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## INSTABILITY IN SUGARCANE ACREAGE: AN INTER-REGIONAL ANALYSIS

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### SUMMARY

The sugar industry is continuously plagued by uncertainty in sugarcane supplies to the factories. Fluctuations in area or production of sugarcane and dualistic nature of its market are the two chief sources of this uncertainty. This paper deals with the problem of variations in sugarcane acreage with the help of simple Cobweb analysis. The main objectives of this paper are (1) to obtain estimates of supply and demand elasticities of sugarcane, and (2) to examine the nature of equilibrium. Each of the eight regions, namely, Eastern Uttar Pradesh, North-Central Uttar Pradesh, Western Uttar Pradesh, Northern Haryana Punjab, South-Western Maharashtra, Coastal Andhra Pradesh, Northern Tamil Nadu and Central Karnataka, recognized by K. W. Easter, has been covered in the present study. The data on area, production, yields, prices of sugarcane and the competing crops, and rainfall are gathered from secondary sources. Regression analysis has been used to obtain both supply and demand functions.

The analysis indicates very low difference between profitability of sugarcane and its competing crops in the sub-tropical zone of northern India. In the tropical zone of southern India, the difference is so large that even substantial changes in the yields or prices of competing crops do not alter the profitability of sugarcane. Of major interests are the estimates of short and long run supply elasticities. The estimates obtained indicate highly inelastic short run acreage response in eastern and north-central regions of Uttar Pradesh and northern region of Haryana. In the tropical regions, the elasticities are relatively higher, though still well below unity. In the long-run, the position appears to be reversed. The demand equation attempted in this study is of static nature. The demand elasticities obtained are mostly inelastic which is consistent with our expectations as the capacity of cane processing sector is rather very limited.

With the help of the demand and supply (response) functions obtained above, it is possible to comment on the nature of equilibrium for each region. The results indicate a stable (convergent) equilibrium in all regions except northern Tamil Nadu and Central Karnataka. Except for the three regions of Uttar Pradesh, the estimates for which are unrealistic, a 6-9 years' cycle is exhibited by the study. These do not always match with the observed duration, but appear fairly accurate in terms of range. In conclusion, Cobweb analysis indicates a generally stable equilibrium for sugarcane acreage and thus, this tool does not appear very helpful in explaining the chronic instability of the sugar economy. The analysis suffers from a weak demand relation. However, it appears that a proper understanding of the working of the sugar economy can be had only with the help of a simultaneous equations model incorporating the sugarcane, sugar, *gur* and *khandsari* and State policy sub-systems.

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## IMPACT OF YIELD INCREASING TECHNOLOGIES OF PADDY AND WHEAT ON THE CULTIVATION OF SUGARCANE

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### SUMMARY

Before 1966, many programmes such as Grow More Food Campaign, Intensive Agricultural District Programme, Intensive Agriculture Area Programme, etc., were launched to increase agricultural production. But they could not get as much success as High-Yielding Varieties of Programme (HYVP) could receive. Due to this programme which was launched in 1966, the area and production of food crops like paddy, wheat, maize, jowar and bajra increased considerably. While there has been a considerable increase in the area and production of foodgrain crops noted above, the area and production of commercial crops have registered a marginal increase or have even decreased in many cases. Due to yield increasing technologies, wheat and paddy crops have become great competitors for the resources which were being diverted towards sugarcane cultivation. An interesting feature is that even land suitable for sugarcane cultivation is under great competi-

tion since both wheat and paddy can be grown on the land where sugarcane can be cultivated. Due to the above factors as well as the possibility of growing paddy and wheat on the same land, the production of sugarcane has gone down. To test the hypothesis that yield increasing technologies of wheat and paddy crops have affected the cultivation of sugarcane, an empirical study was conducted in Azamgarh district of Uttar Pradesh. The comparison of cultivation of paddy and wheat with sugarcane leads us to an important conclusion that due to the introduction of yield increasing technologies of foodgrain crops, they have become more remunerative than the commercial crops. Due to this the cultivation of commercial crops is being depressed slowly and slowly and many farmers have started growing commercial crops mainly for their home consumption or to earn some income in the period when there is no income from any other enterprise on the farm. The commercialisation of these crops has gone down to the standard of general crop cultivation whereas some foodgrain crops are being grown commercially since they are fetching better income to the farmers. If this trend continues, the reduction in the area and production of commercial crops will go on increasing day-by-day and may place the nation in a difficult economic position since many of the commercial crops are major foreign exchange earning crops. This necessitates on the part of the Government to have a bold policy to improve the cultivation of commercial crops by taking suitable actions with regard to supply of improved and high-yielding seeds, fertilizers and other necessary inputs as well as suitable priced policy for the produce. Thus, both important aspects—improvement in the cultivation and in the marketing system should be considered simultaneously so that improvement in the production may not glut the market and the growers may get remunerative prices for their produce. It may also be mentioned here that prices of most of the commercial crops are fixed by the Government—directly or indirectly. As such, proper attention should be given while fixing the price of commercial crops. It is high time that the Government should evolve suitable guidelines so that there may not be any adverse impact of yield increasing technologies of foodgrain crops on the cultivation of commercial crops by giving some incentives to the growers of commercial crops either by way of subsidized input or high prices for their produce.

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## ECONOMICS OF COMMERCIAL CROPS IN PUNJAB

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### SUMMARY

The first part of this paper deals with the shifts in the trend of area, production, yield and prices of four major commercial crops, namely, *desi* and American cotton groundnut and sugarcane. Dummy variable has been used to arrive at the shifts in the trend function and to derive the compound rates of growth for the pre-and post-green revolution periods. This part depends upon the secondary data taken from the Statistical Abstracts of Punjab. The second part deals with the profitability of crops under study for which primary data have been collected from the sample farms. American cotton, groundnut and sugarcane are the worst affected commercial crops by the foodgrain technologies in Punjab. The area under these crops showed a decreasing trend after the green revolution. The green revolution has led to a significant decrease of 7.2 per cent per annum in the area under sugarcane and this has resulted in the fall of production with no significant change in yield. The prices of *gur* have shown a non-significant growth rate of 12.84 per cent in the first period and 4.64 per cent per annum in the second period. The growth rate for production and yield of groundnut was 22.73 and 6.64 per cent per annum respectively in the first period. But the introduction of multiple cropping pattern over the groundnut areas resulted in the decline of area, production, and yield at a growth rate of 3.75, 4.95 and 1.13 per cent per annum. The growth rate of area for American cotton was worked out to be 0.7 and 2.1 per cent per annum, both non-significant, for the first and second period respectively. The yield of American cotton has shown a constant increase of 3 per cent per annum for both the periods and this was significant at 1 per cent level. This however, did not result in a significant increase in production. Prices and yield of *desi* cotton showed an increasing trend in the first and second period. *Desi* cotton is grown almost throughout the Punjab but on the basis of the crops, the State was divided into three zones homogeneous with respect to cropping pattern, soil type, irrigation, rainfall and productivity. The costs and returns for American cotton, sugarcane and groundnut were estimated from the sample farms selected from the respective zones and the estimates for *desi* cotton were for all the zones. The returns per hectare over the operational cost was the lowest for *desi* cotton being Rs. 253.51, Rs. 597.22 and Rs. 485.75, for zone I, zone II and zone III respectively. The estimates of operational cost per hectare for sugarcane in zone I was Rs. 2,065.80 and the returns over the operational cost were the highest at Rs. 2,811.16 for this crop. Groundnut was a major *kharif* crop of zone II and it gave a return of



Rs. 698.68 per hectare over the operational cost of Rs. 660.26 per hectare. American, cotton, a major *kharif* crop of zone III, gave a return of Rs. 1,611.13 per hectare over the operational cost of Rs. 868.15.

### CAPITAL AND CREDIT REQUIREMENTS OF FOOD AND CASH CROPS ON DIFFERENT FARM SIZES (A CASE STUDY IN DISTRICT AMRITSAR)

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#### SUMMARY

The present study is designed to estimate the capital and credit requirements of food and cash crops on different farm sizes in Patti block of district Amritsar (in the year 1972-73). The specific objectives of the investigation are to (i) work out per acre gross returns, variable costs and net returns, (ii) estimate the capital and credit requirements of food and cash crops, (iii) and assess the role of different lending agencies to meet the aggregate short-term credit needs of the farmers. For the purpose of study, Patti block was randomly selected. From this block, four villages with probability proportional to the cultivated area of the villages were selected. The farms were arranged according to the farm size so as to develop different farm size groups. Two sets of farms were selected: bullock operated and tractorised farms. The farms were classified into small upto 7.58 acres, medium between 7.58 and 18.75 acres and large above 18.75 acres. The large farms were split into bullock operated and tractorised farms. From each group, 16 small, 34 medium, 10 large and 10 tractorised farms representing 25 per cent of the universe were selected. So a multi-stage stratified random sampling technique with stratification at the second stage constituted the basis of the sample. Then a pre-tested schedule containing information about farm inventory, crops, input, costs and income pattern for the year 1972-73 was administered to each selected respondent. Short-term credit requirements were estimated by subtracting the owned funds from the capital requirements. Cropping intensity on the small, medium and large bullock operated farms worked out to 1.96, 1.81 and 1.61 while on the tractorised farms it was 1.94. The per acre variable costs incurred by the four size-groups of farms respectively were Rs. 313.81, Rs. 364.95, Rs. 377.71 and 390.65 and gross returns were Rs. 1,707.06, Rs. 1,796.77, Rs. 1,840.20 and 2,065.25 and net returns amounted to Rs. 1,393.25, 1,431.82 and 1,462.50 and 1,675.50 on the small, medium, large (bullock operated) and tractorised farms, respectively. The per acre and total cash expenses for food crops varied from Rs. 129.35 to Rs. 216.10 and from Rs. 855.04 to Rs. 8,287.46 on different size-groups respectively. As against this, the per acre and total cash expenses for cash crops ranged from Rs. 75.62 to Rs. 122.99 and from Rs. 130.07 to Rs. 2,533.75 on different farm categories respectively. Among the foodgrains, paddy was highly capital intensive followed by wheat, maize, gram and *massar*. For paddy, wheat, maize, gram and *massar*, cash expenses varied from Rs. 193.34 to Rs. 267.54, from Rs. 117.10 to Rs. 228.97, from Rs. 75.50 to Rs. 104.47, from Rs. 39.68 to Rs. 69.54 and from Rs. 24 to Rs. 83 on different sizes respectively. Among the cash crops, sugarcane was most capital intensive followed by cotton, *toria*, and *til*. The per acre cash expenses for cotton, sugarcane, *til* and *toria* ranged from Rs. 79.19 to Rs. 113.14, from Rs. 122.40 to Rs. 250.72, from Rs. 40.18 to Rs. 49.01 and from Rs. 73.16 to Rs. 92.44 on different farms. The per acre credit requirements for food crops were Rs. 76.11, Rs. 91.74, Rs. 97.89 and Rs. 107.21 on the small, medium, large (bullock operated) and tractorised farms respectively, while for the corresponding farms the per acre credit for cash crops amounted to Rs. 48.31, Rs. 54.27, Rs. 54.30 and Rs. 56.21. The per acre aggregate credit requirements (for food crops and cash crops) varied from Rs. 70.37 to Rs. 89.85 on different farm categories. The credit requirements were maximum for paddy followed by wheat and maize and the per acre credit requirements for these crops varied from Rs. 98.22 to Rs. 130, from Rs. 90.21 to Rs. 120.18 and from Rs. 20.22 to Rs. 40.27, respectively on different farm categories. Among the cash crops, sugarcane topped in credit needs followed by cotton and *toria* and the per acre credit requirements for these crops ranged from Rs. 90.12 to Rs. 120.72, from Rs. 50.72 to Rs. 75.32 and from Rs. 16.15 to Rs. 45.39 respectively on different farm sizes. A major portion of the credit came through co-operatives, which varied from 52.16 to 60.17 per cent on different size-groups. The commission agents occupied the second position. On small, medium, large and tractorised farms, their share was 35.61, 40.23, 36.00 and 32.16 per cent respectively. Relatives and friend, financed to the extent of 9.17, 7.61, 10.84 and 9.67 per cent of the total credit on the small, medium, large and tractorised farms, respectively. So it may be inferred that capital and credit requirements for food crops are higher than the cash crops. Secondly, co-operatives followed by commission agents and friends and relatives are the main sources of credit.

