

NPI Brown Bag Seminar Series

Pesticides in Food: Residues, Risks, and Reality

Carl Winter PhD

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Thursday, May 9th, 2019

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University of California

Agriculture and Natural Resources

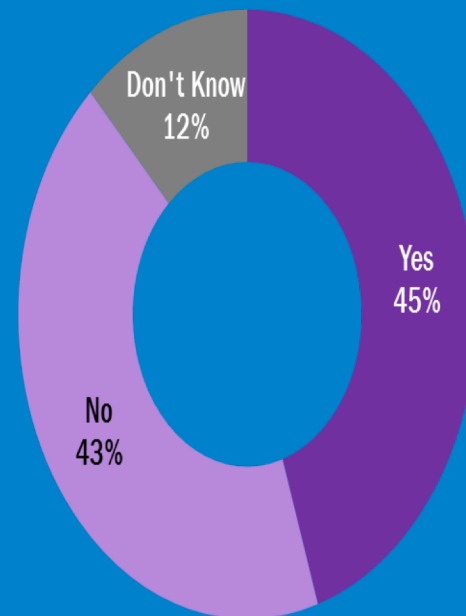
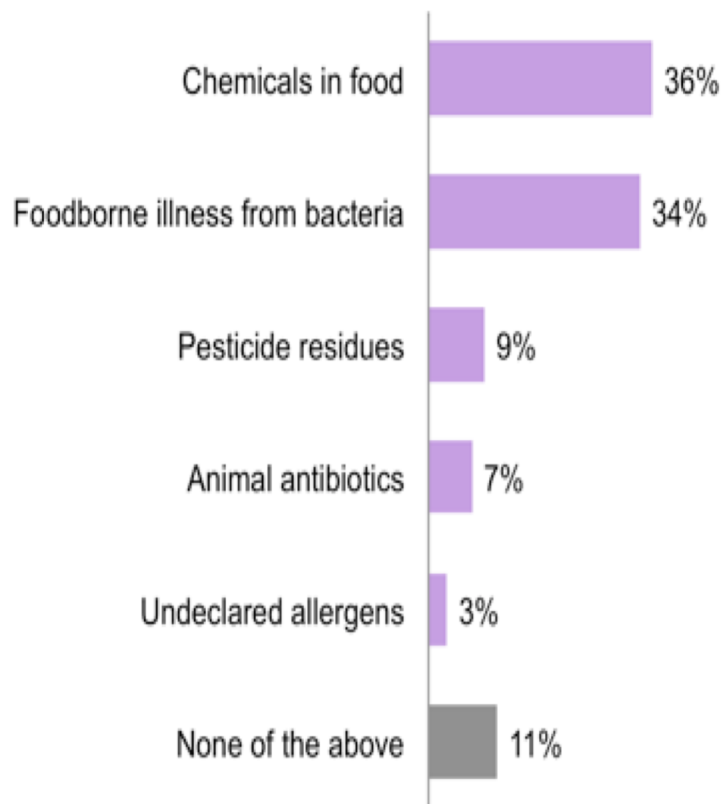
Nutrition Policy Institute



International Food Information Council Foundation Food and Health Survey, 2015

In your opinion, what is the most important food safety issue for you and your family today? *(Select one.)*

Have you made changes to your food purchases because of recent information about chemicals in food/pesticide residues/animal antibiotics?



Polarity of Viewpoints

- Government programs effective in ensuring consumer protection from pesticide residues

Polarity of Viewpoints

- Government programs effective in ensuring consumer protection from pesticide residues
- Government regulation is inadequate and does not ensure consumer protection

