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# INDIAN JOURNAL OF AGRICULTURAL ECONOMICS

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# REPORT OF THE SYMPOSIUM ON APPRAISAL OF RECENT TRENDS IN AGRICULTURAL GROWTH IN THE WESTERN REGION OF INDIA*

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The Symposium was of topical interest as agriculture has been the mainstay for overall economic growth in India, particularly since 1967-68, and there has been some concern regarding deceleration in agricultural growth in the recent past. The two main objectives of the Symposium were, (*i*) to examine as concretely as possible the growth performance of the agricultural sector in the Western region of India during the last five years or so compared with the period since early 1950s: the pre- and post-green revolution periods, and (*ii*) to identify the factors responsible for the observed growth rate so as to provide some clear understanding to the professionals and the policy makers. In all, following 10 papers were received for discussion in the Symposium:

1. D. K. Desai and N. T. Patel, "Improving Growth of Foodgrains Productivity in the Western Region of India."
2. G. M. Desai, and N. V. Namboodiri, "The Deceleration Hypothesis and Yield-Increasing Inputs in Indian Agriculture."
3. S. P. Pant, "Growth and Stagnation of Agricultural Production: A Critical Analysis with special reference to Madhya Pradesh."
4. M. P. Pathak and H. F. Patel, "Growth of Agricultural Production in Gujarat."
5. V. T. Raju and V. J. Patel, "Trends in Groundnut Production in the Western Region in India: 1977-78 to 1981-82."
6. Vidya Sagar, "Agricultural Performance in Rajasthan."
7. S. D. Sawant, "Investigation of the Hypothesis of Deceleration in Indian Agriculture."
8. C. H. Shah, "Development Perspective for Indian Agriculture."
9. Girja Sharan, "Agro-mechanical Technology in Gujarat."
10. M. V. Thombre and M. P. Dhongade, "Trends in Cotton Production in the Western Region in India."

Besides these, the paper titled "Agricultural Production in India—State-wise and Crop-wise Data: 1949-50 to 1981-82" by the Centre for Monitoring Indian Economy, Bombay, was circulated amongst the participants.

The Symposium was inaugurated by Dr. I. G. Patel, Director, Indian Institute of Management, Ahmedabad. Professor C. Gopinath, Chairman, Centre for Management in Agriculture, Indian Institute of Management, Ahmedabad, welcomed the participants and the opportunity to work with

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* Organized at Indian Institute of Management, Ahmedabad on 9th and 10th September, 1983.

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the Indian Society of Agricultural Economics on such an important issue. Professor M. L. Dantwala, President, Indian Society of Agricultural Economics, provided the genesis of the Symposium. He said that the initial inspiration for holding the three Regional Symposia (Waltair and Patiala being the other two) came from an occasional paper by Narottam Shah of the Centre for Monitoring Indian Economy. The paper painted a very gloomy picture of Indian agriculture. This was an important issue which necessitated as concrete an understanding as possible. It was further thought that this could not be done through an all-India Seminar as the problems of agriculture were unique with respect to areas and crops. The need was not only to find out whether or not there has been deceleration in agricultural growth, but also to identify the States and the crops where there were problems. Disaggregated facts were, therefore, more important than the statistical tools used for analyses.

In his keynote address, I. G. Patel emphasized the significance of ascertaining the relative climatic composition of a given period prior to measuring the rate of growth of output during that period. In the context of the Symposium, there was need to understand whether the last five years were weatherwise better or worse than the average. But a definite conclusion on that was not going to be easy.

Doubts were expressed regarding one of the conclusions in a paper that Maharashtra's progress in agriculture has been unmatched in the recent past (growth rate of more than 6 per cent). I. G. Patel emphasized the importance of more detailed analyses of such experiences to enable an understanding of the extent to which these can be replicated in other parts of the country.