IMPACT OF COMMERCIAL CROPS ON FARM INCOME AND INVESTMENT  
(A STUDY IN DISTRICT SANGRUR)

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SUMMARY

The adoption of high-yielding varieties of cash crops in different agro-economic tracts of the Punjab State has not only replaced the local varieties but has made agriculture more capital intensive and profitable. The present study attempts to examine the impact of cash crops on farm income and investment. Specifically the objectives of the study are to (i) work out the relative share of cash crops to sown area on different sized farms, (ii) examine the impact of cash crops on farm income and investment, and (iii) compute the economics of cash crops versus food crops on different farm organizations. The investigation was conducted in 1972-73 in the five randomly selected villages of Barnala block of district Sangrur. From each village 24 farmers, 8 small, 8 medium and 8 large were randomly selected. The sample consisted of 120 farms (bullock operated farms alone). A two-stage random sampling technique was used for the analysis of this study. The farmers were the ultimate units of study. The source of irrigation on these farms was well/tubewells-cum-canals or canals alone. A pre-tested schedule was administered to each selected farmer to get the required information. To examine the impact of commercial crops on income and investment, the following model was used :

$$X_1 = a_1 X_2^{B1e1} \text{ and } X_3 = a_2 X_2^{B2e2}$$

where  $X_1$  = per acre total farm income in rupees,

$X_2$  = proportion of farm income derived from commercial crops,

$X_3$  = farm investments made during the year in rupees per acre.

The cropping intensity varied inversely with the farm size. Among the cash crops, crops in order of importance were cotton, *sarson* and sugarcane with the percentages of sown area of 10.23, 1.61 and 2.42. On the small, medium and large farms, the area under cotton, *sarson* and sugarcane ranged from 8.13 to 12.87, 1.51 to 2.63 and 1.52 to 1.82 per cent respectively. Among the cash crops the share of cotton, sugarcane and *sarson* to the total net returns varied from 10.09 to 14.27, 1.95 to 4.19 and 1.71 to 2.76 per cent on different categories of farms respectively. The share of cotton was maximum on all farm situations. The per acre gross returns, variable costs and net returns (from cash crops) were positively related with the farm size. The per acre variable costs amounted to Rs. 116.70, Rs. 167.06 and Rs. 233.15 and gross returns were Rs. 555.10, Rs. 646.56 and Rs. 758.11 on the small, medium and large farms respectively, yielding a net return of Rs. 438.40, Rs. 479.50 and Rs. 524.96 respectively. Log linear model also confirmed the hypothesis that the area under cash crops is instrumental in enhancing investment and income of different categories of farms. Farm income was found to be elastic with respect to the proportion of commercial crops. The value of  $R^2$  ranged from .48 to .55. Commercial crops also exercised perceptible influence on farm investment. The elasticity was greatest in the case of middle sized farms. Farm investment was elastic in the case of small and medium land holders while it was inelastic for the big holders. The reason might be that the big farmers have already larger investment on their holdings. A comparative study of the economics of food crops vis-a-vis cash crops revealed that the per acre net returns from cash crops were higher to the extent 132.91, 79.37 and 36.36 per cent as compared to the net returns from food crops on the small, medium and large farms respectively. The net returns per rupee invested from the commercial crops amounted to Rs. 3.75, Rs. 2.87, and Rs. 2.25 and that from the food crops were Rs. 1.61, Rs. 1.60 and Rs. 1.65 on the small, medium and large farms respectively. The foregoing analysis suggests to the possibilities of shifting area from the food crops to the cash crops in such a manner that the marginal returns from each crop enterprise are equalised. This will enable the farmers to maximize their net returns from fixed resources. But the farmers reported a number of reasons which were keeping them away from diverting land from the food crops to the cash crops. The principal reasons stated were (i) preference for growing foodgrains; (ii) irrigation difficulties; (iii) high operating investment in sugarcane; (iv) ignorance about the relative profitability of cash crops vis-a-vis food crops; (v) transportation problems associated with sugarcane crops. So the farmers may be advised through the extension agency to put more area under cash crops

depending upon the socio-economic milieu in which the farmers are operating. Secondly, relative profitability of cash crops vis-a-vis food crops be demonstrated to the farmers through experimentation on their own farms.

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COMPARATIVE ECONOMICS OF AMERICAN (320-F) AND DESI COTTON ON  
DIFFERENT SIZED FARMS (A CASE STUDY IN DISTRICT FARIDKOT)

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SUMMARY

The present study seeks to work out the economics of American (320-F) and *desi* cotton. Its specific objectives are (i) to examine the relationship between variable costs and returns (per acre) in respect of American (320-F) and *desi* cotton; (ii) to work the economics of American (320-F) and *desi* cotton; (iii) to compute the marginal value productivities of different types of investment in these crop enterprises. It covers 80 farmers, 20 small, 20 medium, 20 large (bullock operated) and 20 tractorised farms, selected randomly from four villages (randomly selected) of Lambi Block of district Faridkot. A pre-tested schedule was convassed to each selected farmer to get the required data. 't' test was applied to interpret the significance of difference between cropping intensities and net returns per acre. Cobb Douglas production function was the analytical tool used to derive the marginal value productivities of different inputs. The cropping intensity varied inversely with the farm size. The per acre gross returns, variable costs and net returns of American cotton vary positively with the farm size. On the small, medium and large (bullock operated) and tractorised farms the per acre variable costs were Rs. 525.72, Rs. 560.04, Rs. 614.64 and Rs. 608.40, and gross returns were, Rs. 1,833, Rs. 2,065, Rs. 2,240 and Rs. 2,450, yielding a net return of Rs. 1,307.28, 1,504.96, 1,625.36 and 1,841.60. The net returns per rupee invested were Rs. 2.48, Rs. 2.68, Rs. 2.64 and Rs. 4.02 respectively on the small, medium, large (bullock operated) and large (tractorised) farms. Among the modern inputs, the expenditure on insecticides was maximum (18.00 per cent) followed by fertilizers (17.73 per cent), irrigation (5.62 per cent), and seeds (3.65 per cent). The expenditure on casual labour increased upto medium farms and thereafter decreased due to less number of pickings by the large farmers. Its percentages varied from 44.37 to 53.64 on different categories of farms. For *desi* cotton the per acre variable costs on the small, medium, large (bullock operated) and large (tractorised) farms were Rs. 405.08, Rs. 426.92, Rs. 429 and Rs. 493.48 and gross returns were Rs. 1,305, Rs. 1,308, Rs. 1,425 and Rs. 1,695. The net return per acre amounted to Rs. 899.92, Rs. 891.28, Rs. 996 and Rs. 1,201.52, respectively. The net returns per rupee invested were Rs. 2.22, Rs. 2.08, Rs. 2.32, and Rs. 2.43 on the small, medium, large (bullock operated) and tractorised farms. Even in case of *desi* cotton the farmers invested more on insecticides (21.92 per cent), followed by fertilizers (20.49 per cent), irrigation (5.70 per cent) and seeds (3.02 per cent). The expenses on casual labour in percentage terms varied negatively with the farm size from 36.47 per cent to 44.44 per cent. The higher net returns per acre and per rupee invested from American (320-F) cotton confirms the superiority and more profitability of the high-yielding variety. The tractor operated farms were yielding higher net returns per acre and per rupee invested over all other bullock operated farms. These results establish the relative efficiency of tractorised farms over the bullock operated farms. The marginal value productivity of different inputs used in respect of American cotton was higher than *desi* cotton. Operating capital in respect of American and *desi* cotton was used at sub-optimal level on all the farms. Fixed capital was under-utilized (in respect of American and *desi* cotton) on the small, medium farms, but on the large (bullock operated) and tractorised farms, scope for investment in farm machinery existed. Labour was under-utilized on the small and medium farms but on the large (bullock operated) and tractorised farms scope for employment of labour existed. Bullock power was under-utilized on the small and medium farms but on the large farm, scope for its greater use existed. Tractors remained idle for most of the period. The necessary infra-structure in terms of credit, input and marketing services should be created so that the net returns from the fixed factors are maximized.

## ECONOMICS OF COTTON (KAPAS) AND ITS COMPETITIVE CROPS

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## SUMMARY

The results presented in this study are based on an intensive enquiry of 50 cotton growers from five cotton growing villages of Sasani block, Aligarh district, Uttar Pradesh during the year 1973-74. The cost structure of cotton (*Shamli* variety) locally known as *Kalidandi* and *Pramukh* locally known as American *kapas* studied in Bulandshahr district in 1969-70 was compared with the same varieties in Aligarh district. A comparative body of the economics of *Pramukh* and *Shamli* variety of cotton revealed that the per hectare investment on the former variety was higher by Rs. 185.34; the cost of cultivation of the former being Rs. 1,327 and that of the latter Rs. 1,141.66 per hectare. The gross income, net income, family labour income and farm business income in the case of *Pramukh* variety were higher by Rs. 711.19, Rs. 525.85, Rs. 257.12 and Rs. 264.79 per hectare respectively, accounting for 47.37, 146.26, 31.10 and 19.79 per cent higher over the corresponding items of *Shamli* variety. The return on per rupee investment in *Pramukh* variety was 167 paise and that of *Shamli* variety 131 paise. The cost of production per quintal of *kapas* (cotton) came to Rs. 167.95 in the case of *Pramukh* and Rs. 190.12 for *Shamli*. The cost on human labour was Rs. 444.06 in case of *Pramukh* and Rs. 296.79 in case of *Shamli* variety per hectare. The cost on human labour was higher by 147.27 per hectare in case of *Pramukh* variety. A comparative study of the economics of cotton cultivation of *Shamli* variety in 1969-70 and 1973-74 revealed that the input cost in 1973-74 was higher by 154.95 per cent over the same variety in 1969-70, being Rs. 447.80 in 1969-70 and Rs. 1,141.66 in 1973-74. The gross income in 1973-74 was higher by 85.95 per cent, but the net income, family labour income, farm business income at the two points of time either remained the same or if increased, it was negligible. The input-output ratio in 1973-74 and 1969-70 came to 1:1.31 and 1:1.80 respectively. The cost of production of cotton (*kapas*) was Rs. 74.88 per quintal in 1969-70 and Rs. 190.12 in 1973-74, the increase being 153.90 per cent. At the rental value of land, the total investment on cultivation of cotton per hectare in 1969-70 was Rs. 849.61 against Rs. 1,141.66 in 1973-74. On the basis of revenue of land, the investment was Rs. 447.80 in 1969-70 and Rs. 739.85 in 1973-74.

On comparing the cost structure of cotton with its competitive crops, maize and bajra, it was revealed that in the cost of cultivation of cotton, maize, and bajra there was no significant difference. It ranged between Rs. 1,141.66 in the case of cotton and Rs. 1,368.25 in the case of maize. But the difference in the gross income between the above crops was quite substantial. It was Rs. 2,000.80 in the case of maize and Rs. 1,812.40 in the case of bajra and Rs. 1,501.20 in the case of cotton. The gross income of maize and bajra was higher by Rs. 500 and Rs. 341 respectively over that of cotton per hectare. The net income varied between Rs. 632.55 for maize and Rs. 645.45 for bajra against Rs. 359.54 for cotton. The net income of bajra and maize was higher by Rs. 286 and Rs. 273 respectively over that of cotton per hectare. The input-output ratio was also higher in the case of maize and bajra as compared to cotton. Conclusively, maize and bajra are more remunerative than cotton. This is one of the reasons responsible for the declining area under cotton. Besides, there are other reasons associated with this fall in its acreage which may be the heavy demand of human labour for picking the cotton balls, at the time when the demand for *rabi* preparation of land is also high; severe susceptibility of the crop by disease and pests, long duration of crop in the field, the loss of the crop due to untimely rains at the time of flowering, defective marketing system and instability of prices are also associated with the reluctance of the farmer for growing this crop.

