

Cornell stressing varied acid rain studies

ITHACA, N.Y. — From studying the effects of liming acidic lakes to calculating electricity customer costs of pollution, many Cornell University scientists are researching acid precipitation.

More than 50 people here are involved in research projects pertaining to the effects of acid rain, defined as precipitation including hail, snow, sleet, fog, gases, and dust that has high concentrations of sulfuric acid and nitric acid. Acid rain is a potential threat to lakes, rivers, agricultural crops, soils, forests, drinking water, and even to man-made objects such as buildings, statues, and painted surfaces, according to many scientists.

Several hundred lakes in New York State's Adirondack Mountains, for example, have become too acidic to support fish life and the cause is attributed to acid precipitation. Damage to forests in the Northeast, blamed by some on acid rain, is another concern.

Cornell research ranges from studies of water and terrestrial ecosystems, and atmospheric processes, to monitoring, economics, and communication. The following is a sampling of some of the Cornell projects.

AQUATIC ECOSYSTEMS

- * the effects of neutralizing the acidity of several lakes in the Adirondacks with lime and how long those lakes can sustain fish life again is being studied by Carl Schofield of the department of natural resources and Steven Gloss, Cooperative Fish and Wildlife Research Unit biologist.
- * stream acidification in the

Adirondacks and the Smokies, and aluminum cycling in relation to acid rain in forested watersheds is being examined by Schofield.

- * brook trout that are resistant to at least marginal conditions of acidity are being developed by Schofield and Dwight Webster in an attempt to preserve the recreational value of the lakes in the Adirondacks. The fishery scientists point out that this is an interim measure until a permanent solution to the acid rain problem is forthcoming.
- * how sodium bicarbonate — commonly known as baking soda — can neutralize Adirondack lakes and support fish populations is being analyzed by James Bisogni, associate professor of environmental engineering.
- * looking for the relationship between lake water chemistry and the kinds of algae and sediments present in acidified lakes is the project of Jesse Ford, a researcher in the Ecosystems Research Center. She is using that information to sort out the history of the biological and chemical effects of acid rain on New Hampshire and Vermont lakes.
- * an analysis of why New Hampshire lakes, which receive as much acid deposition and have similar geological features as lakes in the Adirondacks, are not as adversely affected as upstate New York lakes is being conducted by Ford and Schofield.
- * the effects of acid rain on aluminum transport in stream ecosystems is being researched by Christine Shoemaker, associate professor of environmental

engineering. She is working on the development of a model that incorporates the effects of water hydrology on stream chemistry and aluminum mobilization.

TERRESTRIAL ECOSYSTEMS:

- * the biological processes that take place in soil impacted by acid rain are being examined by soil microbiologist Martin Alexander, professor in the department of agronomy.
- * field and greenhouse experiments on the removal of pesticides from agricultural crops by acidic rain are being conducted by Laurence Heller and Joe Osmelowski of the Boyce Thompson Institute for Plant Research located at Cornell.
- * To assess possible effects of acid precipitation on forest productivity, Philip Dixon, a graduate student in ecology and systematics, is analyzing long-term tree growth records from the eastern U.S. He hopes to determine whether patterns of tree growth and mortality have changed in the past 30 years.
- * the effects of acid rain and other pollutants and their influences on growth and productivity of agricultural plants is being studied by Jay Jacobson, a plant physiologist at Boyce Thompson Institute. He is also working on interpreting scientific evidence for the development of public policy.
- * the influence of acid rain and ozone on photosynthesis and growth of Northeastern forest tree species are being examined by Robert Amundson and Peter Reich, environmental biologists at Boyce Thompson.
- * how sensitivity of forest trees to acid rain varies throughout the Northeast is the thrust of the work being done by researcher David Weinstein in the Ecosystems Research Center.
- * how environmental stresses affect forest-tree physiological processes and forest ecosystem dynamics is being pursued by forest tree ecophysiological James Lassoie, associate professor of natural resources.
- * the effects of acid rain on tree pollen is being studied by Debbie van Ryn, a graduate student in the department of natural resources.
- * soil chemical mechanisms responsible for interactions between forest soils and acid

precipitation as well as spatial variability of forest soil chemical properties and the fundamental chemistry of acid forest soils are the projects of Susan Riha, associate professor, and Bruce James, research associate, both in the department of agronomy.

ATMOSPHERIC PROCESSES

- * high elevation forests appear to be more seriously damaged by acid deposition than lower elevations. In an effort to find out why, Gene Likens, adjunct professor of ecology and systematics, is collecting cloud water chemistry data from several sites around the U.S., including Alaska and Hubbard Brook, New Hampshire.
- * particulate aerosols in the atmosphere, which lead to "dry" deposition, are being studied by Thomas Butler, a researcher in ecology and systematics. He is trying to characterize mineralogy of the dust particles to determine what effect they may have on the chemistry of rainfall.

MONITORING

- * in a long-term monitoring project, Butler operates a site on Connecticut Hill (Tompkins County) which is part of the Multi-State Atmospheric Power Production Pollution Study (MAP 3S), a network of nine sites in the eastern U.S. Butler monitors the chemistry of every storm.
- * the background chemistry of rain in remote areas of the world is another project under Likens. The

Global Precipitation Chemistry Project, with sites primarily in remote areas of the southern hemisphere, serves to collect rainwater that presumably is unaffected by pollution. The information gathered is to serve as a comparison for rain that has become acidic because of man's activities.

ECONOMICS

- * trying to model the physical and economic aspects of controlling sulfur emissions from power plants is the problem confronting Tim Mount and William Deehan, both in the department of agricultural economics. By examining in detail the utility industry in New York, which releases over half of the sulfur emissions in the State, the researchers are developing models that assess the customer costs of controlling pollution and the financial impact of reducing emissions on utilities.

COMMUNICATIONS

- * a project to examine how news media coverage of research on sensitive national issues affects public perceptions has been initiated by Carolyn Glynn, an assistant professor in the department of communication arts. She will be using acid precipitation as a case study.

Acid precipitation is a complex, international issue. To understand the severity and implications of the problem requires many research projects in many fields of study.

Pseudorabies meeting

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Dirty boots and human skin are excellent vehicles for the disease, but the manure pit is not, said the veterinarian, who pointed out that very little virus is shed in feces.


PRV probably does not travel long distances on the wind, and ingesting the virus in drinking water is not a major factor, said Beran.

One fundamental question raised at the meeting was whether or not an eradication program would be cost effective. Simply put, would it be cheaper to live with the disease as present levels, in light of the fact that PRV has no detrimental effect on the pork products themselves?

"The question of the economic feasibility of a control program

hasn't been answered yet," concluded the Iowa veterinarian, "and this is hopefully one of the answers that will come out of our pilot project."

But one strategy for dealing with PRV that has proven totally unacceptable for a number of stricken Pa. hog producers is forced depopulation with no indemnity. In response to a request from the Pa. Pork Producers Council, the Department of Agriculture's Bureau of Animal Industry has placed a moratorium on forced depopulation of infected herds until May 1, 1985. According to PPPC spokesman, John Henkel, the Bureau has asked the Council to recommend alternative methods for combating the disease.




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