ABSTRACTS OF M. Sc. THESES

Rao, C.A. 1987. Regional Trends and Disparities in Fertilizer Consumption in India. G.B. Pant University of Agriculture and Technology, Pantnagar. *Major Adviser* : V.K. Pandey.

Fertiliser consumption in India has increased at a fast rate since mid sixties. But, this increase is reported to have been widely different in different states of the country leading to regional disparities in fertiliser consumption. These disparities need to be narrowed down in order to enhance fertiliser consumption and meet the country's food and fibre needs. Keeping this in view, the present study was conducted to (i) estimate trends and growth rates in fertiliser consumption in different states and the country as a whole, (ii) study the regional disparities in fertiliser consumption, and (iii) identify the factors responsible for these disparities. For this purpose, seventeen states of the country were selected, for which consistent time series data were available for the period from 1966-67 to 1984-85.

Linear and exponential trend equations were estimated to work out trends and growth rates in fertiliser consumption. The coefficient of variation and Spearman's rank correlation coefficients were used to see the disparities in fertiliser consumption across different states. A composite analysis of factors affecting fertiliser consumption and growth in these factors was done to identify the possible causes of these disparities.

The consumption of individual nutrients as well as total nutrients per hectare of both net cultivated and gross cropped areas was found to have significantly increased in most of the states during the period. The fertiliser consumption, in general, was found to have increased at a much faster rate above all India average, in the states of Punjab, Madhya Pradesh, Haryana, West Bengal, and Uttar Pradesh. It was found to have increased at a much slower rate, below all India average, in the states of Assam, Kerala, Tamilnadu and Rajasthan.

There were large variations in fertiliser consumption per hectare of net cultivated area as well as gross cropped area, during both the terminal years of the study period. These disparities, as measured by coefficient of variation, were found to be quite high and did not show any rising or declining trend over the study period, except in case of potassic fertilisers where declining trend was observed. The ranks of different states with respect to per hectare fertiliser consumption also remained

unchanged during the study period. Total credit advances per hectare, per cent gross cropped area irrigated and per cent area under HYVs were found to have significant impact on fertiliser consumption in all the states. The growth rates in per cent irrigated area and per cent area under HYVs across the states were significantly correlated with growth rates in per hectare fertiliser consumption. However, the growth rates in credit advances were not correlated with that in fertiliser consumption across the states. Thus, differential growth rates in per cent irrigated area and per cent area under HYVs across different states can be said to have caused differential growth rates in per hectare fertiliser consumption.

Kiresur, V.R. 1987. An Economic Analysis of Marketing of Vegetables—A Case Study in Dharwad and Hubli Markets. University of Agricultural Sciences, Dharwad. *Major Adviser* : K.C. Hiremath.

The present study is an attempt to identify some of the weaknesses in the present system of vegetable marketing in Dharwad and Hubli cities (Karnataka State) and to suggest appropriate measures to overcome them. This study tried to analyse the factors responsible for the wide marketing margins under different channels of marketing of vegetables. It also throws light on the Costs-Returns-Profits profiles in the production of vegetables.

The study was restricted to four important vegetables grown and marketed in the study area, viz. tomato, brinjal, onion and potato. The data collected and analysed related to the year 1985-86.

Cluster sampling was followed for selection of villages and multi-stage random sampling technique for the selection of respondents.

The important findings of the study are as follows :

(1) The two main channels identified in the vegetable marketing were :

(a) Channel-I : Producer-seller—Commission agent-cum-wholesaler—Retailer—Consumer.

(b) Channel-II : Producer-seller—Village Merchant—Commission agent-cum-wholesaler—Retailer—Consumer.

(2) Of the two main channels identified, the Channel-I was found to be more efficient in terms of the net price received by the producer-sellers and the price spread. Further, Channel-I was much more popular than Channel-II.

(3) The producer's share in consumer's rupee was higher in Hubli market (48 to 68%) compared to Dharwad market (42 to 67%).

(4) The day-to-day variations in wholesale prices were of greater degree in Hubli market compared to Dharwad market, and such fluctuations were relatively smaller in the case of onion and potato compared to those in tomato and brinjal in both the markets.

(5) The shares of the retailers were positively related to the consumer's price, whereas those of the producer-sellers were negatively related.

(6) The marketing costs per quintal incurred by the producer-sellers were higher in Dharwad market compared to Hubli market for all the vegetables in general under both the channels. The marketing costs in Channel-II were much lower compared to Channel-I, since Channel-II consisted of sales at farm level only.