Therefore in order to at least maintain the level of hectareage of cotton in the State, it is essential that hybrid variety of cotton like type 4 and *Varalakshmi* may be introduced. The extension service in the field should be strengthened, which may convey the message of research to the growers of cotton. Emphasis should be given for short duration and dwarf variety of cotton, requiring lesser inputs and maturing latest by September. The agronomic practices should be so designed that the flowering and fruiting time may escape from severe rains. The strain should be as far as possible insect and pest resistant. An integrated programme of plant protection for cotton should be developed. The price mechanism should be so regulated that the stabilization of prices in cotton may come in the market. Buffer stocks in cotton will also help in stabilizing the prices.

## COST STRUCTURE OF JUTE IN KHERI DISTRICT, U. P. (A CASE STUDY)

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## SUMMARY

This paper attempts to study the economic aspects of jute, based on an intensive survey conducted in 1973-74 of 50 jute growers, selected randomly from five villages of Phool Behran block in Kheri district in Uttar Pradesh. The data were collected by the survey method. J. R. O. 632 and J. R. O. 878 variety of olitorius type of jute were taken up for study. The main objectives of the study were to work out the difference in the cost structure of jute in 1970-71 and 1973-74 and the factors associated with the gap in the levels of investment and income. The analysis of the problem involved with the cultivation of jute formed part of the study. On the basis of secondary data, it was observed that the hectareage under jute has been declining in district Kheri, and being replaced by paddy. One of the important reasons for the same appears to be that the jute crop is less remunerative as compared to paddy. The study on the comparative cost of jute and paddy per hectare revealed that the investment on jute was Rs. 1,647 against Rs. 1,413.60 on paddy per hectare in 1973-74. The net return was Rs. 567 and Rs. 1,053 per hectare for jute and paddy respectively, being higher for paddy by Rs. 486.90. The return per rupee investment on jute was Rs. 1.34 and that on paddy Rs. 1.75.

The cost and return of jute in 1973-74 and in 1970-71 showed that the cost of cultivation per hectare on jute in 1973-74 increased by 40.71 per cent over that in 1970-71. On the other hand the gross return in 1973-74 increased only by 18.38 per cent. In fact, the net income decreased from Rs. 699.76 in 1970-71 to Rs. 567 in 1973-74 per hectare. There was substantial decrease in its production from 20.78 quintals per hectare in 1970-71 to 18 quintals per hectare in 1973-74. The return per rupee investment was Rs. 1.34 in 1973-74 as against Rs. 1.59 in 1970-71.

From the break-up of cost of cultivation of jute at two points of time, it was revealed that the major factors associated with the increase in the cost were fertilizer, insecticides and human labour. The overhead cost and rental value of land also contributed considerably in increasing the cost of cultivation in 1973-74. The higher price of fertilizer, insecticides and the higher wage rates were responsible for the increased cost of cultivation of jute. Therefore, in order to save this industry from disaster, the jute growers should be given parity price incentives. Modern package of agronomy practices should be introduced so that the yield potential of improved varieties of crop may be fully exploited. Modern technology of retting and curing of jute, at lower cost, should be extended in order to produce quality jute fibre for obtaining premium price. The marketing of jute should be simplified and price mechanism be regulated to avoid severe fluctuation in prices. The jute corporation of India should participate in marketing programme activity so that buffer stock of sufficient quantity of jute may be made, which may help in stabilizing the prices.

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 COMPARATIVE PROFITABILITY OF VEGETABLE CROPS IN THE VICINITY OF KANPUR CITY

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## SUMMARY

The study seeks to work out the comparative profitability of various vegetable crops in the vicinity of Kanpur city in Uttar Pradesh for the year 1973-74. The vegetable farming yields higher returns per hectare in comparison to foodgrains crops. The highest net return per hectare was ob-

tained from tomato, being Rs. 3,948.28, followed by cauliflower Rs. 3,640.26, onion Rs. 2,653.04 and brinjal Rs. 2,394.46. Ladiesfinger (*bhindi*), *palak* and tomato gave a net income of Rs. 1,799.48, Rs. 1,010.42 and Rs. 1,469.69 per hectare respectively. The net return on per day basis was also examined. It was again highest in tomato (Rs. 39.48), followed by cauliflower (Rs. 36.40), *bhindi* (Rs. 29.99) and *palak* (Rs. 29.44). Although, *palak* gave the lowest net returns on per hectare basis, the net return per day was higher than brinjal, onion and *lauki* due to its short duration. The net returns per day in the case of brinjal, onion and *lauki* came to Rs. 19.15, Rs. 22.10 and Rs. 16.32 respectively.

So far as the investment on different vegetables is concerned, it was highest being Rs. 1,896.96 per hectare on onion and lowest on *lauki* being Rs. 1,155.54 per hectare. In the case of cauliflower and tomato it was Rs. 1,871.74 and Rs. 1,836.72 per hectare respectively. The per hectare investment on brinjal, *bhindi* and *palak* was Rs. 1,518.04, Rs. 1,408.52 and Rs. 1,260.58 respectively. The total labour days utilization was highest in the case of onion (149.50), followed by tomato (144) cauliflower (139.75), *brinjal* (113), *bhindi* (92), *palak* (88.20) and *lauki* (57). Of the total labour days utilization, family labour accounted for the greater share varying from 64.59 per cent to 81 per cent on different vegetable crops.

When the economics of the highest paying vegetable crop, *i.e.*, tomato was compared with that of H.Y.V. of wheat in the same locality, the per hectare investment was found to be higher by 3.64 per cent on wheat over tomato. But the net income was higher on tomato which was greater by  $1\frac{1}{2}$  times than wheat. The return per rupee investment was Rs. 3.14 in tomato against Rs. 2.49 in wheat, while the per day return in the case of tomato came to Rs. 39.48 against Rs. 22.80 in wheat. Further, the employment of labour days was higher in tomato than in wheat, which came to 144 and 113 days respectively. Vegetable farming is subjected to problems like non-availability of storage facilities, processing and preservation units and wide price fluctuations leading to less than expected returns. It is an enterprise of higher returns and can be undertaken on small piece of land with lesser investments. It necessitates a series of improvements in the matter of supply of inputs, storage facilities, packing and processing units and credit agencies at reasonable rates.

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## PRODUCTIVITY AND OPTIMIZATION OF RESOURCE USE IN SUGARCANE IN U.P. (A CASE STUDY)

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### SUMMARY

The conclusions drawn in this study are based on the investigation of a project entitled "Cost and price relationships of sugarcane and its products" in district Meerut. For the purpose of investigation, a multi-stage stratified random sample was used, in which 100 cane growers of different size-groups randomly selected from ten randomly selected villages in a development block, Hapur in Meerut District were studied. Cobb-Douglas equations were fitted to determine the productivity of various farm resources used in the production of sugarcane. The production elasticities of the individual resource use were found to be positive and less than unity, showing thereby diminishing returns to individual resource input. The highest elasticity of production was observed in the case of manure-fertilizer followed by irrigation both in sugarcane planted and ratoon, being 0.36050, 0.17155 in cane planted and 0.42298 and 0.26385 in cane of ratoon crop. The marginal value product of manure-fertilizer was Rs. 5.28 in sugarcane planted and Rs. 5.60 in sugarcane ratoon, indicating the possibility of higher returns in sugarcane ratoon by additional use of manure-fertilizer as compared to sugarcane ratoon. The same trend was observed in the case of irrigation. The marginal value product of human labour was Re. 0.60 and that of bullock labour Re. 1, indicating that with an additional investment of a rupee on bullock labour, the additional income was less than investment. Hence, the scope for further investment on bullock labour was restricted. Again, the human labour which is already in excess use, need to be reduced to the level to which the marginal value product was equal to a rupee. Both in sugarcane planted and ratoon, the use of manure-fertilizer and irrigation was much below the level of optimum requirement, whereas the use of human



labour in sugarcane planted and bullock labour in sugarcane ratoon was in excess. The difference was non-significant in the marginal value product of manure-fertilizer and irrigation both in sugarcane planted and ratoon ( $t=0.3922$  and  $0.720$  non-significant at 5 per cent level), indicating that the growers in the study area have been applying manure and fertilizers at uniform level both in planted and ratoon crops, irrespective of their economic advantages. The optimum levels of manure-fertilizer and irrigation in terms of value, for sugarcane planted per hectare came to Rs. 655.01 and Rs. 311.70 and that in sugarcane ratoon were Rs. 284.99 and Rs. 177.77 respectively against the existing levels of Rs. 318.82 for manure-fertilizer and Rs. 162.70 for irrigation in sugarcane planted and Rs. 244.98 and Rs. 163.50 in sugarcane ratoon for the corresponding items per hectare. The existing levels of human labour in sugarcane planted and bullock labour in sugarcane ratoon being Rs. 634.63 and Rs. 68.48 respectively, were higher than the worked out optimal levels, being Rs. 148.88 and Rs. 14.20 for human and bullock labour. The optimum level of human labour should be reduced to Rs. 148.88. By utilizing the optimal levels of manure-fertilizer and irrigation, the production of sugarcane planted per hectare can be increased to 700 quintals against the existing level of production of 552 quintals per hectare. With an additional investment of Rs. 500 on manure-fertilizer and irrigation per hectare, the additional net gain can be of the order of Rs. 1,450 per hectare at the current market rate. In case the cane growers do not have additional capital for investment on manure-fertilizer and irrigation, it is desirable that they may divert a part of the funds so far used on human and bullock labour to manure-fertilizer and irrigation to get the optimum level of production, which may yield an additional income of Rs. 1,950 per hectare. The excess labour may be used in other crops and livestock enterprises.

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#### STUDY OF ECONOMIC INDICATORS OF COTTON CULTIVATION IN BULANSHAHAR DISTRICT, U.P.

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AND

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#### SUMMARY

This paper seeks to study the comparative economics of American and *desi kapas*, economics of cotton and sugarcane and economics of maize-wheat and cotton-wheat crop rotations in the year 1973-74. For the purpose, five villages from Siyana development block in the Bulandshahr district and 30 cultivators growing cotton were selected purposively from these villages. Out of all the selected cultivators only seven were cultivating American *kapas*. Informations pertaining to the investigation was collected personally with the help of schedules and questionnaire. The study revealed that the cost of cultivation of American and *desi kapas* was Rs. 927.28 and 742.85 per hectare respectively. The American *kapas* required about 25 per cent higher expenses over *desi kapas*. The expenses on operating cost in American *kapas* in comparison to *desi kapas* were about 26 per cent higher due to higher expenses on labour, seed, manures and fertilizers, irrigation and plant protection. The yield of American *kapas* was about 1.31 times higher than the *desi*. The gross return per hectare amounted to Rs. 2,338.75 in the case of American *kapas* and Rs. 1,630 in the case of *desi kapas*. The net income per hectare from sugarcane was  $3\frac{1}{2}$  times higher than cotton mainly due to the fact that sugarcane got more assured irrigation and is highly responsive to irrigation, and manures and fertilizers. The physical return per unit of area in terms of grain was higher in the case of maize-wheat crop rotation due to maize yield and comparatively higher yield of wheat. The quantum of production as well as economic productivity of land per hectare in cotton-wheat crop rotation was lower than maize-wheat crop rotation.

