Streams Can Clean Up Organic Pollution

All organic pollution need not be eliminated from streams to keep them clean enough to support trout and other clean-water life.

This is the findings of a study conducted by Dr. Kenneth W. Cummins, fresh-water ecologist from Michigan State University's Kellogg Biological Station. He conducted a stream leaf-litter study to determine how fast a stream decomposes organic matter.

Cummins worked closely with systems scientists and engineers. They "enriched" experimental and control streams with large quantities of water-soluble organic matter made from leaves to see what materials the stream could clean up.

"We really loaded the stream with dissolved organic material at quantities of about 1 part of the organic matter for every 25,000 parts of stream water," said Dr. Cummins. That is 10 times the natural levels of organic matter from leaves in a typical trout stream.

"Some pretty resistant stuff comes out of such natural leaf litter. This was very complex organic material with substances including organic acids, cellulose, phenolic compounds and tannic acids," he continued.

Bacterial count per mililiter went from several thousand to six million and then back to several thousand. This explosion of bacterial population turned the experimental stream dark brown. Oxygen levels fell before the bacterial growth reached its peak.

Oxygen depletion was probably mainly due to the organic matter shielding light from the algae growing on the rocks, determined Dr. Cummins.

There was enough mixing and turbulence in the stream to provide oxygen for the bacteria. The little additional oxygen previously manufactured by algae was no longer generated. Instead the tiny plants burned the stream's oxygen as did the bacteria.

Even when the oxygen levels sagged, the water was still 60 to 65 percent saturated with oxygen, said the researcher.

Turbulence is a device pollution fighters have used for a long time to increase oxygen levels in waterways.

The ecologist pointed out that water plants and animals did their clean-up jobs without massive mortality to either the animals or other components of the stream. After the first week and a half, except for minor variations, the experimental stream had pretty well returned to normal, the scientist reported.

Dr. Robert H. Boling, MSU engineer and systems scientist worked with Dr. Cummins and other ecologists in this test. "By assembling such data from this stream model system we can analyze similar streams," he said.

The research team expect that some of their findings will apply to other types of organic pollution, such as sewage and farm run-off of organic matter, but that many other controlled studies are needed before accurate predictions can be made.

Scientist Advocates Tailoring Plants To Soil

Tailoring plants to fit the soil may be more effective and economical in many cases than changing the soil to fit a particular plant, said a USDA soil scientist.

Dr. Charles D. Foy of Agricultural Research Service was speaking about strongly acid surface soils, subsoils, and mine spoils laced with toxic levels of aluminum and other mineral elements. The acidity makes the minerals more available to plants and limits their growth.

Dr. Foy, stationed at the U.S. Soils Laboratory, Beltsville, Md., said that mineral element toxicities cannot always be corrected economically by conventional liming and fertilization practices that neutralize the acidity. A promising approach is the selection or breeding of plants more specifically adapted to the growth-limiting factors present.

"A plant breeding approach has a tremendous potential for solving some of the more difficult soil management and mineral nutrition problems," the soil scientist said.

"In some cases," he said, "plant breeding may mean greatly increased yields of the crop species presently grown through the use of more tolerant varieties; in others, the increased food production may result from the introduction of more desirable crop species not previously adapted to a region."

He said any plant breeding program should include the identification of plant form, structure, function and chemical processes associated with tolerance to a given soil factor. These plant characteristics may be useful to plant breeders as screening tools for large plant populations.

"Plant varieties differing in tolerance to excess mineral elements are also valuable as indicators of metal toxicities in soils and as tools for studying the mechanisms of mineral element toxicity or tolerance in plants," Dr. Foy said.

"The understanding of such fundamental plant processes will almost certainly lead to improved soil fertilization and management practices," he concluded.

Miracle of the Land Stauffer Presentation

The role of crop-protection chemicals in raising our standard of living are examined at length in an audio-visual show, "Miracle on the Land," produced by Stauffer Chemical Company.

A battery of synchroized, tape-programed projectors, multiple screens, hundreds of color slides, and an orginal musical score are used to trace the history of American agriculture, from the ealiest settlers to the present, in this unique 20-minute show.

The basic message of the presentation is agriculture's importance to our national economy.

Before the 1860's, the American farmer produced enough to feed and clothe himself and three other persons. By World War II that figure had increased to himself and 11 others. In just the past quarter century the figure has grown to himself and 45 others.

With an exciting sound track and a whirlwind projection of slides, panoramas of agricultural America unfold across the five projection screens. The story reminds viewers that it was not easy to achieve our modern power to produce food for millions of city dwellers who are free of the need to go out and hunt for game or grow their own crops.

Without the technology of today's agriculture we would all be back on the land with a hoe, trying to grow our food, instead of having "the time to become scientists, doctors, artists, or put a man on the moon," "Miracle on the Land" points out.

Man has had to use his intelligence over thousands of years to adapt things to his needs. The same intelligence that brought him this far must continue to expand our modern miracle of agricultural production while working out problems of our environment, the show concludes.