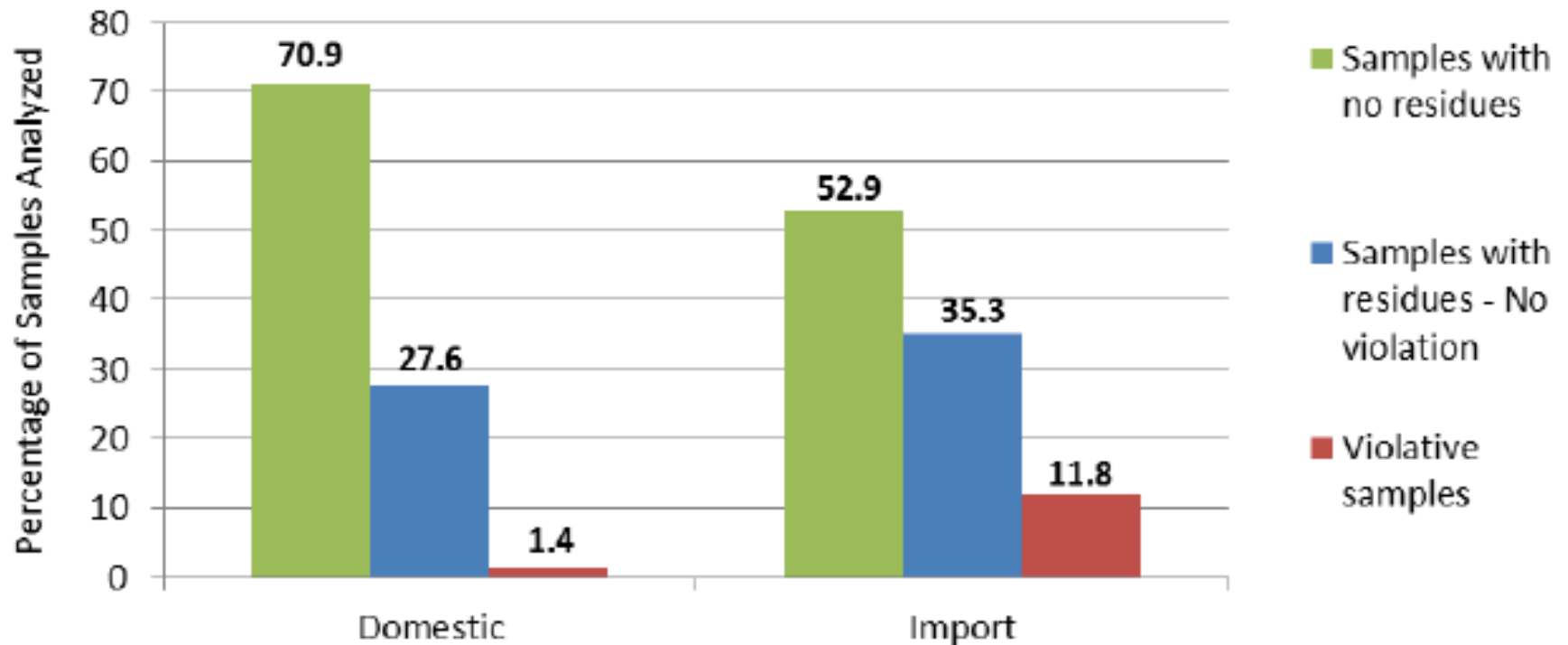
Common approaches to discuss pesticide/food safety issues

- Discuss regulatory framework
 - EPA, FDA, USDA
- Provide data on residue findings
- Safety conclusions based on residue findings
 - Most samples have undetectable residues; violations rare

Pesticide Residue Monitoring Program Fiscal Year 2014 Pesticide Report

U.S. Food and Drug Administration

Figure 3 - Summary of Results of Domestic vs. Import Food Samples



Problems with this approach (general)

