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RAPPORTEUR'S REPORT

ON

ECONOMICS OF COMMERCIAL CROPS

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Forty-five papers were received on this subject. The scope for study as indicated by the synopsis for the subject, covered a wide gamut of several important topics relating to the economics of non-foodgrain commercial crops. However, the papers submitted for discussion have, by and large, clustered around the single issue of the profitability of one or more of these crops. Most of the papers are methodologically prosaic and hastily drafted. For the purpose of a review, these papers have been classified on the basis of the broad aspect of the subject on which they have a bearing, *viz.*, (*i*) growth and fluctuations of acreage, productivity and output of commercial crops, (*ii*) impact of technology on the cultivation of commercial crops, (*iii*) regional specialisation in the cultivation of commercial crops vis-a-vis regional self-sufficiency in foodgrain production, (*iv*) impact of commercial crops on farm incomes and investment, and (*v*) economics of production and resource use.

GROWTH AND FLUCTUATIONS

Four papers have analysed some aspects of growth/instability of commercial crop output at the macro level. S.S. Acharya and N.L. Agarwal make use of time-series data for the period 1959-60 to 1972-73 in their ambitious attempt to estimate the trends in area, production and productivity of commercial crops and to study the impact of relative prices, physical factors and yield increasing technologies of foodgrains on the supply of commercial crops in Rajasthan State. The time rates of growth of area, productivity and production are not statistically significant for the broad groups of oilseeds and commercial crops as also for the individual crops of sesamum, chillies, potato and tobacco (the rate of growth of productivity of oilseeds of which the authors talk about is significant at 20 per cent level). Even the modified Nerlovian model for estimating the responsiveness of acreage under commercial crops, could explain only 49 per cent of the variation thereof; the explanatory strength of this model varies from 40 to 65 per cent for the individual crops studied, the only reasonably good fit being that for oilseeds as a group where again the coefficient for the area-shifter dummy representing the impact of the HYVP for foodgrains is non-significant though negative. It is open to

question whether meaningful results can emerge from such aggregate acreage adjustment models.

Nirmal Singh and H.S. Bal have derived for Punjab, the compound rates of growth of area, production, yield and prices in respect of cotton (*desi* and American), groundnut and sugarcane for the pre-and the post-green revolution periods. However, with the exception of sugarcane in the latter period, the rates of growth of acreage under the selected crops are not statistically significant in both the periods. On the other hand, the rate of growth of the production of groundnut alone is significant in both the periods. In view of this, the authors' generalisation that "cotton (American), groundnut and sugarcane are the worst affected commercial crops by the foodgrain technologies in Punjab" seems to be baseless.

With the help of a model for directly identifying the components of growth rate of agricultural output, P.V. Sarma finds that during the period between 1956-64 and 1964-72, the growth of commercial crop output in the State of Andhra Pradesh as also in the majority of the districts which performed better than the State as a whole in this regard, was mainly due to increase in area.

In order to obtain estimates of supply and demand elasticities for sugarcane and to examine the nature of equilibrium, G.S. Ram and Dayanatha Jha apply cobweb analysis to eight cane-producing regions of the country—an exercise somewhat similar to the one already done by Jha and Maji for North Bihar*—and fit dynamic supply and static demand functions for acreage under sugarcane. The results indicate a stable and convergent equilibrium in six out of the eight regions studied. Surprisingly, the authors have specified the demand and supply functions in a verbal form and rather vaguely—even the lags in the independent variables have not been defined. Based upon a weak demand relation, the results do not seem to have much of an interpretative significance.

IMPACT OF TECHNOLOGY ON THE CULTIVATION OF COMMERCIAL CROPS

Two papers are concerned with the broad issue of identifying the impact of technology on the cultivation of commercial crops while one paper deals with the effect of the introduction of an economic overhead such as irrigation, on the cropping pattern of the farmers in the region. K.C. Dhawan and A.S. Kahlon have developed normative production plans for farms of various sizes in the paddy and the groundnut zones of the central plains of the Punjab under the existing structure of prices, yield levels and technology (referred as optimum plan I in the discussion below) as also under different sets of prices for commercial crops (optimum plan II), and compared the same with the existing

* Dayanatha Jha and G. G. Maji, "Cobweb Phenomenon and Fluctuations in Sugarcane Acreage in North Bihar," *Indian Journal of Agricultural Economics*, Vol. XXVI, No. 4, October-December, 1971, pp. 415-421.