(7) Eventhough the prices received by the farmers of Dharwad taluka were higher compared to Hubli taluka, all the costs of production and marketing (Cost D) were covered by the prices received.

Naik, V.G. 1987. Economics of Farming Systems in Sindhudurg District (Maharashtra). Konkan Krishi Vidyapeeth, Dapoli. *Major Adviser* : S.G. Barude.

Farming systems followed by the cultivators in Sindhudurg district is typical of coastal tract. Malvan, Kankavali and Vaibhavwadi tahsils were selected randomly from the district for study. Three villages each from Malvan and Kankavali and two from Vaibhawadi tahsil were selected randomly. Fifteen farmers were selected randomly from each village and data were collected by survey method.

The total cropped area of sample cultivators was 114.53 ha of which 62 per cent was under *kharif* crops, 12 per cent under *rabi* crops and 26 per cent under perennial fruit crops. According to commercial classification, 69 per cent area was under foodgrain crops and 31 per cent under cash crops. Classification by crop combinations showed that 96 per eent area was under sole crop (single crop) and four per cent under mixed crops. Thus *kharif* cropping was predominant with foodgrain crops. Rice is the main crop with 58 per cent area under it. Other crops were *nagli*, groundnut, kulthi, chilli, watermelon, mango, cashew and coconut. Of the total cropped area, 16 per cent area was under irrigated crops.

Use of inputs like FYM, fertilizers and pesticides was below the recommended levels resulting in low per hectare yields. There were wide variations in per hectare gross values, net returns and per day returns of different crops. Irrigated crops were found to be more profitable than rainfed crops. Net returns were negative in rice and nagli and positive in other crops.

In unirrigated cropping, paddy—fallow, paddy—kulthi (under residual moisture) and nagli-fallow were common rotations. In irrigated cropping, paddy-paddy and paddy-groundnut were the common rotations. Few farmers were found to grow chilli and watermelon after *kharif* paddy. In unirrigated crop rotations, about two per cent area was under second crop and in irrigated cropping 49 per cent area was under second crop. Average per hectare profit in unirrigated crop rotations was Rs. 512 and in irrigated crop rotations Rs. 3726. Average per hectare employment was 270 days and 549 days, respectively. This indicated that under irrigated cropping, there is more intensive use of land, more income and employment generation. In irrigated crop rotations, paddy-groundnut, paddy-watermelon and paddy-chilli are more profitable. Paddy-chilli rotation provided maximum employment (704 days).

Although crop production was the main source of income and employment, many farmers were found to combine dairy or poultry or both with crop production. The income from crop only was Rs. 1775, crops + dairy Rs. 2702, crops + poultry Rs. 2118 and crops + poultry + dairy Rs. 3045. Employment was also maximum (248 days) in crop + dairy + poultry combination as against 199 days in only crops. Combination of dairy and poultry with crop production, provided more employment for family labour, particularly the females.

Mhetre, C.R. 1987. An Economic Analysis of Cultivation and Marketing of Watermelon in Thane District (M.S.). Konkan Krishi Vidyapeeth, Dapoli. *Major Adviser* : G.G. Thakare.

An attempt was made to examine the economics of production and marketing of watermelon with following specific objectives : (i) to study cultivation practices and physical inputs used by cultivators for watermelon cultivation, (ii) to study productivity, cost structure and profitability of watermelon, (iii) to identify the different marketing channels for watermelon and to study the market margins and price spread in different channels.

Thane district was purposively selected for the present study. Bhiwandi and Wada tahsils having maximum area under watermelon were selected. From six villages, 80 cultivators were selected randomly. Ten marketing functionaries from Bombay market were also selected randomly. Data were collected through personal interview during the year 1987.

The average total operational holding was 2.41 hectares. The per farm total value of assets was Rs. 1,11,097.92. Land was found to be a major constituent of investment (90.53%).

Per hectare human labour required for watermelon cultivation was 428.78

days. Maximum labour (57.90%) was required for irrigation followed by preparatory tillage, transport and application of FYM and fertilizers. Watermelon cultivation in Thane district is male oriented as it provided maximum employment to male labour only. In addition to human labour, 3 59 bullock pair days and 5.21 tractor hours were used for ploughing. Per hectare cost of cultivation of watermelon worked out to Rs. 12,778.73. In the total cost of cultivation, the share of Cost-A, Cost-A_1 and Cost-B was 52.60 per cent, 54.83 per cent and 71.73 per cent, respectively. Net returns at Cost-A, Cost-B and Cost C worked out to Rs. 6,675.08, Rs. 4,516.09 and Rs. 903.37, respectively. Benefit-cost ratio came to 1.07 indicating that watermelon crop was profitable.

