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Vol XXIX
No. 2

APRIL-
JUNE
1974

ISSN 0019-5014

INDIAN JOURNAL OF AGRICULTURAL ECONOMICS

INDIAN SOCIETY OF
AGRICULTURAL ECONOMICS,
BOMBAY

BOOK REVIEWS

The Green Revolution and Rural Labour—A Study in Ludhiana, Partap C. Aggarwal, Shri Ram Centre for Industrial Relations and Human Resources, New Delhi, 1973. Pp. vii + 148. Rs. 25.00.

The literature on various aspects of green revolution has been growing in recent years. Besides economists and sociologists, the industries manufacturing some of the important farm inputs have also undertaken a number of studies bearing on some aspects of the green revolution and its impact on the rural economy. The present study by an anthropologist has been financed by Shri Ram Chemical Industries. It is indeed a good sign that some of the non-academic institutions which have a stake in the success of the green revolution are venturing into undertaking studies of the green revolution with special reference to the increase in demand for some of the farm inputs necessary to sustain the green revolution. The present study however does not seem to be oriented towards making an assessment of the increase in demand for any of the farm inputs. Its objective, as stated by the author, is to make a study of the impact on the landless labour. It is but natural that the new prosperity brought about by the green revolution would change some of the traditional socio-economic systems in the rural economy. In the village economy where a large number of persons subsist below the poverty line, the new income generated on account of the green revolution is likely to widen the gap between the haves and have-nots. This may tend to create social tensions and the break-down of the social system in the villages. Therefore, a study of the socio-economic changes which result from the green revolution is most welcome.

This study is confined to three villages in Ludhiana district of Punjab. The author has narrowed down the scope of the book to a study of the impact of the green revolution on the socio-economic conditions of the rural labour. The selected villages are in the vicinity of Ludhiana; Bhanguwal, at a distance of 10 kms., Gobindwal, at a distance of 11kms., and Kalsi, at a distance of 16 kms. from Ludhiana. It is a purposive selection and one has no quarrel as far as it is concerned as the author has asserted that "we are convinced that the villages we have chosen are culturally similar to others in the area" (p. 5). However, since what is sought to be examined is the impact of the green revolution on the economic conditions of the rural labour, it would have been better to select at least one village which is far away from Ludhiana, the important urban centre in the district. It is reported that nearly half of the Ramadasia households in the villages have taken up non-agricultural employment mostly in Ludhiana city (p. 94). This may be on account of the nearness of the selected villages to the industrial centre where small-scale industrial units flourish in large number. Perhaps this sort of an occupational shift would have been less pronounced if a distant village is included among the three selected villages. Another procedural step in the field study which

is a little doubtful is the basis of preparation of the list of households in the village. It is said "making use of the *voter register* we drew up a list of all the households of landowners actually engaged in cultivation in each village and the landless who mainly depended on agricultural employment (p. 5)." One is not sure whether the voter register really furnishes information pertaining to the occupational status of the voters, giving the details of the land ownership. And it cannot be said that this register would be complete. Persons below the age of 21 years do not find a place in this list. The agricultural labourers below 21 years (but not the children) are likely to be left out in this. Other more authentic list available at the Block Development Office could have been used for this purpose.

The total number of households in the three villages selected is 525, out of which 239 are land holding households. The agricultural labourers constituted 20 per cent of the total households. Two separate questionnaires have been used to interview the cultivating households and the agricultural labourers. However, very little use of the data pertaining to the latter group appears to have been made in the book. This is perhaps a major lacuna of the study as no data regarding the income trends and the man-days employed are given for the agricultural labourers. Only some generalised statements are made in the chapter on "Changing Labour." The accent has been inevitably more on tracing the sociological changes than on quantifying the economic gains of the green revolution accruing to the agricultural labourers in the selected villages. Without questioning the propriety of the anthropologist's interest in the changing caste system and *Sepi* system in the rural areas, it may be said that the data collected through the second questionnaire could have been fruitfully used in assessing the changes in the economic conditions of the agricultural labourers. Despite these blemishes, there are a few very useful observations made in this book which would be of interest to all those who are interested in understanding the process of rural transition and its consequences.

