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Food Safety

Pesticide Use and the Public

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Outline

- The Issues
- Pesticide Use by Sector
- Pesticides and Food
- What You Can Do
- Summary

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Issues

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War on Pesticides?

- Growth of Organic Food Industry
  - Significant increases in percentages of sales and land in production.
  - As of 2011, 4.2% of all US food sales organic.
  - "…healthier for my children and me."

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Historical Uses

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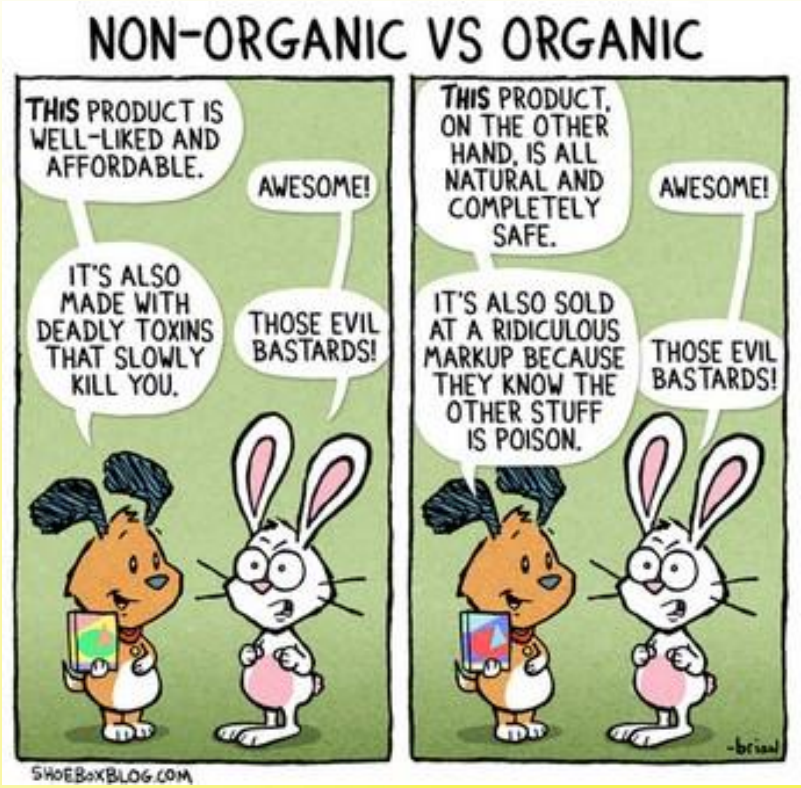
Non-pesticide Production?

- Organic does not mean grown without pesticides.
  - Rotenone
  - Sabadella
  - Spinosad
  - Pyrethrins
  - DE, Soaps, & Oils



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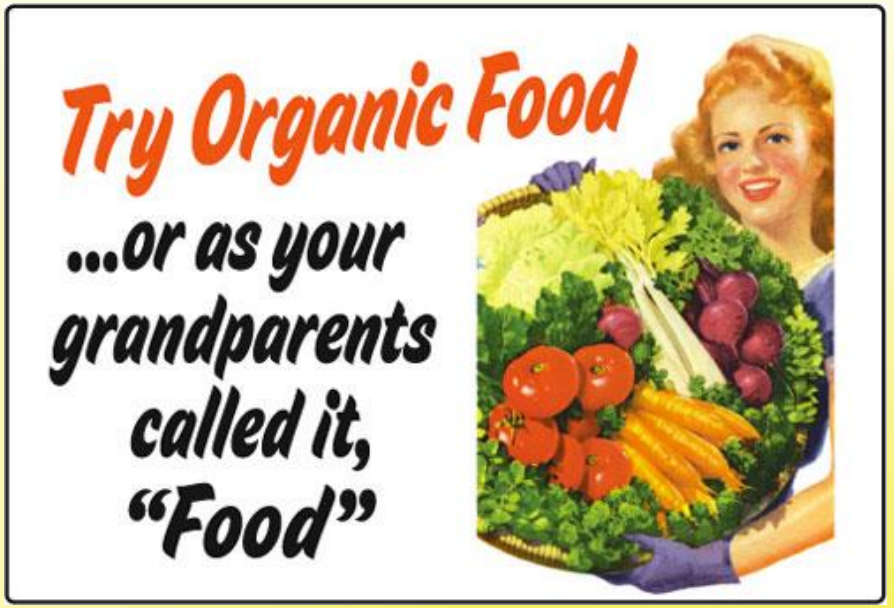
Old Time Food?