An examination of yield levels and corresponding inputs used indicated that higher per hectare yield was associated with higher per hectare quantities of inputs.

Though, watermelon requires more working capital none of the cultivators borrowed from the institutional agencies. The amount borrowed from private agencies was also negligible.

The non-availability of pure seed of Sugarbaby variety, lack of knowledge about control of pests and diseases, problems in obtaining credit and marketing were some contraints in watermelon cultivation.

The per farm production and marketed surplus was found to be 98.01 quintals and 97.02 quintals, respectively, More than 90 per cent of the cultivators sold their produce through contractors ,wholesalers or through commission agents. The per quintal price received was highest (Rs. 98.09) in self marketing on the basis of fruits and lowest (Rs. 54.33) when sold on lumpsum basis. Average per quintal price received was Rs. 64.78. Marketing system was un-organized as there were eight channels for watermelon trade. The per quintal cost of marketing was maximum (Rs. 74.32) in the channel producers—commission agents - contractors—wholesalers — retailers—consumers and minimum (Rs 20.07) in the channel producers – commission agents—contractors—consumers. The producers share in consumers price was the highest (73.52%) in case of direct sale by producers to consumers and lowest (25.23%) in the channel producers—contractors—wholesalers—retailers -- consumers.

Bhambure, C.V. 1987. Districtwise Growth Rates of Agriculture in Konkan Region. Konkan Krishi Vidyapeeth, Dapoli. *Major Adviser* : G.G. Thakare.

The study was conducted to estimate growth rates (trends) in agricultural and allied development and to study the growth rates of important agricultural inputs in Konkan region. Time series data was used to compare the present level of agricultural and economic development in the Konkan region with the average situation in

Maharashtra State, and to estimate districtwise growth rates of selected parameters of agricultural development and allied activities in Konkan region.

The study revealed that there was a high density of population (233) and low man-land ratio in rural Konkan as compared to Maharashtra State (204) indicating very high pressure of population on land. The net area sown per head of total population and population engaged in agriculture in Konkan was lower than for Maharashtra state. The proportion of barren and unculturable land, culturable waste land, current and the other fallows is high in Konkan as the proportion of net area sown is very low as compared to the State. Low total cropped area in Konkan as compared to the State has had an adverse effect on the agricultural economy of the region. While the proportion of area under foodgrains in the region was the same as in the State, the region was better off in fruits, vegetables and fodder crops but lagging behind in oilseeds. Agricultural development in the region has also been affected by low net irrigated area.

The consumption of nitrognous fertilizers is increasing in all the districts of Konkan region. At present fertilizer consumption worked out to 32 kg per hectare. There were desirable trends in land utilization with positive growth rates of area under forest in all the districts of Konkan and net area sown and total cropped area in Ratnagiri district. The growth rates of area for all foodgrain crops were negative in Ratnagiri district but positive for horticultural or plantation crops like coconut, mango and cashew. Except nagli, the growth rate for area under foodgrains was positive in Raigad and Thane districts. The productivity of important crops, namely, rice, nagli and coconut showed positive growth rates in all the districts except Thane, where the growth of productivity in nagli is negative.

The rate of growth in electric motors was high in all the districts which is desirable sign. The growth rate of short term and medium term loans advanced by Co-operative Banks is negative, while for long term loans advanced by Land Development Banks it is positive in all the districts of Konkan. The average wages paid to the field labourers in the Konkan region were higher as compared to the State of Maharashtra. The wage rates showed a positive trend in the region.

In general, positive growth rates were observed in area under forest, area irrigated, area under horticultural crops, consumption of nitrogenous fertilizers and productivity of the important crops. This indicates that agricultural development is taking place in the desired direction.

Sawant, S.M. 1987. An Economic Analysis of Impact of New Farm Technology in Rice Cultivation in Sindhudurg District (M.S.). Konkan Krishi Vidyapeeth, Dapoli. *Major Adviser* : G.G. Thakare.

The present study was undertaken in Sindhudurg district of Maharastra State

with the overall objective of enquiring into the economic aspects of the impact of modern rice technology on costs, yields, returns, employment, and to highlight the gap between the levels of production, productivity, cost and returns among adopters and non-adopters.

The total sample comprised 120 randomly selected cultivators from eight villages of two randomly selected tahsils of Sindhudurg district. Data were obtained by survey method for *kharif* 1986.