The green revolution was ushered in Ludhiana district, with the adoption of the high-yielding variety of wheat and the utilization of the complimentary inputs like fertilizers in increasing doses. This new strategy of agricultural development is adaptable even when the operational holdings are not very large. The profitability of the new strategy has been established not only on the research farms but also on the farms of the early adopters. The Punjab farmers have been very progressive in their outlook and receptive to new ideas. They took to the hybrid variety enthusiastically when it was propagated in the early 'sixties. In the selected villages a variety of dwarf wheat known as S 308 was introduced in 1965-66 and within two years, over 55 per cent of the households adopted it for cultivation. Even in the lowest size-group of holdings, 0-5 acre group, the percentage of adopters was 40 at the end of the second year and increased to 75 by next year. The demand for other farm inputs increased appreciably only after the adoption of the high-

yielding varieties. The investment on farm machineries also has increased by nearly 100 per cent in the selected villages from 1965-66 to 1970-71. The value of output per acre has increased by over 120 per cent. The net income per acre varied between Rs. 397 and Rs. 535 among the three villages. With the increase in wheat production, the marketable surplus has increased. The farmer has become conscious of the price offered in the market. Most of his farm requirements have to be purchased from outside the village. The additional income has diversified his consumption pattern and many of the factory produced consumer goods now find a place in his consumption basket. The green revolution has undoubtedly improved the standard of living of the farm households.

The agricultural labourers in the selected villages are mostly Harijans. About 80 per cent of them are casual workers. The average number of days during which they are employed varies between 151 and 270 days in a year. Most of them find supplementary employment in a brick kiln. The demand for labour to do the seasonal agricultural operations has increased on account of the increase in the crop intensity. This has resulted in the scarcity of labour and hence the wage rates have increased. It is reported that the wage rates have more than doubled during the last 6 or 7 years and the earnings of the labour households have increased nearly four fold in recent years. The analysis of the changed conditions of agricultural labourers is sketchy. Some elaborations accompanied by relevant data would have been very meaningful. This is necessary because it is said that the gap between the farmer's and labourer's incomes has widened and consequently it is reported that 60 per cent of the labourers are dissatisfied (p. 102). Passive submission to their lot was the order of the day earlier. The dissatisfaction in the rural areas now appear to be growing. This deserves closer scrutiny.

It is interesting to find that remarkable improvements have taken place in the socio-economic conditions of the non-agricultural labourers. The traditional social institutions have shown definite signs of change under the influence of the economic factors. The caste-occupation relationship has been the first casualty as the economic incentives have altered this relationship into a proposition based on pecuniary considerations. The *Bega* system of free labour has vanished. The *Sepi* system through which the village artisans were paid subsistence wages in kind is now slowly reduced to a thing of the past. The rigidity of the caste system is lost specially for the Harijans who now find employment in the factories. It is however difficult to attribute these desirable developments entirely to the advent of the green revolution. This is a long drawn process of social change which started perhaps since Independence and the new prosperities generated by the green revolution have accentuated it. Secondly, the rapid progress achieved in the small-scale industries sector in the district and the rise in the demand for factory labour are responsible for accelerating the shift in the occupational pattern. Some Harijans who could find gainful employment in Ludhiana factories,

now own some lands which was not possible earlier. It appears that Jats, the dominating landowners, have readily reconciled with the changed situation. The ease with which the social adjustments are made, is ascribed to the teachings of the Sikh Gurus and the influence of Arya Samaj. This silent revolution on the social plane is of crucial significance as it can work as a positive factor in sustaining the tempo of the green revolution. Among the factors which have contributed to create the environment conducive to the initiation of the green revolution, the role played by the Punjab Agricultural University is remarkable. The farmers could reap the benefits of the research work done in the university farms because a meaningful dialogue was established between them and the research workers. The Punjab farmer was quick in acquiring the skills of handling the farm machineries and even repairing them when necessary. The development of infra-structure facilities including the irrigation facilities in the State has been very rapid. It is no wonder therefore that the green revolution started first in the Punjab and its achievements there are more impressive than elsewhere.