Referring to the phenomenon of peaks and plateaus in agricultural output, an issue was raised whether a plateau (such as the current one) will necessarily be followed by a height. This could be true if there were clusters of weatherwise good and bad years but, in that case, the whole approach to agricultural development could also be different. Alternatively, reasons for plateaus must be searched to find long-term solutions. In the same vein he said that the statistical techniques to be used for deriving usable conclusions were not a matter of indifference. A simple issue like the choice of using triennial or quinquennial averages should depend on the distortions one is trying to iron out and in the context of Indian agriculture, a moving average must, at least, relate to the weather cycles. In that case, five-year moving averages might be better compared with three years which are generally used.

In the context of the law of diminishing marginal returns, I. G. Patel asked if there was a factor which remains or has remained constant in the real sense. Even land was not constant in that sense as the quality of soil can be varied with varying capital investment and human effort. Similarly, the amount of sunshine available to a piece of land can be altered by human interference. The economic sense of the law of diminishing marginal returns was, thus, different from the physical sense, and the latter appeared to be more

important in the current context as there might be limits on the extent to which a particular seed variety can be multiplied, or rise in the price of an input can retard the extent of its use.

Referring to the main objectives of the Symposium, he re-emphasized the importance of analysing Statewise and cropwise composition of agricultural output, and of situation specific analyses with respect to inputs, technology, and climate. These efforts would identify problem areas and help in understanding what 'needs' to be done. He, however, emphasized on two points in this context. First "managerial feasibility" of what 'needs' to be done should receive equal attention. Second and more importantly, the process of identification of what needs to be done for the future should not be confined to experiences of the recent past. It may, for instance, emerge that better management of existing irrigation facilities was the most important step to enhance farm output in the near future. But such considerations could escape the attention if we concentrated only on the experiences of the last three to five years.

The Symposium was conducted in four sessions. The main objective of the first session was to have an overview of problems and prospects of growth of agricultural output in India—with special reference to the Western region. The papers of D. K. Desai, S. D. Sawant, and C. H. Shah were discussed in this session. Location specific performance was taken up in the second session and the discussions centred around the papers of S. P. Pant, Vidya Sagar, and M. P. Pathak. Inputs and crop specific issues responsible for the growth in agricultural output were discussed in the third session. Papers of G. M. Desai, Girja Sharan, V. T. Raju, and M. V. Thombre formed the basis for discussion in this session.

The fourth session was divided into two parts. In the first part there was a general discussion on the issues not covered in the papers discussed in the preceding three sessions. In the second part, the main conclusions emerging from the growth performance of individual States in the Western region were summarised. This was followed by the valedictory address by Shri Madhavsinh Solanki, Chief Minister, Gujarat State.

## I

Of the three papers included in the first session, Sawant's paper reviewed crop production in India for the pre-(since Independence) and post-green revolution periods. The paper covered rice, jowar, bajra, maize, and wheat in the category of foodgrain crops; and groundnut, cotton, jute, and sugarcane in the category of commercial crops. For foodgrains the growth performance was also reviewed for different States of India.

For studying the growth rates, the author used both tabular analysis and statistical techniques. In the tabular analysis, data on foodgrains production from 1949-50 to 1981-82 with triennial averages were given. The author identified the years with peak output levels and worked out annual growth rates between successive peaks.

In the statistical techniques, Sawant used linear and log-linear functions and estimated growth rates of foodgrains production for various periods. The techniques were also used to estimate the rates of growth of individual crops.

The paper examined whether there had been a deceleration in the growth of agricultural production, and concluded that (*i*) no definite or statistically tenable conclusion could be drawn regarding the emergence or existence of deceleration particularly in the latter half of the 1970s; (*ii*) the growth in agricultural production varied significantly amongst States and amongst crops; (*iii*) wheat contributed most towards acceleration of growth in foodgrain production, followed by rice and jowar in the category of foodgrains; (*iv*) in the category of commercial crops cotton and jute experienced growth in production whereas sugarcane and groundnut performed poorly; and (*v*) increase in productivity was considerably a more important variable contributing to the growth in the production of major foodgrains compared with increase in area, but the latter was relatively more important in the case of non-foodgrain crops.

