



Nutrition Issues for Organic Food

David M. Klurfeld

National Program Leader, Human Nutrition

USDA Agricultural Research Service

David.Klurfeld@ars.usda.gov



From The Sunday Times
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Eat your words, all who scoff at organic food

Jon Ungoed-Thomas

Findings from the £12m European Union-funded project, the biggest of its kind and the first to investigate systematically the physiology of produce from the different farming techniques, will be peer reviewed and published over the next 12 months.

But already one conclusion is clear: organically produced crops and dairy milk usually contain more “beneficial compounds” - such as vitamins and antioxidants believed to help to combat disease.

Official: organic really is better

This weekend the Food Standards Agency confirmed that it was reviewing the evidence before deciding whether to change its advice. Ministers and the agency have said there are no significant differences between organic and ordinary produce.

Fruits/Veggies & Health

- Higher consumption linked to
 - Less heart disease, cancer, stroke, diabetes, obesity
- Basis for Dietary Guidelines for Americans and More Matters



- Based primarily on conventionally grown products
- So ... does organic food contain fewer unwanted chemicals or more wanted chemicals, both or neither?

Organic Foods & Health

- All current data are on content of food
- Needed data are on health effects in consumers – the **only** research gap that counts for nutrition
- It would take huge groups over many years to derive answers if we could have people consuming organic vs. conventional products for study of chronic disease endpoints or intermediate biomarkers



Women's Health Initiative

■ Clinical Trials

- 68,000 postmenopausal women
- 9 years
- 3 components
 - Hormone therapy
 - Diet modification – 50,000 participants
 - Calcium/vitamin D

■ Observational Study

- 93,000 women
- \$725 M so far -- \$415 M for diet study



Organics vs. Conventional

- Some labs always find organic is better
- Some labs never find organic is better
- Is this bias?
- Is this due to methods?

Organic vs. Conventional

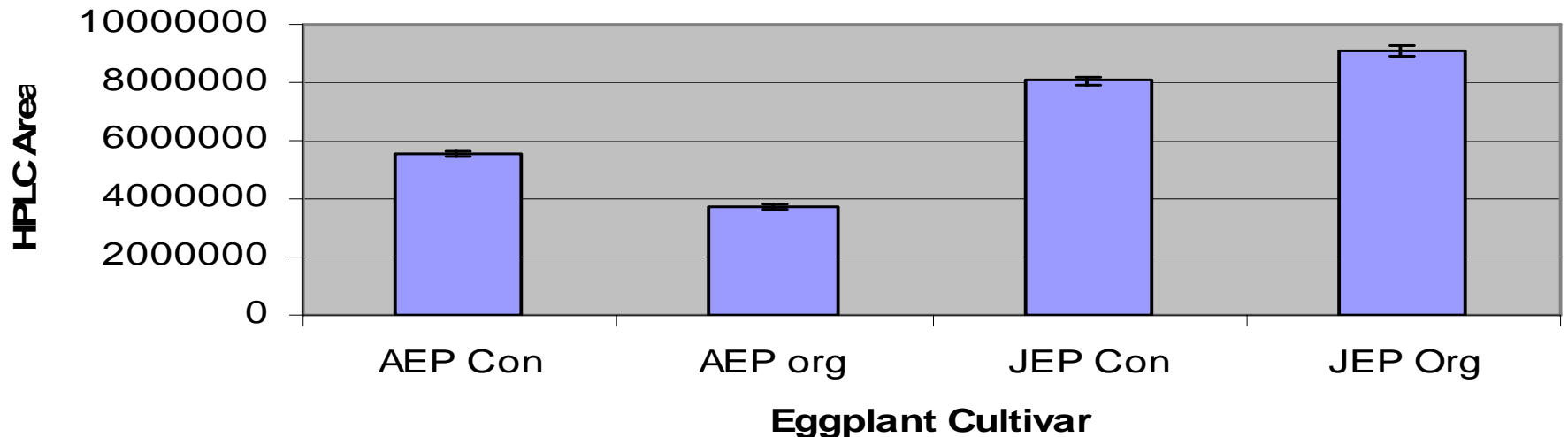
- USDA Pesticide Data Program – 2005
 - 14,749 total samples
 - 10,154 fruits and vegetables
 - Soybeans, wheat, milk, pork, water
- 34% have no detectable residues
- 30% contained 1 pesticide
- 36% contained >1 pesticide
- 0.2% of samples exceeded tolerances