In sum, it may be said that the book is readable and useful as it throws some light on the social implications of the green revolution with reference to the rural labour. Analytically it could have been made more rigorous within its own narrow framework by quantifying the economic changes.

N. K. THINGALAYA

Impact and Economics of Community Water Supply, I. D. Carruthers, School of Rural Economics and Related Studies, Wye College (University of London), 1973. Pp. 120. £1.50.

In this research report Carruthers has demonstrated a unique combination of agricultural, engineering and socio-economic disciplines in analysing a complex reality. The study relates to investments in rural water supply in Kenya. More specifically, this is an attempt to unveil and explain various aspects of invesment in rural water which deserve careful consideration. A critical evaluation of projects as suggested may sharpen decision-making processes in the developing nations.

The first chapter deals with the physical and structural conditions of water supply and other related aspects in Kenya. The second chapter is an attempt to portray the national objectives of water supply. Carruthers has objectively analysed the impact of water investments upon agriculture in Chapter 3. He has used cost-benefit approach to evaluate a number of rural water schemes in Kenya. The impact of water supply on public health is examined in Chapter 4. Chapter 5 discusses the problems of and the criterion for selecting and designing of Water Projects in Kenya. The engineering, economic

and financial aspects have been dealt with adequately to evaluate the effectiveness of a water project. In Chapter 6 self-help water schemes in Kenya have been objectively studied and it has been suggested that large schemes (over £15,000) should be discouraged and if formulated, made the responsibility of the Central Government to minimize wastages.

Financial considerations have been highlighted in the last chapter The present practice of setting and applying water rates has been criticised on the ground that it is not financially sound, nor is it economically or socially optimal. The findings indicate that, at present, realised benefits of rural water investment are insignificant but potential health and economic impact is substantial. It has been recommended that schemes should be selected to support viable production programmes so that the necessary complementary facilities are made available. It has also been recommended that either low cost, low impact communal point systems should be installed initially, or high cost, high benefit individual connection systems, and not the present high cost communal networks. The suggestion that investment in rural water supply should not be considered as a fund-raising investment, rather it has to be treated as a social service such as a public library or a rural dispensary, although such investment has a revenue-raising potential in the long run, is significant for most of the developing nations.

The study presents and illustrates a new way of evaluating a complex project co-ordinating information from various disciplines. The economists, engineers and administrators working in the relevant area in the developing countries will benefit most. Though the findings are not precise and conclusive, the methodology and approach chosen by the author shall be appreciated by future researchers.

One could argue that an impact study or project analysis must phase the benefit and the cost stream over a period of years and a discount rate selected judiciously reflecting true opportunity cost. This is a valid argument but the present problem appears to be much more complex than a single water project.

However, the study could be further improved by quantifying various values such as the effect of piped water supply on energy saved, additional productivity and income, employment, general awareness about a high standard of living, subsidiary occupations, changing economic activities, marketing, etc. Various production function studies could aid this study in the appropriate perspective so that generalisations could be empirically reliable and valid.

MD. FAZLUL HAQUE

Problems and Prospects of Agricultural Taxation in Uttar Pradesh, D. N. Dwivedi, People's Publishing House, New Delhi-55, 1973. Pp. xv + 228. Rs. 25.00.

Of late, there has been a proliferation of agricultural economics literature dealing with agricultural taxation. The present book is a revised version of the author's doctoral dissertation submitted to the Banaras Hindu University in 1968. The first two chapters give a concise treatment of the agricultural sector in the economy of Uttar Pradesh and the economic backwardness of the State. Most of the material contained in these chapters has been assembled from published sources and contains little new knowledge. Various taxes of the State are presented in Chapter 3. The author gives a brief history of land revenue and its incidence. He maintains that "In essence, it is used to tax the returns on land and by virtue of its productivity. Thus the burden of land revenue is expected to fall on three elements of agricultural economy, *viz.*, land (as a factor of production), cultivator and agricultural produce (pp. 53-54)." But it is not correct to say that the burden of land revenue will fall only on the above-mentioned elements of society. In reality, the incidence of tax is more diffused and the cultivators may shift their taxes to the consumer.* However, in the latter part of the book, the author mentions that the farmers with marketable surplus can shift taxes forward (p. 164).