Sawant's presentation raised issues which may be divided into two categories: (*i*) the validity of comparing growth rates, and (*ii*) the policy issues. The questions pertaining to the first category were whether the concept of deceleration as used by the author was correct. Was the comparison of two growth rates measured from two different base levels (with very low absolute level and with very high absolute level) and varying in time, place, and crops valid for deciding deceleration or acceleration ? More importantly, even if a statistically significant conclusion to support the deceleration hypothesis could not be drawn from Sawant's paper, the results appeared to show a move in that direction. For instance, the paper stated that the functions fitted for foodgrains for each of the decades (1950-51 to 1960-61, 1960-61 to 1970-71, and 1970-71 to 1980-81) showed that the growth rates were 3.32, 2.52, and 2.41 for the three decades, respectively. This indicated a steady decline over the past periods. This raised a question whether the growth rates belong to the same growth path which points to the natural phenomenon of diminishing returns. There was a considerable discussion on these and related issues.

Some of the policy related questions emerging from Sawant's paper were: Should aggregate growth performance be relied upon when there are wide variations in growth between States and crops ? What should be the strategy for accelerating growth of agricultural production with widely varying performance amongst States and amongst crops ? Should the emphasis be on crops and regions which have lagged behind or should it be on avenues which have contributed maximum to the past growth ? Should the concept of comparative advantage leading to regional specialisation be a relevant tool in formulating crop specific development strategies ?

Desai and Patel in their paper examined the growth rates of area, productivity, and production of major foodgrains (rice, wheat, bajra, and jowar) in the four major States of Western India: Gujarat, Madhya Pradesh, Maharashtra and Rajasthan. Following this, the paper attempted an analysis of

changes in yields of different crops in relation to changes in the causal variables: fertilizer use, irrigation, and weather by fitting the Cobb-Douglas production functions.

The main conclusion arrived at by Desai and Patel was that the growth rates in production of rice and wheat had declined (though not significantly) whereas that for jowar showed slight improvement in the region as a whole and in three out of four States, except Gujarat. The performance had been yield based, *i. e.*, the crops where productivity did not improve over time exhibited de-eleration (rice and wheat) while improved yield resulted in higher growth (jowar).

The authors have studied the effect of different factors by using proxy variables of fertilizer use for farmer-controlled variables, irrigated area for government-controlled variables, and weather for nature-controlled variables —and fitted the Cobb-Douglas function.

From the results of the Cobb-Douglas function, it was observed that the declining tendencies of yield per hectare in rice and wheat were due to the phenomenon of diminishing returns. It was also observed that the present levels of prices of fertilizer and crops did not discourage farmers in using the right quantities of fertilizers.

According to the results of the Cobb-Douglas function, the response of output to fertilizer in the present technology was such that it was possible to use more fertilizer than currently used in wheat. In the case of rice, the farmers in Gujarat seemed to have used more than the quantity required. They needed to be advised to divert the use of fertilizers from rice to wheat.

This study further indicated that there was a need to shift the policy emphasis from agricultural prices, land reforms, and institutional structures regarding credit and marketing, to the development of agricultural extension, education and research, and better delivery systems of agricultural inputs and credit to farmers.

The discussion on the Desai-Patel paper centred mainly on their production function analysis and the results which did not appear to be rational. A good number of the participants thought that the results arrived at were mainly due to (*i*) highly aggregated data used for the analysis; and (*ii*) multicollinearity in time-series data which, in turn, resulted in biased "production elasticities."

It was, therefore, felt that the conclusions arrived at could not be used for policy purposes even if there was no doubt on the need for more research, strengthening the extension services, and improved delivery systems.

Shah reviewed the performance of Indian agriculture during the last three decades. The paper argued that the main sources of growth in Indian agriculture were increase in cropped area, increase in the percentage of cropped area irrigated, enhanced use of modern inputs, and the technological change. Of these, the relative importance of area had declined over time.