Available from: www.ams.usda.gov/pdp



Total Phenolic Antioxidants in Organic vs. Conventional Eggplants

HPLC Analysis Summary: Phenolic Acid Analysis



AEP: American Eggplant Variety Black Bell

JEP: Japanese Eggplant Variety Millionaire

ORG: Organic

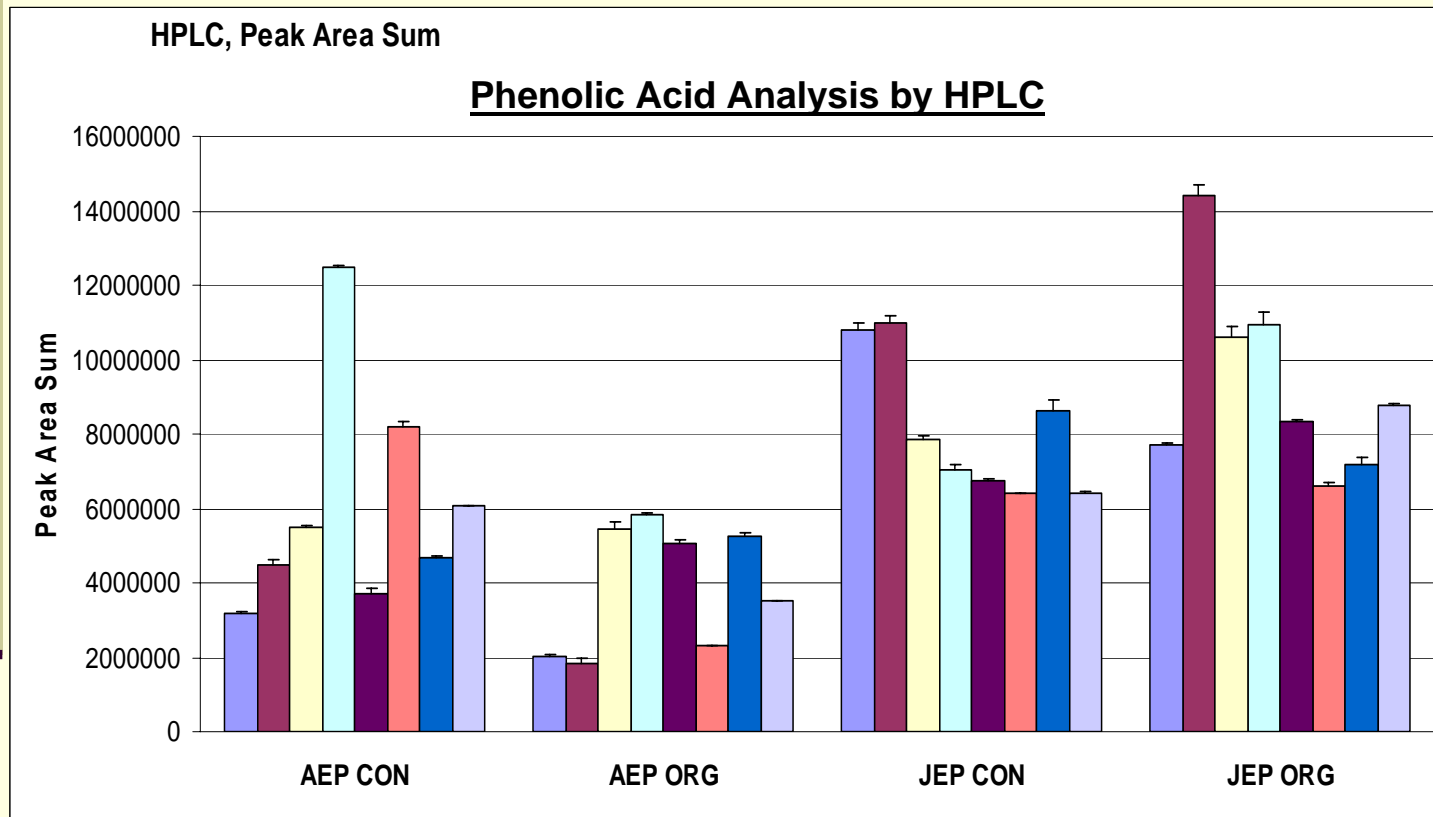
CON: Conventional

Grown by ARS in Parlier, CA

Analyzed at BHNRC



