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PESTS OR PESTICIDES?

by

Dr. JOE SCHWARCZ

Dr. [Joe Schwarcz](#) is Director of McGill University's Office for Science and Society. He hosts The Dr. Joe Show on Montreal's CJAD and has appeared hundreds of times on The Discovery Channel, CTV, CBC, TV Ontario and Global Television. Dr. Schwarcz also writes a newspaper column entitled *The Right Chemistry* and has authored four best sellers, *Radar*, *Hula Hoops and Playful Pigs*, *The Genie in the Bottle*, *That's the Way the Cookie Crumbles*, and *Dr. Joe and What You Didn't Know*.

Pesticides are nasty chemicals. They have to be. You don't beat off the myriad insects, weeds and fungi which look upon our food supply as their food supply with sweet smells and pleasant tastes. You do it by poisoning them. Hopefully, without poisoning ourselves.

Pesticides were born out of necessity. The cultivation of crops has always been characterized by a relentless battle against pests, a battle which required farmers to take up chemical arms. Thousands of years ago the Sumerians learned to dust crops with elemental sulphur and the ancient Romans drove insects from their orchards by burning coal tar. The discovery of the toxicity of lead and arsenic compounds led to the extensive use of lead arsenate in agriculture, without much concern for its effects on human health. After all, producing enough food to feed the growing population was the prime goal.

Nicotine, pyrethrum and rotenone extracted respectively from tobacco, chrysanthemum and derris plants joined the chemical stockpile by the 19th century. Malathion and chlorpyrifos, typical organophosphates, were born out of research into



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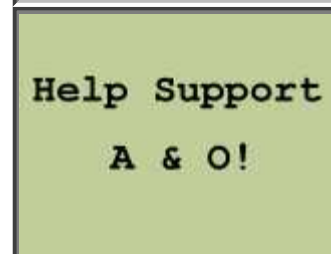
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poison gases during WW II, and the rapid advances in chemistry in the post-war era introduced synthetic pesticides such as DDT, benzene hexachloride and dieldrin. Insects shuddered, fungi floundered, weeds wilted and agricultural yields boomed. And at least in the developed world, worries about lack of food began to be replaced by concerns about pesticides. Rachel Carson's *Silent Spring* alerted us to the possible effects of pesticides on biodiversity, and we heard the faint rumblings of epidemiological studies linking occupational pesticide exposure to health problems.

Analytical chemists, armed with their gas chromatographs and mass spectrometers, heightened our fears by revealing that it was not only farmers or agro-chemical producers who were exposed to pesticides, we all were! Residues of these chemicals were found on virtually everything we ate. Apples, for one, were tainted with Alar, a plant growth regulator sprayed on trees to prevent the fruit from falling prematurely. This chemical had cruised under the public radar until 1989 when the popular TV program *60 Minutes* lowered the boom by introducing a segment on Alar with a picture of an apple bedecked with the classic skull and crossbones as a reporter enlightened us about the "fact" that "the most potent cancer-causing agent in our food supply is a substance sprayed on apples." People responded by flushing apple juice down the drain and removing apples from children's lunch boxes. But the fact is that the "fact" that Alar was the most potent carcinogen in our food supply was not a fact. True, one of the breakdown products of Alar, 1,1-dimethylhydrazine, did induce tumours when fed to mice in huge doses, an effect that regulators were well aware of when approving Alar for commercial use. The carcinogenicity study was questionable, they maintained, and irrelevant as a model for human exposure.

Whether or not Alar ever posed a risk is still debated, but there is no doubt that it placed the issue of pesticide residues in food on the front burner. Toxicologists, agronomists, physicians and environmentalists all waded in with their opinions, along with hordes of emotionally-charged consumers who were clearly out of their depth in such a complex discussion. Bruce Ames of the University of



California, one of the most respected biochemists in the world, was quick to point out that we are exposed to all sorts of toxins, both synthetic and natural, on a continuous basis and that more than 99.9% by weight of pesticides in the average diet are naturally occurring compounds that plants produce to defend themselves against insects and fungi. Potatoes, for example, synthesize solanine and chaconine, compounds which like some synthetic pesticides inhibit the activity of cholinesterase, a crucial enzyme. But we don't shun potatoes because they harbour these natural pesticides. According to Ames and other experts, the body doesn't handle natural pesticides differently from synthetic ones, so there seems to be little justification for all the hand-wringing over remnants of synthetic pesticides in our food supply, usually measured in parts per trillion. Take a football field, pile it with sand to a height of some eighteen feet, mix in one single grain of red sand, and search for it. You'll be searching for 1 ppt!

Of course, some will argue that there is nothing we can do about the natural toxins, and their presence does not justify a cavalier use of synthetic pesticides. True, but our use of pesticides is anything but cavalier. Regulatory agencies demand rigorous studies before a pesticide is approved. This involves determining the maximum dose that causes no effect in a test animal and dividing it by a safety factor of at least 100 for human exposure. Furthermore, when the risk of pesticide residues is assessed, the supposition is that the food contains 100% of all legal residues and that people eat these foods for seventy years. That sounds comforting, especially when we learn that more than 70% of fruits and vegetables have no detectable pesticide residues and only about 1% of the time is the legal limit exceeded, a limit that already has a hundred-fold safety factor built-in. Of course, produce should still be washed, although more for removal of bacteria than pesticides. A 30 second rinse significantly reduces both water soluble and insoluble pesticides.

Undoubtedly debates about the validity of using animal models to determine human carcinogenicity, about whether or not there is a threshold effect for carcinogens, and about the possibility of trace residues of pesticides which may be harmless individually but not when they team up, will continue.

So will the use of pesticides. By the year 2030, ten billion people will be coming to dinner. But without the sensible use of pesticides they will be going home hungry. Would a pesticide-free world be better? For people who have to handle pesticides occupationally, and for the environment, yes. For the consumer, no. Yields would be significantly reduced, and in light of the overwhelming evidence of the ability of fruits and vegetables to protect against cancer, public health would be compromised.



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