pattern in 1972-73, the study being based upon a sample of 48 farms drawn from this region. It is observed that in the paddy zone, the percentage of area under foodgrains ranged between 75 and 77 per cent for different farm sizes whereas it would have only further increased in the optimal plan I; in the groundnut zone, there was no substantial difference in this regard between the existing plan and the optimum plan I. In view of this, the authors conclude that given the relative profitability of foodgrains resulting from the high-yielding varieties, the Punjab farmers of the region were rational in allocating more acreage to foodgrains. But this is not enough basis to infer that the existing crop-mix in its entirety was optimal. Thus in the paddy zone, not only did the acreage under commercial crops decline in the optimal plan I compared to the existing plan but also there was a reshuffling of the acreage within the foodgrain group; paddy in the optimal plan I claimed on different farm sizes 31 to 38 per cent of the cropped area compared to 14 to 18 per cent in the existing plan. Similarly in the groundnut zone, the acreage under commercial crops was larger in the optimal plan I than in the existing plan, the increase being more pronounced in the case of groundnut (*i.e.*, from 5.6 to 7.6 per cent in the existing plan to 15.2 to 18.8 per cent in the plan I) than for sugarcane or *desi* cotton. In the light of the aforesaid, it would have been useful if the authors had, in the first instance, examined the optimum plan formulated under existing technology and prices before proceeding to locate optimal farm organization with different sets of prices for commercial crops; more particularly, they should have worked out the net effect of an increase in the percentage of acreage allocated to commercial crops in the optimal plan I vis-a-vis the existing plan in the groundnut zone and a decline in this regard in the paddy zone to examine the scope for an overall increase in the acreage under commercial crops in the optimal plan, even under the prevailing structure of prices. The authors' finding that a higher level of price assumed for one commercial crop led only to a diversion of acreage from other commercial crops indicates that more than price policy, emphasis should be laid on developing yield-increasing technologies for commercial crops to match those for foodgrains.

Arunendu Mukhopadhyay uses farm management data for Ferozepur district for the two trienniums ending 1956-57 and 1969-70 for assessing the differential impact of technological change on food (*desi* wheat) and commercial crops (cotton—*desi* and American). While the intensity of capital per unit of each of inputs of human labour and bullock labour increased during this period more for wheat (*desi*) than for cotton (*desi* and American), thereby leading to a higher net saving of cost in the substitution of machinery and implements for human and bullock labour in the cultivation of wheat vis-a-vis cotton, the impact of overall technological change (including yield-increasing technology) resulted in a much higher additional return per unit of additional cost for a switch-over from *desi* cotton to American cotton compared to a shift from *desi* wheat to Mexican wheat. Even so, considering the peroid, *viz.*, 1967-68—1969-70, the author notes only a marginal increase in the area under

American cotton compared to a substantial expansion of acreage under wheat in the sample villages; in fact, the percentage of area under cotton, when both the local and the improved varieties are taken together, declined from 18.5 per cent in 1967-68 to 17.4 in 1969-70. It is likely that with the development of the high-yielding varieties of rice, bajra, and maize, the area under cotton had got diverted to these crops. It may however be of interest to note that the acreage under cotton in the State of Punjab has since then registered an increase from 4 lakh hectares in 1969-70 to 5 lakh hectares in 1972-73, thereby more than regaining what it had lost during 1964-65 to 1969-70.

A study by D. L. Vyas and Jagdeesh C. Kalla which purports to assess the relative importance of commercial crops like cumin, chillies, rapeseed and hybrid bajra seed production compared to wheat from data for 1972-73 relating to a sample of 24 farm families having assured irrigation facilities in the Borunda tube-well command area in Jodhpur district of Rajasthan shows that with the advent of irrigation, commercial crops had started figuring in the cropping pattern of this area which earlier used to have a mono-culture system. And yet, notwithstanding the higher remunerativeness of hybrid bajra seed production, the farmers still preferred to put the largest percentage of the cropped area under wheat, thereby indicating that risk aversion was a more powerful factor than profitability in cultivators' decision-making.

REGIONAL SPECIALISATION IN THE CULTIVATION OF COMMERCIAL CROPS VIS-A-VIS REGIONAL SELF-SUFFICIENCY IN FOODGRAIN PRODUCTION

Whereas Dhawan and Kahlon have derived on the basis of survey data, optimal crop plans under scarce resources and also for assumed levels of prices of commercial crops, P.L. Sankhayan and D.S. Sidhu have worked out, using secondary data for the State of Punjab, a scheme of optimum allocation of scarce resources under self-sufficiency constrains for foodgrains and have further observed that under such an optimum plan, commercial crops as a group would gain about 5.68 per cent more of cropped area in the State with the value of gross output from all the crops registering an increase of nearly the same order. But before coming to any policy conclusions, it is important to examine if equally encouraging results would accrue in respect of the aggregate value of agricultural output of the country, consequent on a generalised application of the Sankhayan-Sidhu exercise to the economy as a whole with self-sufficiency constraints for foodgrains for the different States.

