Genetically engineered, pest-resistant seeds created and reported in journal Bio/Technology by team of researchers led by Maarten J. Chrispeels, professor of biology at UCSD

July 25, 1994

*Hold for Bio/Technoloqy embargo: July 25, 1994 Media Contact: Warren R. Froelich, (619) 534-8564
GENETICALLY ENGINEERED, PEST-RESISTANT SEEDS CREATED

Insects that normally feast on certain plant seeds were left malnourished and starving with the help of a transplanted gene that protected the seeds from these pests.

In a study reported in the August issue of the journal Bio/Technology, a team of researchers led by a biologist at the University of California, San Diego described how they conferred insect resistance to peas using a gene transplanted from the common kidney bean.

"This is the first time that seeds have been made resistant to insects," said Maarten J. Chrispeels, a professor of biology at UCSD.

Chrispeels noted that the stage was now set for the creation of genetically engineering insect-resistant seeds for cowpeas, blackeyed peas, chickpeas and mungbeans--important sources of protein in developing nations in Africa, Asia and South America.

"This is just one example of how genetic engineering, a method that allows scientists to transfer genes from one species to another, will help increase food supplies in the future," he said.

Other researchers who participated in the study include Richard E. Shade and Larry L. Murdock, of the Department of Entomology, Purdue University; Hartmut E. Schroeder, T.J.V. Higgins and Linda M. Tabe, of the Division of Plant Industry, the Commonwealth Scientific and Industrial Research Organization (CSIRO), Australia; and Jose J. Pueyo, of UCSD.

The quest for pest-resistant seeds in the developing world, in part, stems from the lack of insecticides generally available in the Western world. Insect larvae dine on the starch and protein of seeds stored in granaries, leaving little more than a seed shell after the insect larvae emerge as adults four to five weeks later.

Particularly devastating in Africa, Asia and Latin America are weevils that attack beans, black-eyed peas, chickpeas and mungbeans. From one weevil, an insect population of 2 1/2-million can arise in six months, virtually wiping out an entire granary of seed.

"This is a real problem in the Third World," said Chrispeels. "Crop losses there can be anywhere from a quarter to complete after harvest."

About five years ago, researchers discovered that larvae growth of cowpea weevils and Azuki bean weevils--from the family of Bruchidae (seed-feeding beetles)--could be stunted when fed a diet that inhibited amylase, a

protein needed to digest starch in the digestive tract. Subsequently, Chrispeels' laboratory identified the gene responsible for an amylase inhibitor protein found in the common kidney bean.

With this advance, Chrispeels speculated that by transferring the gene that encodes bean amylase inhibitor from the kidney bean into a legume species, he could make seeds that were indigestible to weevils. That transfer could not occur through classical plant breeding techniques, but it could be accomplished through genetic engineering.

The project was carried out with the help of T.J.V. Higgins and Hartmut Schroeder, experts in the introduction of genes into pea plants using biotechnology techniques. A team of researchers at Purdue University, led by Dick Shade and Larry Murdock, then tested those plants for insect resistance.

"The results were clear-cut," Chrispeels said. "The peas that contained the same amount of amylase inhibitor as is normally found in beans (about one percent of the weight) were totally resistant to the cowpea and Azuki bean weevils."

Chrispeels plans to isolate other pest-resistant genes from wild beans found in Mexico; afterward, he will collaborate with other researchers to transfer these genes into important protein-rich legumes.

*(Please note: Maarten Chrispeels will be available for interviews from July 18-July 22 and after July 28)