- Pesticides used extensively for food production in the 1940's, 50's and 60's.
- DDT not banned until 1970's.
- OP's, Carbamates, PGR's developed in 40's and 50's.



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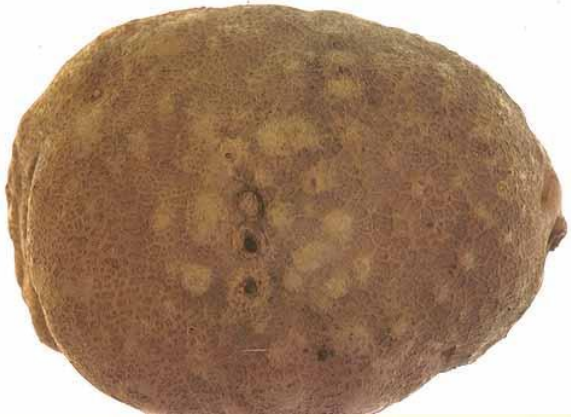
Reality

- No commercially available food that is 100% pesticide free.
- Locally grown or home grown is the are available.



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PESTICIDE USE BY INDUSTRY

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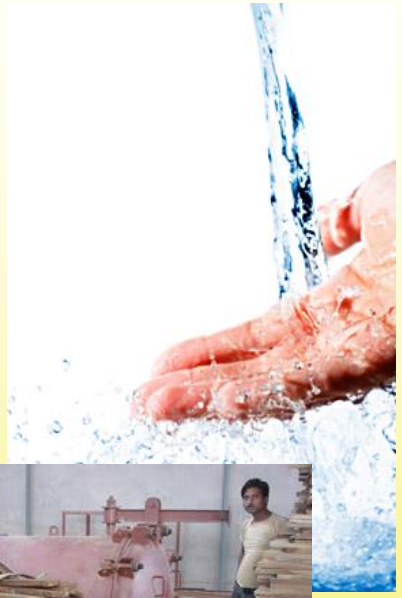
Pesticide Use by Industry

- Industry Uses (2007 Figures)
  - Water Treatment – 51%
  - Wood Preservatives - 19%
  - Conventional Pesticides - 17%
  - Specialty Biocides - 8%
  - Other Pesticides - 7%



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Conventional Pesticide Use

- Ag uses vs. Non-Ag uses
  - Agricultural Uses – 80%
  - Non-Ag Uses – 20%
- Non-Ag uses include home and garden, commercial, individual and government.
- Percentage total of Ag Use – 13.6%

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Types of Pesticides Used

- Top three pesticides used in the Agricultural Sector:
  1. Glyphosate (herbicide)
  2. Atrazine (herbicide)
  3. Metam Sodium (fumigant)
- Of the top 10 pesticides, 6 are herbicides and 4 are fumigants.

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Pesticides and Food



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Getting rid of Toxins...

- Even if you did not apply a single chemical, except for water, to grow a vegetable, fruit or grain, your food would still contain toxins.

