

# Chemical gives seeds "get-up-and-grow"

BELTSVILLE, Md. — Ever heard of polyethylene glycol? It's a chemical used in a host of industrial processes, and now research by two USDA scientists suggests it may increase yields of soybeans and other legumes.

Lowell W. Woodstock and Karl James Tao of USDA's Beltsville Agricultural Research Center in Maryland have found that soaking the embryo of soybean seeds with polyethylene glycol will improve the germination and early growth of aged or damaged seeds. In some cases, the effects of aging are almost completely avoided.

Woodstock and Tao found that proper germination and early growth depend partly on the seeds' ability to withstand rapid uptake of water immediately after planting. If the cell membranes have deteriorated because of age or damage, they tolerate water uptake less, and the swelling caused by water can further injure the membranes.

"The seed's embryo appears to

be the critical component when injuries occur from the rapid influx of water," says Woodstock, who is with the Seed Research Laboratory of Beltsville's Plant Genetics and Germplasm Institute.

During the first minutes of exposure to water, aged embryos lose six times more of the cell constituents than young, healthy embryos lose, Woodstock and Tao found. These may include the enzymes, nucleotides, amino acids, and organic and inorganic ions needed for the seeds' life processes.

In the experiments, PEG-treated embryos (from seeds which had first been "aged" by storing for up to 5 days at 106 degrees F. and 100 percent humidity), grew at a rate comparable to that of high-vigor embryos.

Woodstock and Tao theorize that PEG slows the seeds' water uptake, possibly giving cell membranes time to repair, thus reducing the leakage of cellular constituents. Cell membranes are

semipermeable, allowing smaller molecules such as water to enter while blocking larger molecules such as PEG. PEG's presence reduces the effective concentration of water molecules, and fewer water molecules hit (and pass through) the cell membrane in a given amount of time.

Although he reaffirms that there is no substitute for high-vigor seeds, Woodstock believes that polyethylene glycol might substantially increase the yields of soybeans, lima beans, peas, and other crops whose seeds are

such injury—

particularly when planting is followed by a cold spring rain.

Subsequent work by Woodstock and colleague Raymond B. Taylorson into PEG's effects on whole seeds has supported these findings. Results indicate that the chemical could also solve problems with the practice of soaking seeds in water before planting. Soaking encourages uniform and rapid germination, but it also causes some seeds considerable injury. In Beltsville tests, low-vigor soybean seeds not only were protected from soaking injury when PEG was added to the

water, but also actually grew better than PEG-treated, low-vigor seeds not soaked in water.

Work at the Boyce Thompson Institute in Ithaca, N.Y., has been equally encouraging, showing that a coating of PEG and gum arabic protects soybean seeds against chilling injury. "Gaps between the laboratory experiments and the actual field use of polyethylene glycol remain to be filled," Woodstock says. "But the results thus far suggest that we're on our way to improving soybean and other legume yields."

## U. S. Senate committee hears rural energy testimony

WASHINGTON, D.C. — Senator Jesse Helms, chairman of the Senate Committee on Agriculture, Nutrition, and Forestry, has announced hearings on rural energy policy will be held May 25-26.

Senator Mark Andrews (R-ND), chairman of the Subcommittee on Rural Development, Oversight, and Investigations, will conduct the hearings, which are scheduled for 1.30 p.m. in Room 324 Russell Senate Office Building.

Senator Andrews said the "Rural Energy Equity" hearings will investigate the extent of energy problems and will explore all avenues that will help the United States achieve energy independence.

"For quite some time I've been

deeply concerned over this country's lack of a cohesive energy policy. This is a serious omission which disturbs me even more during our present 'glut' of energy supplies and a prevailing attitude of complacency," Andrews said.

"As a farmer myself, I have some knowledge about how precarious our rural energy supply system is. Furthermore, I know something about the dependency farmers have on petroleum supplies at the critical planting and harvesting periods, which are dictated almost entirely by weather," he continued.

The North Dakota senator added that he is alarmed at what over-regulation, high production costs aggravated by repressive interest

rates, and the reluctance of some areas of the country to develop their own energy are doing to the entire energy industry.

Invited witnesses include the Electric Power Research Institute, Palo Alto, CA, the National Rural Electric Cooperative Association, the Basin Electric Power Co-Op of Bismarck, ND, the Georgia Power and Light Co., Atlanta, GA, the National Coal Association, the American Nuclear Energy Council, the National Food and Energy Council, the Consumer Federation of America, the Americans for Energy Independence, and the National Council of Farmer Cooperatives.

## Ag under fire

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Costa Rica and Honduras. U.S. exports are expected to fall further this fiscal year, primarily because of lower grain prices and reduced grain demand.

Although political and economic conditions are depressing U.S. sales for now, the Central American market has a lot of future growth potential when and if strong economic performance returns to the region.

"There is clearly a great deal of

latent demand for improved diets," says economist Donnel O'Flynn. In fact, during recent years, farm production hasn't even kept pace with population growth.

The fastest growing needs seem to be wheat and flour for human consumption, and feed grains and protein ingredients to expand livestock and poultry production in the short term, dairy and vegetable oil sales could also increase to offset local production declines.

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