The study revealed that the adoption of HYV of rice was very low among the cultivators from all the groups. Though, 90 per cent of cultivators were using fertilizers, per hectare quantity of N, P and K used were much below the recommended levels, indicating partial adoption of fertilizer technology. Although all farmers used FYM, the per hectare quantity applied was lower than the recommended level.

The per hectare labour requirement for HYV was higher than the local varieties of rice indicating favourable impact of this technology on employment.

Overall per hectare quantity of HYV seed used was 73.50 kg which was very high as compared to recommended quantity of 50 kg/ ha. The cultivators used more seed to counter exigencies arising due to several factors such as low germination percentage, washing away of seed due to heavy rainfall, and occurrence of pest and diseases.

None of the sample cultivators were found to adopt plant protection measures.

Some constraints identified by the cultivators in adoption of improved rice technology were lack of knowledge, lack of funds, lack of awareness of the benefits, lack of availability and timely supply of certain crucial inputs, namely, HYV seeds, fertilizers and credit.

Adoption of new technology in the form of higher input utilization and improved agricultural practices has resulted in higher per hectare yields in HYV as well as local varieties of rice. However, the extent of adoption is very low. This calls for new strategies of extension and demonstration to convince the rice growers. Education of the farmers and improvement in supply of inputs and finance are essential to encurage the farmers to adopt new technology to the fullest extent, so that the objective of augmenting per ha production of rice can be achieved.

Gumaste, A.K. 1987. Socio-economic Impact of Minor Irrigation Projects in Sindhudurg District (M.S.). Konkan Krishi Vidyapeeth, Dapoli. *Major Adviser*: H.N. Patil.

Irrigation facilities from minor irrigation projects in Sindhudurg district are being provided since 1974 and it is imperative to evaluate the impact of these projects on the social and economic conditions of the cultivators residing in their

command areas. The present study attempts to evaluate the impact of minor irrigation projects on asset position, cropping pattern, cropping intensity, income and employment.

Sindhudurg district of Konkan region of Maharashtra was selected purposively as it has a large number of completed projects. Five projects which were operational were selected randomly. Twenty farmers from the command area of each irrigation project were selected randomly (10 beneficiaries and 10 non-beneficiaries). Thus the total sample consisted of 100 farmers. Data were collected by survey method for the agricultural year 1985-86.

The average operational holding of beneficiaries was higher (2.57 ha) than that of non-beneficiaries (2.13 ha). Per farm total cultivated land with beneficiaries was more than with non-beneficiaries. Beneficiary farmers owned 0.52 hectares (20%) irrigated land, while it was zero with non-beneficiary farmers.

There was negligible difference with regard to total assets possessed by the beneficiaries (Rs. 56,91[illegible]) and non-beneficiaries (Rs. 55,918). However, beneficiary farmers had made more productive investment in land than the non-beneficiary farmers.

The cropping intensity of beneficiary farms was higher than that of non-beneficiary farms. While both groups had a greater area under foodgrains than under cash and perrenial crops, the beneficiary farmers could divert some land (8.58 per cent) for cash crops. This provided them additional employment and farm business income. This clearly indicated that, cropping pattern of beneficiary farmers was oriented to high value or cash crops while that of non-beneficiary was oriented to low value or subsistance crops.

Per farm employment generated for human and bullock labour on beneficiary farms was almost double (221 man days and 61.36 bullock pair days) as compared to non-beneficiary farms (119 man days and 33 bullock pair days). This is a positive impact of minor irrigation projects in the study area. While there was not much difference in total per farm income between beneficiary and non-beneficiary farms, the share of income from crop production was more (70.65 per cent) on beneficiary farms than on non-beneficiary farms (54.24 per cent).

Adoption of modern technology and educational levels were higher on beneficiary farms with mean scores of 7.20 and 5.19 as compared to 3.90 and 4.50 for non-beneficiary farmers.

Hazarika, J.P. 1987. A study of Economic Feasibility of Lift Irrigation Project in Jorhat subdivision of Assam. Assam Agricultural University, Jorhat. *Major Adviser* : B.K. Barooah.

The study was undertaken to assess the impact of lift irrigation on cropping pattern, production, income and employment of beneficiary farmers along with the

economic feasibility of the project in Jorhat Sub-Division of Assam. Data relating to 60 beneficiary and 20 non-beneficiary farmers from the command area of Nahatia LIS, Simoluguri LIS and Lahing LIS were collected during 1986-87.