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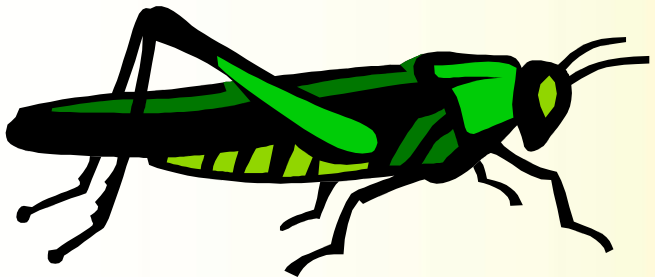
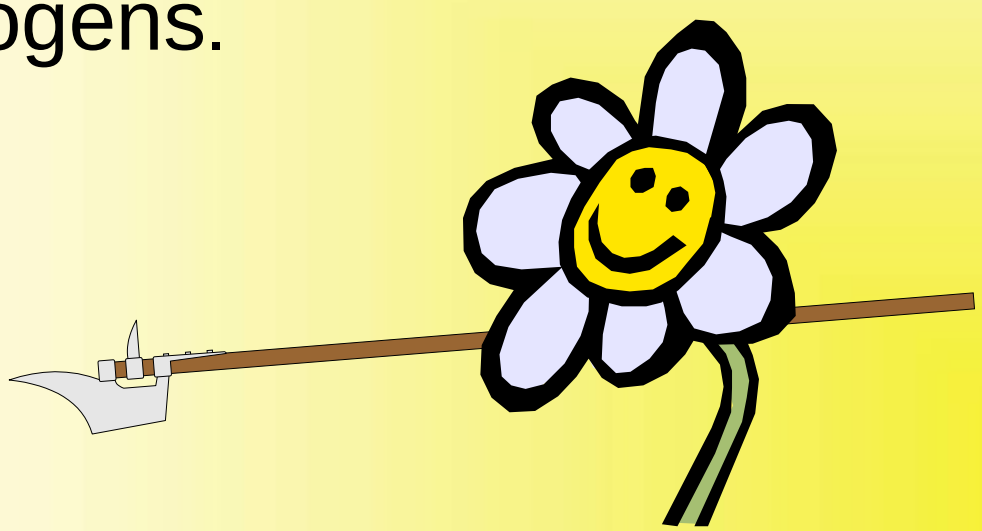
Natural Pesticides

- Natural toxins are present in food.
  - Plants don't run away from predators.
  - Chemicals within the plant protect it from pests.
- Many naturally occurring toxins in food are carcinogens.





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Glycoalkaloids

- Solanine in potatoes, Chaconine in eggplants, Tomatin in tomatoes
- Cholinesterase inhibitor (nerve toxin)
- Toxic to intestines, causes bleeding.
- At high concentrations:
  - affects heart contractions
  - may cause birth defects

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Factors which increase glycoalkaloid levels in potatoes

- **Stress**
  - potato blight infection
  - defoliation by insects
  - selection for potato leafhopper resistance
  - bruising
  - exposure to light

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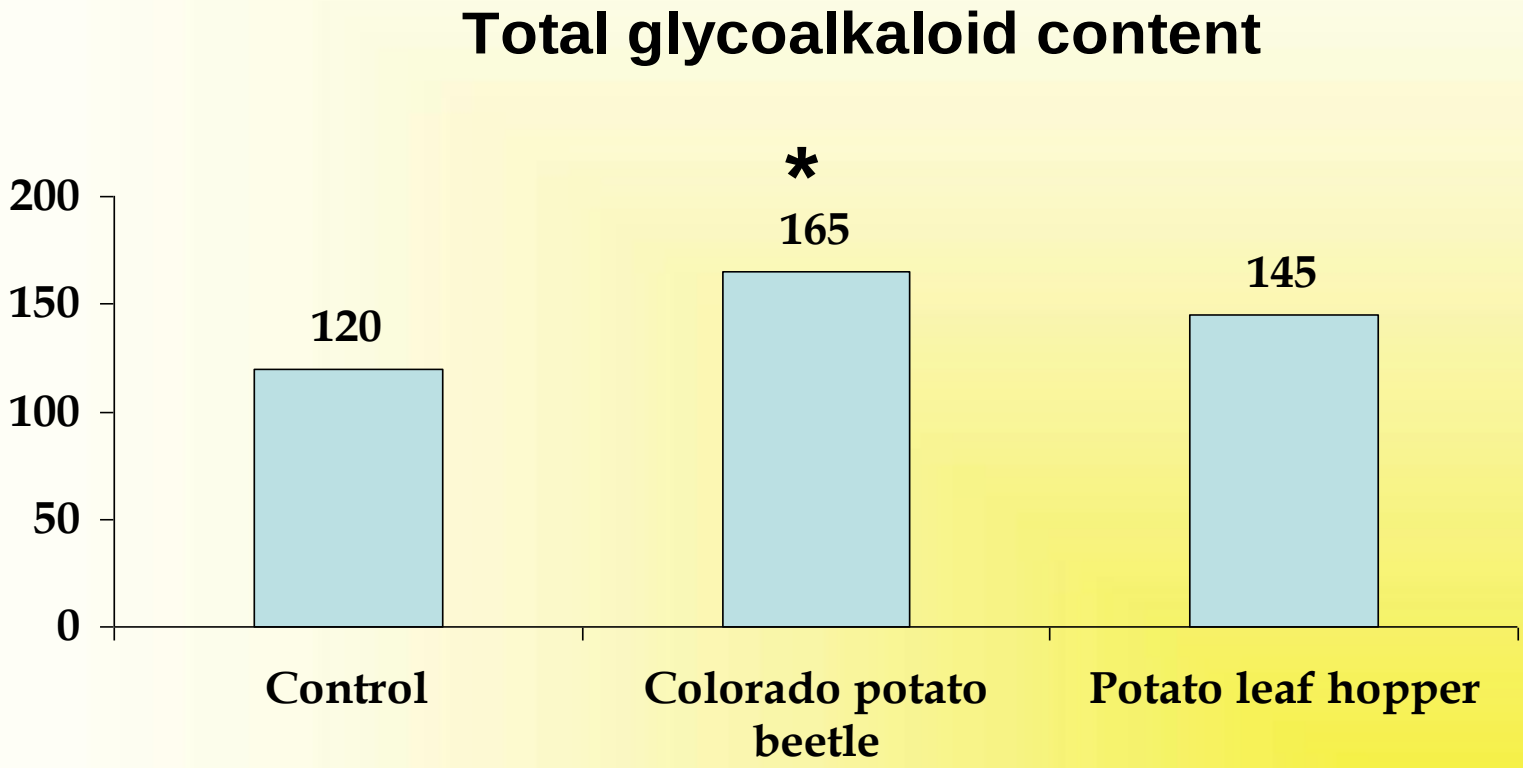
Effect of insect damage on natural toxicants in potatoes



