

US agrigenetics

Suit filed against NIH

Washington

THREE environmental groups last week filed suit against the National Institutes of Health (NIH) in an attempt to prevent a University of California research team from going ahead with field trials in an experiment that would, for the first time, release genetically engineered organisms into the general environment.

The experiment, approved last April by the NIH Recombinant DNA Advisory Committee (RAC), is designed to enhance the frost resistance of crops by displacing naturally occurring bacteria that promote the nucleation of ice crystals on plants with a genetically engineered mutant in which the ice nucleation properties are deleted (see box). The principal investigators, Steven Lindow and Nickolas Panopoulos of the plant pathology department at the University of California, Berkeley, plan to spray crops with the experimental mutant at a site near Lake Tulane, California, early next year.

In papers filed with a federal court in the District of Columbia, the environmental groups claim that releasing recombinant DNA mutants could have damaging ecological consequences akin to those caused by introducing "exotic" organisms — such as the gypsy moth and the kudzu weed — into new environments. They also suggest that the frost-resistant bacteria might rise

into the upper atmosphere, inhibiting the natural formation of ice crystals and disrupting the global climate.

The suit was instigated by Jeremy Rifkin, author of a controversial recent book on genetic engineering (*Algeny*, Viking, May 1983) and a veteran advocate of stricter federal controls of recombinant DNA techniques. Rifkin is president of the Foundation on Economic Trends and organized the publication last June of a resolution in which a group of religious leaders called on Congress to prohibit genetic experiments designed to alter the human germ line (see *Nature* 16 June, p.563).

Other plaintiffs in the suit are two Washington-based non-profit groups, Environmental Action Inc. and Environmental Task Force, and Michael Fox, scientific director of the Humane Society of the United States. Fox said the society, an influential animal welfare lobby with 200,000 members, was not a party to the suit but planned to issue a statement later in the year drawing attention to the dangers of genetic engineering.

A number of professional ecologists added their voices to complaints about the proposed experiment. Eugene Odum, professor of ecology at the University of Georgia, said that at least a year of study of experimental releases in greenhouse

conditions should precede any general release of new organisms; and David Pimental, professor of insect ecology and agricultural science at Cornell University, urged "the greatest precautions" before any genetically engineered organism is released.

The principal legal question raised by the suit is whether NIH should have issued an environmental impact assessment before approving any experiments in which genetically engineered organisms are released into the environment. Under the National Environmental Protection Act (NEPA), agencies are required to make such an assessment whenever a federal decision is likely to have a "significant" impact on the environment.

Lindow and Panopoulos, and a spokesman for NIH, said last week that the frost retardation experiment was not expected to have a significant impact on the environment. They pointed out that the dimensions of the experiment were small, having been reduced from six proposed test sites to only one, and that similar experiments had already taken place using classical mutagenic techniques.

The plaintiffs counter that the impact of a new organism cannot be predicted and that similar experiments should therefore be deferred until techniques have been further refined for assessing the likely consequences.

The suit also raises new questions about the federal government's control of recombinant DNA experiments and products, arguing for example, that RAC is dominated by members with expertise in human pathology and genetics and contains no botanists, plant pathologists or ecologists capable of assessing environmental risks associated with the new class of experiments.

But Dr William Gartland, head of the NIH recombinant DNA activities office, said that when it approved the frost retardation experiment, the RAC included two members with a background in agricultural sciences and a third non-voting member with special expertise in the area. In addition, NIH had obtained the approval of the Department of Agriculture RAC even though all federal agencies are bound to accept NIH decisions concerning the release of genetically engineered organisms.

The frost retardation project is the third experiment approved by RAC in which genetically engineered organisms are released into the environment. The others involve the planting of genetically engineered corn, tomato and tobacco crops, but in none of these cases are field trials imminent.

Last April, RAC also relaxed its regulations by ruling that researchers would no longer have to apply for a formal exemption from the committee's rules in order to field-test genetically engineered plants (see *Nature* 21 April, p.644).

Peter David

How bacteria can protect plants

THE startling notion that frost damage to plants is often catalysed by bacteria has won ground only in the past decade, chiefly on the strength of experiments in which bacterial populations on the surface of vegetation have been altered, by the external application of antibiotics. Experiments have also shown that ice does not form on a plant's surface free from ice-nucleation bacteria even at temperatures below -10°C .

The two bacterial species included in the proposed field trial, *Pseudomonas syringae* and *Erwinia herbicola*, have been identified (principally by the Berkeley group) as the most common cause of frost damage to growing plants, and have been shown to produce ice nuclei only just below freezing point, at around -1.8°C . From the outset, it has been apparent that only a small fraction of the bacteria infecting a plant surface would serve as nucleation centres, but that they could remain effective as such even when killed (by antibiotics for example). That the bacterial cause of ice-nucleation is a protein gene product was conclusively demonstrated only last year when the genes were isolated from bacterial genomic DNA and expressed in *Escherichia coli* (C. G. Omer *et al. Phytopathology* 72, 1000; 1982). The plan for the proposed field trial

is that bacteria should be engineered in such a way that the genome is identical with that of a vigorous naturally occurring organism except that the ice-nucleation gene is deleted. The authors of the proposal say that the result should be a genetically stable strain whose fitness would not be impaired by mutations elsewhere in the genome, as would be likely to be produced by chemical mutagens.

This is an important consideration because bacteria lacking the ice-nucleation gene and sprayed on plant surfaces would be effective only if they were able to diminish the proportion of bacteria capable of nucleating ice crystals. If the wild and engineered bacteria have equal success, sheer numbers may help. If the engineered bacteria were less fit, they would be ineffective. One of the objectives of the planned trial is to select, on the basis of experiment, engineered strains effective for particular crops.

One of the controversial features of the experiment (which explains earlier rejections of the proposal by RAC) is the plan to use an antibiotic. The authors of the proposal emphasized in their latest version that the resistance would reside in genomic and not plasmid genes.

Peter David