Individual Samples of Phenolics in Organic vs. Conventional Eggplants



AEP: American Eggplant Variety *Black Bell*

JEP: Japanese Eggplant Variety *Millionaire*

ORG: Organic

CON: Conventional

Grown by ARS in Parlier, CA

Analyzed at BHNRC



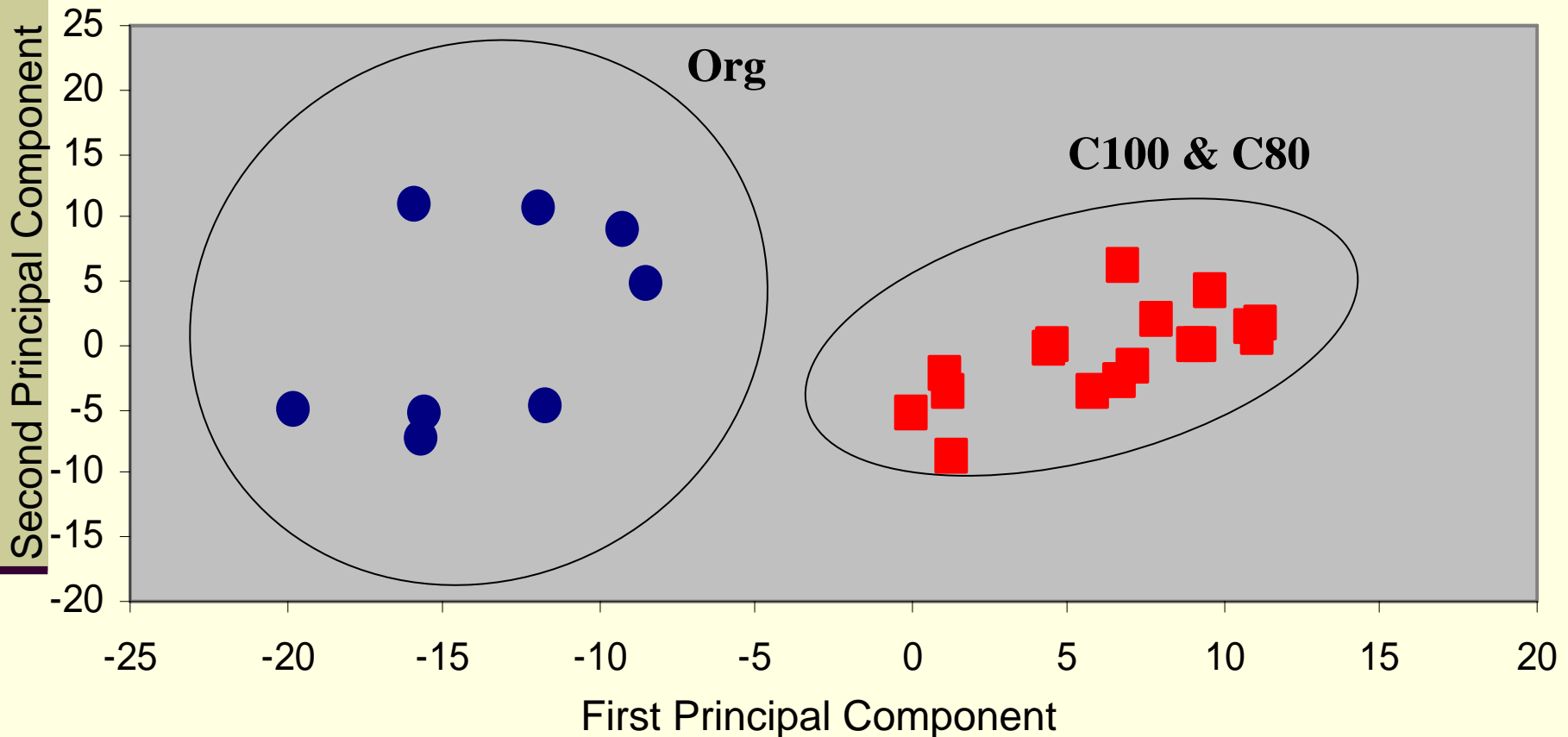
ARS Comparison of Organic vs Conventional Rio Red Grapefruits