Hlywka et al. 1994

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Use of Pesticides

- Proper Pesticide Use:
  - Reduces stress on crops.
  - With reduced stress, lower levels of toxins are produced in the crops.
  - Reduces the amount of insects that may be processed with the crop (processed food products).

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Pesticide Residues

- Includes the parent compound and all other breakdown products that remain on or in the food.

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Pesticide Residues

- Amount of residues depend upon:
  - Chemical and amount of chemical applied.
  - Commodity.
  - Amount of degradation of the pesticide since application or amount of time after application.

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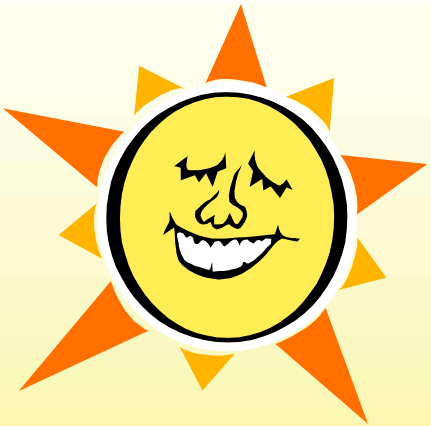
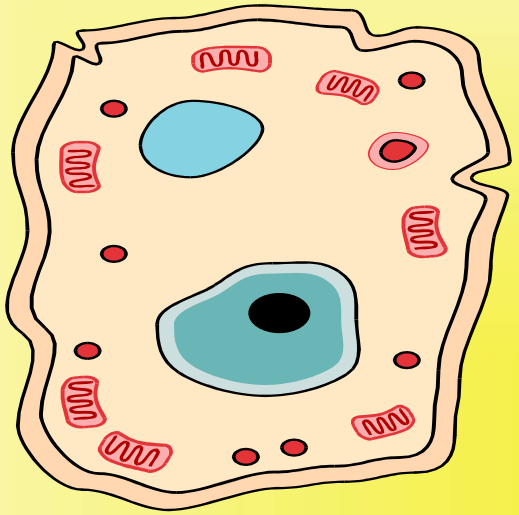
Pesticide Degradation

- In the presence of sunlight (Photodegradation)



- By the action of Microbes (Microbial Degradation)