The author observed that foodgrain production in India stagnated every tenth year but each plateau was at least 25 per cent higher compared with the preceding one. The past performance of Indian agriculture, therefore, conveyed two important messages: (*i*) learn to live with fluctuating output levels and continued dependence on imports and buffer stocks; and (*ii*) the long-term growth in foodgrain production was slightly higher than the population growth.

The paper raised a question whether the chequered history of the past could sustain for the future. This was answered positively by the author. At the same time, by juxtaposing the rate of growth of production against the growth in input use, Shah concluded that the productivity of inputs had sharply declined in the recent past. In his opinion, this was mainly because the technological change embodied in the green revolution was resource-using and not resource-saving. To sustain the optimism for the future, it was, therefore, necessary to enhance investment on research, irrigation, and input delivery systems.

The main issue for discussion in the context of this paper was the conceptual framework used for analysing the development perspectives for Indian agriculture. Some participants argued that the author had not recognized the concentration of resource base as a result of which some important issues arising out of accelerated growth did not or could not be appropriately analysed. These included (*i*) income distribution and low level of private investment; (*ii*) imbalances in growth amongst regions and crops; and (*iii*) imbalances between demand and supply of agricultural commodities.

Discussion was also centred around the plausibility of the plateau hypothesis. Shah argued that this could be due to the concern for improvement in the quality of outputs at the cost of quantity. At the same time, there was somewhat of a general consensus amongst the participants that prior to a search for the causal factors for the plateaus, an understanding of their anatomy was necessary. This could be achieved through disaggregation of production over time amongst zones and amongst crops.

The two most important points emerging from the discussions in the first session were: (*i*) there was no factual or logical basis to conclude that there had been a deceleration in agricultural production in India and the Western region in the recent past; and (*ii*) a lot more thought needed to be given to the methodology for studying such issues.

## II

One paper each based on growth performance of Madhya Pradesh, Gujarat, and Rajasthan were discussed in the second session.

Pant in his paper analysed the performance of agricultural output and the constraints on it in India and in Madhya Pradesh. One of his major conclusions was that agricultural growth in India was constrained by

institutional and structural rigidities, but there had been no stagnation. It was further argued that growth was smooth and less uneven across crops and regions till such time when the traditional technology was in use. On the contrary, the new technology differentiated between crops and locations. Since modern inputs have synergistic effects, regions and crops with assured irrigation performed relatively better, and vice versa.

Specifically in Madhya Pradesh, introduction of new technology helped some of the farm enterprises such as wheat, mustard, and gram. On the contrary, jowar, bajra, groundnut, and cotton came under the category of losing enterprises. Scrutiny of past data for a few selected crops revealed that (*i*) fluctuations in production were more common prior to the introduction of HYVs and the overall production trends behaved better, and (*ii*) successive peaks in foodgrain production were consistently higher whereas the troughs were correlated with uncertainty of weather.

Pant also argued that lack of assured irrigation was the main constraint in rapid diffusion of the new agricultural production technology not only in Madhya Pradesh but in India as a whole. Surface Irrigation which was less dependable continued to dominate the psyche of irrigation managers. More importantly, the author observed that assured irrigation facilities (tubewells and wells) were highly concentrated on medium and large holdings while most of the irrigation available on small farms was from canals and other public works which was less assured and, thus, less conducive to promote new technology. In this context, the policy of ceiling on irrigated land was proving to be a constraint on speedy growth of agricultural productivity and production.

The paper by Pathak and Patel indicated that the use of all modern farm inputs had increased in Gujarat during the years 1977-82. It argued that during the post-HYVs period, an analysis of growth in productivity was more relevant compared to the growth of production. The authors concluded that in Gujarat (*i*) the average productivity of major cereals during the period under review was higher compared to the average for the years 1972-77; (*ii*) fluctuations in productivity were more prominent during 1972-77 than during 1977-82; and (*iii*) fluctuations in productivity of rice, jowar, bajra, cereals, pulses, and groundnut were highly correlated with rainfall.

