Environment

This 'nontoxic' dioxin isn't

TCDD (2,3,7,8-tetrachlorodibenzo-p-dioxin) is the most toxic member of a class of 75 chlorinated compounds known as dioxins. Each is differentiated by the number and placement of the chlorine atoms attached to the eight available sites on the molecule. Octachlorinated dibenzo-p-dioxin (OCDD) — the only one with chlorine atoms at all eight sites — is "a very common environmental contaminant," says Linda S. Birnbaum, a toxicologist with the National Institute of Environmental Health Sciences (NIEHS) in Research Triangle Park, N.C. OCDD also has been labeled a "nontoxic" dioxin, she notes. But new animal research by Birnbaum and her colleagues suggests that OCDD is not only toxic, but also capable of inducing mild symptoms characteristic of TCDD. Their findings appear in the March 30 Toxicology and Applied Pharmacology.

Seemingly ubiquitous industrial contaminants, dioxins have been found in the bodies of people from virtually all regions and walks of life. Several of the studies measuring this human contamination in body fat have shown that, as a rule, the more chlorines in the dioxin, the higher its concentrations in the body will be — up to 1,000 parts per trillion (SN: 7/13/85, p.26).

OCDD is very insoluble, and therefore difficult for the body to absorb, Birnbaum says. And because her data show that increasingly large doses contribute proportionately smaller amounts to the body, she says acute poisoning is not a concern. However, the new NIEHS data show that once OCDD does get into the body, it stays put. That led Birnbaum to wonder whether an animal could accumulate toxic levels of the chemical through small, chronic exposures. She tested that, exposing rats to 50 micrograms of OCDD per kilogram of body weight five days a week for 13 weeks. "What we found," she reports, "are some of the same effects you see after exposure to a low concentration of TCDD" — enlarged livers, development of fat-filled cavities in the liver, characteristic blood changes, and synthesis of several drug-metabolizing enzymes.

"We never got to the point where we saw the classic signs of [overt] dioxin toxicity, such as wasting and thymic atrophy," she says. But she suspects that is because she never got enough OCDD into her animals. "Our prediction is that had we continued to treat these animals with OCDD, eventually we would have seen those signs [of classic TCDD poisoning]."

These data indicate that OCDD's toxic potency is only 1/100 to 1/1,000 that of TCDD. However, Birnbaum points out, because "there's at least 1,000 times as much OCDD out in the environment as there is TCDD — maybe more — [one could argue that] you should be as concerned about it as you would be about TCDD."

No acute sulfur dioxide standard

Last week the Environmental Protection Agency (EPA) announced it would not impose an acute, 0.4-part-per-million, 1-hour ceiling on sulfur dioxide emissions even though health-effects data now show that currently permissible acute peaks in emissions can induce asthmatic reactions in susceptible individuals. In justifying the controversial decision, EPA Assistant Administrator J. Craig Potter said his agency estimated that no more than 100,000 asthmatics live in regions where acute emissions might cause them problems, that a susceptible individual is not likely to encounter such emissions more than once a year and that many who do are probably on medication that would limit the severity of their reaction.

"We feel that the decision was inadequate...and that a stringent short-term 1-hour standard is necessary," says Fran duMelle of the American Lung Association in Washington, D.C. She adds that even "healthy asthmatics" will respond adversely to 5- or 10-minute sulfur dioxide peaks such as those EPA had considered.

Horticulture

Super-slurper cocktail helps rout weevils

An estimated 80,000 acres of Florida citrus groves are currently infested with weevils. Among the more devastating is *Diaprepes abbreviatus,* also known as the sugar-cane root-stalk weevil. The mature insect attacks orange and grapefruit foliage; its soil-foraging larvae have a predilection for the roots of citrus trees. Within two years, an infested grove can suffer such extensive damage that costs of treating affected trees can equal or surpass the value of their fruit, according to William J. Schroeder, an entomologist at the U.S. Department of Agriculture (USDA) Horticultural Research Laboratory in Orlando, Fla. Without treatment, weevils will kill 20 to 30 percent of a grove and render the remaining trees unable to bear fruit.

What's a citrus grower to do? Mix his trees a watery cocktail laced with nematodes (soil roundworms that harbor bacteria lethal to weevil larvae) and microscopic flakes of the USDA-patented polymer known as "super slurper." In preliminary experiments, Schroeder has demonstrated that this very low-cost insecticide can rout 60 percent of infesting weevils.

Once a nematode enters a larva, its bacteria get right to work, killing the weevil within 24 hours. But Schroeder found that the dry, quick-draining sandy soils typical of most Florida groves can't sustain the moisture-loving host worms throughout dry spells. So Schroeder enhances the soil's water-holding ability with the biodegradable cornstarch-based super slurper; it can absorb up to 2,000 times its weight in water.

One liter of Schroeder's weevil-killing cocktail contains water, 5 grams of the starch and about 5 million nematodes. It can be applied to the roots of a tree at planting, or sprayed directly onto the soil under a tree. Schroeder has applied for a patent on this super-slurper application and expects to pilot test it in groves this year. If all goes well, he says, the technology could be commercially introduced within two years. Other USDA labs are looking to adapt this cocktail to control corn and vegetable pests.

Major plant scourge at last identified

For more than a century, farmers have been fighting Pierce's disease of grapes, phony peach disease and several "scorches" — diseases that leave trees looking parched. But decades of study didn't discover the small viruses thought to cause at least some of these blights. Now a researcher has identified and named the common culprit: *Xylella fastidiosa.* It's not a virus but the first pathogenic bacterium affecting plants to be discovered in almost 50 years.

The bacterium is so small it passed through filters made to trap such pathogens, leading to suspicions it was a virus, explains John L. Wells, a plant pathologist at the USDA's Eastern Regional Research Center in Philadelphia. While the organism physically resembles that causing Legionnaire's disease in humans, Wells says that genetically it bears no resemblance to any known bacteria. He called it *Xylella* to denote where it resides — in the xylem, the woody conduit through which nutrients pass up a plant's stem or trunk.

Transmitted by insects, principally leaf hoppers, *Xylella* has very catholic tastes. It stunts ragweed and Johnson grass, yellows periwinkle and causes scorches in almonds, plum, sycamore, oak, maple, mulberry — even stately American elms on the Mall in Washington, D.C. Cherry trees have carried the highest concentrations of the pest, although they show no symptoms. In most cases, *Xyllela* appears to blight by disrupting a plant's hormone balance, Wells says. In fact, hormone treatment has put some affected trees, including peaches, in remission. In most cases, however, diseased plants must simply be pulled out. But help is on the way. Grafting roots of resistant plants to susceptible trees appears to offer one solution; another is to treat plants with antibiotics.