Misconception: Natural Pesticides Less Harmful Than Synthetic for the Food we Eat?

Bad Science Presentation

Jaime Emberger

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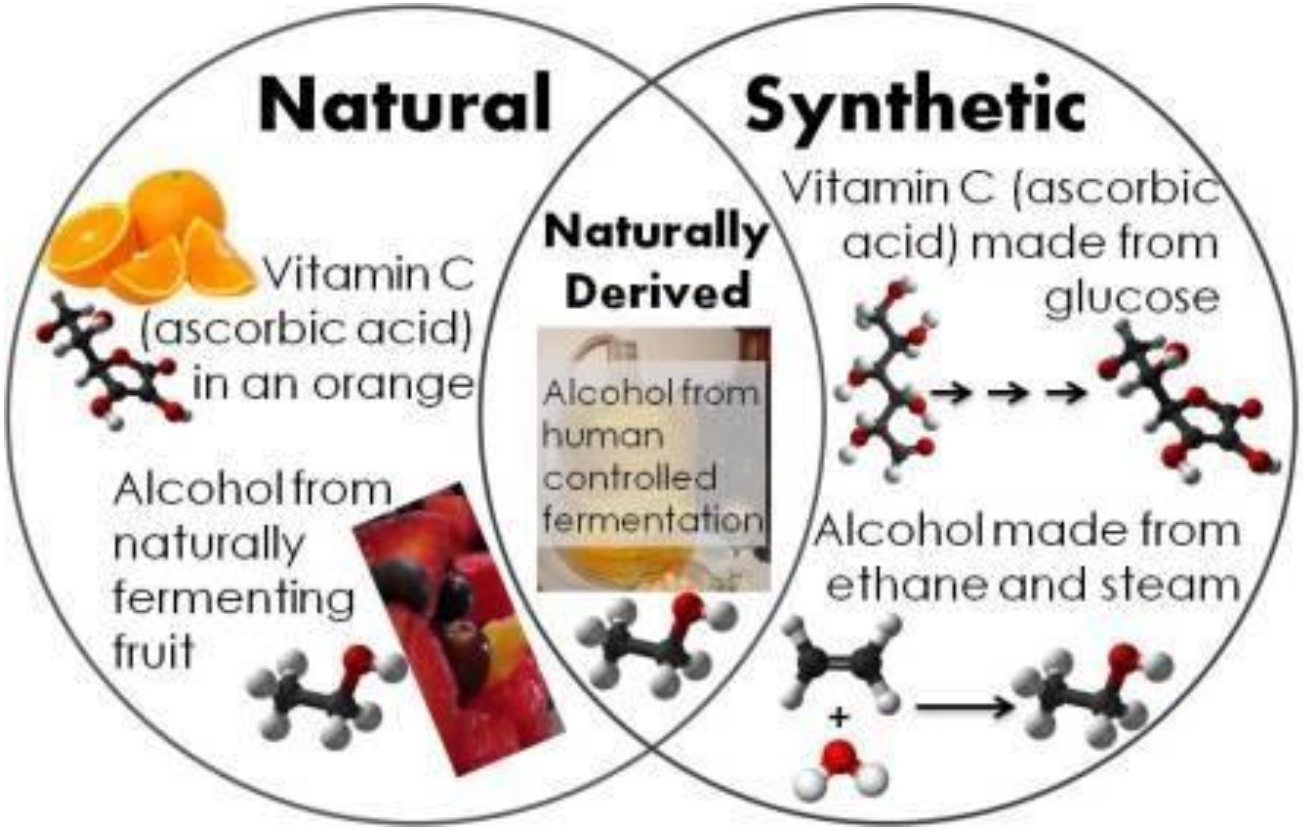
Defining “Natural” vs. “Synthetic”



http://blogs.scientificamerican.com/guest-blog/natural-vs-synthetic-chemicals-is-a-gray-matter/

There's a fairly common general perception that natural chemicals are safer than synthetic.

Q.13_03 Can you tell me the extent to which you agree or disagree with the following statements? Natural chemicals are safer than man-made chemicals Base: All respondents (2,104 UK adults 16+)

Natural chemicals are safer than man-made chemicals	Agree	40
	Disagree	44
	Don't know	15

Many current debates revolve in part around this assumption that natural is better than synthetic

Harmful chemicals only found in synthetic products (e.g. vaccines)

Natural pesticides are less harmful than synthetic for human health

Synthetic version more dangerous/less healthy than natural (e.g. vitamins)

Images from: http://images.sodahead.com/polls/003272157/263699282_292877_295282880585159_1424578848_n_xlarge.jpeg
http://naturemoms.com/blog/2008/06/25/dangers-of-synthetic-vitamins/
http://www.luckinlove.com/vaccinewatch.htm