IMPACT OF COMMERCIAL CROPS ON FARM INCOMES AND INVESTMENT

Five papers have been contributed on this specific issue. K.K.S. Chauhan, R. C. Verma and G. C. Shukla attempt to examine the impact of commercial crops on farm incomes and resource use in Jaipur district by developing two optimum farm plans for different size-groups (*a*) under the existing resource constraints and with limits on the maximum area which the farmers wanted to put under commercial crops (plan I) and (*b*) under the existing resource

constraints and relaxed constraints of area under commercial crops (plan II). Under both the plans, the cropping pattern shifted in favour of commercial crops on all farm sizes except in the case of the large farms under plan II where, in fact, the percentage of area under commercial crops declined. According to the authors, the possible reason for this decline in the area under commercial crops on the large farms in plan II, "was the availability of limited irrigation resources in *rabi* where almost all the available irrigated area was devoted to *methi* alone." But if we examine the two optimum plans for the large farm, it is observed that even when the percentage of area under commercial crops declined under plan II, the absolute cropped area under the *rabi* (commercial) crops increased from 3 hectares under plan I to 3.75 hectares under plan II; the decline had therefore occurred in respect of the *kharif* (commercial) crops, *i.e.*, from 11.39 hectares in plan I to 0.46 hectare in plan II. At any rate, what is not understandable is whether scarcity of irrigation input could be specific only to the large farms. The noteworthy point —which the authors have not highlighted—is that while incomes increased under both the optimal plans for all farm sizes, the percentage contribution to the additional incomes of grain crops was higher than that of commercial crops for small and medium farms and the vice versa true of the larger farms under plan I. It is only in plan II, that the predominant contribution to additional incomes came from commercial crops in respect of all farm sizes.

Comparing the sample data on gross incomes and costs relating to 30 potato-tobacco farmers ('A' category) and 30 farmers who were "non-growers of potato and tobacco" ('B' category) in the Hasanpur tehsil in Moradabad district in Uttar Pradesh during 1973-74, R. Kunwar and Ram Iqbal Singh conclude that the higher levels of net income as also of fixed and variable farm expenses per hectare on the 'A' category farms than on the 'B' category were the direct result of raising potato and tobacco as commercial crops on the former farms. The authors have, however, overlooked the fact that sugarcane—also a commercial crop—figured under both sets of farms as a crop of minor importance for the 'A' category and a major crop for the 'B' category. In this context then, the 'B' category farmers, by not being cultivators of potato and tobacco alone, cannot be *ipso facto* taken to have fulfilled the condition for constituting a control group for purposes of effecting conclusions on the impact of commercial crops.

J.S. Chawla and R.K. Pandey, working with data for a sample of 120 bullock operated farms in Barnala block in Sangrur district in Punjab for 1972-73, show that the proportion of farm income from commercial crops explained 45 to 55 per cent of the variation in overall farm incomes, and 50 to 53 per cent of the changes in farm investment on different farm sizes. The net return per rupee of expenditure was as high as 2.8 for the commercial crops compared to 1.6 for the food crops, while the variable costs were higher for the latter set of crops than for the former. Another study by J. S. Chawla and R.P. Singh also points out in respect of a sample of 70 farms (of which

60 were bullock operated) in Amritsar district in Punjab in 1972-73, that the per acre cash expenses were higher for food crops than for cash crops due to the larger input requirements for the high-yielding varieties of wheat and paddy. The paper further provides estimates of the short-term credit requirements thereof. But per acre variable capital expenses for cash crops in this study worked out to Rs. 89 (weighted average for the bullock operated farms) as against Rs. 172 in the study by Chawla and Pandey, whereas the area under cash crops such as cotton, sugarcane and *til* in the former case was about 25 per cent for the different sample farms vis-a-vis 14 per cent under cotton, sugarcane and *sarson* in the latter study.

V. Prasad and R.I. Singh also find that for a sample of 100 farmers in Farrukhabad district in Uttar Pradesh that the commercial crops which accounted for 47 per cent of the area of the average farm contributed 73 per cent of the total income from all crops raised on the farm. A comparison of the marginal value products of the different inputs for commercial and sood crops shows that the farmers used the inputs more intensively on the former set of crops.

ECONOMICS OF PRODUCTION AND RESOURCE USE

As many as thirty-two papers have analysed the nature of costs and returns in the cultivation of different commercial crops and have estimated the profitability thereof—absolute and/or in relation to the competing crops. Before undertaking a discussion of these papers a few general comments are in order. The data for these papers have been collected by survey method and therefore suffer from all the inherent limitations of this method. Not all the contributors have adopted the standard concepts of cost; important details on the manner of imputation of the value of owned inputs and the allocation of joint costs among the individual crops have not been presented even in a footnote. Many authors speak of "net returns per unit of rupee investment" whereas the estimates actually refer to the value of gross output per unit of input cost incurred. Where production function analysis has been resorted to, there is neither a clear definition and measurement of the variables nor a proper specification of the fitted function. Inferences on the nature of resource use on the sample farms are drawn on the basis of an examination of the arithmetical values of the ratios of marginal value products to the respective factor costs, without applying the statistical tests to see if these ratios significantly differed from unity.