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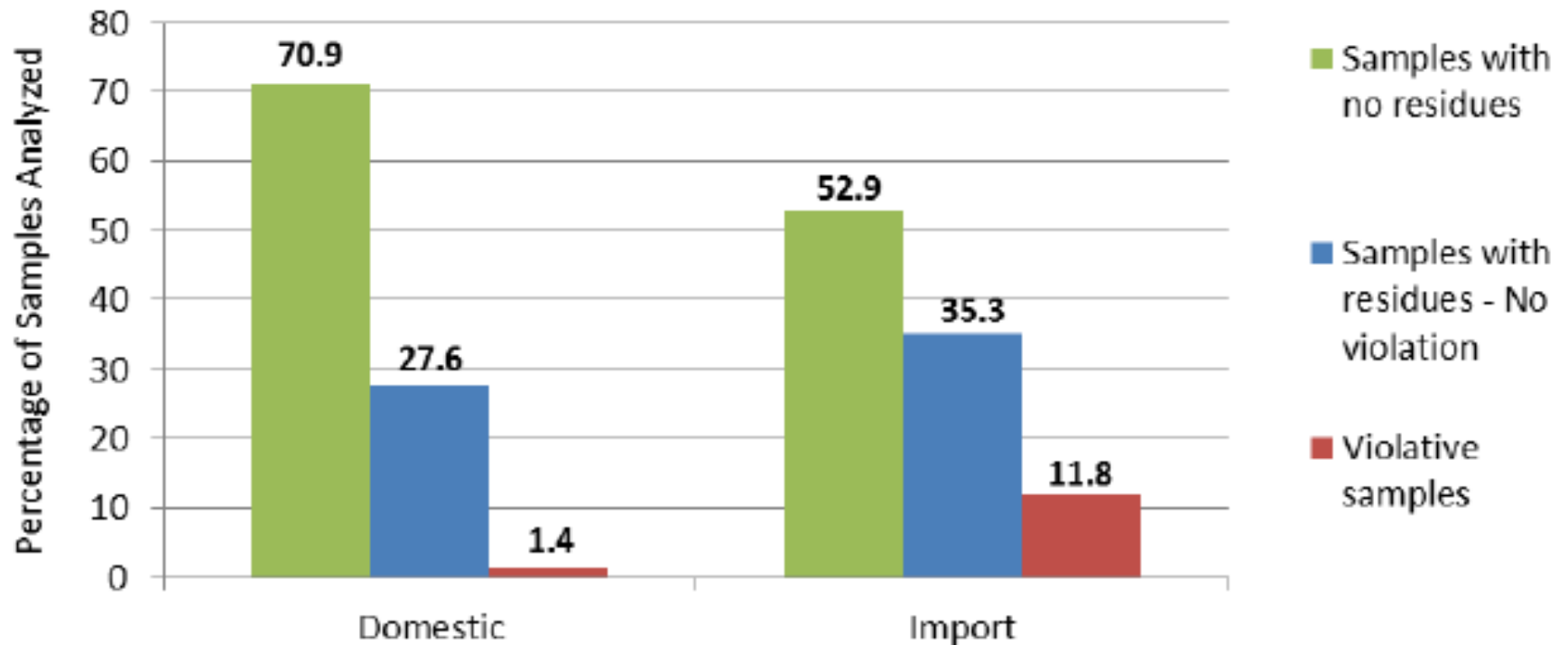
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- Many people do not trust the government
- Violative residues frequently reach consumers
- Not all food is tested
- Imported foods higher violations

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 - New research developing “safety” levels for pesticide residues on foods and comparing with tolerances

Problems with this approach (technical)

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- Tolerances are enforcement tools based on good agricultural practices and are NOT safety standards
 - Could frequently raise tolerances by 10 or 100 times and residues at those levels still not of safety concern

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- Tolerances are enforcement tools based on good agricultural practices and are NOT safety standards
- Violative residues rarely constitute “unsafe” residues
- **GOAL: Steer discussion away from tolerances/regulation**

**WHAT ARE THE RISKS
FROM PESTICIDE
RESIDUES IN FOODS?**

1. BEST ESTIMATES OF DAILY HUMAN DIETARY EXPOSURE TO PESTICIDES



= X

2. MULTIPLY HUMAN EXPOSURE LEVELS BY 10,000 TIMES



**3. FEED 10,000 X DAILY TO
LABORATORY ANIMALS
THROUGHOUT THEIR LIFETIMES**



4. WHAT HAPPENS TO THE ANIMALS?



**5. NO ADVERSE EFFECTS
ARE OBSERVED**

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- Doesn't "prove" safety but provides strong argument why most health professionals encourage more consumption of fruits and vegetables rather than avoidance of pesticide residues
- Conclusion based on food safety issues; doesn't consider worker safety or environmental impacts of pesticides

