

Agricultural Research Doesn't Cost, It Pays, Thanks to the Coordinated American System

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Would you like to be investing in an endeavor that has brought annual rates of return of about 50 percent for half a century?

If you pay taxes, you are.

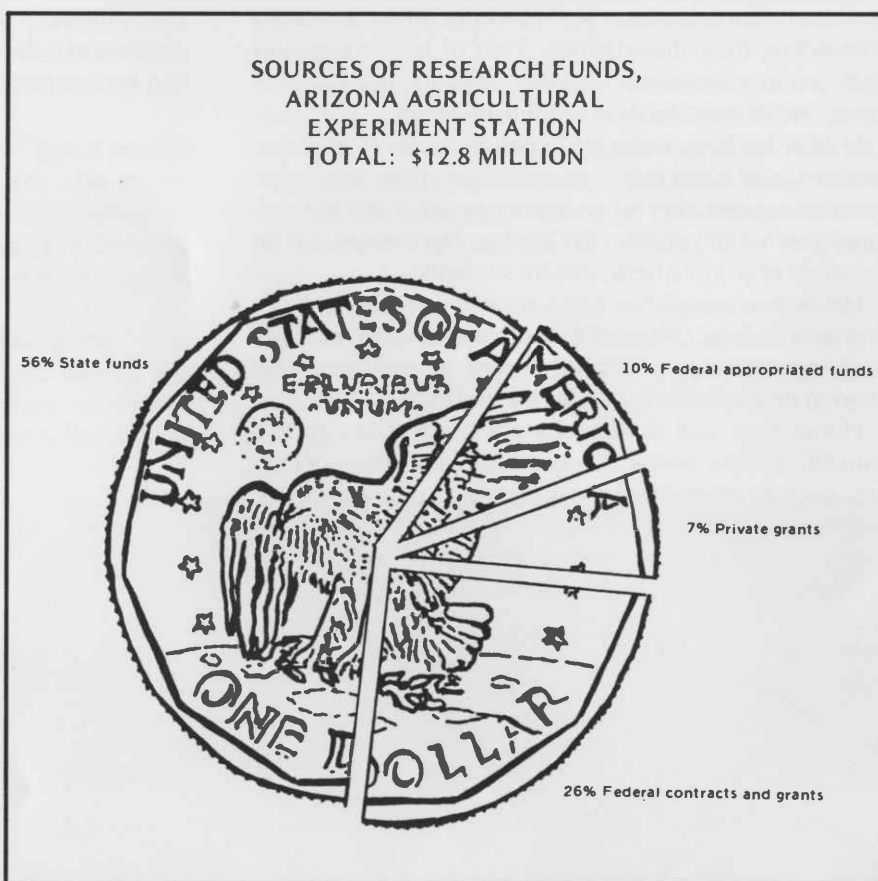
Federal and state governments invested about \$1.5 billion in agricultural research and extension in 1978. That comes to about \$20 per American family.

A recent report in *Science* magazine summarized 32 different studies of the long-term results of agricultural research and offered the 50 percent annual-rate-of-return average.

Most of the benefits of the increased agricultural productivity in the United States have gone to the consumer rather than the farmer. The increase has helped lower the portion of Americans' disposable income spent on food from 22 percent in 1950 to 17 percent today, the lowest in the world. The main reason for the drop is the doubling in total productivity of U.S. agriculture (the ratio of total outputs to total inputs) in the past 40 years.

Passing up the chance to invest at such high rates of return would be poor policy. In fact, economists at Virginia Polytechnic Institute recently figured that lowering federal funding for agricultural research by 10 percent for the next two decades would cost American consumers \$6.14 in higher food costs for each dollar saved by the government.

The studies of research as investment have varied widely in scope and method. Some look at a specific



crop in a specific country, such as the pioneering 1958 study of hybrid corn in the United States by Zvi Griliches. He found a 35-40 percent annual internal rate of return for hybrid corn research. Other studies inspect international effects of research in a crop, such as rice in Asia.