To facilitate discussion, the papers under this topic have been grouped according to the major crop studied (except the contribution by I.J. Singh and others which did not lend itself to this classification). I.J. Singh, A.C. Gangwar, O.P. Chhikara and P. Singh have estimated Cobb-Douglas production functions for cotton, sugarcane and rape and mustard based respectively upon samples drawn from Hissar, Ambala and Mohindergarh districts in

Haryana, the reference year being 1973-74. The selected variables of expenses on fertilizers, irrigation, insecticides and human labour explain only 59 per cent of the variation in the value of gross output of rape and mustard on the sample farms, the coefficient of determination being 0.72 for cotton. The possibilities for improving the explanatory strength of the production function do not seem to have been examined. The authors have presented and interpreted the results in a rather mechanical way. For instance, no reason is given as to why the regression coefficient of the value of insecticides used per hectare (x_3) does not figure in the production functions for sugarcane and cotton whereas it finds a place in the function for rape and mustard; it has been left to the reader to guess if it could be a problem of multicollinearity. Or is it a case of omission ? The information provided in the paper on the comparative economics of sugarcane, cotton, rape and mustard shows that in respect of the sample farms, cotton was more profitable than rapeseed and mustard or sugarcane, though sugarcane was the most labour intensive crop. It may be pointed out here that Nirmal Singh and Bal in their study (already referred to) find on the basis of data from the comprehensive scheme of cost of cultivation for Punjab, that sugarcane was the most profitable crop followed by cotton (American) and groundnut.

Jute

Three papers respectively for a selected district in each of the States of Assam, Orissa and Uttar Pradesh deal with the economics of cultivation of jute vis-a-vis paddy. The results presented by P.C. Goswami and C.K. Bora on the basis of the farm management data for 150 farm families of Nowgong district in Assam for the three consecutive years ending 1970-71 indicate that notwithstanding the higher costs of cultivation per hectare of jute compared to paddy, the output-input ratio for jute was, on an average, one and a half times as high as that for paddy. The authors are of the view that this resulted in the observed increase in the acreage under jute on the sample farms. It is however open to question whether meaningful inferences regarding acreage adjustment can be made from data for three years only. Even so, the paper does make a valid observation in regard to the tendency on the part of the Assam farmer to sustain the acreage under the main food crop of *Sali* paddy and to allow autumn paddy to assume the role of food-cum-commercial crop and compete with the acreage under jute.

Baidyanath Misra, Prafulla Kumar Das and Narendra Kumar Mohanty have collected data for *kharif* 1973-74, from a sample of 48 farms in Kendrapura area in Cuttack district in Orissa, covered by the Intensive Jute District Programme, and shown that the net returns per hectare from the improved technique of jute cultivation stood above those from the traditional method of jute cultivation and from the high-yielding variety of rice by 63 per cent and 32 per cent respectively. The adoption of the improved technology of jute cultivation would not only enhance the supply potential of the fibre through

an increase in the yield levels but also result in lower unit costs of production of the finished jute products consequent on the reduced cost of production of the fibre per quintal. It needs to be pointed out here that whereas the cost and returns in respect of jute relate to the sample chosen by the authors, the paper does not indicate the basis for the corresponding estimates in regard to paddy. Even assuming that they do refer to the sample farms, it would still have been necessary—for being able to assess the statistical validity of the estimates—to give details of the break-up of the gross cropped area of these farms under the crops taken up for study, *viz.*, jute under the traditional and the improved techniques of cultivation and paddy, local as well as high-yielding varieties.

J. S. Garg and Rama Kant Singh, doing a similar exercise in comparative economics of jute and paddy in respect of a sample of 50 jute growers in the Phool Behren block of Kheri district in Uttar Pradesh for 1973-74, explain the secular phenomena of a decline in the hectareage under jute and an increase in that under paddy in the district in terms of the higher remunerativeness of paddy vis-a-vis jute. The authors have pleaded for parity price incentives to jute cultivators in order to "save the jute industry." While a favourable price climate is necessary for extending/preserving the acreage under the fibre, it is, however, not a sufficient condition. Given the highly competitive overseas market in jute goods, the long run solution lies in a technological break-through in jute cultivation, which would reduce the unit cost of production of the fibre.

