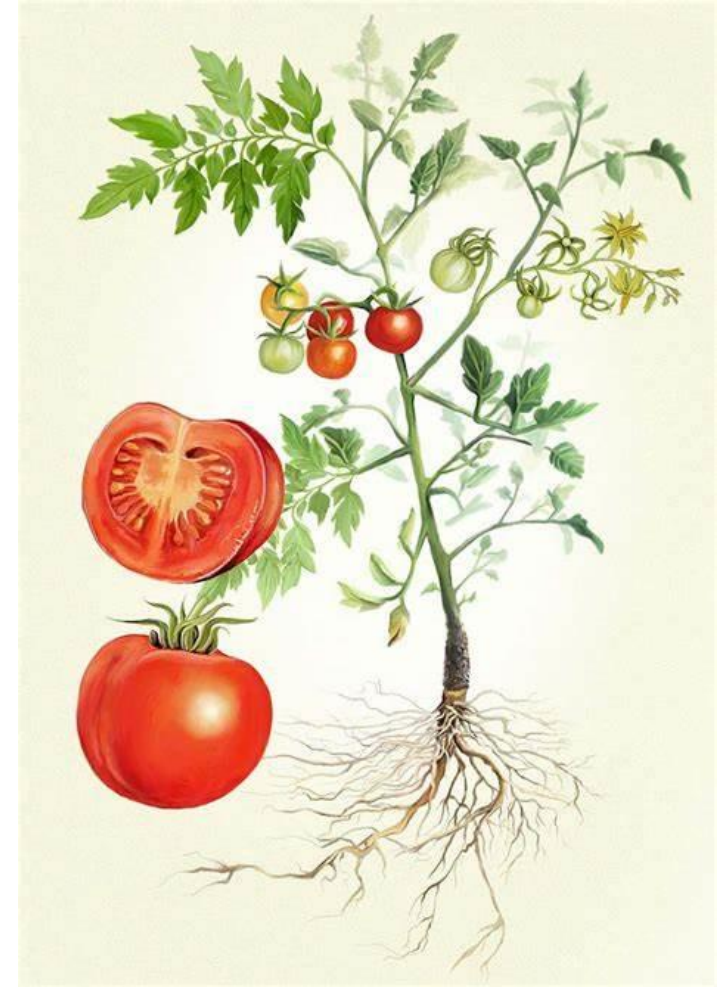
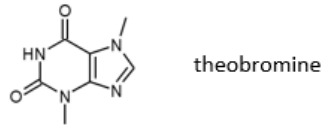
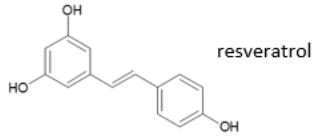
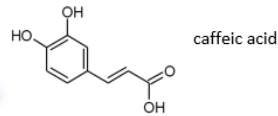
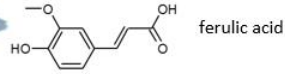
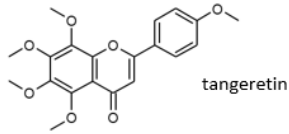
- Low in energy, high in nutrients
- Good quality carbohydrates (bran), proteins and lipids
- Vitamins, minerals
- **Phytochemicals**

“Eat the rainbow!”