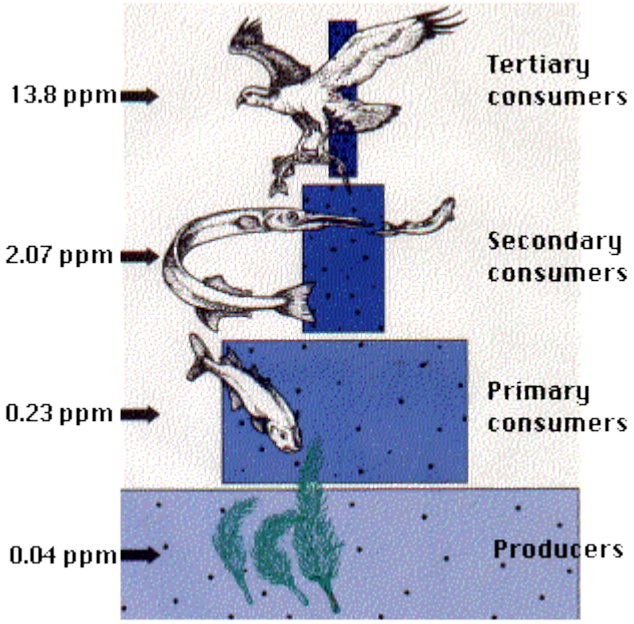
History of Synthetic Pesticide Use

- Began in 1930's and grew rapidly after WWII.

- DDT especially useful because of its low cost and high effectiveness
  - Banned in 1972 - harmful effects on wildlife through bioaccumulation ,and human health concerns

- 1970's and 80's - effective pesticides, high selectivity but led to resistance issues

- 1990's until today, developed to have safer toxicology profiles, broader application, and lower amounts needed



DDT concentrations as it bioaccumulates in food chain

http://www.bt.ucsd.edu/synthetic_pesticide.html
http://agrochemicals.iupac.org/index.php?option=com_sobi2&sobi2Task=sobi2Details&catid=3&sobi2Id=31

Use of Pesticides

Pesticide "Any substance or mixture of substances intended for preventing, destroying, repelling, regulating, or controlling pests."

Advantages

- Increased food production
- Increased profits for farmers
- Prevention of diseases

Disadvantages

- May disrupt balance of ecosystem
- Unintended health effects
- Genetic Resistance

http://study.com/academy/lesson/use-of-pesticides-benefits-and-problems-associated-with-pesticides.html

Origin of Fears

- Overuse of pesticides during early era of modern usage
  - Led to killing off unintended populations, increased resistance in insects, human health effects

- Historic bans due to unanticipated consequences (e.g. DDT) have supported mistrust

- Concerns that synthetic pesticide residues found on fruits and vegetables cause cancer

Taylor, E. A. G. Holley, and M. Kirk. "Pesticide development: a brief look at the history." *Southern Regional Extension Forestry. Mar* (2007).
http://www3.hcs.ohio-state.edu/wiki/index.php/Blanket_application

Natural pesticides may pose similar acute health risks as synthetic pesticides

Synthetic

Naturally derived

Based on Acute LD50

http://www.crediblehulk.org/

Other Scientific Data

- Disproportionate focus on synthetic pesticide dangers vs. natural
  - Database testing for carcinogens, 77% synthetic
  - ~99 % pesticides we're exposed to are natural
  - Rates of carcinogens in natural and synthetic similar (~50%)

- Daily levels of exposure to synthetic pesticides lower than exposure to natural (0.09 mg vs. >1000 mg)

- Both natural and synthetic have gaps in understanding the effects.

Gold, L. S., and Zeiger, E. (eds.) (1997). "Handbook of Carcinogenic Potency and Genotoxicity Databases." CRC Press, Boca Raton, FL.
Gold, L.S., Slone, T.H., Ames, B.N., and Manley, N.B. Pesticide Residues in Food and Cancer Risk: A Critical Analysis. In: Handbook of Pesticide Toxicology, Second Edition (R. Krieger, ed.), San Diego, CA: Academic Press, pp. 799-843 (2001).

Unscientific Evidence

- Most opposition draws on historical evidence for pesticide dangers or make unsupported blanket statements

"Natural pesticides are much more healthier to use and pose less risk to our health and the environment compared to the synthetic pesticides."

- Some correlation between ADHD and organophosphates
  - No causational link established
  - Some methodological weaknesses

Bouchard, Maryse F., et al. "Attention-deficit/hyperactivity disorder and urinary metabolites of organophosphate pesticides." *Pediatrics* 125.6 (2010): e1270-e1277.

Conclusions

- Dangers of pesticides should be evaluated on a case by case basis
- More studies on effects of natural pesticides needed to effectively compare to synthetic
- Modern methods should moderate use of pesticides (natural or synthetic) while integrating it with other means to protect crops