In the case of Rajasthan, Vidya Sagar argued that the hypothesis of stagnation in agricultural performance could not be analysed by taking a macro view of the situation. A few zones in the State produced a major part of the total agricultural output and the contribution of such zones to the total output was substantially higher than their relative share in the total area under cultivation. Fluctuations in total production in the State were positively correlated with fluctuations in rainfall. Since the rainfall was significantly higher than normal during 1975-79, the foodgrain production touched an all time high during this period. On the contrary, rainfall was significantly lower than normal during 1979-82 and the output of foodgrains was also lower.

The paper further observed that fertilizer use in Rajasthan was concentrated only in the canal irrigated zone and its use could be substantially enhanced in such areas. More importantly, the author observed that the area under HYVs of wheat declined in the recent past even in high productivity zones. The main reason for this change had been comparatively higher prices of local wheat than the HYVs. It was, therefore, concluded that Rajasthan had high potential for improving its agricultural performance if the fertilizer use and adoption of HYVs could be improved through appropriate change in price policy.

Based on the data in these three and the earlier papers (first session), it could be concluded that amongst the four major States of the Western region, Gujarat and Maharashtra showed better performance compared to Madhya Pradesh and Rajasthan. The growth in agricultural production in the former two States was yield based. The fertilizer use which was highly concentrated on a few crops and in a few locations in Rajasthan and Madhya Pradesh, was comparatively widespread in Gujarat and appeared to be growing at a rapid rate, though there was considerable inter-district variations within that State also.

Once again, there was no tenable basis to uphold the deceleration hypothesis for the Western region. In fact, some States in the region had maintained a four per cent rate of growth in agricultural production during the last three decades, and this was no mean achievement.

It was also pointed out that the experiences of the Western region were somewhat unique, particularly because irrigation did not appear to play a significant role in consistently better performance of agricultural production and productivity in Gujarat and Maharashtra compared to the other two States.

This did not mean that the potential for growth did not exist. A number of participants pointed out that the policy did not appear to favour regional specialisation to suit location specific natural resource endowments. This was all the more important for a State such as Rajasthan which had the most heterogeneous system of crop production in spite of poor quality of soils and near absence of irrigation facilities over vast tracts, and high variations in rainfall.

In the context of searching for enterprises suited to inherent capabilities of the land base, it was pointed out that research efforts to develop high yielding, disease resistant, and input absorbing cotton varieties for irrigated as well as rainfed areas in parts of Rajasthan could place the State's agriculture on a dynamic path. This was considered all the more important because cotton was moving and had to move westwards from Punjab and Haryana due to severe problem of waterlogging in those States.

Specialisation in sheep and goat breeding combined with a silvi-pastoral land use was identified as another set of enterprises capable of introducing sustained change for the better in the difficult terrains such as the hot arid zone in Rajasthan. It was further emphasized that research to improve genetic characteristics of local species such as *Azadirechta indica* (neem) and

*Prosopis cineraria* (khejri) could be of crucial significance in bringing about the desired change in the economic and ecologic situation.

Specially in the context of the prevalent situation in Madhya Pradesh, the need for broadening the production base through concentrated attention on less developed zones (and pockets within such zones) with high developmental potential was emphasized not only to harness the potential growth areas but also to ensure that developmental resources were not spread too thin. More and more of such areas could be taken up over time as more resources become available.

It was observed that gaps between the potential and actual yields were very high even when the potential was estimated on the basis of experiments on the farmers' fields. These gaps could be filled through appropriate emphasis on software strengthened research and extension systems and stronger tie-ups between them. Moreover, situations with decentralised agencies for seed production and distribution experienced comparatively better productivity gains. Could Madhya Pradesh and Rajasthan learn from other such experiences ?

The unit of production had to be adjusted to bring the fruits of new technology to small holdings. Innovations in the form of joint ownership of capital assets, and organizations to facilitate sharing and higher utilization of such productive assets may have to be evolved. The need for such structural adjustments could be felt much more in the foreseeable future when the technology starts tapering off. The structural adjustments were also necessary to relieve the stress on infrastructure and institutions, particularly in rainfed areas where inputs must reach the producer within a narrow time span.