Cotton

Nine papers have been submitted on the costs and returns pertaining to cotton and its competing crops in the cotton producing areas of Gujarat, Maharashtra, Madhya Pradesh, Uttar Pradesh and Punjab. Of these, five studies relate to the economic aspects of hybrid cotton. V . K. Madalia and A. S. Charan study the economics of production of seed and commercial crop of H-4 cotton. Using data relating respectively to samples of 60 seed growers and 60 cotton cultivating farm households in the Amod taluk of Broach district and Sinor taluk of Baroda district in Gujarat during 1972-73 and 1973-74, the authors observe that the cultivation of hybrid cotton seed costs as much as Rs. 44,688.80 per hectare, yields about 12 quintals of seed, which, evaluated along with the lint and other by-products, works out to Rs. 87,238.57 and results in an output-input ratio of 1.95. Commercial cultivation is also shown to be quite remunerative, with the output-input ratios of 2.37 and 2.30 for the irrigated and the rain-fed crops respectively. There is however a conceptual error in including the marketing costs in the estimate of overall cost of production of the commercial hybrid crop.

D. K. Marothia compares the costs and returns of the local and the high-yielding varieties of cotton respectively with the local and the high-yielding

varieties of each of the competing crops of groundnut, maize and jowar with the help of data collected from a sample of 40 farmers in the Intensive Cotton Development District of Khargone in Madhya Pradesh for *kharif* 1973 and establishes that cotton cultivation was the most profitable enterprise, yielding as it did an output-input (operational costs) ratio of 3.90 for the high-yielding variety and 3.39 for the local variety.

H. R. Rawalji presents, by size of holding and for tractor and non-tractor farms separately, estimates of costs and returns for hybrid cotton, for a sample of 48 cultivators in Anand taluk of Kaira district in Gujarat for 1972-73. But in so far as the non-tractor farms in this study were also hiring in custom tractors—the per hectare tractor costs for all sizes of farms, on an average, were identical for the tractor and the non-tractor farms—the distinction between tractor and non-tractor farms is nominal and does not make one wiser on the issue of tractorisation. On the other hand, the important conclusion from this paper is that the medium-sized farms were able to get higher output per unit of input cost compared to the small or the large farms.

Another study by S. B. Singh, M. R. Patel and A. D. Patel of a sample of 45 cultivators in Anand taluk in Kaira district in Gujarat during 1973-74 finds that the net incomes per hectare from hybrid cotton-4 which increased with the size of holding was higher than that from tobacco on the medium and large farms and lower for the smaller farms. The cost of production of H-4 cotton given in this study at Rs. 5,623 per hectare and Rs. 439 per quintal seems to be an over-estimate; the possible source for this over-estimation could be the high rental value (*i.e.*, Rs. 1,809 per hectare) included in this estimate. Even the estimate of cost excluding the rental value, *i.e.*, Rs. 3,814 per hectare does not compare with the corresponding estimate of a little over Rs. 2,300 per hectare of the same taluk given in Rawalji's study.

M. K. Shingarey, V. D. Galgalikar and B. D. Bhole show, with the data for a sample of about 50 cultivators for each of varieties of cotton, *viz.*, H-4, MCU-5 and AK-235 in Akola district in Maharashtra during 1972-73 and 1973-74, that the net return per hectare was about nine times in the case of hybrid cotton and four-fold in the case of MCU-5 over the local one.

Explaining the value of gross output of H-4 cotton pertaining to a sample of 50 cultivators in the Parbhani and Bastmathnagar tehsils in the Parbhani district in Maharashtra for 1972-73, in terms of expenses on manures and fertilizers, plant protection and human and bullock labour, T. G. Satpute and B. D. Bhole observe increasing returns to scale. The overall estimate of cost of production of H-4 cotton per hectare at Rs. 2,501.70 for 1972-73 is however higher by Rs. 854 than that given for the same year by Shingarey, Galgalikar and Bhole. Both these studies observe that the cultivators of H-4 cotton followed the departmental recommendations in regard to the use of N, whereas the utilization of P and K was less than the recommended doses.

Based upon information referring to a sample of 30 cotton cultivators during 1973-74 in the development block Siyana in the Bulandshahr district in Uttar Pradesh, Ram Iqbal Singh and R. Kunwar find that cotton, *desi* as well as American, yielded a considerably lower net return per hectare compared to sugarcane, and that the *desi* cotton-wheat crop combination was less remunerative than the maize-wheat rotation. The output-input ratio worked out to 2.52 and 2.20 for cotton, American and *desi* respectively. Similar conclusions are derived in another study by J. S. Garg and Om Prakash, from the sample data for 50 cotton growers in the Sasni block in Aligarh district in Uttar Pradesh during 1973-74. The output-input ratios for the *Pramukh* (American *kapas*) and the *Shamli* (local) varieties of cotton are estimated at 1.67 and 1.31 respectively. Also, the cultivation of maize and bajra is shown to be economically superior to that of cotton of the *Shamli* variety. It is further observed that the cost of production per quintal of cotton *kapas* of the *Shamli* variety recorded an increase of nearly 154 per cent from Rs. 75 in 1969-70 to Rs. 190 in 1973-74. There is, however, a problem of comparability here; the comparison has been wrongly made in the paper between the per hectare costs exclusive of rental value for 1969-70 (*i.e.*, Rs. 447.80) and those inclusive of the same for 1973-74 (*i.e.*, Rs. 1,141.66), the yield rates being 5.98 quintals and 5.56 quintals in these years respectively. When this is corrected, and the comparison is effected between the estimates of cost inclusive of rental value at the two points of time, the cost per quintal works out to Rs. 142 in 1969-70 as against Rs. 190 in 1973-74 thereby showing an increase of only 34 per cent.

