

just as bad as that of the 1930's. Soil blowing was not nearly as serious as it was 20 or 25 years earlier. At Dodge City, Kans., in 1936-37 there were 120 days of blowing dust. At the same location under comparable conditions in 1956-57 there were only 40 days of blowing dust.

Studies started by the Department of Agriculture back in the twenties showed that graded cropland terraces can reduce soil erosion and sediment delivery; and in combination with such practices as crop rotations, mulching, minimum tillage can reduce soil loss from cultivated fields to practically nothing. Converting croplands to good grasslands, pasture, or woodlands can nearly eliminate sediment delivery.

The Department of Agriculture has had a major impact on the conservation and protection of soil and water resources and the preservation and enhancement of natural beauty through its vigorous programs of research, technical help, land management, credit, and cost-sharing assistance. USDA has provided help in contour farming on 43,900,000 acres, in 29,000 miles of hedgerow and 82,000 miles of wind-break planting, in building 1,600,000 acres of grassed waterways, in planting trees on 13 million acres, in preservation and development of 18 million acres of wetland and wildlife habitat. In fiscal year 1967, fire protection was provided on 210 million acres of forest. Farmers Home Administration loans and grants of \$200 million for construction of rural community water and waste disposal systems, \$28 million for development of rural recreation areas, and \$442 million for construction and repairs of homes and farm buildings were made. These measures aid soil stabilization, water conservation, control of runoff, and pollution control; they also improve the attractiveness of the landscape.

FERTILIZER RESEARCH

The Department of Agriculture has been studying the behavior of phosphorus in soils, water and plants for 80 years. We know there are only traces of phosphate actually in true solution in the soil. Phosphate is held on the surface of clay particles by high energies of retention. We have studied its chemical behavior extensively by using radioactive phosphorus as a tracer. We know that only minute amounts of phosphate move from our fields in runoff water except by their attachment to eroding soil. Soil conservation measures obviously, therefore, are the first measure of defense against pollution.

Nitrogen is another matter. That which is present as nitrate is highly soluble and will readily move with water if not absorbed by plant roots. Studies in Colorado at the turn of the century show that it is part of natural processes for nitrate to accumulate in some soils. We know that more nitrate may leach out of unfertilized, uncropped soils than from those well fertilized and growing a crop. Roots are avid absorbers of nitrate.

We have developed and provided information on proper fertilizer placement, timing of application, and optimal levels of needed applications for the different agricultural soils of the United States to help the farmer gain maximum beneficial use of his purchased fertilizer, while minimizing losses to the environment.