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Production Research . . . and Environmental Quality

ALTHOUGH THERE is a reasonable range for differences of opinion on how our activities affect the environment, it is generally agreed that our research and educational efforts have not been extensive enough to allow for the understanding, measurement, and management of our land, water, and air resources—as currently demanded by society.

To understand, measure, and manage the earth's resources requires more than to merely achieve maximum production. Agricultural production techniques have traditionally involved operations made at daily, weekly, or monthly intervals, with a few essential functions carried out on a seasonal or yearly basis. Seldom have we needed to anticipate the results of our actions in time spans of a decade. Yet in the environment, changes in water quality (for example seepage below the root zone into our groundwater supplies) take place gradually but steadily, and many such changes are hardly perceivable in less than a decade.

The same may be said for our daily disposal of quantities of food and fiber products, packaging materials, fuels, minerals, and other wastes which flow into and out of our irrigated basins, sprawling suburbs, and industrial areas. We must adjust our environmental time dimension to include decades, scores, and hundreds of years.

To measure the performance of nature, we need to improve our capability to measure the small rates of mass, and energy changes that occur in nature's time scale. Instead of measuring only capacities or amounts—such as pounds

of fertilizer, inches of rain or irrigation water, bushels or tons of crop yield, and numbers of head of cattle—we need to develop reliable methods of measuring such things as rates of water percolating through our soils under specific crops, rates of decomposition of organic materials, subtle soil temperature changes occurring under different kinds of land use, and rates of diffusion of gases.

In other words, management of the earth's resources, including production, should be achieved through a careful monitoring of all eco-biological rates. These studies, which reveal the cleansing and regenerating capacity of land, water, and air, also force us to recognize that these are not unlimited, free resources to be squandered.

Crop or animal scientists conducting field experiments to improve biological production must also measure and understand the impact and the consequences of any management changes resulting from these studies of our natural resources. No longer can we be satisfied to measure their effectiveness only in terms of yield. Similar examination must also be given to our processing and distribution systems. It is essential that these environmental concepts be developed by the scientists presently carrying out our production research, even though in most cases, it will require a substantial redirection of effort and philosophy. The expertise already available in the Division of Agricultural Sciences is more than adequate to provide the leadership essential for the management of our natural resources and environment.