2019: Dirty Dozen List



Strawberries

Spinach

Kale

Nectarines

Apples

Grapes

Peaches

Cherries

Pears

Tomatoes

Celery

Potatoes

MAJOR RECOMENDATIONS

- Consumers should consider purchasing organic forms of the “Dirty Dozen” commodities

Is EWG Methodology Appropriate?

EWG indicators

- Percentage samples with detectable residues
- Percentage samples, 2 or more residues
- Avg. number of pesticides found on single sample
- Average amount of all pesticides found
- Maximum number of pesticides found on commodity
- Total number of pesticides found on commodity

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Normal risk assessment parameters

- **Amounts** of pesticide residues found
- **Amounts** of food items consumed
- **Toxicity** of the pesticides

Research Article

Dietary Exposure to Pesticide Residues from Commodities Alleged to Contain the Highest Contamination Levels

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Probabilistic techniques were used to characterize dietary exposure of consumers to pesticides found in twelve commodities implicated as having the greatest potential for pesticide residue contamination by a United States-based environmental advocacy group. Estimates of exposures were derived for the ten most frequently detected pesticide residues on each of the twelve commodities based upon residue findings from the United States Department of Agriculture's Pesticide Data Program. All pesticide exposure estimates were well below established chronic reference doses (RfDs). Only one of the 120 exposure estimates exceeded 1% of the RfD (methamidophos on bell peppers at 2% of the RfD), and only seven exposure estimates (5.8 percent) exceeded 0.1% of the RfD. Three quarters of the pesticide/commodity combinations demonstrated exposure estimates below 0.01% of the RfD (corresponding to exposures one million times below chronic No Observable Adverse Effect Levels from animal toxicology studies), and 40.8% had exposure estimates below 0.001% of the RfD. It is concluded that (1) exposures to the most commonly detected pesticides on the twelve commodities pose negligible risks to consumers, (2) substitution of organic forms of the twelve commodities for conventional forms does not result in any appreciable reduction of consumer risks, and (3) the methodology used by the environmental advocacy group to rank commodities with respect to pesticide risks lacks scientific credibility.

OUR METHODOLOGY

- Looked at 10 most frequently detected pesticides, according to most recent year of PDP data, on each of the 12 “Dirty Dozen” commodities

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- Looked at 10 most frequently detected pesticides, according to most recent year of PDP data, on each of the 12 “Dirty Dozen” commodities
- Performed exposure assessments
- Compared exposures with EPA reference doses

MAJOR FINDINGS

- No exposures of the ten most frequently detected pesticides on any of the “Dirty Dozen” commodities were anywhere near Reference Doses

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- Only 7 of the 120 exposures exceeded 0.1% of the Reference Dose
- 75 percent of exposures less than 0.01% of Reference Dose (one million times lower than doses that cause no effects in laboratory animals)

FURTHER EXPLANATION

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- City of San Francisco example

San Francisco, CA population 870,887 (nearly 1 million)



San Francisco example

- Prepare daily food for one million people in San Francisco

San Francisco example

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- Feed all of the food to one person

