

Philip G. Pardey, Johannes Roseboom and Jock R. Anderson (eds). *Agricultural Research Policy: International Quantitative Perspectives*. Cambridge: Cambridge University Press. 1991. 462 pp. Price not given.

Economic growth depends largely on growth in agriculture, and agricultural growth is a function of research and development. There is an increasing realisation that the welfare of mankind in the future will hinge crucially on agricultural research policy. The book under review is an edited collection of twelve chapters covering five major themes in the area and is a follow-up volume to the agricultural research indicator series of ISNAR (International Service for National Agricultural Research) published in 1989. The five themes covered are agricultural research in a policy context; measuring agricultural research and economic development; private and public sector agricultural research and emerging issues in the area of agricultural research policy. The list of contributors to this volume reflects the wide experience in the area of international agricultural research that is distilled into the twelve chapters of the book. The international perspective is considerably strengthened by the intimate knowledge of the international agricultural research system with which all three editors and a significant number of the contributors are or have been associated either directly or indirectly.¹

Part I, comprising of four chapters, puts agricultural research in a policy context. The first chapter points out the impact of agricultural and foreign trade policy on the productivity of resources in agriculture. This chapter also focuses discussion on the direct and indirect effects of government intervention in agriculture; the direct effects include the price distortion in foreign trade and domestic markets in the agricultural sector while the indirect effects are classified as the distortions introduced by adopting, for example, import substitution policies. The author explains how the import substitution policies can be beneficial for urban households and detrimental for rural households. High population growth rates and the absence of technological change cause a decline in the real wage rate in agriculture that result in a decline in the welfare of rural households and consequently slower rates of growth in the agricultural sector. This chapter, therefore, also examines the nature of public investment in the political economy framework and the importance of government intervention despite causing inefficient allocation of resources.

With the changing structure of the international economy, there is a need to establish research programmes that take into consideration the effects of national and international economic policies. Chapter two discusses the role of agricultural

¹See for example, Anderson, J. R. (1985) *International Agricultural Research Centers: Achievements and Potential*. CGIAR, Washington and Pardey, P. G., and J. Roseboom (1989) *A Global Evaluation of National Agricultural Research Investments: 1960-1985*. In E. Javier and U. Renborg (eds) *The Changing Dynamics of Global Agriculture*. The Hague: ISNAR.

research in the context of international economic policy. This chapter provides useful information on the changing structure of the international economy, trends in world agricultural trade, the debt problem facing developing countries, uncertainty in international monetary conditions and environmental and natural resource problems. An aggregate agricultural production function is estimated from cross-sectional time-series data for 98 less-developed countries to examine the impact of foreign aid on agricultural productivity. The analysis finds that aid has had a positive impact on agriculture in the most populous region of the world (Asia and Pacific) and in the poorest (Sub-Saharan Africa) while the impact in West Asia and North Africa and Latin America and the Caribbean has been on average not significant. The chapter also cites the sixty less-developed countries study by de Janvry and Sadoulet² (1988) that shows the positive and highly significant elasticities of manufacturing output with respect to agricultural output and of consumption with respect to income. The chapter concludes that the days are gone when segmented national economies could develop agricultural research agendas in isolation from the rest of the world and without taking into consideration the effect of domestic and international economic policies. The authors list fourteen implications for the substantially broadened research agenda when agricultural research is considered in the context of international policy.

The issue of sustainable development and its implications for agricultural research are analysed in Chapter 3. Sustainability, the author maintains, is a broad set of concepts which should serve to guide research in all its facets and not a set of technologies that can be recommended for adoption. If sustainability is defined as the broad concept that it is, then agricultural research policy needs to encompass all agro-ecological zones and linkages to other systems and sectors and the constraints that these impose all of which can have implications for altering agricultural research priorities.

The variability and uncertainty in the natural, economic and political environment is also reflected in the agricultural sector. The presence of such uncertainty is generally neglected in decision-making and research planning. Chapter four highlights an interesting paradox, namely, the reconciliation of the inherent uncertainty in research with the "regularities that seem to guide the invisible hand in research investment". Although there is evidence that, when viewed retrospectively, on an average technical change and institutions do respond to changes in resource endowments and prices of factors of production and products. However, moving away from measures of central tendency such as average research benefits to jointly incorporate, for example, the influence of changes in factor prices as well as the variabil-

²de Janvry, A., and Sadoulet E. (1988) The Conditions for Compatibility between Aid and Trade in Agriculture. *Economic Development and Cultural Change* 37:1.

ity of these changes and measures of the uncertainty of research results themselves, are aspects that the present research does not encompass. In terms of prospective planning also the role of risk in decision-making is a neglected area.

