

## Predator Bacterium Protects Against Fungal Plant Diseases

UNIVERSITY PARK, (Centre Co.) — Arnold Schwarzenegger doesn't have to worry, but if you're a fungus, watch out.

A predator bacterium, discovered by a Penn State researcher, seems to be on the top of the bacterial and fungal heap in respect to predatory behavior and may provide a biological control for common fungal-caused plant diseases.

"About 12 years ago, I stumbled onto a new group of bacteria that I call non-obligate bacterial predators," said Dr. L.E. Casida Jr., professor of microbiology.

Non-obligate predators act like other bacteria as long as soluble nutrients are available in the soil, but when nutrients are in short supply, they attack other bacteria or fungi for food.

"Over the years, I have found several new predator bacteria, and some of these bacteria would attack other predator bacteria," said Casida. "Every time I discovered a new strain, I'd test it to see which other predator bacteria it would attack."

With *Pseudomonas* strain 679-2, Casida finally found the bacterium at the top of the hierarchy. Nothing attacks strain 679-2 very quickly, and it attacks most bacteria and many fungi.

Predator bacteria that eat other bacteria are interesting, but one that also consumes fungus has potential for biological control of the fungal diseases that attack plants.

Current agricultural practices use chemical fungicides to control plant diseases. Everyone agrees that a naturally occurring biologi-

cal control agent for these problems would be a good idea.

Casida and Dr. F.L. Lukezic, professor of plant pathology, report on field trials that test the control of leaf spot diseases of alfalfa and tomatoes using *Pseudomonas* Strain 679-2, in the December issue of *Plant Disease*.

Lukezic conducted initial trials to ensure that the bacterium did not damage the plants. A suspension of the bacterium was then sprayed on the plants growing in test plots where fungal diseases were endemic.

"Strain 679-2 greatly reduced the incidence of fungal disease," said Casida.

While it may not be unusual to test biological organisms to control plant diseases, it is unusual to use predator bacteria.

Other biological control methods use organisms that excrete antibiotics or other chemicals into the environment. Strain 679-2 actually targets the specific bacteria or fungi and kills them.

Strain 679-2 controls bacteria and fungi by attaching onto the host cell and delivering a tiny amount of a toxic compound. This compound is water-soluble and generated in such small amounts that the researchers determined there is no danger from this naturally produced substance and no residual build up.

Laboratory tests of Strain 679-2 and its toxic compound show that control of fungal diseases can also occur at sublethal levels.

"It is not necessary for Strain 679-2 to kill the fungus outright," said Casida. "It only has to do enough damage so that the fungus

does not sporulate."

Inoculation of plants with Strain 679-2 is also not a problem because Casida can grow the bacterial cells in a medium that nutritionally programs the organisms for death. In the field trials, Strain 679-2 lasted for two to three weeks, long enough to control the fungal diseases, and then died out. A change in the nutritional programming, however, can allow Strain 679-2 to survive for prolonged periods.

Unlike many other bacteria, Strain 679-2 is highly resistant to copper and can be used in conjunction with chemical fungicides that are formulated with copper

containing compounds. These fungicides will not hamper the biological activity of Strain 679-2.

*Pseudomonas* Strain 679-2 in nature is quite rare. It was found in only one soil sample, and this sample was taken in one corner of one field in Pennsylvania. While it grows well in the laboratory apparently, it can not be permanently transferred to other soil areas.

"If you put it in soil, it will attack other bacteria and multiply, but eventually it dies out," said Casida. "It must be very sensitive to something, but I don't know what."

Casida is not sure why Strain 679-2 survives in one corner of

one field and nowhere else. Because only one strain of this bacterium has been found, taxonomists are reluctant to name this bacterium. Thus, it continues to be called Strain 679-2 for Casida's 679th experiment and the second organism he looked at in that experiment.

Penn State has applied for a patent on *Pseudomonas* Strain 679-2. Its agricultural applications as a biological control for leaf-fungal diseases are under continued investigation by Lukezic.

Casida is continuing attempts to figure out what holds Strain 679-2 in check in nature to explain why its occurrence is so rare.

## Beef Producers Say Mexican Tariffs Are An Outrage

WASHINGTON, D.C. — Reports of impending Mexican tariffs on their live slaughter cattle and beef imports is an outrage, said NCA President Jimmie Wilson, Trout Creek, Mont., in letters to Agriculture Secretary Edward Madigan and U.S. Trade Representative Carla Hills.

A plan to impose a 15 percent tariff on live slaughter cattle and carcass beef, a 20 percent tariff on fresh or chilled beef, and a 25 percent tariff on frozen beef is expected to be published in the Mexican version of the federal register, "Diario Oficial."