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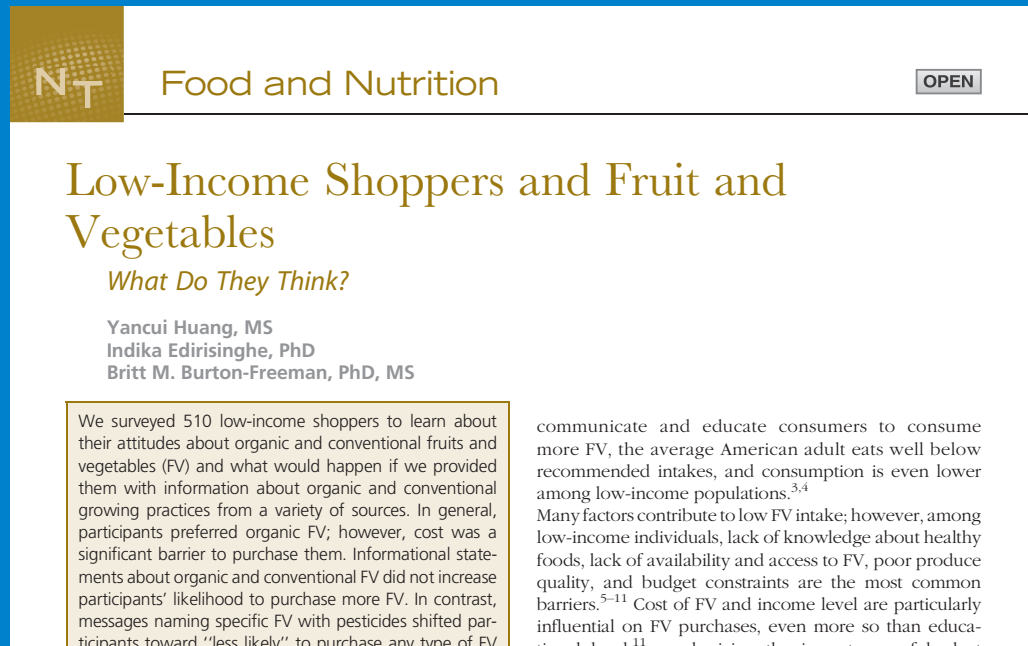
- Prepare daily food for one million people in San Francisco
- Feed all of the food to one person
- Repeat every day for 70 years

San Francisco example

- Prepare daily food for one million people in San Francisco
- Feed all of the food to one person
- Repeat every day for 70 years
- Exposure still not sufficient to cause any noticeable effect based on animal toxicology data

Unanticipated consequences?

- Recent research – Illinois Institute of Technology
- Low income consumers and their fruit and vegetable purchasing preferences



The screenshot shows a research article page. At the top left is the 'NT' logo. The page title is 'Food and Nutrition' with an 'OPEN' button to its right. The article title is 'Low-Income Shoppers and Fruit and Vegetables' with the subtitle 'What Do They Think?'. The authors listed are Yancui Huang, MS; Indika Edirisinghe, PhD; and Britt M. Burton-Freeman, PhD, MS. The abstract text is partially visible, starting with 'We surveyed 510 low-income shoppers to learn about their attitudes about organic and conventional fruits and vegetables (FV) and what would happen if we provided them with information about organic and conventional growing practices from a variety of sources. In general, participants preferred organic FV; however, cost was a significant barrier to purchase them. Informational statements about organic and conventional FV did not increase participants' likelihood to purchase more FV. In contrast, messages naming specific FV with pesticides shifted participants toward "less likely" to purchase any type of FV'.

NT Food and Nutrition OPEN

Low-Income Shoppers and Fruit and Vegetables

What Do They Think?