A significant impact of lift irrigation on cropping pattern was observed in the study area. During *kharif* season, traditional rice were replaced by high yielding rice in the irrigated area. Proportion of gross cropped area under HYV rice in the irrigated area was observed to be 76.62 per cent against only 18.29 per cent in the non-irrigated area (non-beneficiary). In contrast, local rice variety occupied 79.62 per cent of gross cropped area in the non-irrigated area against only 16.76 per cent in the irrigated area. The study observed a higher cropping intensity (180.26 per cent) in the irrigated area against 112.18 per cent in the non-irrigated area. During *rabi* season, the impact of irrigation was found to be insignificant in the study area.

Impact of irrigation on production and productivity was found to be satisfactory Yield per hectare of different *kharif* and *rabi* crops grown in the irrigated area was observed to be higher than in the non-irrigated area. The attained yields per hectare of HYV Ahu, HYV sali rice, mustard and vegetables were 31.19, 32.66, 15.24 and 91.35 quintals in the irrigated area against 23.41, 24.21, 10.38 and 52.90 quintals in the non-irrigated area.

Per hectare income in terms of gross margin and net return was found to be higher in the irrigated area. It was Rs. 2280 in the irrigated area against Rs. 1264 in the non-irrigated area.

Additional employment opportunities were created due to provision of irrigation in the study area. The per hectare employment of human labour in the irrigated area (517.38 man days) was much higher than in the non-irrigated area (381.37 man days).

Capital budgeting analysis indicated lift irrigation scheme to be economically infeasible at the existing irrigated situation. However, the analysis suggested that the scheme would be viable if the total command area, i.e., full capacity of the project could be brought under operation.

Singh, P. 1987. Evaluation of Integrated Rural Development Programme in Bichpuri Block of Agra District (with special reference to Canara Bank). G.B. Pant University of Agriculture and Technology, Pantnagar, Nainital. *Major Adviser* : B. Prasad.

The study was based on the data collected from IRDP beneficiaries of Bichpuri block of Agra district. In all 64 beneficiaries, 8 from each selected popular schemes

having atleast 15 beneficiaries financed under IRDP, were selected and interviewed for this study. The objectives were : (i) to evaluate the impact on the economic status of the beneficiaries financed under IRDP, (ii) to study the financial viability of the selected schemes; and (iii) to identify the problems of beneficiaries and suggest suitable measures to solve them.

On account of adoption of IRDP, the average family income of sample beneficiaries increased from Rs. 3,202.67 to Rs. 5,945.26. All the selected schemes made positive contributions to the family income as a whole. The total mandays of employment increased from about 658 mandays in pre-assistance period to about 951 mandays in post-assistance period. On the whole, 39.06 per cent of sample beneficiaries were lifted above the poverty line and 42.19 per cent of sample beneficiaries generated their annual family income more than Rs. 3,500 but less than Rs. 6,400.

Financial viability analysis of the selected schemes pertaining to cash-flow statement of the schemes and the parameters of viability (viz., NPV, IRR and B/C ratio) indicated that all the schemes of IRDP selected for the study were financially viable. The analysis of problems related to the beneficiaries identification and operation of the scheme indicated that lack of proper infrastructural facilities, interference of influential persons and lack of supervision by the technical staff were the main drawbacks of the programme. However, inadequate knowledge of the programme to the beneficiaries, greater time lag between selection and delivery process, complicative and defective process of purchasing the assets were found to be other important drawbacks of the programme.

Verma, R.K. 1987. Impact of Crop Insurance on Cropping Pattern, Resource use and Income Level on Farms in Baheri Block of District Bareilly (U.P.). G B. Pant University of Agriculture and Technology. Pantnagar, Nainital. *Major Adviser* : S.K. Tewari.

Appreciating the risk in farming, Central Government launched Crop Insurance Scheme linked with institutional credit, for certain specified crops in 12 states and 2 Union Territories from *kharif* 1985. This study was conducted in Baheri block of district Bareilly (U.P.) where the scheme is operative from *kharif* 1985. The study was aimed at examining the actual implementation of the scheme in the background of provisions envisaged; evaluating the impact of crop insurance on cropping pattern, resource use and income level on farms; examining the financial feasibility of farmers' participation in crop insurance and finding out the weaknesses of the scheme if any. The study was based on the data collected for the scheme (1985-86) and the pre-scheme (1984-85) years from 32 participants and an equal number of non-participants.

It was found that credit-linked crop insurance scheme was implemented strictly according to the modalities envisaged and no deviations were reported by the banker or any of the sample participants. Impact of crop insurance on cropping pattern, resource use and yield levels was found to be insignificant in the first year of the scheme. However, there was an increase of about 3 per cent in net farm income which was found to be significant in case of marginal and small farmers.