Some of the papers and the ensuing discussion brought out that management of existing irrigation facilities had not received the desired and deserved level of attention. Timely availability of water, price for its use, and the distribution of water across its command to facilitate appropriate use were interrelated issues and had to be handled through a systems approach by irrigation engineers, agricultural scientists, and the economists. The professionals must work in inter-disciplinary teams to find solutions to the problems in order to make a dent on the policy making mechanisms.

In the context of Madhya Pradesh's experience with soybean and Rajasthan's experience with HYVs of wheat, it was re-emphasized that the producer was responsive to market behaviour. An integrated demand and supply approach was, therefore, essential for the development of new product markets. In that context it was also thought that the use of tractors for transport may be inefficient in an absolute sense but it was rational from the individual farmer's point of view as there was a considerable slack period for on-farm use. This did not mean that all of the farmers' decisions were always the best. Their rationality was subject to the information available with them, and there was considerable scope to improve their knowledge with regard to enterprises and institutions.

III

Desai and Namboodiri did not accept the deceleration hypothesis and argued that growth and deceleration were long-term phenomenon which could not be satisfactorily examined over a short period of three to five years. Their paper pointed out that except for 1979-80 which was weatherwise bad, in all the other years from 1976-77 to 1981-82 there was an increase in the aggregate production of foodgrains in Gujarat.

The authors, however, observed that there was a comparatively faster increase in input use compared with increase in yield. This was explained by concentration of inputs in a few locations and crops. The paper emphasized that (*i*) an understanding of the components of foodgrain production was necessary prior to analysing the causes of aggregate behaviour, (*ii*) noticeable changes in the trend of aggregate production could be observed only after input use crossed a critical minimum level, and (*iii*) the experience of the Western region, especially differences among its four constituent States, demonstrated that impressive growth in yields was possible through growth in fertilizer use and HYVs even under conditions of low irrigation.

Girja Sharan's paper dealt with agro-mechanical technology, with particular reference to the on-farm power segment in Gujarat. It observed that the level of mechanization, as judged by the contribution of tractors to the total mobile farm power used, was higher in Gujarat than the national average but significantly lower in comparison with Punjab. Moreover, there was considerable variation in the degree of tractorisation amongst districts within the State. Factors such as size of land holdings, cropping pattern, and socio-economic structure appeared to be responsible for the variations.

The paper observed that the use of tractors was confined to preparatory tillage, land shaping, and haulage. Seeding, interculture, pest control, and harvesting were mostly done by human labour or animal power. The farmers were rational in accepting only multi-crop equipment.

These facts indicated that research on development of multi-crop equipment could go a long way in mechanizing farm operations which, in turn, could lead to enhanced productivity per unit of land. R and D to develop multi-crop seed-cum-fertilizer drills would also enhance utilization of tractor power and, thus, accelerate the pace of mechanization. To further facilitate enhanced utilization of mechanical aids, (*i*) hiring out of moveable machines, and (*ii*) development of organizations to facilitate group rather than individual ownership of machines and pumpsets was suggested. An interesting fact in the paper was that 20 per cent of the pumpsets in Gujarat were jointly owned, and the proportion of joint owners was as high as 44 per cent amongst farmers owning less than one hectare.

Girja Sharan also observed that the number of draft animals per unit of cultivated land was highest (perhaps excessive) in relatively backward districts of the State: Panchmahals, Dangs, Valsad and Sabarkantha.

Thombre and Dhongade presented a paper on cotton production and productivity in the Western region. Within the region, Maharashtra and Gujarat were relatively more important States with respect to cotton production, but their contribution to total production had declined during the years 1977-78 to 1981-82. This was attributed to relatively lower productivity. The authors contended that the main reasons for poor yields were (*i*) insufficient and uncertain rainfall, (*ii*) low percentage of irrigated area, and (*iii*) low diffusion of HYVs of cotton which, in turn, was due to inefficient input use, low returns to inputs, and high risk on investment.

