Environment

Where the daminozide is

In the United States, 75 percent of all daminozide, the carcinogenic plant-growth regulator that the Environmental Protection Agency will seek to ban (SN: 9/7/85, p. 149), is used on apples. "We use it primarily on those that are heading for the fresh market," says Derl Derr, executive vice president of the International Apple Institute in McLean, Va. Though precise figures are not available, Derr estimates that 80 percent of all McIntosh and Stayman apples are routinely treated with the controversial chemical. "And on Red Delicious, which is the single largest variety that we grow, I would guess it would be at least 50 percent," he told SCIENCE NEWS.

Not all "eating" apples have been treated, however; EPA estimates that treated apples account for only 35 percent of those sold as fresh. And some treated apples — especially the misshapen or scarred — will end up in juice or processed food, Derr notes.

Daminozide is used primarily to hold apples on the tree longer, providing them a chance to firm up and increase their color. "There are some other 'stop drops,'" Derr says, "but they're not widely used or nearly as effective."

Peanut growers are the second-largest users of daminozide. However, not only do their crops contribute less to contamination of the food chain, but their industry also stands to suffer relatively less under a daminozide ban. In Georgia, where half of all U.S. peanuts are grown, only 10 to 25 percent in any year are treated, according to Craig Kvien, a University of Georgia peanut specialist in Tifton. Moreover, only growers able to charge a premium for their crops — like the seed producers — tend to use the costly chemical treatment, he says. Seed peanuts are planted, not eaten.

On peanuts, daminozide is used to control "rank vine growth," a condition leading to excessive moisture-trapping foliage that can incubate fungi. The chemical also sets peanuts closer to the plant's taproot, making them easier to harvest. And for these applications there are alternative chemicals, called sterol biosynthesis inhibitors, which Kvien says have been used in Europe for several years but are not yet on the U.S. market.

For several years, the Coastal Plain Experiment Station, where Kvien works, has experimented with these fungicidal agents. The chemicals work by inactivating a fungal enzyme called P-450. A similar enzyme in peanuts, also inactivated by these compounds, inhibits production of the plant growth hormone, gibberellin. Depending on how they are formulated these chemicals can be fungicidal, growth regulating or both. Kvien says a number of U.S. chemical companies have been exploring their potential for peanuts, apples, pecans and peaches. Though not stop-drop chemicals, they could benefit orchard owners by limiting the need for costly pruning.

News briefs

• Based on studies suggesting carbon tetrachloride to be a human carcinogen, EPA has announced plans to list the chemical as a hazardous air pollutant under the Clean Air Act. The compound is so extremely stable that emissions disperse globally and have accumulated to the point where they can be measured virtually anywhere in the world.

EPA estimates that as many as 69 cancer cases attributable to carbon tetrachloride may occur annually in the United States. Elsewhere, another 250 cases per year might be caused by emissions generated in the United States, the agency reports.

• EPA has just issued two reports giving practical guidelines on controlling or removing asbestos. The first is for building owners and custodians. The second, in both English and Spanish, is aimed at helping custodial staffs recognize asbestos. Copies can be obtained by calling EPA's Office of Toxic Substances toll free at: (800) 424-9065.

Physical Sciences

Dietrick E. Thomsen reports from San Francisco at the International Conference on Magnetism

Swinging magnetic bacteria

Magnetic bacteria contain chains of magnetic material by which they orient themselves in the earth's magnetic field (SN: 8/11/84, p. 87). Presumably these orientations help them find food. A group of Brazilian scientists has been working with the south-seeking magnetic bacteria found in Brazilian waters to determine their magnetic moment and the efficiency with which they reorient themselves in a suddenly changed magnetic field.

Magnetic moment is a measure of an object's intrinsic magnetism and also of the strength of its response to a magnetic field imposed from outside. Magnetic bacteria have not yet been successfully cultured, so the researchers used wild ones collected from waters 50 centimeters deep in the region of Rio de Janeiro. They froze a sample containing 100 million cells per cubic centimeter and measured the magnetic moment with a magnetometer. They then calculated what the magnetic moment ought to be from the amount of magnetic material in a bacterium, assuming the material to be 80 percent magnetite (Fe_3O_4). The average magnetic moment per cell came to 1.8×10^{-12} electromagnetic units with the magnetometer and 1.3×10^{-12} electromagnetic units by calculation — a good agreement, they say.

Magnetic moments of individual cells tend to vary according to the size of the cell from 3×10^{-13} electromagnetic units for the smallest to 54×10^{-12} electromagnetic units for the largest. Studies of the time they took to turn about after sudden reversals of the magnetic field indicate that the reversal time (which varies by size from one-half second to 50 seconds) is smaller than the mean time of other perturbations that take place in the organisms' environment, and the energy of the magnetic interaction is greater than the thermal disorder energy. This indicates that the magnetic mechanism is efficient for putting and holding the cells in a particular orientation. The researchers are Darcy Motta Esquivel, Henrique Luis de Barros, E. Wajnberg and L.H. Souza of the Brazilian Center for Physical Research in Rio de Janeiro.

Eels lack magnetic compasses

The discovery of magnetic bacteria led scientists to wonder whether other organisms might have built-in magnetic compasses. Many species of birds and fish migrate long distances with uncanny precision of navigation, and it seems an attractive suggestion that they use the earth's magnetic field for direction.

One such species is the European eel, *Anguilla anguilla L.* Researchers from Chalmers University of Technology in Gothenburg, Sweden, and the University of Gothenburg dissected European eels (using nonmagnetic tools) in search of magnetic materials. Although they found materials in several parts of the eel's anatomy that show a magnetic susceptibility, none of these could be lined up in chains of single magnetic domains all oriented in the same direction, as is the magnetic material in magnetotaxic bacteria. So the researchers conclude that they have been unable to find any evidence for a magnetic compass in European eels.

Magnetism enhances immunology

The immunologic reaction of a given antibody with its antigen can be measured by collecting the products of the interaction on microscope slides prepared to adsorb them. The adsorption can be enhanced by using nickel-plated slides that have been submitted to a magnetic field, reports L.T. Ho of the Institute of Physics of the Academia Sinica in Taipei, Taiwan. The imposed field lines up magnetic domains in the nickel, and this somehow enhances adsorption. Nickel-plated slides can thus be used, Ho suggests, to improve the detection of immunologic reactions in extremely dilute solutions of antigen.