IMPACT OF COMMERCIALIZATION ON FARM INCOME AND  
INVESTMENT IN MORADABAD DISTRICT, U.P.

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SUMMARY

This paper was mainly designed to study the impact of raising commercial crops of potato and tobacco on farmers' income and their investment in the year 1973-74. For the purpose, two sets of farmers, those growing both these crops and those not growing them, numbering 30 in each category group and residing in one and the same locality, randomly selected, were personally interviewed. It was found that, on the whole the net income per hectare in 'A' category where potato and tobacco were the main crops was Rs. 4,199.85 as against Rs. 2,756.30 in 'B' category of farms (non-growers of potato and tobacco). This additional income of Rs. 1,443.55 per hectare, therefore, on 'A' category of farms was the direct impact of raising potato and tobacco as commercial crops even though these farmers were losers in wheat, paddy and sugarcane, also important crops of the locality. The farm business income and family labour income per hectare in 'A' category were higher than in 'B' category. The former was due to heavy expenditure incurred as working capital while the latter due to more and frequent use of family labour in different farm operations. The per capita annual income for 'A' and 'B' categories of farms was calculated as Rs. 3,216.9 and 3,147.7 respectively.

The values of cropping intensity, percentage of irrigated area and number of tube-wells or pumping sets per farm were calculated for 'A' and 'B' categories of farms, as 240 per cent and 185 per cent; 94 per cent and 68.12 per cent and 0.66 and 0.20 respectively. The value of fixed capital per hectare amounting to Rs. 4,029.25 was higher by about one and a half times than its counterpart due to heavy investment on farm building and irrigation structure. The investment on improvement in land, layout and fencing and irrigation structure, etc., was higher in 'A' category than in 'B' category because these items had direct bearing on the yield of potato and tobacco crops. The expenses per hectare on seed, manures and fertilizers, plant protection and irrigation in 'A' category which amounted to Rs. 1,031.14 were about two times higher than in 'B' category (Rs. 535.12) mainly due to raising of expensive crops of potato and tobacco.

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ECONOMICS OF POTATO IN PRODUCTION SYSTEMS PREVALENT  
IN WESTERN AND CENTRAL UTTAR PRADESH

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SUMMARY

Potato has a distinct advantage over other crops, being amenable to short and long duration cultivation. Two crops of short duration potato can be harvested from the same field. The economics of potato has therefore been computed as a short period as well as long period crop and also as two successive crops given in the system. It is observed from the study that Meerut has low requirement of man-days, but due to high wage rates the total investment on labour is higher than that in Farrukhabad. A similar trend is observed in the use of bullock labour in both the places but the investment is of much higher order due to heavy requirement of bullock power in potato operations. The productivity in Meerut is much higher than that obtained at Farrukhabad but the price advantages excel at Farrukhabad due to well established cold storage industry in the district. Traders



pay premium price to the farmers in Farrukhabad and save on cost due to space and time. There are several methods for potato storage in the villages *viz.*, storage of potato in bags, in baskets but sand storage method is very common even though there are number of cold storages in Farrukhabad district. The storage cost per quintal by sand storage method is Rs. 23.46 and by cold storage method is Rs. 17.12 per quintal. The first crop of potato is harvested in 65 to 70 days for table purpose and the succeeding crop of potato is meant for production of quality seeds in both the districts. If a farmer has got unlimited resources and techno-economic control over the production process he will go for potato. Dwarf wheat offers better substitution for potato if production inputs are limited and price of potato is not remunerative. Wheat is a good substitute for potato if labour availability is not adequate, availability of fertilizer is scarce, and arrangements for plant protection, irrigation and credit are not within the reach of the farmers. It may be concluded that wheat provides best substitute for short duration second crop of potato and many progressive farmers in Farrukhabad and Meerut district have started growing late wheat in the same fields after the first crop of potato.

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#### AN INVESTIGATION INTO THE ECONOMICS OF GUAVA PLANTATION IN ALLAHABAD DISTRICT, U. P.

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#### SUMMARY

The study seeks to work out the economics of guava plantation from its establishing stage to declining stage in Allahabad district of Uttar Pradesh for the year 1973-74. Allahabad district has a good reputation for its 'Safeda Guava variety' not only in the State but throughout the whole country. In order to cover all the stages of growth, *i.e.*, from establishment, fully grown and declining stage, the guava planters having their orchards in different growth stages were studied. Fruiting in guava starts after three years. This period is utilized by growing the inter-crops. By this way, the guava planters try to compensate the per hectare investment made on guava plantation. The total investment on the establishment of guava orchard upto age of three years came to Rs. 5,107.32 per hectare. The initial investment for the first year was Rs. 2,765.17 per hectare of which layout and fencing accounted for highest expenditure of 28.85 per cent followed by labour charges used on maintenance 17.45 per cent and digging of pits 13.94 per cent. In the second and the third year, the investments were less than half of those made in the first year. By inter-cropping programme, a planter gets a per hectare net income of Rs. 2,865.20 for the total period of three years. The investment per hectare for the same period was Rs. 2,452.71. From three to six years, the per hectare net income was lower due to lower production in the initial stage of its fruiting. The net income per hectare of Rs. 25,216.23 was highest in the fully growing stage from ninth to twelfth year. More or less the same level of income was received from ninth to twentieth year, after that it started to decline. The per hectare investment and net income on per year basis came to Rs. 1,126.80 and Rs. 5,352.14 respectively. The return on per rupee investment on an average, came to Rs. 5.74. Guava enterprise in spite of paying higher returns per hectare is subjected to problems like lack of credit agencies, mass production at a time, non-existence of canning and processing units, improper packing and transportation and seasonal vagaries like frost, hailstorm and attack of insect and pests. However, if problems are carefully handled, it may be very helpful in the development of guava enterprise.

IMPACT OF COMMERCIAL CROPS ON THE LEVEL OF FARM INCOME AND  
INVESTMENT IN FARRUKHABAD DISTRICT, U.P.

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SUMMARY

This paper attempts to work out the impact of commercial crops on the level of farm income and investment in Farrukhabad district, Uttar Pradesh, which is noted for the higher intensity of commercial cropping not only in the State but throughout the country. The cropping intensity reaches upto 300-400 per cent near towns and cities by raising maize-potato-tobacco or maize-potato-muskmelon/vegetables during a year on the same piece of land. Keeping in view the economic importance of the commercial crops of the district, a study was conducted during 1972-73 to work out the contribution made by the commercial crops to total crop income, their impact on the level of farm income and investment and the rate of commercialisation. For investigation, 100 farmers having at least 20 per cent area under commercial crops were selected from ten villages of two blocks in the district. Of the total cropped area under study, commercial crops occupied the highest area of 46.65 per cent (potato 28.98 per cent, tobacco 9.49 per cent and vegetables-musk-melon 8.18 per cent). The area under these crops was higher on the small farms upto 3 hectares, indicating the fact that the small farmers try to maximize their income by growing more of commercial crops. Further, commercial crops accounted for the highest contribution of income to the extent of about 73 per cent of the total income of crops. Potato gave an income of 56.76 per cent, tobacco 13.77 per cent and other vegetables 2.60 per cent.

The investment on farms, on an average, came to Rs. 2,888.69 per hectare. It was higher on the small farms upto 3 hectares, due to comparatively larger area under commercial crops which require more investment in the form of seed, manure and fertilizers, irrigation and human labour. Consequent to the prevalence of large area under commercial crops and thereby higher investments, the small farms yielded higher net profits which came to the extent of Rs. 3,149.78 per hectare. So far as the extent of commercialisation is concerned, it was found to be 100 per cent in tobacco and 92 per cent in potato. Statistical comparisons between the marginal value products (MVPs) of different inputs showed that the MVPs of all inputs were lower for commercial crops than for foodgrain crops. The farmers of the study area are reaping relatively higher profits, mainly due to growing of more commercial crops like potato, tobacco and other vegetables on their small piece of land.

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ECONOMICS OF RESOURCE USE AND PRODUCTIVITY IN SUGARCANE IN U.P.

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SUMMARY

Observing the important role played by the sugarcane crop in the agricultural economy of Uttar Pradesh, the present study attempts to (1) work out the costs and returns of sugarcane per hectare, (2) determine the cost of production of sugarcane per quintal, and (3) find out the marginal value productivities of different resource uses. The enquiry is based on an intensive study of 300 cultivators of different size of holdings, selected randomly from three sugarcane producing regions of the State. From each region one district, viz., Gorakhpur from the eastern region, Muzaffarnagar from the

western region and Lakhimpur Kheri from the central region, having largest area under sugarcane were selected. The study was conducted during the year 1973-74. The findings of the study revealed that the cost of production of sugarcane per hectare, on an average, was Rs. 2,809.67. It was lowest in the central region, being Rs. 2,702.41 and highest in the western region, being Rs. 3,004.43. The production of sugarcane varied from 385.97 quintals in the eastern region to 453.87 quintals per hectare in the western region with an average yield of 413.65 quintals per hectare. The net income, on an average, was Rs. 2,567.78 per hectare. It was lowest in the eastern region, being Rs. 2,295.42 and highest in the western region, being Rs. 2,895.88. The cost of production of sugarcane, on an average, came to Rs. 6.79 per quintal. It was lowest in the western region, being Rs. 6.62 per quintal, because of relatively higher yields.

To estimate the productivity of various capital inputs, Cobb-Douglas type of production function was used. The results showed very high values of  $R^2$  of the equations for all the three—eastern, western and central—regions, being 0.8021, 0.7894 and 0.7943 respectively. The elasticities of production were positive for all the inputs and significant at 5 per cent level. The sum of elasticities was positive and greater than unity in all the three regions, indicating thereby increasing returns to scale in the area under study. The marginal value products (MVPs) of capital inputs were worked out at their geometric mean level for all the three regions and were compared with their respective prices. The MVPs of fertilizers and irrigation in all the three regions were significantly greater than their respective prices. Therefore, the maximization of profits can be attained by shifting resources from items where its marginal value product is relatively lower to those where it is higher. Thus, in the present case, more use of fertilizers and irrigation in all the three regions will result in higher production of sugarcane.

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## ECONOMICS OF SUGARCANE VIS-A-VIS ITS COMPETING CROPS

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### SUMMARY

To examine the economics of sugarcane crop in comparison to its competing crops on different size of farms the data were used from a survey of 30 farms randomly selected from Rudrapur block of Nainital district in Uttar Pradesh. Out of these 30 farms, ten farms were taken from each group representing small (below 3 hectares), medium (3 to below 6 hectares) and large (6 to below 12 hectares) farms. The input-output data were collected from the sample farms pertaining to the agricultural year 1973-74. The intensity of cropping showed an inverse relationship with the size of farm because of increase in the proportionate area under sugarcane crop and limitation of the labour availability on larger farms in peak times. The proportionate area under high-yielding varieties of paddy and wheat also showed an increasing trend with the farm size. The increase in the proportionate area under sugarcane and high-yielding varieties of paddy and wheat with size of farms was because of better resource position on the larger farms in terms of purchased inputs, assured wheat supply and owning of tractor which helped in timely accomplishment of the farm operations. The yield per hectare of sugarcane crop showed an increasing trend with the farm size because of increasing expenditure on fertilizer, irrigation and interculture operations. The yield per hectare of high-yielding varieties of paddy and wheat was almost the same on the small and medium farms but was significantly higher on the large farms due to higher use of fertilizer and timely irrigation through their own source on this category of farms. The comparison of sugarcane and paddy-wheat rotation indicated that sugarcane is profitable as compared to paddy-wheat rotation on the medium and large farms. On the small farms the paddy-wheat rotation turned out to be profitable because of the depressed yield of sugarcane crop on account of lower level of irrigation application as these farms were handicapped with respect to their own source of irrigation.