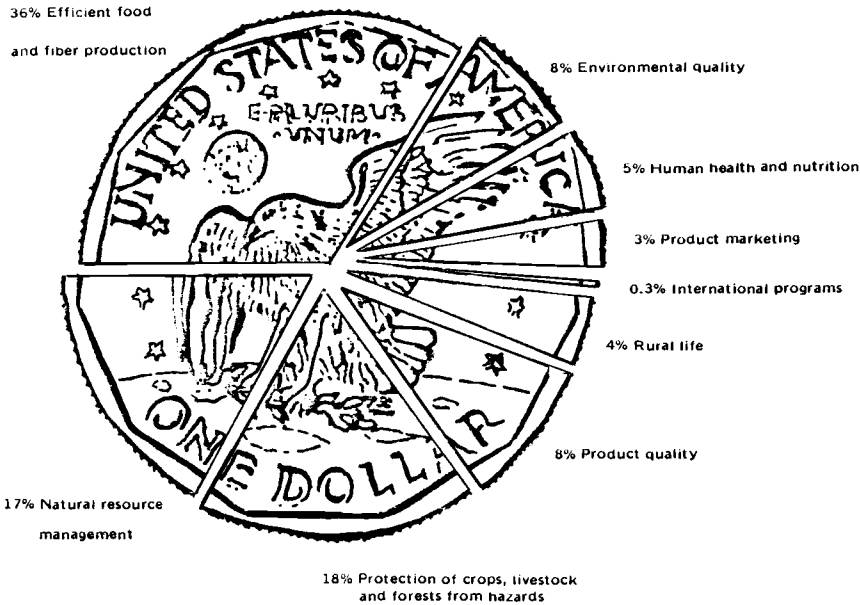
Costs and Benefits

Several researchers have evaluated the aggregate benefits of agri-

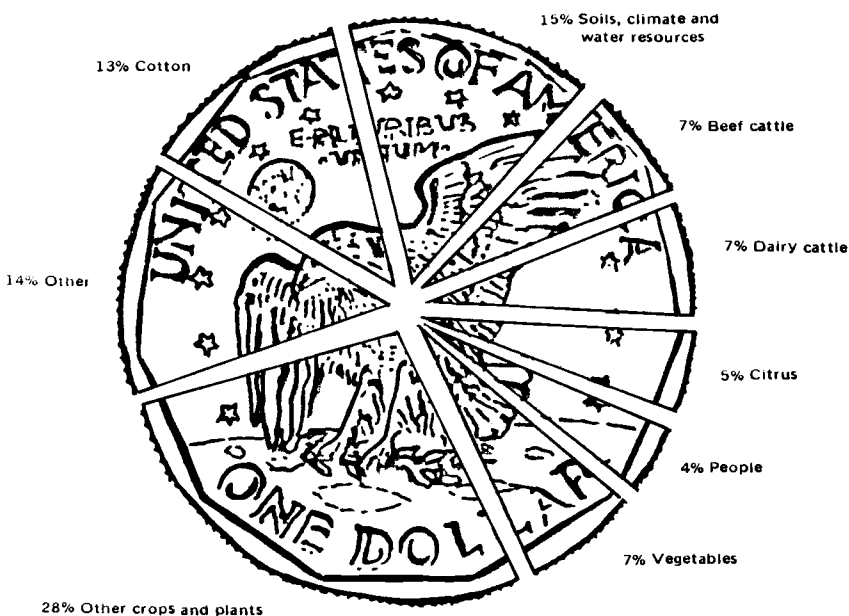
cultural research on all crops in the United States. Willis L. Peterson of the University of Minnesota, for example, figured that the total government cost of research and extension work from 1910 to 1967, \$9.4 billion, equaled only one-third of the production costs saved in 1967 alone because of that work.

The *Science* article by Robert E. Evenson, Paul E. Waggoner and Vernon W. Ruttan last September

RESEARCH EXPENDITURES,
BY SUBJECT AREA,
ARIZONA AGRICULTURAL
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RESEARCH EXPENDITURES,
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examined 32 of these studies and offered reasons for the excellent rate of return. One factor is the close connection in agricultural research between work in basic sciences and work in applied technology. Another is the interaction of research with the extension system for carrying new knowledge and developments directly to the people who can use them, and carrying ideas for needed research back to the scientists. The extension factor contributes 25 to 66 percent of the total increase in productivity in a variety of agricultural products, according to a study by University of Idaho economists.

The decentralization of the national agricultural research effort, with substations in every state, helps keep the research practical by strengthening the connections among basic science, technology, extension and working producers.

Agricultural research is a long-term investment. In a typical pattern of benefits from research, the payoff peaks six to eight years after the investment and continues another eight or ten years. Benefits from basic science research come more slowly than those from technology research, but the two strengthen each other.

The increase in production has been the primary benefit of agricultural research. The demand for food has risen with population and incomes, so without a corresponding rise in supply, prices would have far outrun inflation. But the benefits take other forms, too.

Other Benefits

Advances in our understanding of good nutrition have been linked to agricultural research for many years. Vitamin B-12, for example, was discovered by a poultry nutrition researcher. The Arizona Agricultural Experiment Station directly funds studies in human nutrition.

As public concern for health, safety and environmental protection has increased, reflected in the mushrooming of government regulatory agencies, a growing portion of agricultural research is directed toward

these areas rather than production. Environmental impact studies, repeated testing of the effects of new pesticides, and development of techniques to reduce natural contaminants all require time and money.

Current and planned work in pest management is expected to reduce the use of pesticides on 20 agricultural commodities nationwide by 37 million pounds of active ingredients per year. The reduction is possible through better monitoring systems, better timing of pesticide use, development of resistant varieties, and introduction of biological control.

Finding out how to grow crops with a limited amount of water, rather than finding out how much water is needed for maximum production, is another area of growing emphasis in agricultural research. Some of this work involves development of entirely new crops.

While the scope of agricultural research has increased significantly in recent years, federal funding of this research has not even kept up with inflation for the past decade. The 1980 budget of the Arizona Agricultural Experiment Station has less purchasing power than the 1967 budget.

What does this mean to an average family? Fred C. White, Joseph Havlicek, Jr., and Daniel Otto of Virginia Polytechnic Institute mapped out the dollars and cents.

A 10 percent reduction in federal support for agricultural research, maintained at the lower level for two decades, would save \$3.6 million (1977 dollars) in tax money. That would mean a savings of 39 tax dollars for a typical family of four with a \$20,000 income. Over the same 20 years, however, that typical family would pay \$217 more for food than it will have to if agricultural research is not reduced.