Raju and Patel's paper on groundnut was presented last. Data for the years 1977-78 to 1981-82 revealed that the area under groundnut in the Western region had declined in the recent past. On the other hand, the yield per hectare increased in the period 1977-82. Madhya Pradesh contributed most to the productivity in the region. The low yield of groundnut compared to those observed on research farms were mainly because of lack of awareness and/or adoption of recommended cultivational practices, and non-availability of appropriate varieties of seeds.

The discussion on these papers brought out a number of important issues. It was re-emphasized that the gap between required and available energy on the farms could be reduced by improving the efficiency of biological resources and enhanced emphasis on research on developing implements with multiple uses, or use specific attachments to heavy machines such as tractors. It was further emphasized that the length of the period of coexistence of biological and mechanical energy varied over locations. For instance, it took about 60 years in U.S.A. and 45 years in Japan for a complete shift from biological to mechanical aids in agriculture, whereas three-fourths of the biological means of energy was replaced by mechanical aids within 30 years in Punjab State. However, mechanical aid was essential if required energy was to be provided at the required time which was essential for enhanced rate of growth. A combination of bio-mechanical energy offered intermediate solution.

It was, however, debated whether joint ownership of the on-farm equipment was a special feature of Gujarat agriculture. If yes, what could be done to spread this culture to other parts of the country? Similarly, was higher number of draft animals per unit of cultivated land in some areas a function of subsistence agriculture ? Could one really debate measures to accelerate the growth rate in agriculture if a good section of the farming community continued to look at it as a way of life ?

Some of the members argued that the social environment was an important factor affecting growth of organizations conducive to developmental process. It was also argued that the presence of excessive livestock could be economically justifiable as the cattle are liquid assets for the relatively poor farmers. To some extent, the excessive number of cattle could be due to the practice of using or abusing common property resources for personal gain where the relevant gain may simply be the dung used as fuel. This brought

out the importance of village woodlot to meet fuelwood needs of the local communities.

A specific issue discussed in this session pertained to the reasons for widely varying yield levels for bajra and groundnut amongst different locations in Gujarat with comparable agro-climatic conditions. This was more relevant as the overall performance of the State had been impressive. The discussion brought out that the technology for these crops, particularly groundnut, was lagging behind. The need for research to evolve input absorbing and disease resistant varieties was once again apparent.

## IV

The discussion in the concluding session, besides specific observations on the performance of agriculture and its problems in the four major States of the Western region, can be divided under five main issues.

First, there was a considerable discussion on whether or not further public investment in irrigation, particularly large surface irrigation projects ought to be checked till such time when the nation learns the art and science of appropriate management of such facilities. It was argued that irrigation facilities also met rural water supply needs for drinking, washing, etc., and could be helpful in generating ancillary enterprises such as animal husbandry, fishing and forestry.

There was also some discussion on the behaviour of rainfall. One participant pointed out that a study for a period of over 100 years did not indicate any cyclic pattern. On the contrary, it was observed that even if God does not play dice with the universe, the rainfall did have some pattern and there was a need to identify that. In any case, it was agreed that there were good and poor rainfall periods and irrigation facilities were required to make up for water deficiency in the latter cases. Groundwater development could be cost-effective in many situations and the management problems could also be considerably less, but that did not mean that surface irrigation was not to be thought of.

The need for better management of large irrigation systems, particularly to check waterlogging, was considered to be of absolute significance. There was somewhat of a consensus on these points: (*i*) the role of government in water management should be reduced; and (*ii*) as long as irrigation water was free or nearly free, inefficient management could not be stopped. Community participation could help in better management of the facilities but efforts to organize water co-operatives were not considered feasible on a wide scale. One important suggestion in this context was to think of a system where individual entrepreneurs could purchase water in bulk at the main outlets and sell it to individual farmers in a *chuck*. This type of change in management required that irrigation be looked at as an economic proposition.

The second important issue was pertaining to land use planning for the nation as a whole. The need for distinguishing between the scientists' and the economists' concept of land use planning was emphasized with the help

of a fact that more than two-thirds of the area under sugarcane was in regions where the productivity per unit of land was below the national average. This could be rational for individual farmers, but was it socially desirable? If not, what could be done to correct the situation ? The answer would lie in policy measures to encourage regional specialisation in accordance with inherent capabilities of the natural resource systems.