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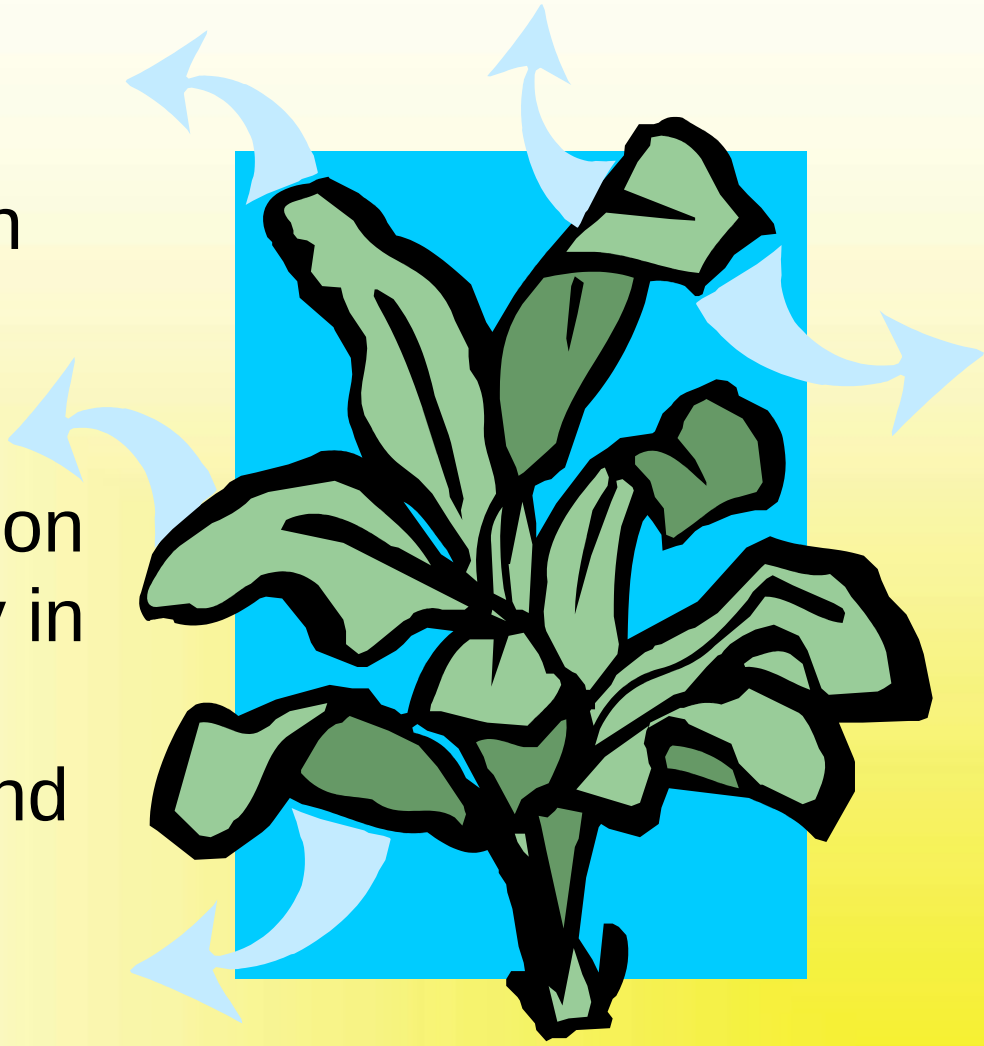
Pesticide Degradation

- In the presence or absence of oxygen (Oxidation or reduction).
- By chemical reaction occurring naturally in the commodity (Biodegradation and respiration).



Example

- Insecticide Permethrin
  - Many registrations.
  - Breakdown occurs <3 days.
  - Most breakdown by oxidation and photodecomposition.
  - >50% decomposed in stored grain within 90 days.

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Pesticide Residues in Food

- Standards for man-made pesticide residues in food are intentionally set far lower than those levels that cause illness.
- In most cases, the amount of these residues, when compared to naturally occurring toxins, seems insignificant.