The results regarding feasibility of crop insurance from view point of farmers showed that in the 18 years period (1966-67 to 1983-84), threshold yields (guaranteed yields) of wheat never fell below their respective actual average yields and, thus, Rs. 52 (Rs. 26 in case of marginal and small farmers) in terms of value in 1983-84 would have become payable as premia by the farmers while no indemnity have become receivable. In case of paddy, threshold yield fell below actual average yield only in one year (1979-80) during the 18 years period and, thus, Rs. 52 (Rs. 26 in case of marginal and small farmers) in terms of value in 1983-84 would have become payable as premia by the farmers and Rs. 59 in terms of value in 1983-84 would have become receivable as indemnity to the farmers. So while the crop insurance appeared to be financially unattractive in case of wheat, it was gainful in case of paddy for marginal and small farmers particularly, the gain being less to other size group of farms. The results suggest that crop insurance should not be implemented in a blanket basis rather it should be selective in terms of defined area and crops strictly on the basis of yield variability in the area.

Opinion survey of the banker and the participants pointed out that they wanted crop insurance to be optional so that those who do not perceive risk in growing wheat and paddy, are not denied institutional credit because of its compulsory linkage with crop insurance.

Toor, J. S. 1987. Growth Trends in Forest Area and its Impact on Rainfall in Different Divisions of U.P. G.B. Pant University of Agriculture and Technology, Pantnagar, Nainital. *Major Adviser* : V.K. Sharma

The study presents the growth trends in forest area and its impact on rainfall in different divisions of U.P. The linear, log linear and second, third and fourth degree polynominal functions were used for estimating the growth trends and linear regression was used for estimating impact of forest area on rainfall.

It was observed that during a period of 30 years (1951-52 to 1980-81) total forest area decreased in all divisions and U.P. state as a whole except kumaon division, afforested area increased in all divisions and U.P. state as a whole and deforested area showed a definite growth trend in only five divisions and state as

a whole. According to projections made for 2000 A.D. forest area will increase in eight divisions and state as a whole and decrease in three divisions.

The impact of forest area on total rainfall (including micro and macro components) of a place was not significant but the impact of forest area of more than ten years age on micro component of rainfall was found to be more pronounced.

Suyal, A. 1988. Economic Analysis of Dairying in Slums of Rudrapur Town of Nainital District. G.B. Pant University of Agriculture and Technology, Pantnagar, Nainital. *Major Adviser* : B. Prasad

The study was conducted in slums of Rudrapur Town to findout cost and returns of dairying to assess the impact of dairying on income and employment of slum dwellers and to establish a functional relationship between feed stuffs and milk production for different categories of dairying animals.

For finding out cost and returns of dairying and its impact on income and employment of residents of the study arca, simple accounting of costs and returns and simple arithmetic averages were worked out. Regression analysis was done to estimate the feed-milk relationship taking milk yield per day as a dependent variable and per day intake of green fodder, dry fodder and concentrates (expressed as their standard feed equivalents) as independent variables.

Per day gross return from a buffalo was Rs. 20.41 and from a cow was Rs. 12.92 in an intercalving period. The per day net return over variable cost was Rs. 3.93 for a buffalo and Rs. 3.46 for a cow. It was found that dairying provided about 49 per cent of average total earning per annum of a family.

For both the categories of milch animals all the regression coefficients and constants were positive, MVPs of green fodder and concentrate were positive and highly significant for both the categories of milch animals, about that of dry fodder was positive but insignificant for the cows and slightly significant for the buffaloes.

Kundu, K.K. 1988. Marketing of Apple in Nainital District of Uttar Pradesh. G.B. Pant University of Agriculture and Technology, Pantnagar, Nainital. *Major Adviser* : T.S. Bhogal.

The present study was undertaken to provide basic information to policy makers, producers and marketing agencies so as to improve overall efficiency of apple marketing system. The specific objectives were—(i) to examine the various marketing channels of apple (ii) to workout marketing costs, marketing margins of different functionaries and price spread in each observed channel (iii) to examine the price behaviour of apple in Haldwani market and (iv) to examine marketing problems

faced by producers. The study was carried out in Nainital district of Uttar Pradesh and among the five apple producing blocks in the district, Ramgarh block was selected. In all, 72 orchardists were selected from the block taking a random sample of 10 per cent from each size group of apple growers viz., small (upto 1 ha), medium (1-4 ha), and large (above 4 ha). Further, 4 preharvest contractors, 3 commission agent cum wholesalers and 10 retailers were also selected for the study. Both primary and secondary data have been used in the study.