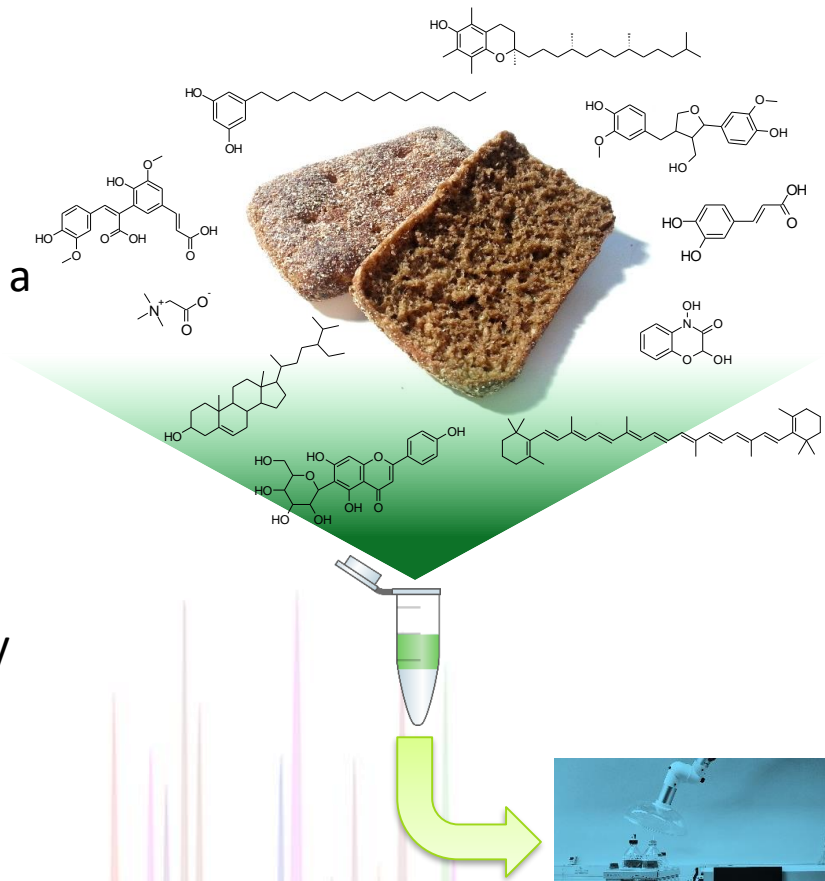
Phytochemicals

- Plant –made bioactive compounds
- Inevitable for plants, beneficial for humans
 - Antimicrobial, antioxidative, anti-fungal...
- Plant rich meal contains 1000s of phytochemicals



