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USDA Research

Food Poisoning Detection Tests Patented

Saumya Bhaduri, USDA molecular microbiologist, has developed and patented a test that detects quickly (within 5 minutes) a relatively unknown food-poisoning bacterium.

The test uses a crystal violet dye which binds to disease-causing strains of the bacterium *Yersinia enterocolitica*, but not to harmless strains. The crystal dye method does not allow for further testing, however, because the bacterium is killed by the test. A newer test also being patented uses Congo red dye. The Congo red dye test is especially useful in field laboratories of food processing plants, hospitals, and sewage treatment facilities where it is essential to isolate the organism live for detailed study.

Y. enterocolitica can grow in dairy, beef, and other meat products at temperatures as low as 32 degrees F. The bacterium can reach infectious levels at refrigerated temperatures in 4 days. Once the organism is eaten in contaminated food, it grows in the human intestine and produces toxins, causing abdominal pains, diarrhea, and vomiting. Ingestion of contaminated foods or bottled water, contact with sick pets, and the transfusion of contaminated blood have been implicated as ways of transmitting *Y. enterocolitica*.

The new tests will make it easier for industry and regulatory agencies to safeguard food by pinpointing the *Y. enterocolitica* strains that are harmful. They are simpler, quicker, and more reliable than current tests, which are often inconclusive and can take days to complete.

The National Centers for Disease Control have received several reports of food poisoning from the bacterium in recent years. An outbreak last year in Fulton County, GA, was caused by children coming into contact with adults who were cleaning chitterlings. The bacterium has also become a major cause of food poisoning in the Netherlands, Belgium, Finland, Sweden, Germany, Italy, Ireland, Australia, Canada, and Japan.

Saumya Bhaduri, who works for USDA's Agricultural Research Service (ARS), explains that the tests rely on the dyes to bind to an unidentified substance produced in *Y. enterocolitica* strains containing a plasmid. A plasmid is a small piece of DNA that can be used to carry genetic messages. In this case, the presence of the plasmid converts a harmless strain to a disease-causing organism.

For more information, contact Saumya Bhaduri, Eastern Regional Research Center, Philadelphia, PA, (215) 233-6620.

Foreign Biocontrol Agents Fight Weed Pests

Increasing numbers of helpful weed-fighting insects and microorganisms are being imported into the United States.

ARS scientists based in Rome, Italy, shipped 33 times more weed enemies in 1990 than in 1980. Insects, mites, and pathogens are tested overseas and in this country, and then released to devour or otherwise control alien weeds.

ARS has stepped up the hunt for natural enemies as alternatives to chemical herbicides, says Lloyd Knutson, director of the ARS Biological Control of Weeds Laboratory in Rome. Some herbicides can injure subsequent crops or move into

ground water, he says. Also, weeds in some areas are showing resistance to the chemicals.

Since the Rome lab opened in 1959, 17 species have been identified that attack 15 different weeds.

For more information, contact Richard Soper, Biological Control, Beltsville, MD, (301) 344-3930.

Herbicides Help Weeds Self-Destruct

A class of herbicides has been discovered that causes weeds to overdose on their own natural chemicals.

Diphenyl ether herbicides, which are used on soybeans, cotton, and many other crops, disrupt weeds' production of chlorophyll. Consequently, a natural compound normally used by weeds to make chlorophyll builds up. This compound produces a form of toxic oxygen that destroys weeds' cell membranes.

This discovery helps scientists learn how chlorophyll synthesis is regulated in plants, and how to control how plants respond to stress, ARS researcher Stephen O. Duke says. He also hopes to make herbicides control a broader spectrum of weeds or reduce the amount needed.

For more information, contact Stephen O. Duke, Southern Weed Science Laboratory, Stoneville, MS, (601) 686-2311.

Forecasting Ground water Contamination

A team of ARS scientists is working out computer forecasts to tell if fertilizer applied to farmland will reach underground water sources.



Two new tests make it easier for industry and regulatory agencies to safeguard food by pinpointing *Y. enterocolitica*, a harmful bacteria that grows in dairy, beef, and other meat products.

Research on a computer model called GLEAMS is part of a national initiative to protect ground water from fertilizer and pesticide contamination, says team leader Ralph A. Leonard, an ARS soil scientist. GLEAMS tracks pesticides only, but scientists hope to expand it to include nitrates and phosphorus from commercial fertilizers and manure.

Reducing the loss of agricultural chemicals to ground water is a top priority of the research.

For more information, contact Ralph A. Leonard, Southeastern Watershed Research Laboratory, Tifton, GA, (912) 386-3462.

Flax for the Health Conscious

A new flax variety called Omega may please the cholesterol conscious.

Developed by ARS plant geneticist Jerry Miller in cooperation with North

Dakota State University, Omega's seeds contain omega-3, a family of fatty acids. Studies suggest that consuming moderate amounts of omega-3 and avoiding high-fat diets may help reduce the risk of cardiovascular disease.

In the United States, flax is typically sold for its oils, although some flax seed is sold in health food stores and bread made with flax is sold in some bakeries.

Omega may be in full production by 1992. A limited debut in commercial markets is scheduled for the early fall harvest this year.

For more information, contact Jerry Miller, Oilseeds Research, Northern Crop Science Laboratory, Fargo, ND, (701) 239-1381.

Oriental Persimmons—High in Vitamin C

Orange-red Oriental persimmons have about three times as much vitamin C as citrus.

Certain varieties provided 218 milligrams of ascorbic acid per 100 grams of fruit, or up to 363 percent of the recommended daily intake of vitamin C, says ARS scientist Jerry A. Payne.

The fruit is also high in fiber and a good source of potassium and vitamin A, Payne says. It can be grown as far north as central Georgia.

Persimmons can be eaten fresh and used in desserts, pies, jellies, and other products. They can be dried and eaten like candy or frozen and eaten like popsicles.

For more information, contact Jerry A. Payne, Southeastern Fruit and Tree Nut Research Laboratory, Byron, GA, (912) 956-5656. ■