The third main issue in this session was that the effectiveness of a package of strategies (not practices) may reduce over time. Land reforms, and organizations designed earlier for input distribution were cited as examples. It was thought that attempts at minor changes in the strategy were not likely to lead to accelerated development, and a new package of strategies would be necessary. For instance, the concept of ownership should not continue to be limited to land, but must be extended to the output processing units for realising the full impact of backward and forward linkages. Experiences of sugar and dairy co-operatives were relevant in this context. The question was whether these experiences could be extended to other commodities/production systems: coconut and paddy.

Fourth, the role of pricing policy was not discussed at length, but some participants talked of steep rise in input prices. On the contrary, the need to concentrate on research efforts to enhance the efficiency of fertilizer use rather than price was emphasized. This could be more important to bridge the wide gaps between the potential (based on demonstrations on farmers' fields) and actual responses of fertilizers used.

Fifth, the point raised in the earlier sessions that stagnation was a long-term phenomenon and could not be studied over a short period of five years came up again. It was said that there have been several peaks and troughs in foodgrain production in India over the last three decades and, with just one or two exceptions, the peaks had occurred at intervals of four years. This could mean that there was correlation between peaks and the weather cycles. If this was accepted, the most important contribution of the Symposium should be in terms of the directions for the future so that the behaviour of the peaks and troughs can be changed for the better.

There was a general consensus that no specific causes existed for gloom on the agriculture front. More importantly, it was agreed that recent increases in output were more due to enhanced productivity than increase in cultivated area. This was a healthy trend and should dispel the fears regarding deceleration.

In his valedictory address, Shri Madhavsinh Solanki, Chief Minister of Gujarat, appreciated the attempts at disaggregated analyses of the growth in the use of agricultural inputs and productivity for different crops. The evidence generated in the Symposium was of great interest to the policy makers for determining the kind of interventions that could be necessary.

In line with the preceding discussions, he questioned the feeling in some quarters that agricultural production had nearly stagnated in the recent past; and that while there had been a revolution in input use,

corresponding results in production and productivity were not visible. He emphasized that even if agricultural output for the country as a whole had not grown at a very fast rate, the situation was definitely encouraging for certain States and for certain crops.

Shri Madhavsinh Solanki also pointed out that the Symposium papers did not cover some of the important variables affecting agricultural productivity and production. Though this could have been due to limited availability of systematic and reliable data, yet the fact remained that the role of exogenous factors, particularly agro-economic and weather, had to be identified for a more meaningful evaluation of the policies and institutions for agricultural development.

The Chief Minister referred to situations where there were conflicts between the individual objective to maximize profits and the national objective to maximize outputs. There was evidence that per unit prices of the local varieties of wheat and bajra were higher compared to the HYVs. Compromise could be found through a more sophisticated approach in agricultural research with an attempt to preserve some desirable properties of the local varieties in the HYVs.

He reiterated the Symposium finding that input use was highly concentrated in some locations and for some crops. For instance, out of 411 districts in the country, 120 districts accounted for 80 per cent of the total consumption of chemical fertilizers. This necessitated a better understanding of the natural and human resource endowments at the taluka level.

The importance of looking beyond the well established crops was also emphasized. It was pointed out that the role of enterprises such as isabgol, cumin, fruits and vegetables, fodders, and dairy development should not be minimized. In fact, some of the slow growth in cereal production in the recent past could be explained by enhanced importance of these enterprises.

Finally, the Chief Minister emphasized the importance of policies to augment the incomes of the rural poor through other occupations than agriculture. This would be a welcome change. There has been a long felt need that the poor need not continue to be committed to land, particularly when there was not much hope for them to derive a certain minimum level of income from very small holdings.

The Symposium concluded on a happy note when the Chief Minister and the participants congratulated Professor M. L. Dantwala on completing 75 years of a professionally rich and varied life.