The author has evaluated the arguments for additional taxation. These arguments are (*i*) rise in per capita agricultural income, (*ii*) rise in per acre productivity, (*iii*) rise in the prices of agricultural produce, (*iv*) rise in the value of land, (*v*) heavy public expenditure on the agricultural sector, (*vi*) inter-sectoral disparity in tax burden, and (*vii*) rising demand for increased marketable surplus from the agricultural sector. Most of these arguments are inter-related. The author has rightly observed that none of these arguments made a case for additional taxation.

The author claims that the most important achievement of this study is the assessment of scope for additional agricultural taxation in Uttar Pradesh (p. 148). This reviewer feels that this has not been fully achieved. This is mainly because scanty data have been used to approximate income from agricultural land. Input-output ratios of Varanasi district are assumed to be true for eastern Uttar Pradesh while the input-output ratio of Meerut district is also assumed to be true for western, northern and central districts. Since there are wide differences in agro-climatic conditions in various regions, the data for Meerut and Varanasi may not be representative for the whole State. Moreover, it is difficult to see how the input-output ratios are constant and applicable over the period of three Plans. Thus, the estimates of total taxable capacity and residual taxable capacity based on the above input-output

* See Fleming Jenkin, "On the Principles which Regulate the Incidence of Taxes," reprinted in Readings in the Economics of Taxation, R. A. Musgrave and C. S. Shoup (Eds.), Richard D. Irwin, Inc., Homewood, Illinois, U.S.A., 1959, pp. 227-239.

data will be of little value for policy purposes. The approach of taxable capacity is based on ability-to-pay approach. Some estimates on the basis of benefit taxation could have been developed.

The proposals for tax reforms put forth by the author are very interesting. Some of them are neither simple to administer nor politically acceptable.

On the whole, the book provides good reading material for the students of agricultural taxation with special reference to Uttar Pradesh.

R. K. PANDEY

Fundamentals of Farm Business Management, S. S. Johl and T. R. Kapur, Kalyani Publishers, Ludhiana, 1973. Pp. xi + 475. Rs. 27.00.

The most striking characteristic of the book is the clarity and simplicity with which the authors have presented the textual material on farm business management adaptable to Indian conditions in general and Punjab conditions in particular. The subject matter of the book is divided into 16 chapters. In the first two chapters, the fundamentals of farm management have been discussed lucidly with particular emphasis on the meaning of farm management and characteristics of farming as a business. Farm management has been defined as a business science of scarce resource use. The nature and characteristics of farm management, its relationship with other sciences and typical farm management decisions have been dealt with economic rigour and logic. However, the authors seem to have missed to provide a clear discussion on the scope and importance of farm management research for farm policy-making and its contribution to accelerating the pace of development through better project formulation. To make these chapters more informative and to show the recent emphasis on farm management teaching and research a brief survey of teaching in farm management starting from Agricultural College and Research Institute, Madras in 1924, Government Agricultural College, Kanpur in 1934, B. R. College, Agra in 1940, Allahabad Agricultural Institute in 1941 upto the recent teaching position in 20 Agricultural Universities and the running of a comprehensive research scheme on the cost of cultivation of principal crops on continuous basis with effect from July, 1970 in all the States would have been very much rewarding.

Chapters 3 to 7 deal with different relationships such as factor-product, cost and production, factor-factor and product-product relationships. The basic aspects of Production Economics have been adequately illustrated with the help of statistical tables, graphs and little bit of alg ora at some places. Inadvertently, some odd slips remained unnoticed which should be taken care of by the readers. For instance, Figures 3.4 (a) and 3.4 (d) (on p. 64) show in-

