Entomologist Joseph C. Dickens observes a Colorado potato beetle's response to a blend of plant odors coming out of the tube at right. The beetle is walking atop a servosphere.

STEPHEN AUSMUS (K10194-1)

These Bugs Are On the Ball

Computerized Tracking System Shows What Pests Prefer

From a distance, through squinted eyes, it looks like a vehicle driving on the moon. But when you get closer, you see that it's actually a tiny bug making its way across the smooth terrain of a servosphere—an incandescent globe the size of a basketball.

At the Chemicals Affecting Insect Behavior Laboratory, in Beltsville, Maryland, entomologist Joseph C. Dickens uses this special, custom-made equipment to figure out which stimuli attract insects.

"There are a lot of basic behaviors we can track with the servosphere. We can find out how the insect reacts to plant odors and pheromones by watching how long it will walk toward either scent, for example," says Dickens. He can also assess the interaction between chemical and visual stimuli.

The servosphere was developed by SYNTECH, a manufacturer of custom scientific equipment, after discussions between Dickens and SYNTECH president Jan Van Der Pers. The instrument took 3 years to design and build.

Dickens, a behavioral physiologist for insects, essentially teases the bugs with different scents and other stimuli to gauge what turns them on. "We want to know more about their internal desires," says Dickens.

To find out how insects respond to various plant odors and insect pheromones, Dickens records the path they take across the servosphere. For example, a plant odor could have a very different influence than a sexual odor on the bug's walking pattern.

On the servosphere—also called a locomotion compensator—an insect's movements are tracked by specially developed software and fed into a computer. The computer activates two motors that turn the sphere to compensate for movements of the insect, in effect keeping the bug in place as it tries to reach the object of its desire.

The device is based on the first servosphere built at the Max Planck Institute for Behavioral Physiology in Seewiesen, Germany, in the 1970s but incorporates new technology. Key to its success is a specially designed attachment through which the

various scents may be funneled. The device allows air to be distributed in a consistent, even stream called a laminar flow.

Several experiments using the servosphere are in planning stages. Dickens and his colleagues have already identified volatiles released by potato plants that attract the Colorado potato beetle and a male-produced aggregation pheromone—one that attracts both sexes for feeding and mating.

When pests congregate in response to the best attractants, the possibility of catching or killing them increases. "We want to modify their behavior in such a way that we can manage them," says Dickens. These experiments should lead to development of optimal attractants combining chemical and visual signals.—By **Rosalie Marion Bliss,** ARS.

This research is part of Crop Production, Product Value, and Safety, an ARS National Program (#304) described on the World Wide Web at http://www.nps.ars.usda.gov.

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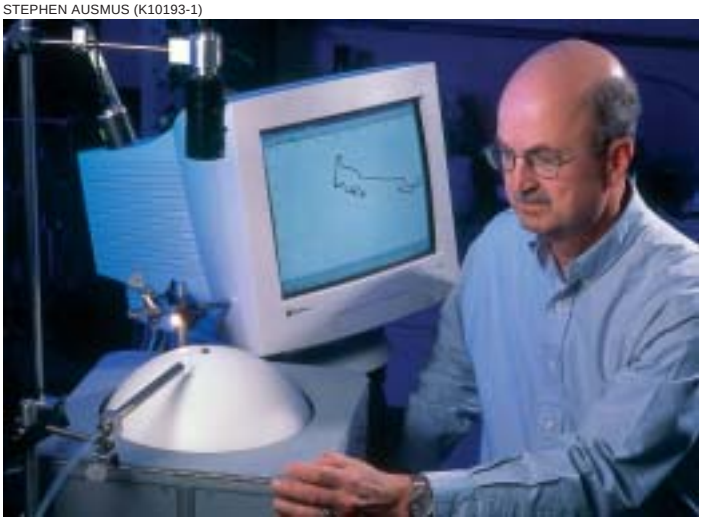
STEPHEN AUSMUS (K10193-1)



Entomologist Joseph Dickens uses the servosphere in conjunction with the computer program SphereTrack to determine how insects move in relation to external stimuli such as scent and light.

New Strain of Pearl Millet

Agricultural Research Service plant scientists have developed a new strain of pearl millet that may become an important U.S. grain crop.

Though pearl millet, a grain crop native to western Africa, is grown in the United States for forage, there is no established grain market for it. But research undertaken by geneticist Wayne Hanna and plant pathologist Jeff Wilson of ARS' Crop Genetics and Breeding Research Unit in Tifton, Georgia, may help create such a market.

The hot and sometimes arid summers of the southeastern United States can pose problems for growers of other crops. But pearl millet, native to the southern fringes of the Sahara Desert, thrives under these conditions. In Africa, it grows 10 feet tall and is a difficult crop to handle by U.S. standards.

Hanna and Wilson developed a new strain that grows only 4 feet tall, flowers earlier at 45 to 48 days, and produces higher yields of grain. The new hybrid can be harvested in 80 days, a short growing season that can offer flexibility on southeastern farms, and its compact size allows growers to use standard planting and harvesting equipment.

The protein- and calcium-rich grain may find a market as part of commercial poultry diets, which now consist mostly of corn and soy, with corn being the largest component.

Corn used for feed in large commercial poultry operations in Georgia and other southeastern states is shipped in from other states at great expense. Pearl millet may allow farmers in the region to supply some of the poultry industry's needs, significantly reducing costs, and at the same time open a new market for pearl millet.

Pearl millet's use may not be limited to poultry feed. In Africa, the highly nutritious grain is used mainly for human consumption. The grain may, in time, find a market in the U.S. food industry as well.—By **Sharon Durham,** ARS.

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