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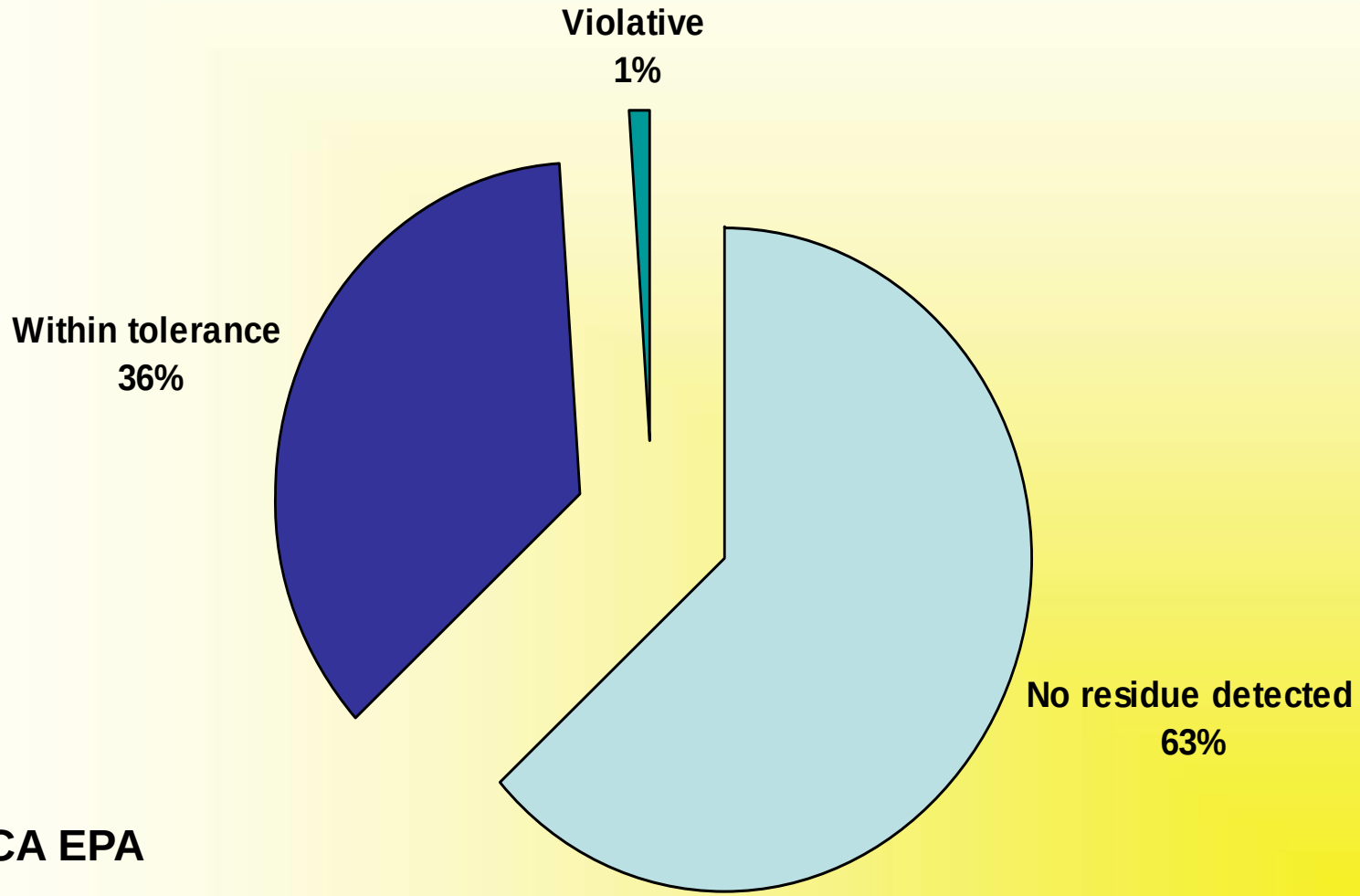
What are the levels of pesticides on produce?