The impact of agricultural research on economic development is discussed in Part II in chapters five and six. This part describes the concept of the national agricultural research system (NARS). Chapter five presents a description of the data base underlying the analysis reported in this book. While this data set substantially upgrades and extends the previously evaluated data, especially on research personnel and expenditures, it still contains a large number of missing observations. A cross-country comparison is also presented. The author explains the strengths and weaknesses of the data used for analysis in this book to measure the impact of agricultural research on agricultural development and productivity. The regional differences in the pattern of growth and development in agriculture in the countries for which these data are available are studied in Chapter 6. The measured changes in factor productivity reflect variation in output. Agricultural policies are highly affected by these differences.

Part III, consisting of three chapters, deals with public sector agricultural research to achieve various national development objectives. In this part a sample average of 83 countries is used to represent the 130 less-developed countries. Chapter seven presents the detailed quantitative descriptions of recently available data for selected regions. Data have been grouped into six regions: four regions cover Sub-Saharan Africa, Asia and Pacific, Latin America and Caribbean and West Asia and North Africa. The fifth region is China and the sixth is selected from a more-developed country of the first world for comparative insight. The purpose of this exercise is to examine broad trends rather than country-specific details.

Chapter eight attempts to explore the broad policy issues based on the national system using the new aggregated data set. The author has selected those countries for which comparable data sets could be assembled. A comparison with the newly developed longitudinal data series for the US agricultural experiment station system is also made in this chapter. This chapter analyses the impact of research on agricultural production systems.

Chapter nine throws some light on the efforts at introducing advanced technology, made by the CGIAR, which plays an important role in the global agricultural research system in less-developed countries to increase agricultural production and build research capacity. This chapter explains the trends in resource allocation in international research and contains a brief discussion of some of the policy issues faced by the CGIAR.

Chapters ten and eleven in Part IV explain the role of the private and public sector in agricultural research. It is generally observed that most of the basic research is done by the public sector whereas the private sector conducts basically

applied research. Public research complements and stimulates private research. Chapter ten concentrates on research conducted rather than sponsored by the private sector. In most developed countries, the private sector plays an important role in generating and transferring new methods and materials in the agricultural sector. The determinants of private sector investments in agricultural research and development in less-developed countries are explored. The analyses finds that these determinants can be divided into three groups: market forces, the firm's ability to appropriate economic gains from research and development, and the technological opportunities for innovations. This chapter suggests that governments in developing countries could increase national welfare by removing the constraints to private Research and Development activities.

The policy implications based on an analyses of the impact of public and private research and the seed trade on maize productivity (which is the second most important cereal crop after wheat) are presented in Chapter 11. Maize seed production, trade, and research based on data from 45 most important maize-producing countries in the world over the 1960 to 1985 period are analysed using a Cobb-Douglas production function. The analysis indicates that private investment in maize research is determined by potential market size and public sector policy. The structure of the seed market and the presence and market share of public seed companies are important determinants.

The challenges facing global agricultural research as we move forward to the next century are addressed in the final chapter. The issues of (a) biological and technical constraints on crop and animal productivity, and (b) resource and environmental constraints on sustainable growth in agricultural production are analysed. The impact of environmental, technological, and institutional change on future agriculture research is also evaluated. The study concludes on a warning note. The failure of the national agricultural research systems to keep pace with the growing demands placed upon them over the past decade and a half have left them in a particularly weakened position to handle the challenges of the future.

The book is an important contribution towards raising the awareness, especially in the developing countries, of the importance of agricultural research in improving the welfare of the people. A high level of technical excellence is maintained throughout. The book is aimed more at the technocrat. Most policy-makers are not technical people. The impact of this work would have been greatly enhanced if it had been directed primarily towards the lay policy-maker in the developing world.

Sohail Jehangir Malik

International Food Policy Research
Institute,
Islamabad.