The relative remunerativeness of the American (320-F) and the *desi* varieties of cotton as also the relative efficiency of the tractor operated farms compared to the bullock operated farms are brought out by M. S. Dhaliwal and J. S. Chawla in their paper based on the sample data for 80 farms including 20 tractorised farms in the Lambi block in Faridkot district in Punjab for 1973-74. Whereas in respect of the American 320-F variety, the net return per rupee of variable expenses at 3.02 for the tractorised farms (it wrongly presented by the authors as 4.02 in the summary) stood about 14 per cent higher than the corresponding estimate of 2.64 for the large, bullock operated farms, the difference was about 5 per cent (*i.e.*, 2.43 and 2.32) for these two sets of farms respectively, in the case of the local variety. By fitting a Cobb-Douglas production function, it is observed that operating capital was used at sub-optimal levels on all these farms, irrespective of the variety of cotton cultivated. There seems to be a substantive flaw in regard to the authors' inferences about the nature of utilization of fixed capital, human labour and bullock labour on the different farms. Contrary to the conclusions given in the paper that fixed capital, human labour and bullock labour were under-utilized on the small and medium farms, the ratios of marginal value productivities of the aforesaid inputs on these farms to the respective factor prices being less than unity (assuming of course that the ratios signi-

ficantly differed from unity—an exercise not done in the paper)would indicate an excessive use of these inputs on the farms.

Sugarcane

Six papers have examined the nature of costs and returns and resource use in the cultivation of sugarcane. By fitting a Cobb-Douglas production function to the sample data on per hectare yields pertaining to 100 sugarcane farms in the development block of Hapur in Meerut district in Uttar Pradesh for 1968-69 and 1969-70 and examining the marginal value productivities of the different inputs for sugarcane planted and ratoon separately, J. S. Garg and M. P. Azad indicate the possibilities for increasing the net returns from cane cultivation through a diversion of capital from human and bullock labour to manure-fertilizers and irrigation. A similar conclusion referring to the need for more use of fertilizer and irrigation for higher incomes from sugarcane in Uttar Pradesh has been derived by G. N. Singh and H. L. Srivastava through a production function analysis of the gross returns of 300 cultivators chosen from the sugarcane producing districts of Gorakhpur in the eastern region, Lakhimpur in the central region and Muzaffarnagar in the western region. The average cost of production per quintal of sugarcane for all the regions is estimated at Rs. 6.79 while the output-input ratio works out to 1.91. The study further finds that returns to scale in cane cultivation were increasing.

As against these studies for Uttar Pradesh, P. B. Parthasarathy and K. S. Suryanarayana have shown, with data for Andhra Pradesh for 1964-65 that returns to scale in sugarcane cultivation were generally constant and have further advocated a diversion of resources from human labour, seed, manure and fertilizers to crop land and cattle labour, for a more profitable sugarcane enterprise. S. M. Patel and T. K. T. Acharya also observe constant returns to scale in the cultivation of sugarcane and of bananas in respect of a sample of 60 farmers in the Malegaon taluk of Nasik district and the Bhadgaon taluk of Jalgaon district in Maharashtra for 1970-71 and 1971-72. Examining the nature of resource use of these farms, the authors state that when both land and capital are limited, optimality could be ensured by diverting resources from manures and fertilizers to human labour and seed, and with capital constraint alone, optimal allocation would result when more resources are diverted to land only.

Brijendra Singh, Rajvir Singh and L. R. Singh have studied the cost structure for sugarcane, paddy and wheat with the help of survey data for 1973-74 of 30 farms in Rudrapur block in Nainital district in Uttar Pradesh. Not only were the yields per hectare of sugarcane as also of the high-yielding varieties of paddy and wheat significantly higher on the large farms than on the small and the medium farms, but also sugarcane was more profitable than the paddy-wheat rotation on the medium and the large farms and the vice versa true of the smaller farms, the major contributing reason being the higher levels

of fertilizer use and better management on the larger farms and the absence of own sources of irrigation on the small farms. At variance with the conclusion of this study is that of Vishwa Nath, who, using the data relating to a sample of 40 farmers in Doharighat block in Azamgarh district in Uttar Pradesh in 1973-74, shows that the paddy-wheat combination had an edge over sugarcane, in regard to profitability. It may be mentioned here that the total cost worked out by Brijendra Singh and others, refers only to the operationwise cost and yet is as high as Rs. 2,860 per hectare even for the small farms, as against Vishwa Nath's estimate (which seems to correspond to cost 'C') of Rs. 1,991; Singh and Srivastava also indicate an estimate of Rs. 2,576 per hectare.