1996 Data, CA EPA

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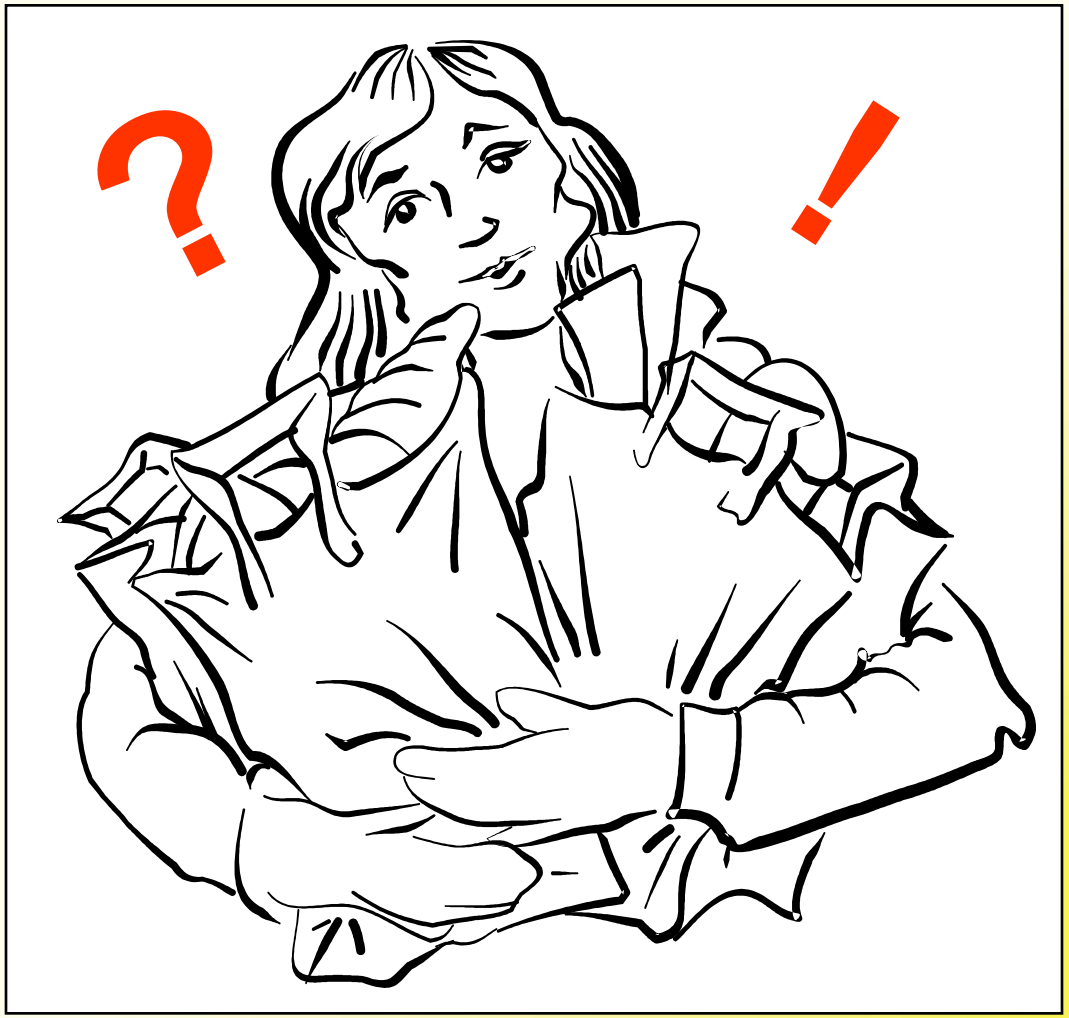
How Safe is our Food?



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FDA Ranking of Food Danger

- Food Borne Diseases (Salmonella, Listeria), Nutrition imbalances and malnutrition.
  - **For comparison - This ranks 1/1**
- Environmental Hazards (Lead, Mercury) and naturally occurring toxins (Arsenic).
  - **Rank is 1/1,000**
- Pesticide residues and food additives.
  - **Rank is 1/100,000**

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The Dose Makes the Poison

- Over 65 naturally occurring compounds in foods have been shown to be cancer causing at high doses.
- Some of these are anticarcinogenic (protective) at low doses.
- Example: Caffeic acid.

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The Dose Makes the Poison

- Lethal dose toxin levels:

  –100 cups of coffee
  –1 bottle of aspirin
  –20 lbs. of spinach

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Common Toxicity Levels

- LD50 of Selected Pesticides and chemicals

vitamin D	10	carbaryl (Sevin)	540
parathion	10	aspirin	750
strychnine	30	2,4-D	1100
nicotine	55	permethrin	2230
calcium chloride	88	sodium chloride	2500
rotenone	132	atrazine	3080
caffeine	200	sulfonyl ureas	>5000
2,4,5-T	300	picloram (Tordon)	8200

SO, WHAT ARE THE FACTS?

