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REVIEWS IN BRIEF

Science and Agricultural Production, No. 4, and *Food and the New Agricultural Technology*, No. 5, Ingrid Palmer, United Nations Research Institute for Social Development, Geneva, Switzerland, 1972. Pp. v + 100 and Pp. vii + 85. $2.00 each.

Both these studies which are issued under the "Green Revolution" series form part of a research project on "the social and economic implications of the large-scale introduction of high-yielding varieties of foodgrain," supported by the United Nations Development Programme. *Science and Agricultural Production* deals with the physical constraints on the automatic transference of cultivation practices between regions in the world and the specific implications of these constraints for social, economic and ecological analysis. Divided into nine chapters, the introductory chapter gives an overall comparative picture of yield levels and post-World War II trends of the major cereals crops, wheat, rice and maize in selected countries of the world. The prime role of fertilizer in increasing the yields of high-yielding (HYVs) and traditional varieties of wheat and rice crops in some selected countries is discussed in Chapter II. The sources of fertilizer supplies, the rate of growth of world consumption and trade in fertilizers, and the physiological basis of HYVs are briefly described in Chapters III and IV respectively. The roles of the environmental factors such as climate, soil, solar radiation and water in regulating plant growth and in influencing yields of HYVs of crops are discussed in Chapter V. The next chapter deals with the incidence of pests and diseases on crop yields, the extent of losses due to pests and diseases and the measures used for the control of pests and prevention of deseases to HYVs of cereals. The benefits which can be gained from establishing plant breeding research centres, the costs and other issues of plant breeding via induced mutation and production and distribution of quality seeds are considered in Chapter VII Some of the implications of using new farm inputs for the cultivator are examined in Chapter VIII. The important conclusions of the study are presented in the last chapter. The study points out that because of the interrelation of many factors, the introduction of the new high response seeds is evolutionary in terms of the proven compatibility of productivity increases and financial yields. The review of data relating to fertilizer use and crop yields suggests that additional fertilizers can raise yields on indigenous cereal varieties already adapted to even niggardly environments. The physical return on an economic "sub-optimal" distribution of fertilizers is likely to be substantially positive, and such a distribution of additional fertilizers and other inputs might serve well the goals of an "optimum" overall national development strategy.

Food and the New Agricultural Technology draws attention to and clarifies various aspects of the relation between nutrition and development. The

medical grounds for the anxiety about the current state of nutrition are reviewed. In the light of this review, the means by which the high-yielding seeds varieties could raise nutritional levels is explained in this study, together with an outline of the progress in their implementation in different countries. This is followed by an analysis of the trends in food supply relative to population growth. The net impact of the introduction of new varieties on food production sectors in some countries is analysed. The conclusions of the study are as follows : Though the medical evidence of the importance of protein and calorie deprivation to human growth has been inconclusive and imprecise, the majority of the world's population has a debilitatingly poor diet. The introduction of HYVs can have a wide range of influences on nutrition. In those countries where the introduction of HYVs of rice has occurred, the decline in per capita food production has been arrested (the Philippines and Indonesia) or together with wheat, has returned the country to the level it enjoyed prior to the mid-1960's drought (India) or improved slightly upon that pre-drought level (Pakistan). The progress in food output in Mexico was largely due to the widespread use of Mexican dwarf wheat seeds in the 1950's, but in recent years there has been no sign of a continuing upward trend. In Africa, the nutritional picture is characterized by the consequences of a physical environment generally unfavourable to delicate HYVs and a colonial pattern of export oriented agricultural production continuing under conditions of highly monopolized world trade in primary products. In general, the factors influencing a change in food production away from proteins towards carbohydrates as a result of the introduction of new cereal seeds are (1) deliberate discriminatory intervention in factor markets favouring cereal production, (2) inegalitarian shifts in mass purchasing power, and (3) the increasing share of household budgets going to cereals as income falls. The data on changes in cereal and pulses production in selected countries which have introduced the HYVs of cereals suggest that the expansion of cereal production might have occurred at the expense of pulses production, thereby impoverishing rather than improving the diets. A separate cause for concern over the effects of the introduction of the HYVs on nutritional levels arises from the regional distributional effects of the benefits. The more intense the geographical concentration of the applicability of the HYVs the greater is the danger of large areas being excluded from direct benefits and the greater is the likelihood of localised labour shortages in successful farms leading to labour-displacing methods of production in these latter areas. The increasing penetration of commercialization and monetization of agriculture could easily have the effect of reducing the standard of living, especially of diet, of agricultural workers because their cash income is not large enough to purchase all the items they once grew or received through a farmer, more personalized relationship with their landowners.