Oilseeds

Only two papers relate directly to the costs and returns in respect of oilseeds. On the basis of a sample study for 1972-73 of 90 cultivators in the Saiyan block in Kheragarh tehsil in Agra district in Uttar Pradesh, K. K. S. Chauhan and P. V. Krishna show that the output per rupee of cost incurred was higher for rapeseed-mustard than for wheat in the case of medium and large farms, as also for all the farms on an a verage. It is interesting to note that though the cost of cultivation per quintal for rapeseed-mustard at Rs. 142.00 was higher by nearly Rs. 60 over the corresponding estimate for wheat, the cultivation of the former crop was more remunerative even at its lowest prevailing market price. Even so, the susceptibility of rapeseed-mustard to insect pests and diseases and the wide inter-year and seasonal fluctuations in its prices are sufficient constraints for any swift switch-over of acreage from wheat to this oilseed.

Presenting the estimates of costs and returns in regard to sunflower cultivation for a sample of 50 farms in Akola district in Maharashtra during 1972-73, V. D. Galgalikar and B. D. Bhole observe that though there was considerable scope for improving the yield rates through the application of the recommended doses of fertilizers, the profit even at the extant yield levels was nearly Rs. 500 per hectare.

Tobacco

D. S. Shukla, R. B. Singh and R. I. Singh have presented the economics of tobacco cultivation by size of operational holding on the basis of information for a sample of 60 farms in Anand taluk of Kaira district in Gujarat. The estimates of costs and yields per hectare are the highest for the small farmer and decrease with increase in the farm size whereas the output-input (operational cost) ratio is lowest for the small farmer and increases with farm size.

Fruits and Vegetable Crops

There are in all ten papers which refer to the economics of cultivation of fruits and vegetables. G. S. Gupta and P. S. George have worked out the

profitability of santra (orange) cultivation in Nagpur with the help of conventional measures of investment worth, the data base for the study being a sample survey of 60 orange growers who had a total of 101 groves of different sizes. The study finds that investment in santra cultivation has, on an average, a pay-back of seven years, with a net present value of Rs. 6,438 per acre (at a discount rate of 12%), an internal rate of return of 39 per cent and a benefit cost ratio of 2.50. The optimum size of the grove is observed to be between 1 and 2 acres.

C. S. Raghubanshi, R. K. Sharma and S. R. Sood find that the cultivators in the Saproon valley in Himachal Pradesh were rational decision-makers, specialising as they did in relatively high pay-off vegetable crops such as cauliflower (the net income per hectare worked out to be Rs. 34,104) as against the low pay-off cereal crops. On the basis of a production function analysis, the authors indicate some possibility for adjustment in resource use. It is not clear if the variables of the production function are in physical or in value terms. The scope for a reallocation of resources is also pointed out in another study on vegetable crops in Himachal Pradesh by M. S. Rathore, J. P. Bhati and R. Swarup. F. K. Wadia lists agronomic, marketing and transport and processing problems in respect of horticultural crops in the north-eastern region and advocates *inter alia* the setting up of a viable processing unit in the region.

Y. S. Chauhan and R. I. Singh examining the economics of cultivation of potato and wheat in regard to a sample of 100 cultivators in the Meerut and Farrukhabad districts in Uttar Pradesh in 1973-74, observe that the progressive farmers in these areas grew late wheat after raising a first crop of potato.

Comparing the income and investment behaviour of samples of 30 vegetable growing farmers and 37 cereal growing farmers in the mid-hills of Himachal Pradesh during 1973-74, S. C. Tewari, S. P. Dhall and S. K. Sharma show that the intensity of cropping, the expenditure on variable inputs as also the fixed investment on both per farm and per hectare basis were higher on the vegetable farms than on the cereal farms. In a similar study of different vegetable crops in the vicinity of Kanpur city, J. S. Garg and V. Prasad point out that tomato, the highest paying vegetable crop in the locality, was economically superior to the high-yielding variety of wheat in terms of both the output-input ratio and the rate of employment of labour days.

There are two studies, one each on the economics of betelvine cultivation and poppy cultivation in Madhya Pradesh by B. L. Mishra and D. K. Marothia. The authors present data on the cost of cultivation of betelvine per sq. ft. of *bareja* (the protected structure for betelvine cultivation); but the blowing up of these estimates to a per acre basis for purposes of comparison with wheat cultivation seems to be stretching too far, since after all betelvine

is "cultivated on a very small piece of land." In regard to poppy cultivation, the authors have reported that in view of its high prices, the net income per hectare was six times as high as that from wheat, though the cost per hectare of poppy cultivated was more than three times that of wheat.