creasing and decreasing response respectively and not just decreasing and increasing response relationship as explained in the text. Similarly, the total product curve in Figure 4.2 (on p. 75) should have started from the intercept of 1300 rather than from the origin as shown in the book. Further, the total product curve in Figure 5.2 (p. 99) should have been moved to the right on the X axis by a distance equal to the fixed cost when its corresponding total cost curve showed fixed cost. It is a convention to show replaced product on the vertical axis and added product on the horizontal axis of the production possibility graphs. In the substitution ratio the numerator is replaced product and the denominator is added product. This type of consistency between the production possibility curves and the marginal rates of substitution does not seem to have been observed on pp. 147-149. Further Figure 7 5 (p. 148) shows $\triangle Y_1$ on Y_2 axis and $\triangle Y_2$ on Y_1 axis while it should be the reverse. Decreasing rate of substitution depicted in Figure 7.6 (p. 149) is correct but its algebraic expression $\triangle_1 Y_1/\triangle_1 Y_2 > \triangle_2 Y_1/\triangle_2 Y_2 > \ldots\ldots\ldots > \triangle nY_1/\triangle n Y_2$ is in fact wrong. In this case either the signs should be reversed or Y_2 should be put as numerator and Y_1 as denominator (preferably the latter). Similar correction is needed in the algebraic expression of increasing rate of substitution on p. 148.

Chapter 8 contains a brief discussion on six economic principles involved in farm management decisions. In fact this chapter is more or less a duplication of the discussion contained in Chapters 4 through 7 since four important principles (namely, principle of variable proportions, cost principle, principle of substitution between inputs and principle of substitution between products) discussed here have already been covered in the preceding four chapters.

The application of budgeting and linear programming techniques in the decision-making process on the farm situation has been discussed in Chapter 9. Production and organization tools specified in Chart 1 (p. 210) are not mutually exclusive *per se*. For instance, operational research techniques may include almost all the planning models specified under perfect and imperfect knowledge situations. Too short a reference of the planning models under the imperfect knowledge is as good as not making any reference of the same, while the discussion on the planning tools such as non-linear programming, operational research techniques, dynamic programming, integer programming and recursive programming has been omitted altogether. Illustration of 3-4 problems of partial budgeting and reorganization of a real farm situation through complete budgeting and linear programming seems to have provided a clear exposition of the farm planning process. However, there appears to be a case of misprinting of the figures showing increase in returns in the alternative plans over the existing in the last now of Table 9.2 on p. 234.

Chapters 10 and 11 are devoted to farm business analysis and farm financial management respectively. Here a commendable attempt has

been made to expose the students to simple types of records and accounts that can be maintained and analysed on average Indian farms but the treatment given to the subject is of elementary nature. The procedures to estimate the capital and credit needs for farming and processing of farm credit proposals have been outlined in Chapter 11 which may be of special significance to commercial banks for financing agriculture.

Management of land, labour, machinery and buildings is discussed in Chapters 12 to 15, respectively, to demonstrate the application of farm management principles for solving the individual resource use problem. Here again a lot of duplication with Chapters 4 through 8 is apparent. This is primarily because management of farm resources can be discussed only at the cost of repetition of economic principles already discussed in Chapters 4 through 7 and rediscussed in Chapter 8 and which are again discussed in Chapters 12 through 15. However, much of the duplication in these chapters with Chapter 8 could have been avoided by proper integration. For instance, "Economics of fertilizer use" (pp. 386-390) and "Substituting machinery for labour" (pp. 414-420) could have been easily discussed under Chapter 8. While structuring the farm management problem situations with regard to different farm resources may be generally good and orientation useful, yet it is not always satisfactory. For example, in the management of land resource which is subdivided and fragmented into small pieces, the importance of providing irrigation, cultivation of more profitable crops, multiple cropping, intensive cultivation, reduction of fallows, livestock keeping, etc., cannot be overlooked under Indian conditions as it has been done so in Chapter 12. A brief introduction to risk and uncertainty has been given in the last chapter of the book which is weak in theory as well as devoid of any empirical content.

In spite of the short-comings as mentioned above, the efforts of the authors in making a useful and timely contribution to the scarce literature on economic aspects of farm management under Indian conditions are commendable. The under-graduate and graduate student will find this textbook useful.