Yancui Huang, MS
Indika Edirisinghe, PhD
Britt M. Burton-Freeman, PhD, MS

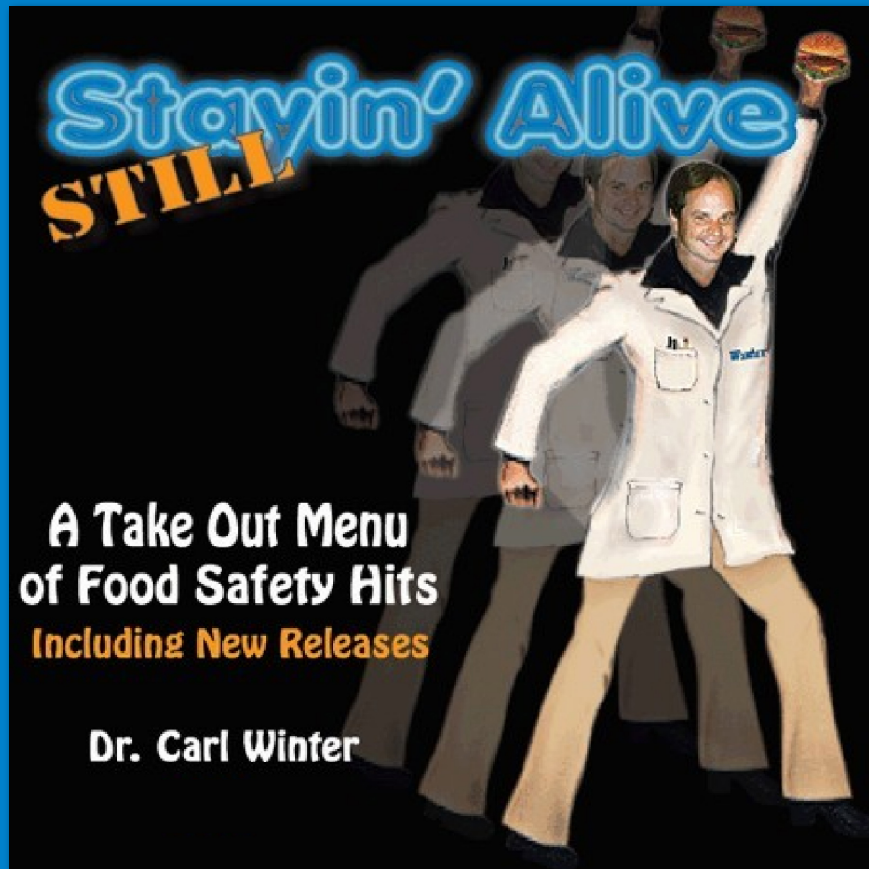
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communicate and educate consumers to consume more FV, the average American adult eats well below recommended intakes, and consumption is even lower among low-income populations.^{3,4} Many factors contribute to low FV intake; however, among low-income individuals, lack of knowledge about healthy foods, lack of availability and access to FV, poor produce quality, and budget constraints are the most common barriers.⁵⁻¹¹ Cost of FV and income level are particularly influential on FV purchases, even more so than education.¹¹ Health communication interventions that

Unanticipated consequences?

- “An environmentalist group called the Environmental Working Group has developed a list of 12 fresh fruits and vegetables they say have the highest levels of pesticide levels on average: apples, bell peppers, carrots, celery, cherries, grapes, kale, lettuce, nectarines, peaches, pears, and strawberries”
- 15% (n=510) responded that based on this information, they would be **less** likely to purchase fruits and vegetables
- Source: Huang, et al., *Nutrition Today*, 51(5): 242-250, 2016.