- Matched for cultivar, soil type, microenvironment, orchard age, irrigation, harvest practices
- Cropping for 14-16 yrs
- Harvested between 0800 and 1000 h
- Early, mid, and late season
- Three consecutive years
- Whole fruits and juices
- Marketable qualities
- Human health-related compounds
- Taste

ARS Comparison of Organic vs Conventional Rio Red Grapefruits

- Market Qualities
 - Fruit weight, % juice, 3 color characteristics, peel thickness, specific gravity
- Minerals
 - Ten plus chloride and total N
- Phenols
 - Seven compounds
 - Up for 2, down for 1, unchanged for 4
- Acidity, soluble solids, consumer acceptance

PCA of Organically and Conventionally Grown Broccoli



Ovals represent 95% confidence limits BHNRC Data



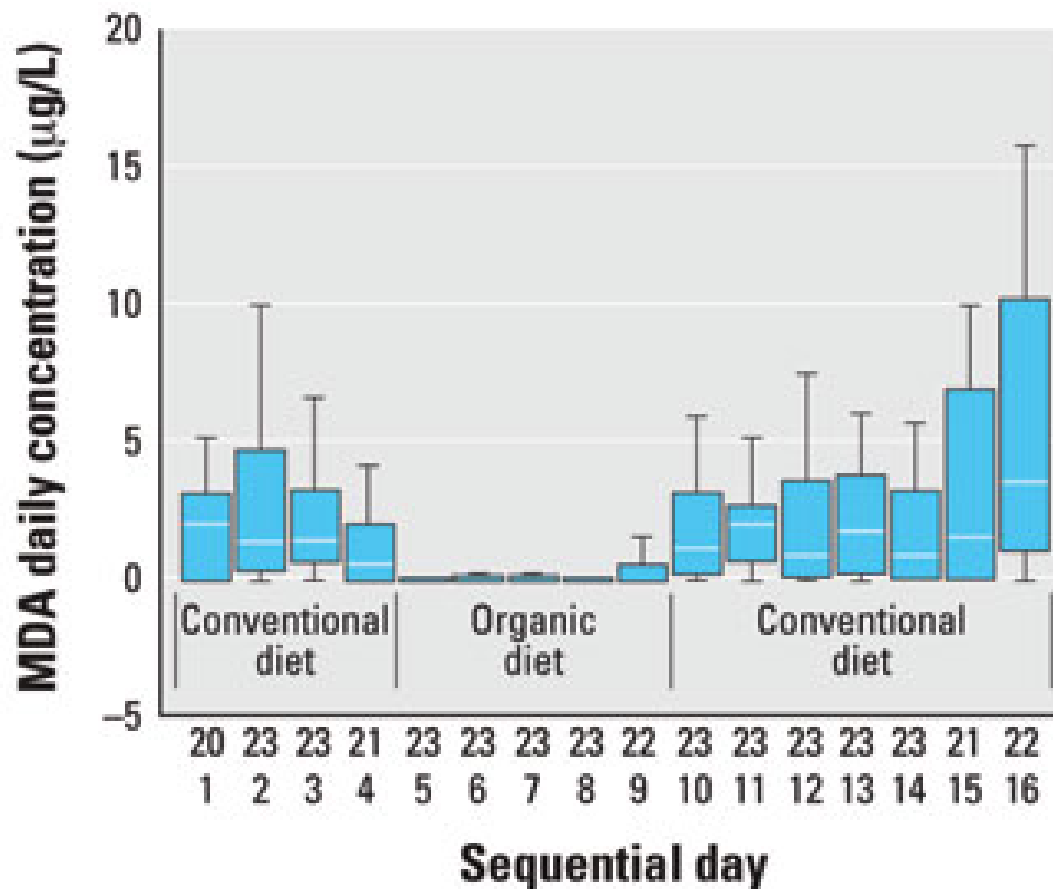


Figure 1. Box plots of DVWA of MDA concentrations in 23 children 3–11 years of age for 15 consecutive days in which conventional and organic diets were consumed. The top row of numbers on the *x*-axis represents numbers of children.