D. S NANDAL

Green Revolution—A Case Study of Punjab, M. S. Randhawa, *et al.*, Vikas Publishing House Pvt. Ltd., Delhi-6, 1974. Pp. xvi + 207. Rs. 35.00.

The book seeks to present certain factors which were responsible for bringing about the green revolution in the Punjab. It has been divided into three sections. The first section deals with the historical development of agriculture in the Neolithic age followed by agricultural revolutions in England, America and finally in the 20th century in Europe. The second section deals with the historical development of agriculture in the Punjab.

The third section is devoted to an analysis of the various factors and agencies that contributed to the green revolution in the State.

In the Neolothic age, a revolution in agriculture occurred because of three factors, *viz.*, (*i*) domestication of wheat and barley in addition to cattle, sheep, goat and pig in about 7000 B.C., (*ii*) the discovery of iron which made iron-tipped plough possible round about 1000 B.C. and (*iii*) the development of legume rotation system by the Romans.

In England the pioneers of agricultural development were those amateurs who accumulated huge wealth in trade and commerce and found investment in agriculture a lucrative proposition. In America, the establishment of Land Grant Colleges in 1862 and the invention of tractor in 1890 were the twin factors responsible for agricultural revolution, whereas in 20th century Europe, the use of chemical fertilizers and plant protection chemicals were the additional factors.

The first section as a whole is not very relevant to the main theme of the book, *i.e.*, the Green Revolution in the Punjab. One can easily dispute whether the historical development is a revolution or an evolution. The historical analysis may be of some interest to the student of economic history as a passing reference.

In section II, all the five chapters deal with the development of agriculture in the Punjab. It has rightly been observed that the geographical situation of the State is very conducive to agricultural growth. The geology and physiology have influenced greatly the fertility of soils. Punjab has been divided into two regions, (1) the hill region and (2) the plain region which has 90 per cent of the total area. Ravi, Beas and Sutlej are the three perennial rivers of the Punjab. The high percentage of land under net cultivation has been made possible by the fact that the Punjab plain is free from physical handicaps. In the cropping pattern, wheat dominates, which forms 65 per cent of the area under cereal crops.

The partition of the country in 1947 acted both as a deterrent and stimulus to the agricultural development of the State—deterrent because most of the fertile and irrigated areas went to Pakistan; stimulus inasmuch as it provided great opportunities for schemes of agricultural development because the Government became very liberal in providing assistance to rehabilitate the refugee farmers by allotting them land, helping in the sinking of tube-wells, purchase of tractors, etc. In fact, these refugees spearheaded the agricultural revolution.

The authors praise the Sikh community in general and the Jat Sikhs in particular. Their traditions, habits, religion, dress, etc., have been formed in such a way as to turn them into excellent farmers. Undoubtedly, it is so but

to attribute the whole of the green revolution to them will be an exaggeration. There are non-Sikhs right in the Punjab, who are equally competent and responsible for bringing about the green revolution. The authors seem to be over-biased in favour of the Sikhs. It is the dynamism of the Punjabis as a whole, which is responsible for the growth of the economy of the State in general and of agriculture in particular. Moreover, the green revolution in other parts of the country shows that there are farmers who are equally receptive to new technology.

A number of legislations enacted during 1948-55 aiming at land reforms such as consolidation of holdings, abolition of intermediaries and ceilings on land holdings, resulted in an increase in the owner-cultivated area and just and equitable distribution of land, and paved the way for the rapid development of agriculture.

One can easily criticise the conclusions that the output increased by 30 per cent due to consolidation of holdings and ceilings on land holdings upto 30 standard acres are justified on the ground of economic efficiency and social justice. It is difficult to measure the increase in production solely attributed to consolidation because the increase in agricultural production is possible due to the interaction of many factors. The authors have not supported their view with facts. Moreover, there were many other enterprising people and officials in initiating agricultural development whereas only Sardar Pratap Singh Kairon and Giani Kartar Singh are specifically mentioned. The green revolution came much later and it was made possible by the high-yielding varieties of seeds, fertilizers, etc., in the late 'sixties whereas these persons dominated the Punjab scene in early 'sixties.