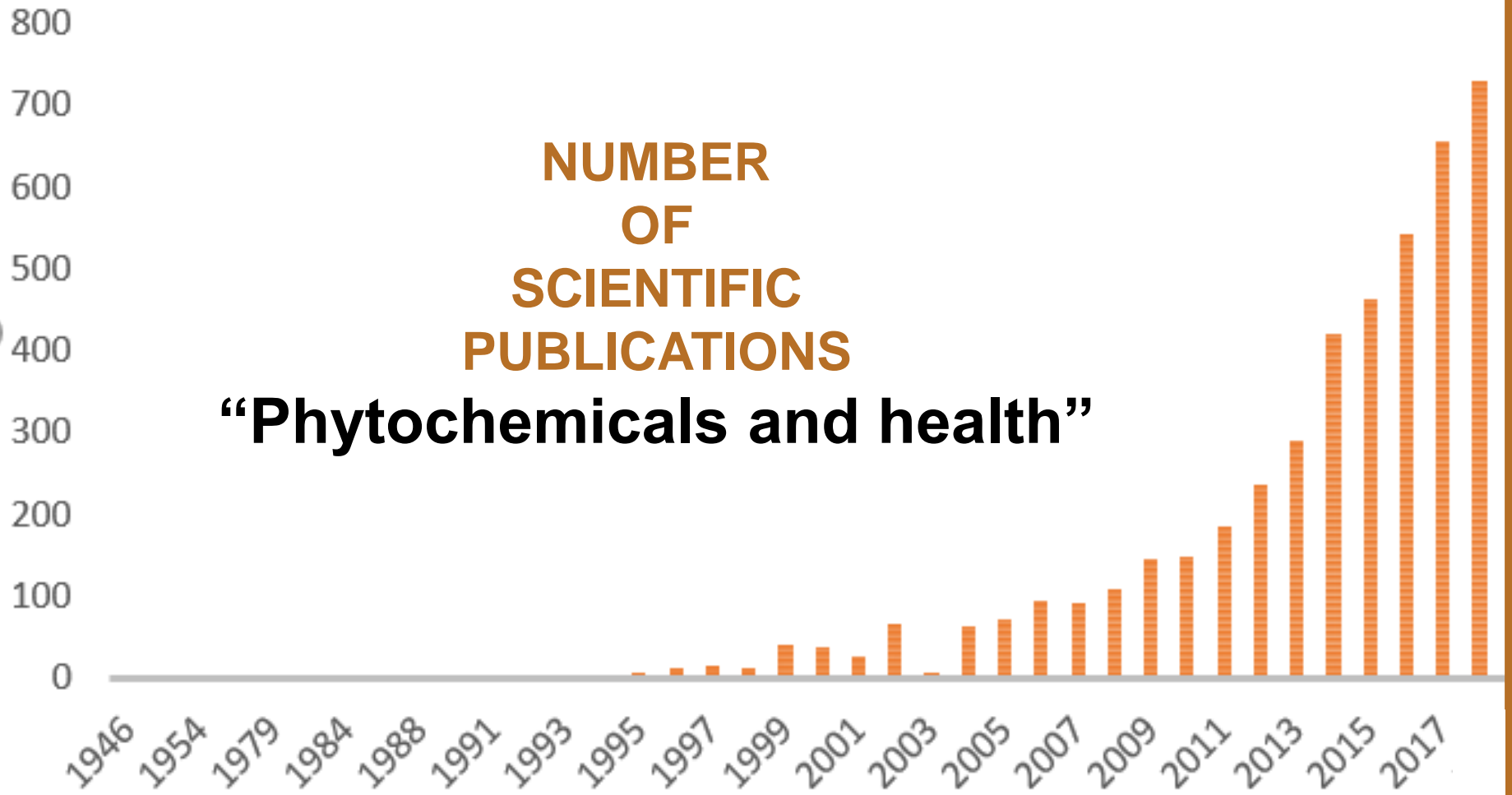
Metabolomics is powerful tool for phytochemical analysis

- The study of all the metabolites produced by a cell, tissue, or whole organism
- In food science and nutrition, it is a tool to study the metabolic profile of a **food** or the metabolic impact of a **dietary** intervention
- In a metabolomics study large number of compounds is measured from the samples by *e.g.* mass spectrometry or NMR



**NUMBER
OF
SCIENTIFIC
PUBLICATIONS**

“Phytochemicals and health”



Outline



- What is healthy to eat?
- Phytochemicals – what are they and why bother?
- **Case whole grains and strawberries**





Whole grains are beneficial for health

- Scientific evidence is strongly indicating the protective effect against several chronic diseases e.g. type 2 diabetes, cardiovascular diseases and certain cancers
- Molecular basis not completely understood

Whole-grain intake and total, cardiovascular, and cancer mortality: a systematic review and meta-analysis of prospective studies^{1,2}

Guo-Chong Chen³, Xing Tong³, Jia-Ying Xu⁴, Shu-Fen Han³, Zhong-Xiao Wan³, Jia-Bi Qin⁶, and Li-Qiang Qin^{3,5,*}

B Whole-grain intake and total mortality, *nonlinear dose-response*

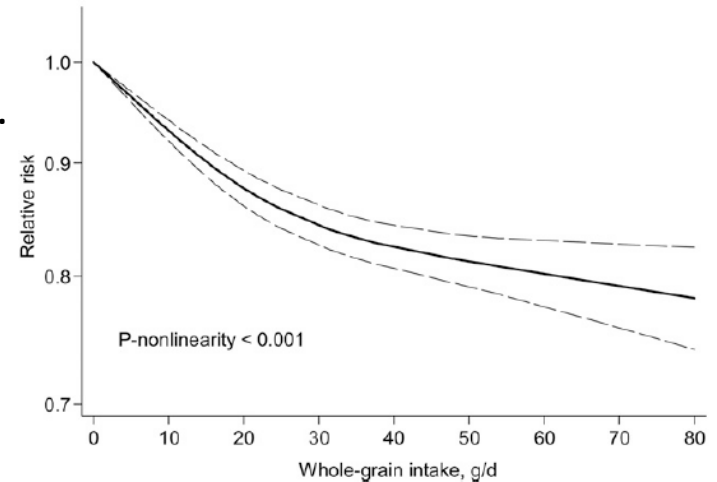


FIGURE 2 Meta-analysis of whole-grain intake and total mortality. The summary risk estimates were calculated with a random-effects model. HPFS,



