BIOLOGY

Nipping plant disease in the bud

A technique first used in research on human viral diseases has just branched out into plant pathology. Richard H. Converse of the U.S. Department of Agriculture reports that the adapted method can detect viruses in young fruit plants and trees with 100 times the sensitivity of other techniques. Previously, viruses could stay hidden in a young plant for months or even years. By the time disease symptoms appeared, it was too late to save the plant. The new technique, called ELISA for enzyme-linked immunosorbent assay, also allows horticulturists for the first time to detect viruses in dormant fruit stock. Converse says the technique works on red raspberries, apples, peaches, soybeans, potatoes and other fruit and seed crops.

More to soda than the fizz

Nutritionists today are doing more than cringing at soft drinks. Some are analyzing the mineral and caloric content. Soft drinks and mixers may contribute appreciable amounts of sodium, phosphorus and, of course, calories to people's diets, Kent K. Stewart reports. He and other U.S. Department of Agriculture scientists analytically sampled 30 soft drinks from the Washington area. They find that caloric and sodium content varies greatly, even among drinks of the same flavor. Club soda, for example, varied more than 20-fold from the lowest sodium (0.36 milligrams per ounce) to the highest sodium (9.8 milligrams per ounce) brand. The club sodas and Perrier mineral water had no calories, while the other soft drinks, including tonic water, averaged 13 calories per ounce. Phosphorus content ranged from zero in Perrier to 5.4 milligrams per ounce in one cherry cola. A 16-ounce bottle of that cherry cola thus would provide more than 10 percent of the recommended daily phosphorus allowance. Potassium content ranged from 0.02 milligrams per ounce (Perrier) to 2.3 milligrams per ounce in Canada Dry Collins mix. Stewart says the level of phosphorus, sodium and calories in the diet can be nutritionally important, particularly for bone and teeth development, hypertension and obesity. He and colleagues are now planning a more comprehensive study with nationwide sampling of soft drinks.

Peptide hormones: A reverse strategy

Most peptide hormones have been identified by their biological activities, and chemical characterization followed some time thereafter. Now in Sweden scientists Kazuhiko Tatemoto and Viktor Mutt have devised a system for first detecting hormones chemically. They report in the June 5 NATURE two peptides isolated on the basis of a terminal amide found in many biologically active peptides. Each new hormone is biologically active, related to known peptide hormones and appears to be present not only in pig intestine but also in pig brain.

Puddings and pies for Miss Muffet

Eighteen billion pounds of whey are discarded each year by U.S. cheese manufacturers. Now an Ohio State University scientist has developed a recipe for turning that watery by-product into nutritious curds. Andrew C. Peng converts a pound of cheese whey, a pound of soybeans, water and salts into 14 pounds of whey-soybean curd. The gelatinous curd, which he estimates to cost about 10 cents a pound to make, could be an economical and nutritionally balanced base for yogurt, puddings and pie fillings. The curd that Peng expects to be most palatable in the United States has a bland flavor, tasting of neither milk nor beans, and accepts such artificial flavors as strawberry, coffee, vanilla and tangerine.

EARTH SCIENCES

Susan West reports from Toronto at the spring meeting of the American Geophysical Union

Fertilizing atmospheric ammonia

A recently developed ability to measure the vertical distribution of extremely small ammonia concentrations in the atmosphere has revealed that ammonium nitrate fertilizers may be the largest regional source of atmospheric ammonia, according to researchers at NASA's Langley Research Center.

Ammonia is a crucial trace gas: It controls the acidity of the atmosphere, it has a "greenhouse effect" and it may lead to production of nitrogen oxides that destroy ozone. Previously, the only available measurements gave total atmospheric ammonia and it was thought to be highest in the late summer when soil temperatures and microbiological reactions in the soil are high.

Joe Levine, James M. Hoell and Tommy R. Augustsson installed an Infrared Heterodyne Radiometer—which measures the vertical distribution of ammonia by analyzing the solar spectrum—on a building at the NASA facility in Hampton, Va. From February to March of 1979—coinciding with seasonal fertilization—they found a ten-fold increase in atmospheric ammonia, from a background level of 1 to 2½ parts per billion to 8 to 10 ppb. While it remains to be seen how widespread the phenomenon is, the researchers say, "The application of ammonium nitrate agricultural fertilizer may represent the largest anthropogenic perturbation to atmospheric composition yet detected."

Forecast: Clear, high near 90, moths

Question: How can you tell when the sunflower moths are going to attack the sunflowers of Saskatchewan?

Answer: Call the weather service.

Well, almost. There are certain meteorological clues that can forewarn sunflower growers of the ravaging onslaught of the moths, according to Canadian government researchers D.J. Bauer and Alfred P. Arthur.

The sunflower moth, *Homoesoma electellum,* is particularly difficult to control by conventional techniques. Following its early summer migration from Texas or Nebraska to Saskatchewan, the female lays its eggs on the newly bloomed sunflowers. The young larvae feed on the flower tops, where they are vulnerable to pesticide sprays, but as they mature, the larvae burrow inside the flower and out of the reach of pesticides. Because the moths are very small—about 10 millimeters long—their presence often goes unnoticed until the larvae have dug in. Therefore, say Bauer and Arthur, because any control measures must be taken within a week or ten days of the moths' arrival, the best protection would be an early warning device so growers can have their pesticides ready.

Using data on the moths' arrival times in 1975 and 1976 and weather maps for those periods, the researchers looked for common conditions that might touch off the migration. They found that the moths seem to take flight in late June and early July when: (1) surface temperatures in Texas and Nebraska reach about 90 °F, (2) a large high-pressure system develops over the eastern United States and a low forms just east or over the Rockies, creating a warm flow of air from the south and (3) unstable conditions produce rising air currents that would keep the moths airborne.

To test their hypothesis the researchers baited pheromone-type traps with virgin females and placed them in several sunflower fields during the summers of 1977, 1978 and 1979. They then watched for the appropriate weather conditions and monitored the traps. Five times the researchers scored: When they spotted auspicious weather patterns and predicted arrivals, more moths showed up in the traps. With the tally now five successes and one failure, the researchers say, "Growers can be alerted to possible influxes so that they may monitor their fields ...and decide on what actions they wish to take."