R. I. Singh, R. K. Singh, and U. P. Singh have investigated into the costs and returns during 1973-74 of a sample of 30 guava planters in Allahabad district. The planters who tried to compensate the cost incurred in the plantation by growing cereals and vegetables as inter-crops in the early stages, reaped the maximum output per rupee investment in the growth interval of 9—12 years.

ISSUES FOR DISCUSSION

In the light of the above review, the Group may discuss the following issues.

1. What are the rates of growth of output of individual commercial crops in the pre-and the post-green revolution periods in the major producing States? In respect of the observed performance thereof, what has been the contribution of each of the components of area, productivity and shifts in the cropping pattern? How do the results compare with those of a component as well as a causal analysis of the trends in the output of foodgrains?

2. To what extent have the geo-physical and agro-climatic factors determined the regional production patterns and made the cultivation of different commercial crops specific to certain regions? Have the yield-increasing technologies in foodgrains been powerful enough to divert, even in these regions, considerable extent of acreage from commercial crops to foodgrains? In this connection, is it possible to distinguish between short-term shifts in cropping pattern due to fluctuations in relative prices of different crops and long-term diversion of large chunks of acreage from commercial crops to food crops due to the impact of the technological break-through in foodgrains?

3. What would be the implications of disregarding the comparative advantages of certain regions in the production of foodgrains and imposing self-sufficiency constraints for foodgrains for all regions of the country (*i.e.*, even for the low efficiency areas), in an eagerness to promote specialisation in the cultivation of commercial crops in every region? Would such a production plan necessarily result, in the final reckoning, in an increase in the gross and net outputs of agriculture for the economy as a whole?

4. What would be the perspective levels of the demand for and the supply of the different commercial crops, in the years ahead? What are the methodological issues involved not only in mapping out the production

prospects over time under constant and changing technologies but also in projecting the expected levels of requirements of intermediate goods (*i.e.*, jute goods) as distinct from goods having a final use (*i.e.*, cotton textiles) and in converting the estimated demand for the processed agricultural commodities into their primary equivalents ?

5. What are the determinants of changes in the prices of commercial crops ? How do we explain the movements in the terms of trade between foodgrains and commercial crops during the last two decades ? How does the long-term behaviour of the prices of the industrial raw material crops compare vis-a-vis the trends in the prices of (*a*) the respective industrial finished products and (*b*) the purchased inputs used in the cultivation of these crops ? What has been the nature of inter-year and intra-year variations in the prices of individual commercial crops in relation to the fluctuations in the prices of foodgrains ?

6. What is the relative efficacy of agricultural price policy vis-a-vis technological development in accelerating the growth of commercial crop output ? In an economy of shortages of different agricultural commodities and with limited possibilities for the extension of cultivable area, can agricultural price policy, oriented towards inducing shift of acreage and other resources from one set of crops to another, help maximize total agricultural output ? In this context, the Group can examine the urgency for (*a*) initiating and pursuing scientific research for bringing about a varietal break-through particularly in oilseeds, jute and sugarcane, (*b*) strengthening the extension network in order to educate the farmers in the use of improved varieties of proven worth (such as H-4 cotton) and in the adoption of better agronomic practices, (*c*) ensuring an elastic supply of crucial inputs for a continuous expansion of the production of commercial crops and (*d*) exploiting the irrigation potential so that output can be augmented not only through an enhancement in yield rates but also *via* a step-up in the cropping intensity.

7. How will the problem of short period instability in the acreage under commercial crops be tackled ? By examining the measures of variability o acreage and output for these crops, is it possible to indicate the probable size of buffer stock that requires to be carried for imparting the much-needed stability to the prices of and acreage under these crops ?

8. What are the specific issues in respect of the individual commercial crops ? The imperfections in the structure of jute marketing and the absence of processing facilities in the distant upcountry markets leading to 'distress sales' by the jute grower to the *farias* and itinerary merchants in these markets, the relationship between the prices of *kapas* and cotton lint keeping in view the fact that the cotton grower sells his crop generally in an unginned state, the problems faced by the cane grower due to the fluctuations in the prices of *gur* and *khandsari* (which absorb a major proportion of the total cane crop but which

do not directly come within the ambit of current price policy), the volatile nature of the prices of oilseeds resulting in a good deal of uncertainty to the grower and the need for the creation of a sound infra-structure in terms of storage, marketing and transport facilities for fruits and vegetable crops are a few aspects which can be examined by the group.

9. On the basis of the results of the different micro level studies submitted to the Conference on the economics of cultivation of commercial crops, what are the generalisations that can be inferred for the important producing States ?