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Soil Warming Being Studied

Waste heat from electrical power generating plants may some day be used to increase crop production by warming the soil. The idea is being explored by scientists at The Pennsylvania State University who report that such a system could increase production of many crops by 30 to 40 percent.

Fulton Grange Meets

Fulton Grange 66 met February 10, with Master Donald Trimble presiding. Membership Committee Chairman Richard Holloway urged members to get applications and try to get new members.

Norman Wood reported that State Grange was putting out a monthly newsletter concerning state legislation.

Lecturer Joyce Holloway announced the winners of the Junior Grange valentine contest as follows: Ages 6-10 - Prettiest, Oleta Fantom; Funniest, Krista Anderson; Best Verse, Dawn DeLong; Most Original, Lisa Duncan; Ages 11-14 - Prettiest, Scott Stauffer; Funniest, Sandy Galbreath; Best Verse, Chris McCardell; and Most Original, Sandy Galbreath.

Mr. and Mrs. Dennis Buchanan, Young Marrieds Committee Chairmen, introduced Mr. Henry Hackman from the Soil Conservation Service who presented slides and spoke on soil conservation.

As conceived at Penn State, soil warming is achieved by circulating hot water through a buried pipe network located in soil irrigated with treated municipal wastewater—another Penn State innovation. The circulating hot water is cooled and returned to the power plant for reuse.

Involved in the study are Dr. David R. DeWalle, associate professor of forest hydrology, Dr. Daniel D. Fritton, assistant professor of soil physics, and Dr. Louis T. Kardos, professor of soil physics—all with the College of Agriculture. The study was funded through the Institute for Research on Land and Water Resources at Penn State with a grant from the National Science Foundation.

For each unit of electrical energy generated, two units of waste heat are driven off and wasted, the Penn Staters point out. Estimates are that by 1980 a volume of condenser cooling water equal to about one-fifth of the annual water runoff in the U.S. will be needed to remove this waste heat from steam electric power plants.

The Penn State study shows that soil warming competes with heat dissipation methods currently used, such as wet and dry cooling towers operated by power plants. When the soil warming system becomes reality, increased crop production could become a byproduct of

waste disposal.

Such a soil warming system for crop production is economically feasible, the scientists point out. The electrical power needs of a city of one million people could supply waste heat for some 4500 acres of cropland. The cost would add 2.6 percent to the consumer electric bill compared with ocean cooling and 0.9 percent when compared with the popular wet-cooling towers.

The scientists say this may be a small price to pay for increased food production sometime in the future. Such soil warming is intermediate in cost between the natural draft wet-cooling towers which are becoming the most popular cooling system for large power plants and dry-cooling towers used only occasionally because of their high cost.

Many beneficial uses of waste heat have been proposed in agriculture, aquaculture, sewage treatment, and household heating. Uses in agriculture include soil warming, greenhouse heating, and warmwater irrigation.

The findings are described in the Winter issue of "Science in Agriculture,"

the quarterly magazine of the Agricultural Experiment Station at Penn State. By early March, free copies will be available from the Mailing Room, 112 Agricultural Administration Building, University Park, Pa. 16802.

An economic systems analysis of soil warming was carried out by faculty in the Department of Civil Engineering at Penn State. Construction, operation, and maintenance costs were calculated for the conceived system. Existing soil heat flow and climatological measurements and theories were contributed by College of Agriculture faculty. A nuclear power plant mathematical model was revised to fit the analysis by Penn State faculty in the Department of Nuclear Engineering.

College of Agriculture faculty members will next investigate actual crop responses to soil warming on a one-quarter acre plot of university land. The work will also analyze how well treated municipal wastewater can be renovated under heated soil conditions

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