The tariffs are reportedly the results of internal pressure from Mexican cattlemen who believe they can not compete with U.S. producers because of high feed

prices in Mexico, and an increase in imports from other countries such as Australia and the European Community.

"Without question, this violates the spirit of the North American Free Trade Agreement (NAFTA)," said Wilson. "Trade is a two-way street, and the beef cattle industries in both countries have benefited enormously to date. However, this recent tariff action is contradictory and unacceptable."

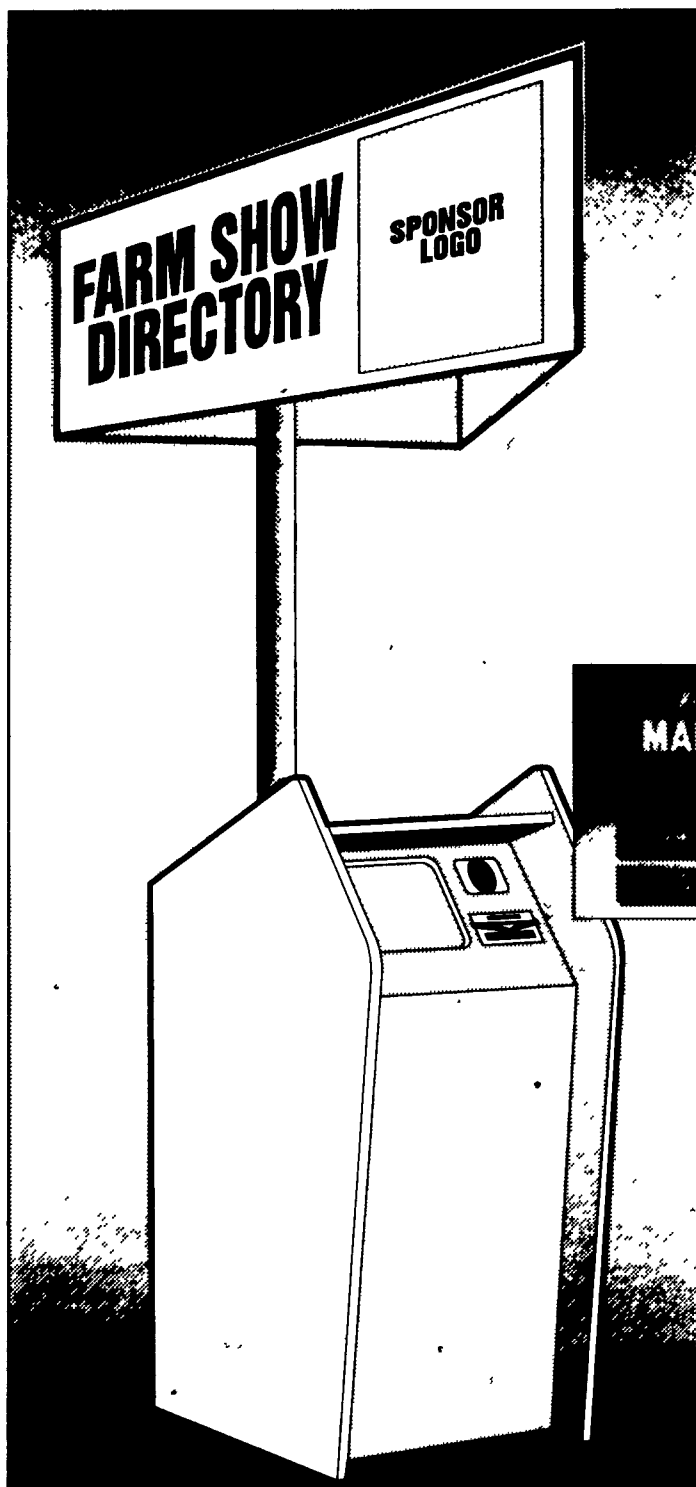
The Mexican market is an important market for U.S. live cattle and beef. In 1992, exports of beef will exceed \$225 million and live cattle will be approximately 250,000 head, Wilson told Madigan.

NCA is opposing the tariffs

based on principle. The tariffs are expected to have limited impact on the overall U.S. cattle market, according to Cattle-Fax, a market analysis firm. However, there may be an impact on regional markets.

U.S. cattle producers are proud of the trade relations that have been developed with Mexico and have been supportive of free trade between two countries by repeatedly testifying in favor of negotiations for a NAFTA, Wilson said.

The tariffs would be dropped on U.S. beef and cattle imports if the NAFTA agreement is signed next year and implemented in January 1994.



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