COMPARATIVE ECONOMICS OF COTTON AND COMPETING CROPS IN  
KHARGONE DISTRICT OF MADHYA PRADESH

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## SUMMARY

An attempt has been made in this paper (1) to compare the costs and returns of cotton with those of competing *khari* crops growing as local and high-yielding varieties in Khargone district (Madhya Pradesh); and (2) to determine the additional net returns from cotton over competing crops for both local and high-yielding varieties. This study was confined to Khargone district which was selected for the Intensive Cotton Development Programme in 1971-72 and 1972-73. A random sampling technique was used to select 40 farmers from Khargone district for each of the crops. Of the 40 farmers, 20 were for local varieties and remaining 20 were for high-yielding varieties. The input-output data of all the crops grown on these farms along with their prices were collected from the respondents by the survey method. Three major competing crops to cotton, namely, groundnut, maize and jowar for both the categories were chosen for detailed economic analysis. The data related to the *khari* season of the year 1973. The analysis of the data revealed that larger quantities of strategic farm resources were used in cotton crop over the competing crops. Consequently, the per hectare cost of cultivation of cotton crop was relatively more in local and high-yielding varieties as well. The total cost per hectare for local cotton, groundnut, maize and jowar worked out to Rs. 650, Rs. 569.17, Rs. 334.17 and Rs. 226 respectively. The costs for high-yielding varieties of these crops were Rs. 963.46, Rs. 871.96, Rs. 579.44 and Rs. 355.70 respectively. From the gross and net returns point of view cotton was the most profitable crop in both local and high-yielding varieties. The net return per hectare for local cotton, groundnut, maize and jowar was Rs. 1,558, Rs. 1,290.83, Rs. 781.28 and Rs. 467 respectively. For high-yielding varieties of crops the net return was Rs. 2,786.94, Rs. 2,228.04, Rs. 1,222.56 and Rs. 851.80 in that order. The input-output ratio shows that the one rupee investment gives a net return of Rs. 3.39, Rs. 3.26, Rs. 3.33 and Rs. 3.06 for local varieties while these ratios were Rs. 3.90, Rs. 3.55, Rs. 3.10 and Rs. 3.39 for high-yielding varieties of cotton, groundnut, maize and jowar respectively. From the input-output ratios it further appeared that cotton crop was a very profitable enterprise in this area. This implies that the use of farm resources was economically efficient in cotton as compared to other crops. The analysis further revealed that there was highest additional net returns from cotton as compared to jowar, maize and groundnut in that order. This study suggests that a shift to cotton cultivation from other crops would be most profitable in terms of gross and net returns. The empirical results further indicate that the land and other growth promoting farm resources can be shifted specially from jowar and maize to cotton crop.

ECONOMICS OF BETELVINE CULTIVATION IN VINDHYAN REGION OF  
MADHYA PRADESH

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## SUMMARY

Betelvine is an important garden crop cultivated throughout India in small gardens for its leaves. Chewing of *pan* leaves is an age-old practice in India specially after sumptuous meals in social gatherings. Unfortunately, so far, the betelvines did not receive due attention of the economists. The main purpose of this paper was to work out the economics of betelvines cultivation in Vindhyan region

of Madhya Pradesh and to compare the same with the economics of wheat cultivation. The districts which are popular for cultivation of betelvines in this region are Rewa (54 hectares), Satna (75 hectares), Panna (50 hectares) and Chhatarpur (267 hectares), which represented 65 per cent of the total *pan* area (690 hectares) of the State. From the four districts mentioned above, 89 newly established *pan* gardens were randomly selected in proportion to the area under *pan* in each district. Similarly, 80 farmers growing high-yielding varieties of wheat were also selected. Betelvines being sensitive to extreme weather conditions are cultivated under a well protected structure called *bareja*. The average size of *bareja* in this region was of 4,009 sq. ft. which needed an investment of Rs. 1,360. The cost of cultivation on an average size of *bareja* amounted to Rs. 2,640.33. The fixed and working capital were distributed in a ratio of 1: 3. The annual output of *pan* leaves from the average size of *bareja* was 1.63 lakhs valued at Rs. 4,051.21, giving a net income of Rs. 1,410.88. Unlike wheat crop, betelvines are propagated vegetatively on small gardens in the month of March-April which start giving consumable leaves after two months and continue to yield *pan* leaves throughout the year. The total cost, gross and net profit per unit area under betelvines were about 43, 42 and 37 times more than those of wheat crop respectively. This means that betelvines are both labour and capital intensive. In view of the rate of return per rupee invested on wheat and betelvines, wheat gave higher returns (74 per cent) as compared to that of betelvines (63 per cent.).

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## ECONOMICS OF POPPY CULTIVATION IN MANDSAUR DISTRICT OF MADHYA PRADESH

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### SUMMARY

Poppy cultivation is mainly done to produce opium—the 'Black Gold of India' to earn foreign exchange and meet external needs of oral consumption and medicinal requirements. Mandsaour district in Madhya Pradesh occupied a place of pride in opium production both in the country and the world as it produces nearly three-fourth of the total opium produced in India and meets more than half of its demand in the world markets mainly for the production of morphine. There is strict control of the Government on the production, distribution and export of opium. In fact, due to very high prices of the poppy products (opium and *posta*) no other crop could compete with it with regard to the returns per unit of area. The cost of cultivation of poppy reported by the sample farmers (90) of Mandsaour district was Rs. 2,058 against Rs. 587 per acre for wheat crop. Poppy through its products (opium, *posta* and *chura*) gave a net income of Rs. 2,400 per acre which was six times larger than that of wheat. The returns to per rupee invested in the cultivation of poppy and wheat were Rs. 2.17 and Rs. 1.67 respectively. In other words, poppy surpassed wheat crop both in respect of cultivation expenses and returns per acre. Poppy is labour intensive as well which needed 360 days of human labour per acre against 39 days required by the wheat crop. In Mandsaour district poppy cultivation adds to the social status of a farmer due to its higher profitability over other crops. Despite strict control of the Government in production and marketing for opium, farmers do resort to foul means of trade practices for obtaining higher rates of opium than fixed by the Government. The cost of production of raw opium was nearly half of its price fixed by the Government. However, a more realistic price policy is needed to eliminate the malpractices associated with the production and marketing of opium.

## ECONOMIC ANALYSIS OF SOME VEGETABLE CROPS OF TEMPERATE REGION

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## SUMMARY

The temperate climate of Himachal Pradesh offers comparative advantages to the State for the production of many cash crops like disease-free seed potato, ginger and off-season vegetables. The crops selected for this study are potato, ginger, tomato, French-beans and chillies. Twenty-five farmers for each of these crops were selected from the areas where these crops are grown extensively. The main objective of the study was to examine the profitability of these crops and suggest the re-allocation of resources for higher returns. The per hectare total cost of cultivating potato, ginger, tomato, French-beans and chillies was Rs. 6,165, Rs. 7,667, Rs. 7,736, Rs. 3,864 and Rs. 5,959 respectively. Of this, about one-third was claimed by imputed rental value of the land in each case. The labour cost which was wholly from the farmers' family accounted for 48.21 per cent in tomato, 40.29 per cent in chillies, 34.67 per cent in French-beans, 27.65 per cent in ginger and 26.68 per cent in potatoes. The cost incurred on fertilizers/manures was also substantial varying between 17.28 per cent of the total cost in the case of French-beans and 7.99 per cent in tomatoes; the respective figures for potato, chillies and ginger being 14.06, 13.16 and 11.77 per cent. It may be interesting to note that no use of hired labour, both human and bullock and machinery was observed in any of the sampled cases. Irrigation was free of charge as it was from naturally flowing streams. The system of leasing land being non-prevalent, the rental value of land was imputed at the rate of one-fourth of the gross returns.

Costs and returns for the crops under study are given in Table I. The returns per unit of paid-out cost received by tomato growers of Solon are highest (5.83) closely followed by the chilli producers of Mandi (5.71). Similar returns to growers of French-beans, ginger and potato are 3.18, 2.76 and 2.57 respectively.

TABLE I

Items	Potato	Ginger	Tomato	French-beans'	Chillies
Yield per hectare (quintal)	99.35	94.55	132.93	38.85	9.60
Gross income per hectare (Rs.)	8,941.50	10,400.50	9,969.75	5,827.50	8,640.00
Net income per hectare (Rs.)					
Over Cost A <sub>1</sub>	6,466.81	7,639.07	8,510.08	3,64.82	7,351.87
Over Cost A <sub>2</sub>	6,466.81	7,639.07	8,510.08	3,864.82	7,351.87
Over Cost B	4,421.92	5,897.82	5,962.97	2,552.84	5,141.95
Over Cost C	2,776.91	2,733.02	2,233.46	1,963.09	2,681.25

The ratios of marginal value product to factor cost for different variables indicated a vast scope for the reallocation of resources. It was observed that there is a good scope for more investment in quality seeds except in ginger, and fertilizers/manures except in tomatoes, to increase farm incomes substantially. The crops that require careful picking of fruits indicated larger marginal returns for the human labour used in that operation.

REGIONAL SPECIALISATION IN THE CULTIVATION OF COMMERCIAL CROPS—  
CASE STUDY OF HILL AREA (THE SAPROON VALLEY IN HIMACHAL)

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SUMMARY

Himachal Pradesh, a mountainous State has few valleys whose capacity utilization holds the key to the State's agricultural growth. Saproon Valley, the location of this research, occupies a key position in raising commercial crops, mainly vegetable crops like cauliflower (for seed) tomato (off-season), hill-capsicum and green-hill-peas. Cereals production is relatively a low pay off enterprise though the valley is agro-climatically suitable for that purpose as well. The study of the comparative economics of crops raised in the valley establishes a highly rational judgment on the part of the cultivators (though backward and custom bound), indicating regional efficiency by specializing in relatively high pay-off crops. Our analysis establishes that growing of cauliflower (for seed) is most profitable followed by hill-capsicum, tomato and green-hill-peas. Cauliflower (for seed) earned a net income of Rs. 34,104 per hectare which is the highest of all the vegetables, much higher than conceivable for any cereal/pulses. The lowest profit was earned by farming green-hill-peas (Rs. 1,814 per hectare). For hill-capsicum and tomato the net income was Rs. 15,037 and Rs. 10,841 per hectare respectively. Select inputs and their contribution as presented indicate a rational decision in cauliflower, values of  $b_1$  (human labour) and  $b_3$  (fertilizer being positive, indicating that the growers have been conscious of the usefulness of the select inputs. However, there is some scope to economise on manures. Negative values of the elasticities of production for fertilizer in tomato, hill-capsicum and green-hill-peas demonstrate its excessive use with possibilities to economise. In short, resource use adjustment is needed more in other crops and marginally in cauliflower. Reduction in human labour as an input in green-hill-peas is another possibility for resource adjustment.

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INCOME AND INVESTMENT BEHAVIOUR OF VEGETABLE GROWING AND CEREAL  
GROWING FARMS—A COMPARATIVE STUDY

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SUMMARY

A study was made in mid-hills of Himachal Pradesh to find out the income and investment behaviour of vegetable and cereal growing farms of different size-groups. A random sample of 30 vegetable growing farmers and 37 cereal growing farmers according to size of holding was selected. The study showed that vegetable growing farmers were cultivating their land more intensively than the cereal growing farmers. The area under vegetable was 59.1 per cent of the total cropped area



in the case of vegetable growing farms whereas the figure for the cereal group was only 3.5 per cent. The gross income of cereal growing farms was less than half of the vegetable growing farms. Agriculture contributed more than 83 per cent of the gross income on the cereal farms whereas on vegetable growing farms its contribution was 80.91 per cent. Crops contributed 66.41 per cent of the gross income on cereal farms while their contribution towards gross income was more than 75 per cent in the case of vegetable farms. The expenditure on variable inputs was on the higher side on the vegetable growing farms than on the cereal growing farms. Fertilizer contributed more than 40 per cent towards the total variable capital on the vegetable farms while hired labour accounted for more than 47 per cent of the total variable capital on the cereal farms. Vegetable growing cultivators, on an average, invested more than four times on fertilizer and manures than the cereal growing farmers. The study also revealed marked differences between the two farm situations in the fixed capital investment pattern. The cereal growing farms still considered land as the most important of all assets for augmenting their income. But the vegetable growing group considered that income can be raised by increasing the economic supply of land and improving the quality of land by adopting different land development measures and irrigation.