Section III analysis the role of various government, autonomous and private agencies in supporting the green revolution. Specific mention is made of researches in evolving the high-yielding varieties of seeds by the Punjab Agricultural University. The University has done a commendable work by evolving three high-yielding wheat varieties, namely PV-18, Kalyan Sona (S-227) and Sonalika (S308). A dwarf variety WL 212 is under advanced stage of testing and has great yield potential. In rice, IR 8, Jaya and IR 579 which are under trial, hold great promise for future production. Similarly HBI in bajra, C65 in *moong* are the other two positive contributions of the University scientists.

The part played by the co-operative societies, land mortgage banks and crop loan system in financing the green revolution has been commended. The authors also praise the Punjab State Co-operative Supply and Marketing Federation Limited in supplying fertilizers, diesel pump-sets, plant protection equipment, pesticides and insecticides, ground and aerial spraying units and providing marketing, processing and storage facilities to the farmers. Similarly, the agro-industries in the private sector are contributing in their own

way by providing agricultural machinery and equipment. However, the authors have conveniently omitted to discuss the inefficient working of such institutions and to give possible suggestions for improvement.

Irrigation is the most important factor in the green revolution as the high-yielding varieties of seeds and fertilizers show their magical effect only when water is available. Punjab has the largest tract of ground water in the whole of the world and this makes well and tube-well irrigation easy. At the same time, some rivers are perennial in nature since they come from the snow-clad mountains of the Himalayas. It is rightly suggested that for the better exploitation of water resources geological and hydrological and geo-hydrological studies of the tract should be undertaken.

Very useful suggestions are made regarding fertilizers. It is recommended that ammonium sulphate should be preferred over sodium nitrate on alkaline soils. Mixed fertilizers are useful if more than one nutrient element is lacking in the soil. Useful guidelines have been provided for mixing single fertilizers. Secondary and micro nutrients are becoming important in some crops due to heavy drain of nutrients and use of NPK fertilizers in high-yielding varieties.

Punjab is one of the leading States in the generation of electricity as it could harness the perennial rivers. To make the best use of electricity it has been suggested that more resources should be placed at the disposal of the Electricity Board, the number of tube-wells energized should be increased and overloading of some transmission lines should be avoided to avoid frequent break down. There is also a powerful case of nuclear power station in the State as the gap between the demand and supply for power resources is widening.

The role of mechanization in agriculture—whether or not mechanization increases employment as concluded by the authors,—is again a controversial issue. Contradictory views are expressed while discussing this issue. On the one hand, it is concluded that mechanization does not lead to unemployment and on the other hand, it is suggested that careful planning is required to avoid unemployment. The authors have recommended the use of tractors of two sizes, *i.e.*, 15 to 20 H.P. and 30 H.P. for Punjab. Manufacturers of small tools and implements should be helped to enable them to modernize their business so that they may keep pace with the rising demand.

The new technology has resulted in an increase in owner cultivation and cash-rented land, whereas share-rented land has declined. The owners also shared half of the cost if the tenant used modern inputs. The small farmers added more area to their existing holdings than the large farmers. As a result, the area held by the small farmers increased whereas it decreased in

the case of the large farmers after the inception of the green revolution. These conclusions of the authors seem pertinent for future land reforms.

By giving the profile of two villages the authors have tried to show that the rural scene is transforming itself and the attitudes of the people are undergoing a metamorphosis.

The book has few new things to reveal since it reiterates commonly known factors of growth in Punjab. The green revolution has bred some undesirable tendencies such as unequal distribution of income, displacement of tenants, unemployment of farm labourers and black-marketing in essential inputs. This dark side of the picture which threatens the green revolution to turn into probably the red revolution has been completely ignored in the book.

A rigorous economic analysis which one could expect from such a book is lacking. Perhaps the book is meant not only for the students of a particular discipline but for general readers as well. It should be mentioned that the book is the result of joint effort of 13 contributors drawn from various disciplines, namely, engineering, soils, geography, economics, journalism, administration and management, but credit is prominently given only to one author on the cover page. The high price of the book also seems to be unjustified.

S. D. CHAMOLA