Whole grain bran contains high diversity of phytochemicals

- 50-80% of the phytochemicals located on the bran and germ of grains
- Beneficial health effects associated with whole grain consumption due to the existence of phytochemicals?



Koistinen et al., 2018, Scientific Reports, 8:5684

Kärkkäinen et al., 2018, Scientific Reports, 8:13036

Kärkkäinen et al., 2018, Am J Clin Nutr, <https://doi.org/10.1093/ajcn/nqy169>

Koistinen, Hanhineva, 2017, Crit Rev Food Sci Nutr, 57:1688



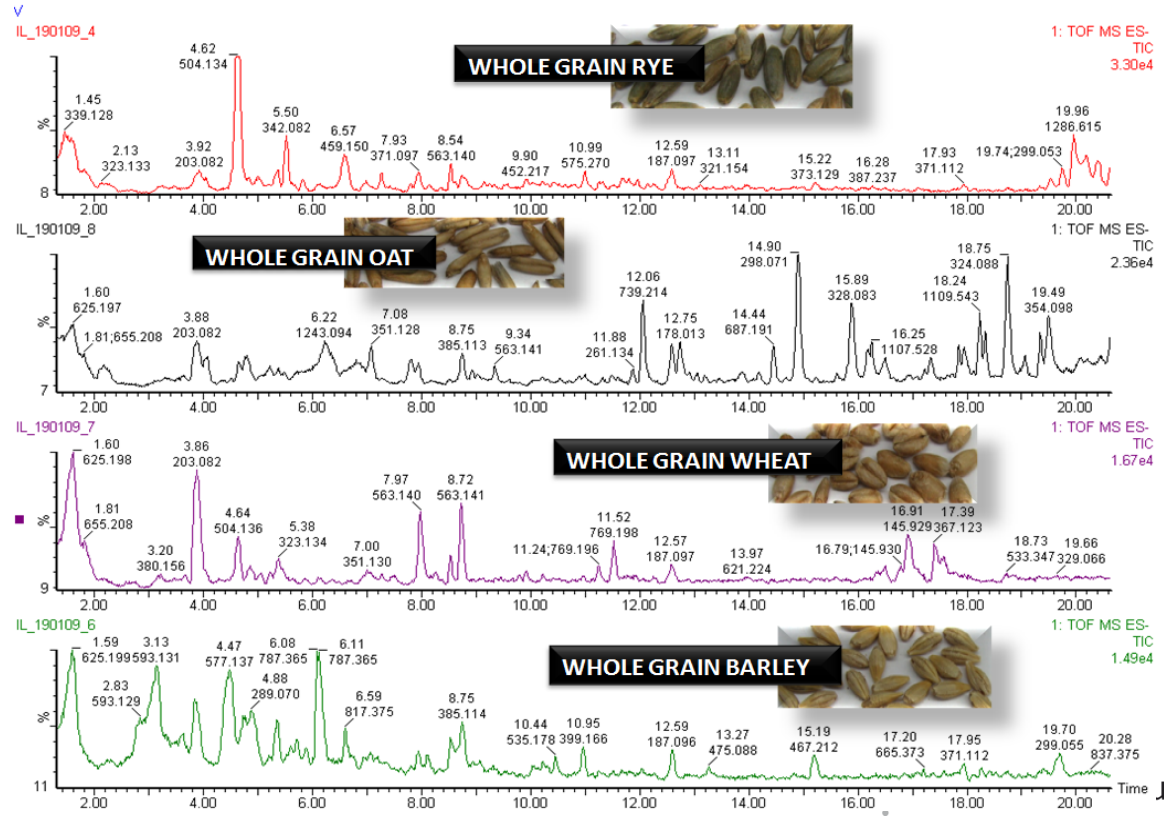
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Phytochemical content has high diversity