The seven marketing channels observed in apple trade were (i) Producer-Local consumer (ii) Producer-commission agent cum wholesaler-Retailer-Consumer in Haldwani market, (iii) Producer-Pre-harvest contractor-commission agent cum wholesaler-Retailer-consumer in Haldwani market, (iv) Producer-Pre-harvest contractor commission agent cum wholesaler Haldwani-Wholesaler-Retailer-Consumer in distant market, (v) Producer-Commission agent cum wholesaler Haldwani-Wholesaler--Retailer-Consumer in distant market, (vi) Producer-Local agent of distant wholesaler-wholesaler-Retailer-consumer in distant market and (vii) Producer-U.P. Hortico factory Ramgarh-Wholesaler-Retailer-Consumer in distant market. Channel v, vi, iv and ii have been found most prevalent marketing channels contributing 37.95, 29.96, 12.91 and 10.57 per cent to total produce marketed, respectively. Major proportion of table purpose variety is being marketed through channel-v and vi and processing purpose through channel v. Fanny and Rymer varieties occupy the pride position in their respective groups contributing 14.26 and 12.55 per cent to the total apple produce marketed. The marketing cost of producer, pre-harvest contractor, commission agent cum wholesaler and retailer comes out to Rs. 16.61, Rs. 15.20, Rs. 0.17 and Rs. 3.64 per half case, respectively.

The analysis of marketing margins and price spread reveals that net margin of producer was found maximum in channel (i) for both the groups of apple varieties but the amount marketed was found negligible. However, among other channels producer's share was maximum in channel (ii) in Haldwani market and in channel (vi) in distant market. The wholesale and retail prices of apples have shown increasing trend over time comprising annual increase in average price of Rs. 58.37 and Rs. 62.85 per quintal for wholesale and retail prices. The seasonal fluctuations show that prices were maximum in June and minimum in August. The various marketing problems expressed by apple growers are; short supply of labour, inadequate availability of packing cases, higher marketing costs, difficulty in arranging the finance to carry out business activities, dominance of trader in market, and non-availability of market information, cold storages and inappropriate transport facilities.

Chaturvedy, G. D. 1988. An Economic Analysis of Milk Marketing in Tarai Region of District Nainital (U.P.). G.B. Pant University of Agriculture and Technology, Pantnagar, Nainital. *Major Adviser* : T.S. Bhogal

Considering the importance of dairy marketing and the research gap that exists in the field, the present study was undertaken in order to provide basic information to the policy maker, dairymen and marketing agencies so as to improve the overall efficiency of milk marketing system in the study area Specific objectives of the study were as follows : (i) To estimate the marketed and marketable surplus of milk for different categories of dairymen, (ii) To identify and quantify the factors affecting the marketed surplus of milk for different categories of dairymen, (iii) To identify the various marketing functionaries and channels involved in marketing of milk, (iv) To estimate market margins and price spread for different milk marketing channels.

The study was confined to the Tarai region of Nainital district of U.P. The data used in the study to fulfil various objectives were collected through personal interview of selected dairymen from four categories viz., landless labourer, small farmer, medium farmer and large farmar dairymen and marketing agencies operating in the area. The dairymen were selected using stratified random sampling technique. To calculate marketable surplus for different categories of dairymen, the requirement of milk for individual dairymen family were computed on the basis of norms given by ICMR. The seasonal variability in milk production, marketed and marketable surplus was examined through constructing index numbers and three months moving averages. Factors affecting marketed surplus were identified with the help of multiple regression analysis.

The results of the study shows that on an average 81.08 per cent of the milk produced was sold by dairymen and the marketed surplus was found to be the highest with small farmer dairymen and lowest with landless labourer dairymen. The marketed surplus was found more than marketable surplus in the case of landless labourer and small farmer dairymen and less in the case of medium and large farmer dairymen. Seasonal variation in production, marketed and marketable surplus was also observed on account of calving season and weather conditions. The annual production of milk was the only factor found significantly affecting the marketed surplus of milk. Six milk marketing channels were identified in the area. Cooperative milk marketing system has brought significant change in milk marketing pattern and has served the producers and consumers well.

The important conclusions emerged from the study are (i) if the cooperative credit societies and cooperative marketing societies are coordinated, the marketed surplus will boostup. (ii) the large farmers may be persuaded to sell more milk in

order to increase the marketed surplus, and the efforts, should also be made to enhance the milk production in the area.