Pesticides Market Studies, Vol. VI—Guntur District, Andhra Pradesh (Resurvey) pp. viii + 72;
Vol. VII—Ahmednagar District, Maharashtra State (Resurvey), pp. xv + 166;
Vol. VIII—Mehsana District, Gujarat State (Resurvey), pp. ix + 112;
Vol. IX—Shahabad District, Bihar State (Resurvey), pp. ix + 95; and
Vol. X—Kulu District, Himachal Pradesh (Resurvey), pp. ix + 91, Pesticides Association of India, New Delhi, 1972.

The studies under review embody the results of resurveys conducted in five districts: Guntur (Andhra Pradesh), Ahmednagar (Maharashtra), Mehsana (Gujarat), Shahabad (Bihar) and Kulu (Himachal Pradesh), with a view to bringing out the changes which took place in the pattern of use of pesticides by the same farmers in the selected districts in 1969-70 as compared to the year 1968-69 and identifying the forces behind the observed changes. These resurveys were undertaken by the Pioneer Agricultural Services for the Pesticides Association of India. The plan of each study is generally as follows: The introductory chapter gives the objectives of the study, the sample frame, method of collection of data and analysis and the reference year of the study. The second chapter describes the changes that have taken place in the selected villages in each district which could have influenced the use of pesticides during the reference period of the resurvey. The discussion generally covers weather, irrigation, intensity of cropping, crop pattern, yield per hectare of principal crops and price situation. In the third chapter, an attempt is made to review the important economic characteristics of the users of pesticides and to identify among users those families that have either increased or decreased the use of pesticides. The changes in the pattern and magnitude of pesticide use by the users are analysed in Chapter IV. The pattern of purchases, the mode of transport used by farmers, the services provided by the dealers and the technique of use of pesticides by farmers are examined in another chapter. An attempt is made to estimate the total volume of pesticides business at the district level. The functional relationship of pesticide use with the relevant variables is studied by fitting a multiple linear regression equation to the data. Technological aspects of the use of pesticides are studied in the last chapter in the study relating to the Ahmednagar district. The summary and conclusions of the resurvey are given in the beginning of each report.

The studies have revealed that the growth in the use of pesticides by farmers is notable in all the selected districts except in Ahmednagar where the pesticide consumption was very low, the pesticide expenditure per acre being only Rs. 4.41 in 1969-70. The pattern of pesticide consumption revealed that more than 80 per cent of the total pesticide expenditure in Ahmednagar was incurred only on cotton, grapes and sugarcane and the expenditure on major food crops like jowar, bajra and wheat was very low. In Kulu district, bulk of the pesticide expenditure was incurred by large orchard owners and on a single product. Hence the whole pesticide market is of oligopoly-

oligopsony type. The trend towards substitution of new costly pesticide products for old cheap products has also been observed in some of the studies, *e.g.*, in Ahmednagar and Mehsana districts. This trend has adversely affected the expansion of the market for pesticides. In Guntur district, high value commercial crops such as chillies and tobacco on which the incidence of pest attack is high were covered extensively by pesticide application while low value foodgrain crops which are very susceptible to pests were generally covered to a low extent. The crucial importance of the farmers' knowledge about pest attack in the adoption process has also been highlighted in these studies. As the adoption of pesticide use reaches a high level, the availability of credit becomes increasingly more important for further growth in adoption because many of the non-adopters are marginal cultivators.

The studies have emphasized the need for expanding the total sales of pesticides by expanding the area under pesticide use and by promoting more intensive use of pesticides by farmers. It is also suggested that the pesticides markets should provide pesticide services instead of pesticides alone as revealed by the studies in Mehsana and Shahabad districts where the farmers have shown their preference for custom service. Other conclusions of these studies are that the education of farmers to know pests and diseases and in the use of pesticides should be the responsibility of the pesticide industry. Special efforts should be made to make farmers prophylactic users. Government should induce the pesticide industry to expand the market by properly evaluating the policy of licensing for new pesticide products.

These resurveys represent a pioneering attempt to probe into an unexplored field of research. They would prove useful to the progressive farmers, extension specialists, pesticides industry and institutions involved in the modernization of Indian agriculture. The authors deserve warm praise for undertaking these resurveys and making the results of their studies available to the reader.