### FACTORS AFFECTING SUPPLY AND GROWTH RATES OF COMMERCIAL CROPS IN RAJASTHAN

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#### SUMMARY

In this paper an attempt was made to examine the trends in area, production and productivity of eleven commercial crops and crop groups and to study the impact of relative prices, weather and high-yielding variety programme (HYVP) for food crops on the supply of commercial crops. Time-series secondary data for the period 1959-60 to 1972-73 were utilized for the purpose. Past trends were examined by computing the compound rates of growth and the impact of various factors on supply was studied by using three different acreage response models for each crop. The reduced form equations for these models are as follows :

- |                              |   |
|------------------------------|---|
| (1) Pre-Nerlovian model      | $A_t = b_0 + b_1 P_{t-1} + u_t$                                 |
| (2) Nerlovian model          | $A_t = b_0 + b_1 P_{t-1} + b_2 A_{t-1} + u_t$                   |
| (3) Modified Nerlovian model | $A_t = b_0 + b_1 P_{t-1} + b_2 A_{t-1} + b_3 R_t + b_4 D + u_t$ |

where  $A_t$  = actual area under the crop,  $P_{t-1}$  = relative price index in year  $t-1$ ,  $A_{t-1}$  = lagged area,  $R_t$  = rainfall during the year,  $D$  = dummy variable representing area shifter since 1966-67 (when HYVP for foodgrain crops was introduced),  $U_t$  = error term and  $b_i$ 's are parameters to be estimated. Ordinary least-square technique was used for the purpose. The results of this study reveal that the commercial crops, taken together did not register any significant change during 1960s' in Rajasthan. Oilseeds as a group, recorded an increase of 3.5 per cent in their productivity. The area under groundnut and cotton increased and under linseed and tobacco declined. The productivity of oilseeds, rape-mustard and cotton increased and of sugarcane declined. For other crops, the growth is characterized either by virulent fluctuations or stagnation. The relative prices have significant effect on the area under oilseeds, groundnut, rape-mustard and, potato for which they explained 23 to 44 per cent variation. Current year's rainfall significantly affected the area under commercial crops in general and rape-mustard and sugarcane in particular. Inclusion of HYVP for foodgrains as an area shifter in the acreage response functions indicated a downward shift in area for most crops and crop groups. However, the shift was statistically significant only for potato and tobacco. Two important policy implications emerge from this analysis: (i) Price policy can be an effective instrument for augmenting the area and production of oilseeds in general and rape-mustard and sesamum in particular. The short run acreage price elasticity is 1.05 for oilseeds, 0.82 for sesamum, 1.77 for rape-mustard and 0.58 for potato; (ii) Unless technology for these crops develops and spreads at the same rate as for food crops, already existing imbalances in the product may assume serious dimensions.



## ECONOMICS OF COMMERCIAL CROPS IN BORUNDA TUBE-WELL COMMAND AREA IN ARID ZONE OF RAJASTHAN

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## SUMMARY

Non-availability of water presents considerable techno-economic problems in the arid zone of Rajasthan. Recently with the demarcation, survey and completion of the tube-well command area, the Bilara development block has witnessed quick changes in the crop production programme. Wherever water has been made available the cropping system has changed from bajra monoculture programme to a multi-activity crop programme where commercial crops like cumin, chillies and rapeseed have been adopted by the farm families inhabiting irrigated pockets of the arid areas. The present study was conducted with a view to survey and ascertain the relative importance of the commercial crops with that of wheat. Out of the demarcated area by the under-ground Water Board and UNDP, twenty-four farm families with assured irrigation from five villages, *viz.*, Borunda, Hariyadhana, Ransigaon, Sambadia and Bhagasani were selected randomly for this study. Judged from the cost structure it can be inferred that while the cost per hectare was higher for chillies and hybrid bajra, it was lower for cumin and rapeseed as compared to wheat. By considering the cost value of output at current prices, hybrid bajra (seed), chillies and cumin had higher value of output per hectare and rapeseed and low value of output per hectare as compared to that of wheat judged from net returns. Whereas hybrid bajra (seed) and cumin production yielded better returns per hectare, chillies and rapeseed trailed behind wheat. The analysis of the comparative crop preference revealed that while in area allocation, total costs and total receipts wheat made a heavy contribution, the percentage of differential returns per unit of cost was highest in bajra hybrid (seed), followed by cumin, wheat, chillies and rapeseed.

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FACTORS INHIBITING THE GROWTH OF HORTICULTURAL CROPS  
IN THE NORTH-EASTERN REGION

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## SUMMARY

The climatic conditions in the north-eastern region favour the cultivation of all types of horticultural crops, temperate, tropical and sub-tropical. The two most common fruits grown in the region are pineapples and citrus fruits. Yet the production of both these fruits suffer from three major problems: agronomic, marketing and transport, and processing. The agronomic problems include the neglect of plantations, the paucity of technical personnel, the low yields and the effect of diseases like "die-back" and "citrus decline" among the citrus fruits. The neglect of this industry is due largely to the marketing and transport problems in the region. There is no organized marketing structure in the region and with the fruits being surplus to the requirements, the producers have to dispose off their produce at miserably low prices immediately after the harvest. The perishable nature of the fruit aggravates the problem. The cost of transport for the movement of the fruit from the region to Calcutta, the nearest consuming centre is inordinately high both by road and rail. The losses in transit act as a further deterrent to the movement of the fruit. Even the processing units in the region are small and uneconomical. There is need therefore of research and extension to improve the quality of the produce, organized marketing to assure the producer of a reasonable price and the setting up of a large-scale viable processing unit in the region.

## ECONOMICS OF JUTE CULTIVATION IN ORISSA

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## SUMMARY

The study relating to economics of jute cultivation in Orissa was conducted in two villages of Kendrapara area of Cuttack district by taking 48 sample farms through stratified random sampling. The data relate to the *kharif* season of the year 1973-74. The paper primarily attempts to examine (i) the economics of improved technology vis-a-vis traditional technology on jute cultivation, and (ii) the economic feasibility of substituting *kharif* rice by jute. The study reveals that about 27 per cent of additional cost is incurred for improved method of jute cultivation compared to the traditional one. The additional investment on improved jute technology is largely due to the use of higher levels of fertilizers, human labour and pesticides. However, the higher levels of expenditure on new technology result in higher productivity. The yield estimates show that the new technology on jute gives roughly 48 per cent of additional yield over the traditional method of jute cultivation. Jute being a capital intensive commercial crop, the large farmers are found to be relatively more efficient than the small farmers. With regard to net return, the estimates indicate that 60 to 67 per cent of additional net return could be obtained by adopting improved practices of jute cultivation from what is received by the traditional ones. Substantial gains are registered both in income and employment due to the adoption of improved technology on jute irrespective of farm sizes. While making an attempt to find out the scope for substituting jute for rice during the *kharif* it is observed that the economic feasibility for substitution exists to a considerable extent in the area under study, since improved method of jute cultivation pays nearly 30 per cent higher net return than the high-yielding varieties of rice grown during the *kharif* under similar conditions. Enlightenment of the farmers in this regard will help release certain rice areas for jute during the *kharif*.

## ECONOMICS OF HYBRID COTTON (A CASE STUDY IN ANAND TALUK)

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## SUMMARY

Gujarat has the second largest area under cotton, but it is the foremost cotton producing State, accounting for one-fifth of the area and about one-third of the production of cotton in the country. In Gujarat State it claims a fifth of the value of agricultural production. Though Hyb-4 variety is very popular among the cultivators of Gujarat, they also grow other varieties of cotton, *viz.*, Co<sub>2</sub>, Kalyan, Vishnu, Krishna, Co<sub>23</sub>, Sujatha and Varalaxmi. To study the economics of Hybrid cotton, 48 cultivators from four villages of Anand taluka (Kaira district) were selected randomly. The cultivators were divided into three categories (on the basis of their size of holding), *i.e.*, small, medium, and large and from each 16 cultivators were selected. These 16 cultivators were again divided into tractor and non-tractor farms. Our sample consists no tractor farms under the small group. Hence all the 16 selected small farms were non-tractor farms. The overall size of holding for the tractor farms is 5.33 hectares, whereas for the non-tractor farm it is only 3.90 hectares. The percentage of area under cotton on the tractor farms comes to 59 whereas it is only 45 under the non-tractor farms. This indicates that the medium and large cultivators with tractors had grown more cotton than the non-tractor cultivators of the same group as well as the small group. The overall cost of cultivation per hectare of cotton comes to Rs. 2,303 and Rs. 2,324 on the tractor and non-tractor farms respectively. Thus there is a marginal difference in the cost of cultivation between these two farms. The cost of cultivation is highest on the large farms (both tractor and non-tractor) followed by the small farms (non-tractor farm). The least cost of cultivation can be observed in the medium size-group (both tractor and non-tractor).

The share of fertilizers, labour and pesticide forms more than 68 per cent of the total cost on the tractor farms and nearly 60 per cent on the non-tractor farms. Irrigation also is another important item of cost on both the types of farms. The share of all these items had shown an increasing tendency with the increase in the size of holding on both the types of farms.

The overall yield comes to 14.90 and 14.01 quintals/hectare in respect of tractor and non-tractor farms respectively. Thus the yield per hectare is more on the tractor farms than on the non-tractor farms. However, the yield is maximum on the small farms (non-tractor). This may be due to their intensive cultivation. But the gross value is more on the tractor farms than on the non-tractor farms. Thus we can conclude that the tractor farms have sold their crop, at the time when the price is maximum whereas the small farmers could not do like this, because of their poor economic position. The overall profit per hectare on the tractor farms is more (Rs. 2,856) than on the non-tractor farms (Rs. 2,284). Since the medium farms spent less on the cultivation and get maximum yield their profits were maximum. The average input-output ratio for the tractor farms is more (2.23) than the non-tractor farms (2.02). All the farms were getting good returns. The highest output ratio was got again by the medium cultivators. The overall benefit is more on the tractor farms than on the non-tractor farms. The cost-benefit ratios were quite satisfactory except on the non-tractor farms of large-sized group. Here again the cost-benefit ratio is high on the medium farms (1:1.52). The cost-benefit ratios are quite encouraging for the cultivators to take up their crop on a large scale. There is a possibility of increasing the yield of cotton crop if the extension agency takes more interest and persuade the cultivators to adopt the improved cultural practices. Timely supply of inputs will also help the cultivators to improve their production. Pesticides which were occupying a prominent place in the cost of cultivation may be subsidised so as to reduce the overall cost of cultivation. Otherwise pest-resistant varieties have to be evolved. The financial institutions should come forward for giving more liberal assistance to the cultivators who were growing the commercial crops particularly cotton in order to encourage them to grow more area under cotton.