Pesticides

- Dietary pesticides (99.99% all natural)
 - BN Ames et al, Proc Natl Acad Sci USA 87:7777-7781 (1990)
- If synthetic pesticides are not used, plants synthesize their own if they are stressed
 - These phytochemicals have potential health benefits

The dose makes the poison

- “All things are poison and nothing is without poison, only the dose permits something not to be poisonous.”
 - Paracelsus 1493-1541

Hormesis

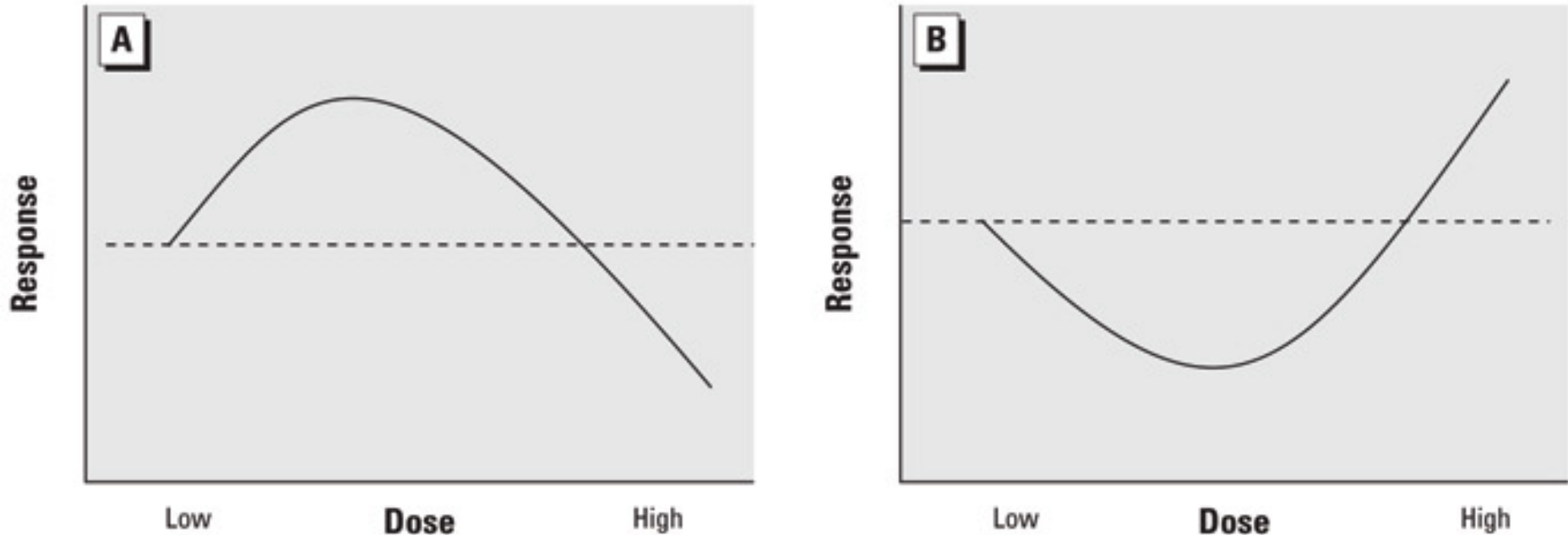


Figure 1. Schematic forms of the hormetic dose response. (A) The most common form of the hormetic dose–response curve showing low-dose stimulatory and high-dose inhibitory responses (β - or inverted U-shaped curve). (B) The hormetic dose–response curve depicting low-dose reduction and high-dose enhancement of adverse effects (J- or U-shaped curve).

Organic Vs Conventional Tomatoes: Antioxidants in Plasma

- 3 cultivars planted same date
- Lycopene, β -carotene, vitamin C, chlorogenic acid, rutin, naringenin
 - Variety affected 4 of 6
 - Culture method affected all 6
- 100 g/day of tomato puree for 3 weeks fed to 20 volunteers
- No effect on plasma lycopene, β -carotene, or vitamin C

Organic vs. Conventional Wheat

- 2003 harvest in Switzerland
- 52 metabolites identified of 250 by GC-MS
 - 14 Amino acids, 11 Sugars, 5 sugar alcohols, 12 organic acids, 10 “other” compounds (including nucleotides, B vitamins)
- 44 showed no differences
- Differences found ranged 10-40%
- “No or only a small impact of the different farming systems”

Organic Foods Status Summary

Institute of Food Technologists

- Lower pesticide residues
- Processing, washing, cooking further reduce these
- “Marginal benefits of reducing human exposure ... appear to be insignificant”
- “Impact on human health has yet to be determined”
- Cannot conclude either system is better



"You may not feel any healthier right away,
but you'll definitely feel more smug."