Influencing factors:

- Different varieties
- Cultivation conditions
- Food technological processing

➡ Bioactive potential of the ready food product is affected by the phytochemical content





Strawberry phytochemical profile is dependent on the cultivar

- Berries have very rich phytochemical content
- The most influencing factor to the phytochemical content is the genotype

Food Research International 89 (2016) 647–653



Contents lists available at ScienceDirect

Food Research International

journal homepage: www.elsevier.com/locate/foodres



Metabolic profiling discriminates between strawberry (*Fragaria* × *ananassa* Duch.) cultivars grown in Finland or Estonia

Anna Kärllund ^{a,*}, Ulvi Moor ^b, Gordon McDougall ^c, Marko Lehtonen ^d, Reijo O. Karjalainen ^{a,e}, Kati Hanhineva ^a

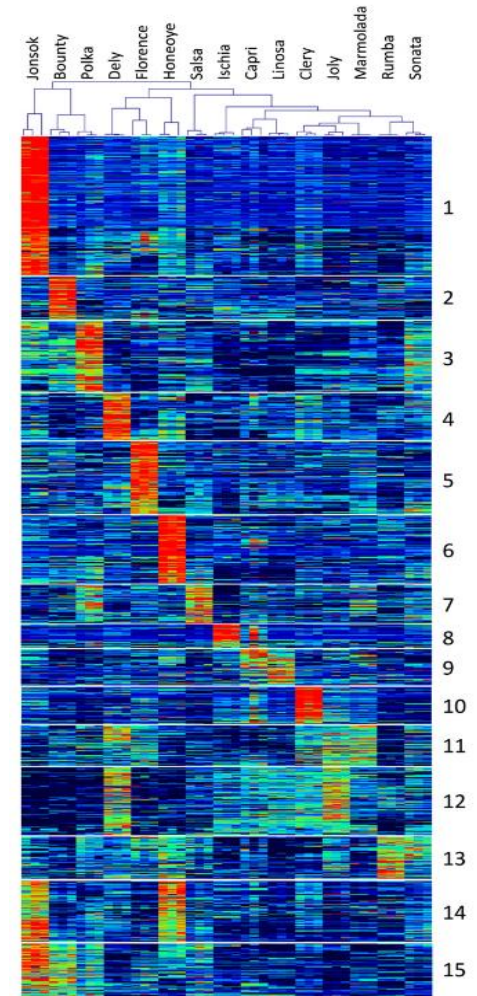
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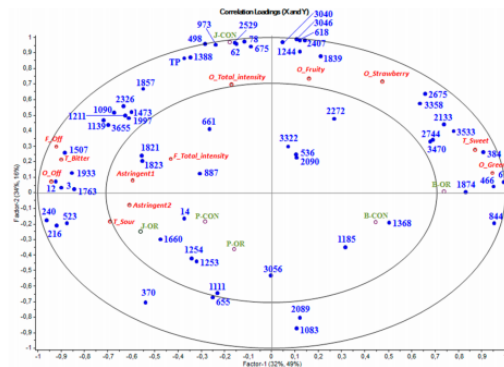
^e Department of Environmental and Biological Sciences, University of Eastern Finland, P.O. Box 1627, FI-70211 Kuopio, Finland



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Conclusions

- Healthy Nordic diet is based on pure nutrient rich raw materials
- Phytochemicals are unique bioactive compounds rich in plant-based food that participate in mediating the health-beneficial effects
- Phytochemical composition is dependent of the variety, cultivation conditions, food processing methods