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#### ECONOMICS OF COMMERCIAL CROPS IN ANAND TALUKA OF KAIRA DISTRICT IN GUJARAT

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#### SUMMARY

An attempt has been made in this paper to study the various aspects of the economics of tobacco and hybrid cotton-4 cultivation in Anand taluka of Kaira district in Gujarat State. The study covers 45 cultivators, which were selected from three villages of the taluka. A multi-stage stratified random sampling design was used for the selection of sample villages and cultivators. The study relates to the year 1973-74 and survey method was used for the collection of data. The study reveals that the net income per hectare was higher in cotton than tobacco on the medium and large farms, while the small farmers got lesser income from cotton than tobacco. It may be because of the fact that the small farmers are not efficient in the use of pesticides in cotton. On the sample farms the net income per hectare was more than double in cotton than tobacco, while the highest variation was observed on the large sized farms. The net income per hectare increased with the increase in the size of farm in cotton, while the opposite trend was observed in the case of tobacco.

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#### ECONOMICS OF TOBACCO CULTIVATION IN KAIRA DISTRICT, GUJARAT

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#### SUMMARY

The Kaira district of Gujarat, in general, and the Anand taluka in the district, in particular, are very famous for tobacco cultivation. That is why this area was chosen for the present study. The

important villages, namely, Sarsa and Chakhodara, were also selected purposively for the completion of this work. Farmers having holdings below 5 acres, 5-10 acres and those having more than 10 acres were classed as small, medium and large ones and from each of such groups ten farmers (tobacco growers) were selected randomly from Sarsa and Chakhodara villages, 30 each from each village and the findings are thus based on a study of 60 farmers. The cost of cultivation ranges from Rs. 665 per acre on the large holdings to Rs. 954 on the small holdings. This difference is quite a marked one and the further interesting thing is that all classes of farmers have spent the highest percentage on manures and fertilizers, followed by human labour and irrigation. The reason for the low cost on the large holdings was their resourcefulness in getting the costs minimized, especially by using tractors and pumping sets. They cultivate the best variety of tobacco and market efficiently which compensates them doubly and saves them against the general belief 'higher costs means higher profits'. Its (variety's) highest sale rate grants them highest per acre of net income also, the cost-benefit ratio is in favour of the big farmers. The output-input ratio too diminishes in the case of large farmers.

### ECONOMICS OF CULTIVATION OF HIGH-YIELDING VARIETIES VIS-A-VIS LOCAL VARIETY OF COTTON

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#### SUMMARY

The present paper attempts to give an idea about the economics involved in the cultivation of the high-yielding varieties H-4 and MCU-5 as against the local variety AK-235. The study pertains to a sample of about 50 cultivators growing each variety for two years in Akola district in Maharashtra. This is a case study and the results are expected to be only indicative. It has been noted that for H-4 cultivation 53 men-days, 140 female-days and 50 bullock labour days per hectare were used. Similar figures for MCU-5 and AK-235 varieties were 43, 121, 41, and 28, 56, 35 respectively. In the case of fertilizer utilization, the use of nitrogenous fertilizers was comparatively satisfactory as against the recommended dose in the case of H-4 and MCU-5 varieties. Forty-eight per cent of the cultivators used a dose of 60 kgs. and above for H-4, while 37 per cent of the cultivators used a dose of 36 to 60 kgs. per hectare. In the case of MCU-5 only 7 per cent of the cultivators were in the first group while 41 per cent of the cultivators were in the second group. For the local variety 90 per cent of the cultivators did not use any fertilizer. The yields obtained per hectare on an average were 1,359 kgs. and 848 kgs. for H-4 and MCU-5 respectively as against 399 kgs. of the local variety, thus showing an additional yield of 960 and 449 kgs. respectively in the case of the two high-yielding varieties. Considering the cost from the cultivators' angle, the per hectare costs were Rs. 1,299 for H-4, Rs. 756 for MCU-5 and Rs. 320 for the local variety, the respective figures of total cost being Rs. 1,647, Rs. 1,013 and Rs. 525 respectively. The highest share of any single item of cost was found to be in the case of manures and fertilizers in respect of both the high-yielding varieties, the proportion being 26 per cent in both the varieties while the labour cost formed the most important item in the case of the local variety. Considering the value of total produce, it is noted that the return over the total cost was Rs. 4,476 for H-4 cotton, Rs. 1,979 for MCU-5 cotton while only Rs. 470 for the local variety. Thus it was about 9 times in the case of H-4 cotton and four-fold in the case of MCU-5 cotton over the local one, signifying that the production of the high-yielding varieties is quite profitable, the advantage being comparatively more in the case of H-4 cotton. The per quintal cost of production considering the total cost is estimated at Rs. 121 for H-4, Rs. 119 for MCU-5 and Rs. 132 for the local variety, the corresponding figures from the cultivators' angle (cost-A only) being Rs. 96, Rs. 89 and Rs. 80 respectively.

## ECONOMICS OF HIGH-YIELDING VARIETY OF COTTON (H-4) IN PARBHANI DISTRICT

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## SUMMARY

This paper attempts to show the relationship between input and output of Hybrid-4 (recently introduced high-yielding variety of cotton) on the cultivators, fields in Parbhani district of Maharashtra. The main objectives of this paper are (i) to find out the cost and return of H-4 cotton, and (ii) to calculate the elasticities of production in respect of major factors. For the study, four roadside villages in two tehsils were purposively selected and 50 cultivators growing H-4 cotton were randomly selected from these villages. Rainfall in the district during the year of study (1972-73) was 518.50 mm. Cultivators have adopted pre-monsoon sowing of cotton under irrigation (May-June 1972). Cobb-Douglas type function has been used in the present analysis. On an average the cultivators obtained a yield of 1,468 kilogrammes of seed cotton from one hectare of H-4 cotton. The per hectare fertilizer use is observed as 101.88 kgs., 41.93 kgs. and 29.46 kgs. of N, P, and K respectively. The total cost of production worked out to Rs. 2,501.70 per hectare, in which the share of out-of-pocket expenditure was Rs. 2,141.22 per hectare. The share of human and bullock labour cost together was maximum in the total cost, viz., 26 per cent, followed by value of manures and fertilizers 22 per cent and plant protection charges 15 per cent. The per hectare gross return was Rs. 4,838.53. The net returns worked out to Rs. 2,697.31 and Rs. 2,336.83 per hectare over cost 'A' and cost 'C' respectively. As regards the cost of production per quintal of seed cotton it was observed to be Rs. 145.86 as cost 'A' and Rs. 170.42 as cost 'C'. In Cobb-Douglas type function analysis, the returns to scale are found to increase for H-4 cotton. The marginal return to labour was much greater than the marginal cost, which indicates the scope for rising output profitably by increasing the use of labour. The marginal return to manures and fertilizers was also greater than the marginal cost.

## ECONOMICS OF SUNFLOWER CULTIVATION IN AKOLA DISTRICT

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## SUMMARY

An attempt is made in this study to determine the costs and returns from sunflower production on the cultivators' fields as also to ascertain its profitability. The cultivation of sunflower is catching the imagination of the cultivators and its area is on the increase. Government efforts are also mainly responsible for it. It has been thought necessary to increase the vegetable oils supplies from different sources so that it may be possible to stop the drain of valuable foreign exchange on import of vegetable oils. Sunflower is becoming popular for the added reason that it can be grown in any season and even on poor soils. This case study pertains to a sample of 50 cultivators drawn from 15 villages in Akola district in Maharashtra. The data relate to the year 1973-74 (*kharif*) for EC-68414 variety. It has been noted that the per hectare average utilization of male and female labour was to the extent of 44.56 and 62.54 days respectively, and of bullock labour days was 22.70.

The utilization of other inputs like seed and farmyard manure was to the extent of 9.61 kgs. and 7.95 cartloads respectively per hectare. In respect of fertilizer use it is noted that no fertilizers were used by 58 per cent of the cultivators and hence the average utilization of N, P and K worked out to 15.07, 6.82, and 3.41 kgs. per hectare respectively, which is much less than the recommended dose of 40, 30 and 20 kgs. of N, P and K respectively. This has affected the average yield which has been noted

as 432 kgs. per hectare. The cost of production from the cultivators' angle (cost-A) worked out to Rs. 424.38 which is 69.47 per cent of the total cost (cost-C) of Rs. 610.84. The percentage contribution of labour in this was to the extent of about 30 per cent and manures and fertilizers about 28 per cent. The average price obtained by the cultivators was Rs. 254.68 per quintal and based on this, the value of gross output worked out to Rs. 1,100.88 per hectare. The profit over cost 'A' worked out to Rs. 676.50 while considering all costs the profit amounted to Rs. 490.04 per hectare. The per quintal cost production worked out to Rs. 141.31 considering all costs. It may be broadly concluded that in spite of the low yields obtained the production of sunflower is quite profitable and there is good scope for increasing the profits further as the yield potential is fairly high.

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A COMPARATIVE STUDY OF RESOURCE PRODUCTIVITIES AND RESOURCE ALLOCATION ON A SAMPLE OF SUGARCANE AND BANANA FARMS IN NASIK AND JALGAON DISTRICTS OF MAHARASHTRA STATE

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SUMMARY

The objectives of this paper are to estimate and compare the cost of cultivation and resource productivities of, and optimum allocation of resources to sugarcane and banana. A random sample of 60 cultivators from two villages in Malegaon taluka of Nasik district in Maharashtra for *adsali* (1½ years) sugarcane and Bhadgaon taluka of Jalgaon district for *basarai* banana on area proportionate basis for each were selected. Both the areas in Girna Valley are fed by Girna canals. Rainfall, climate, soil type, are similar even though distance between these areas of crops are 30 km. Besides, these crops being wet land crops, their duration, manurial and cultural requirement, water requirements, are also the same. Thus variation is minimized for comparison. The data pertained to the two-year period 1970-71 and 1971-72 and were collected by survey method by personally contacting the banana and sugarcane growers during the period. Cost A includes all cash expenditure while cost B includes cost A + imputed values of rent, interest and capital. Cost C includes cost B + family labour. The data are also analysed by using the technique of production function for which modified equation for analysis is  $Y = a x_1^b x_2^c x_3^d x_4^e$  where Y = output of sugarcane/banana in tons,  $x_1$  = land in *gunthas*,  $x_2$  = human labour in man-week,  $x_3$  = manures and fertilizers in rupees and  $x_4$  = seed in rupees. Following conclusions emerge from the study. (1) The per hectare labour utilization is more or less same and heavy in both the crops. (2) The yield of both the crops decreased in 1971-72 and between 1970-71 and 1971-72 the cost per ton of sugarcane and banana has increased by Rs. 16.41 and by Rs. 140 respectively. But the net profits are more in the case of sugarcane than in banana, because of higher and stable prices in sugarcane and low and fluctuating prices in banana. (3) The regression coefficients of land and labour in banana are more than those in sugarcane but they are less for manures and fertilizers and seed in banana than in sugarcane. The regression coefficients are the highest for land in both the crops as compared to those of labour, seed and manures and fertilizers put together. (4) In no case is the individual coefficient greater than unity and hence diminishing marginal returns to individual factors of production are indicated. (5) Even though the sums of regression coefficients, for both the crops and for both the years (1970-71 and 1971-1972) are greater than one, they are found to be non-significant when tested with Tintner's t-test and hence the hypothesis of constant returns to scale is accepted and increasing returns rejected. (6) On the basis of 'F' test, all values of  $R^2$  were found to be highly significant at 1 per cent level and hence the coefficient of multiple determination explained highest percentage of variation for the variables included in the study. (7) The marginal productivity of land in sugarcane is the highest while it is comparatively low in banana, indicating the superiority of sugarcane enterprise over banana. (8) Optimum resource allocation with limited capital and land being fixed indicated that resource allocation on human labour and seed should be increased and on manures and fertilizers should be decreased. While optimum resource allocation with limited capital alone indicated that resource allocation on labour, seed and manures and fertilizers is to be decreased and only land is to be increased which is not practicable. (9) If both criteria of MVP and elasticity are applied, the results show that resource allocations do not always coincide. But irrespective of the criterion used, it is questionable as to whether in all cases resource shifts could be carried

out in practice or would result in increasing future net profits. (10) On the whole, optimum resource allocation indicated that resource allocation on inputs like land and labour have already attained the optimum level in the sample studied.