Music for food safety education



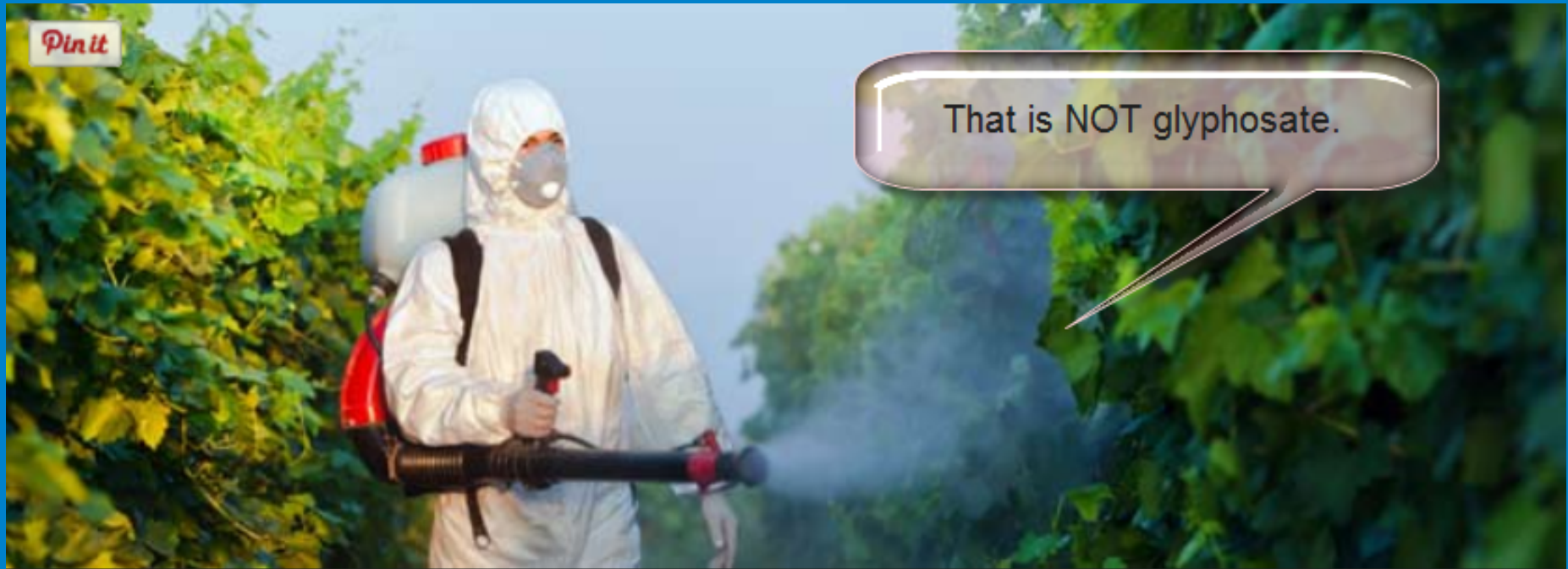
Music highlights

- More than 30,000 audio CDs and animated DVDs distributed throughout world
- Secured \$400,000 USDA grant to study incorporation of music into food safety educational programs
- More than 250 live performances at conferences in 37 states

Youtube Site

- youtube.com/foodsafetymusic
- Animated videos (from DVD) plus live concert footage
- Over 1,000,000 downloads!

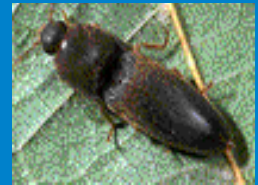
I SPRAYED IT ON THE GRAPEVINE



From
"I HEARD IT ON THE GRAPEVINE"
By
Marvin Gaye

I SPRAYED IT ON THE GRAPEVINE

Ooh, I bet you're wondering how I knew
About those bugs' plans to make me blue
The holes in the leaves, they made it clear
That there are invertebrates to fear
It took me by surprise I must say
But this insecticide will save the day, so...



I SPRAYED IT ON THE GRAPEVINE



I sprayed it on the grapevine

Pretty soon those bugs will be
dyin'

Oh I sprayed it on the grapevine

Cause if I didn't

there'd be no grapes for wine

Honey, honey, yeah

I SPRAYED IT ON THE GRAPEVINE

You know I'd prefer not to spray
But those bugs I've got to keep
away

IPM has clearly got a role
And I'm all for biocontrol

But sometimes the sprays work the
best

And put my worst fears to rest,
that's why...



I SPRAYED IT ON THE GRAPEVINE

I sprayed it on the grapevine
Pretty soon those bugs will be
dyin'
Oh I sprayed it on the grapevine
Cause if I didn't
there'd be no grapes for wine
Honey, honey, yeah



I SPRAYED IT ON THE GRAPEVINE

Yes I'm aware of consumer fear
But the residues will disappear
I understand the environmental view
And worker safety is important too
But I followed all the rules
And it's one of my best tools, so....



I SPRAYED IT ON THE GRAPEVINE



I sprayed it on the
grapevine
Pretty soon those
bugs will be dyin'
Oh I sprayed it on
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