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Consider the Facts

- Pesticide residues in food are ***not*** a significant food safety issue.
- Food borne illnesses and natural toxins are thousands of times more significant than residues.

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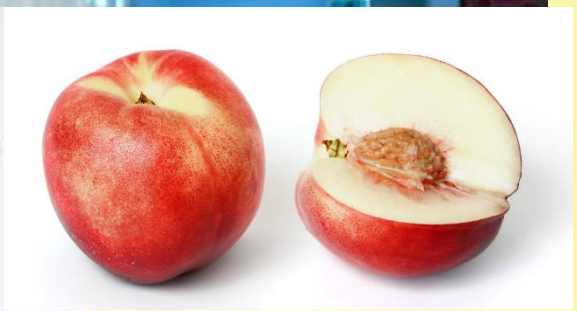
Consider the Facts



- Violations of pesticide residues in food are low.
- In general, violations of imported foods is higher than domestic food for produce items (4% as opposed to less than 1%).

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Consider the Facts

- Organics vs. Conventional Produce.
  - Organic produce commands a higher price and return.
  - Both use pesticide products to control pests.
  - Consumer health benefit claims by substituting organic produce are questionable.

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Consider the Facts

- "Our findings do not indicate that substituting organic forms of the 'Dirty Dozen' commodities for conventional forms will lead to any measurable consumer health benefit."
  - Dietary Exposure to Pesticide Residue from Commodities Alleged to Contain the Highest Contamination Levels, May 15, 2011, Journal of Toxicology.
  - Note: The allegations of the EWG about the "Dirty Dozen" were not published in the Journal of Toxicology or any scientifically reviewed publication.

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Consider the Facts

- "…public health authorities agree that protection against cancer from fruit and vegetable consumptions outweighs any effects of pesticide residues."
  - "Pesticide Residues in Foods", Dr. Thomas H. Jukes, American Council on Science and Health; July 1, 1993.

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SO, WHAT CAN YOU DO?

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Let People Know!

- Good and Bad for both.
- Concentrating on pesticide residues is not getting the whole picture.
- Conventionally grown crops undergo testing to ensure safety.

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Get Involved!

- Comment on news reports or articles that give incorrect or incomplete information.
- Letters to the editor, guest editorials, separate articles can help.

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Be Proud!

- Safe, wholesome food supply.
- Knowledgeable and educated pesticide applicators.
- Proper pesticide applications provide both pest control and safe commodities.

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SUMMARY

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Summary

- Risks due to pesticide residues in food products are low.
- Naturally occurring toxins occur in food products.
- More concerns with exposure to disease, malnutrition, and natural toxins than pesticide residues.

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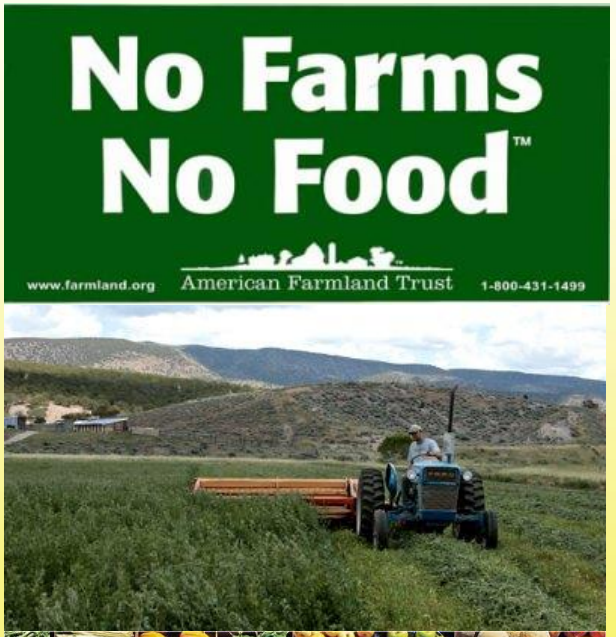
Summary

- Used correctly, pesticides are not harmful to humans, animals or the environment.
- Pesticides have saved lives and prevented illness.
- Pesticides are a essential tool in high-yield, high-production agriculture.

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Questions?