#### IDENTIFICATION OF CONTRIBUTION OF EACH ELEMENT TO THE GROWTH RATE OF COMMERCIAL CROP OUTPUT IN THE DISTRICTS OF ANDHRA PRADESH

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#### SUMMARY

The growth in agricultural output was decomposed into a number of components by Minhas and Vaidyanathan and an attempt was also made by Chander Prabha to modify their scheme of decomposition. In this paper the decomposition technique is modified again and the growth rate of agricultural output is divided into seven growth rates as components, as follows :

Consider

$$P_o = A_o \sum_i w_i c_{io} y_{io} \quad (1)$$

$$P_t = A_t \sum_i w_i c_{it} y_{it} \quad (2)$$

where P stands for the value of agricultural output, A for the total cropped area,  $w_i$  for the price of one unit of crop output,  $c_i$  is the proportion of area under crop 'i' to the total cropped area,  $y_i$  is the yield per hectare of crop 'i' and suffix 'o' and 't' refers to the initial period and final period respectively. From the identities (1) and (2) we can derive

$$\begin{aligned} \frac{P_t - P_o}{P_o} &= \frac{A_t - A_o}{A_o} + \frac{\sum_i w_i c_{io} y_{io} \frac{y_{it} - y_{io}}{y_{io}}}{\sum_i w_i c_{io} y_{io}} + \frac{\sum_i w_i c_{io} y_{io} \frac{c_{it} - c_{io}}{c_{io}}}{\sum_i w_i c_{io} y_{io}} \\ &+ \left( \frac{A_t - A_o}{A_o} \right) \frac{\sum_i w_i c_{io} y_{io} \frac{y_{it} - y_{io}}{y_{io}}}{\sum_i w_i c_{io} y_{io}} + \left( \frac{A_t - A_o}{A_o} \right) \frac{\sum_i w_i c_{io} y_{io} \frac{c_{it} - c_{io}}{c_{io}}}{\sum_i w_i c_{io} y_{io}} \\ &+ \frac{\sum_i w_i c_{io} y_{io} \frac{c_{it} - c_{io}}{c_{io}} \frac{y_{it} - y_{io}}{y_{io}}}{\sum_i w_i c_{io} y_{io}} + \left( \frac{A_t - A_o}{A_o} \right) \frac{\sum_i w_i c_{io} y_{io} \frac{c_{it} - c_{io}}{c_{io}} \frac{y_{it} - y_{io}}{y_{io}}}{\sum_i w_i c_{io} y_{io}} \end{aligned}$$

Multiplying all the terms both on L.H.S. and R.H.S. of equation (3) by 100 and dividing each term by the length of the period under consideration we will obtain the percentage annual growth rate of each component.

So identity (3) can be written as

$$g_o = g_a + g_{wy} + g_{wc} + g_a(wy) + g^a(wc) + g(wcy) + g_a(wcy) \quad (4)$$

Thus the growth rate of agricultural output  $g_o$  can be divided into (1)  $g_a$ —growth rate of area, (2)  $g_{wy}$ —weighted growth of yield, (3)  $g_{wc}$ —weighted shift rate of crop pattern, (4)  $g_a(wy)$ —growth rate of area and weighted yield, (5)  $g_a(wc)$ —growth rate of area and weighted crop pattern, (6)  $g(wcy)$ —weighted growth rate of crop pattern and yield and (7)  $g_a(wcy)$ —growth rate of area and weighted crop-pattern and yield together, weights being the proportion of the value of the output of the  $i$ th crop in the base year 'o'.

In the models developed by Minhas and Vaidyanathan the percentage contributions of each component area, yield, crop pattern and interactions were obtained first and the growth rate of agricultural output was distributed to the various components as against their respective shares. But the model presented in (3) and (4) facilitates us to obtain directly the share of each component in the growth rate of agricultural output. The model (4) is more easy to interpret and it has also the computational advantage.



A linear regression equation has been fitted to the cross-section data to obtain the contribution of individual decomposed growth rates—area, yield and crop pattern on the growth rate of commercial crop output in the two regions—Andhra and Telangana and in the State as a whole. In the State of Andhra Pradesh (1) the productivity has contributed much for the growth of output of gingelly and cotton. (2) The output of sugarcane, chillies, groundnut and tobacco has increased mainly due to increase in the area under cultivation. During the period under study (1964-72 over 1956-64), the commercial crop output in the State has increased by 27.93 per cent. Even though the productivity of these crops as a whole has declined by 0.63 per cent per annum, due to (1) increase in the area under these crops by 2.54 per cent and (2) shift in the crop pattern by a rate of 1.54 per cent, the commercial crop output has increased by 3.49 per cent per annum in the State of Andhra Pradesh. Among the twenty districts in the State, the growth rate of crop output is greater than that of the State average in 13 districts. The crop output has increased but at a lower rate than the State average in five districts and the output in the remaining two districts has declined. In the case of growth of commercial crop output in the aggregate, among the districts that achieved higher growth rates, seven districts have achieved mainly due to increase in area, three due to increase in productivity and the remaining five districts have achieved positive growth rates mainly because of a shift in the crop pattern. In the Andhra region the contribution of crop pattern is more and in the Telangana region the contribution of area is more in increasing the growth of commercial crop output. But in the State of Andhra Pradesh as a whole all the three factors, *viz.*, area, productivity and crop pattern have contributed to a great extent but crop pattern headed the others.

## REGIONAL VARIATIONS IN RESOURCE PRODUCTIVITY OF SUGARCANE FARMS IN ANDHRA PRADESH

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### SUMMARY

The main objective of this paper is to study the regional variations in resource productivity and scale returns in sugarcane farming in Andhra Pradesh by size of sugarcane farms. The study relates to a single production year, 1964-65 and provides inter-farm comparison of input-output data. For this study, a 212 registered sugarcane growers were randomly selected from 18 villages (6 each) in the three agro-climatic regions of Andhra Pradesh, *viz.*, North Circars, South Circars and Telangana representing small (upto 1.5 acres), medium (1.5 to 3.00 acres) and large farms (3 acres and above) on the basis of sugarcane area. In this study only sugarcane plant crop was considered and 177 growers raised this crop (66 each in North Circars and Telangana and 45 in South Circars). Cobb-Douglas type of production was fitted to the input and output data of sugarcane to estimate the resource productivity and returns to scale. Five causal variables, *viz.*, land (sugarcane plant area), human labour (man-days of eight hours), cattle labour (pair days of eight hours), seed, and manures and fertilizers (in rupees). All possible combinations of input variables were taken and 360 production functions were fitted by using the IBM 1620 of the Delhi University. Only production functions with five variables were considered here for detailed discussion.

The coefficient of adjusted multiple determination ( $\bar{R}^2$ ) was highly significant in all the regions and indicated that 94 to 99 per cent of variations in output were associated with the variables included in the functions. Significant diminishing returns were found to exist for land in all the regions. Besides this, only human labour in North Circars, cattle labour in South Circars and cattle labour and seed in Telangana showed significant diminishing returns. In all the regions the contribution of fertilizers in sugarcane production in Andhra Pradesh was practically nil. In all the regions constant returns to scale were prevailing in sugarcane production. The use of more land and seed in all the regions, cattle labour in South Circars and Telangana and less of human labour, and manures and fertilizers in all the regions and also cattle labour in North Circars would increase the profitability of the planted sugarcane crop in Andhra Pradesh.



It was found that diminishing factor returns were found to exist for all the inputs in sugarcane farming in all the size-group of farms. It was interesting to note that the production elasticity of land which was significant in North Circars for the totality of farms turned out to be non-significant in respect of farm size-groups. Irrespective of farm size, constant returns to scale prevailed on the sugarcane farms in all the three regions except on the small farms in North Circars, where diminishing returns to scale were found to exist. The marginal value product to opportunity cost ratios in different size-groups indicated gross inefficiency in resource use in sugarcane farming in Andhra Pradesh. A decrease in the use of fertilizers and human labour and an increase in the use of land and cattle labour might contribute to achieve profitability in sugarcane production among different farm size-groups. Thus there exist opportunities for attaining optimal efficiency in sugarcane production through the substitution of resources.

### ECONOMICS OF RAPESEED-MUSTARD VIS-A-VIS WHEAT I

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#### SUMMARY

Oil seeds occupy a prominent position in the agricultural economy of India as they rank second only to foodgrains. Major oil seeds cover about one-tenth of the total cropped area, account for 9 per cent of the total agricultural production and contribute about 5 to 6 per cent to the national income. Of the five major oil seeds produced in the country, *viz.*, groundnut, rapeseed-mustard, sesamum, linseed and cotton seed, rapeseed-mustard occupy the second position in terms of both the area and production. India ranks first in rapeseed-mustard production accounting for 30 per cent of the world production. Within the country rapeseed-mustard contribute 28 per cent to the total production of major oil seeds.

The present study was conducted in Saiyan block of Kheragarh tehsil in Agra district of Uttar Pradesh. The State, district, tehsil and block were selected purposively on the basis of maximum area under rapeseed-mustard. Three villages in Saiyan block were also selected purposively from the high concentration group of villages on the basis of acreage. Farmers of all these three selected villages were stratified into three categories, *i.e.*, small (upto 5 acres), medium (5 to 15 acres) and large (above 15 acres) and in all 90 farmers were selected on the basis of probability proportion.

The average cost of cultivation (cost 'C') per acre for rapeseed-mustard was Rs. 559. It ranged from Rs. 473.16 for large farms to Rs. 631.20 for small farms. The operational cost formed 64 per cent of the total cost and it ranged from 53 per cent on the large farms to 70 per cent on the small farms. The cost of human and bullock labour, manures and fertilizers were the most important items of operational cost, constituting more than 50 per cent of the total cost. The average yield per acre was 3.93 quintals and it ranged from 3.60 quintals on the medium farms to 4.19 quintals on the small farms. The average net profit per acre was Rs. 297 ranging from Rs. 225 on the small farms to Rs. 452 on the large farms. The overall input-output ratio was 1.56. The input-output ratio was the highest on the large farms and declined with the decline in the size of the farm. The average cost of cultivation per quintal of rapeseed-mustard works out to be Rs. 142. However, the market price ranged from Rs. 175 to Rs. 325 per quintal. Therefore, it can be concluded that rapeseed-mustard cultivation was quite remunerative even if we consider the lowest market price.

Wheat is considered to be the competing crop for rapeseed-mustard since both these crops compete with each other for limited land and other resources available with the farmer. The average cost of cultivation per acre for wheat worked out to be Rs. 587. It ranged from Rs. 562 on the small farms to Rs. 607 on the large farms. Among the different items of cost, human labour, bullock labour cost of manure and fertilizer and seed were more prominent forming more than 40 per cent of the total cost. However, the net profit per acre for wheat (Rs. 270) was found to be less than the net profit for rapeseed-mustard (Rs. 297). The average input-output ratio for wheat worked out to be 1.46 as against 1.56 for rapeseed-mustard. Hence, it can be concluded that wheat cultivation was not as remunerative as rapeseed-mustard. Though rapeseed-mustard was more profitable than wheat which was the main competing crop in the study area, the extension of area under rapeseed-

mustard or replacement of wheat crop by rapeseed-mustard will be difficult because of the following reasons. (1) Rapeseed-mustard is highly susceptible to insect pests and diseases and the risk involved is much greater for this crop than wheat. Thus, the farmers' tendency of risk aversion would act as a major constraint for the growth of rapeseed-mustard cultivation. (2) There are wide fluctuations in the rapeseed-mustard prices from year to year and within the same year. Thus, unless the farmer is assured of a stable market price, he would be hesitant to replace wheat by rapeseed-mustard.