Singh, R. 1988. Possibilities of Increasing Income and Employment on Vegetable Farms in Kasayan Block of Deoria District (U.P.). G.B. Pant University of Agriculture and Technology, Pantnagar, Nainital. *Major Adviser* : S P H. Chaurasia

The research work was carried out to study the existing level of farm income and employment on vegetable farms and to examine the possibilities of increasing income and employment on these vegetable farms. The simple arithmetic average and linear programming technique were applied, in oder to achieve the objectives. The result of the study indicated that under existing condition brinjal in kharif, onion in rabi and bottle gourd in zaid were most remunerative crop activities generating a net farm income of Rs. 9243, 1916 and 5841 per hectare respectively. The human labour employment per hectare from these crops were 183, 168 and 107 man days respectively. The optimum plans using Linear Programming technique were derived under both with and without cash borrowing situations. All the optimum plans indicated a switchover from diversified crop production as practiced currently, towards specialized crop production in the area. Some cultivated land remained unutilized under the optimum plan derived without cash borrowing while land was fully utilized under cash borrowing situations. The most profitable plan from view point of both i.e. farm income and employment was the optimum plan derived with cash borrowing and intermediate technology. The most profitable crop activities appeared in this plan were brinjal in kharif, cauliflower in rabi and bitter gourd in zaid all with intermediate technology. These crops generated a net farm income of Rs. 15389, 20616 and 10152 and human labour employment of 192, 132, 112 man days per hectare respectively. The cash borrowing needed to implement this plan was Rs. 6893, 6080 and 4386 during kharif, rabi and zaid seasons respectively. The specialized crop production will require good marketing facilities for disposing off the produce and minimum assured price.

Rana, S. 1988. An Economic Investigation into the Potential for Raising Farm Income in the Valleys of Chamma Block in District Tehri-Garhwal (U.P.). G B. Pant University of Agriculture and Technology, Pantnagar, Nainital *Major Adviser* : A N. Sharma.

The present study was undertaken in the valleys of Chamma block in Tehri-Garhwal district for the appraisal of farm resources on different size of farms and their utilization pattern; optimisation of production plan to maximize farm income

and optimize resource use and to identify credit problems associated with the optimum plan. Optimum farm plans for different size of farms under existing as well as improved technology with cash borrowings were developed using Linear Programming.

The study revealed that under the existing cropping pattern, paddy and wheat occupied the maximum area in the Kharif and Rabi season, respectively. Low productivity followed by a large family labour cost component resulted in negative net returns for all the crops, except soybean, on all the size group of farms.

The optimum plans obtained suggested crop specialization on all the size of farms with existing as well as improved farm practices. Under existing technology, soybean and potato emerged in the optimum plan for small and medium size farmers whereas paddy and potato emerged in the optimum plan for large size farmers. With improved technology only soybean in Kharif and potato in Rabi emerged in the optimum plan on all the types of farms. By the adoption of new farm technology the income multiplied by as much as 9, 13, and 28 times on small, medium and large size farms, respectively. No cash borrowings were required for the optimum plan under existing technology. In the optimum plan under improved technology credit requirement of Rs. 461.20, 1,305.40 and 1 477.00 in Rabi were required by small, medium and large size farms, respectively.

Vadnere, S. 1988. Economics of Mentha Processing—A Case Study of a Processing Plant in Kashipur Block of Nainital District. G. B. Pant University of Agriculture and Technology, Pantnagar, Nainital. *Major Adviser* : A. N. Sharma.

The study was conducted by selecting a mentha processing plant in Kashipur block of Nainital district. In order to study the economics of mentha processing, three commonly grown species of mentha were taken into consideration i.e. *Mentha arvensis*, *Mentha piperata* and *Mentha citrata*. The processing of these species was studied which consisted of (i) distillation and (ii) crystallization. It was found that only in case of *Mentha arvensis* crystallization was done.

Costs and returns were calculated separately for distillation and crystallization for a period of four years i.e. 1984, 1985, 1986 and 1987. Cost and net returns per kg of oil were calculated species-wise for all the four years. In processing it was found that the net returns/month in case of distillation ranged from Rs. 13918.37 to Rs. 28037.79 while in case of crystallization it ranged from Rs. 40508.95 to Rs. 78944.37.

Kandpal, B. 1988. Economics of Various Tree species and Their Optimum Plan for Afforestation on Community Lands of Selected Villages in Hawal Bagh Block of District Almora. G.B. Pant University of Agriculture and Technology, Pantnagar, Nanital. *Major Adviser* : S K. Tewari.

The present study was conducted to determine the economics of selected tree species and their optimum plan for afforestation in the hills of U.P. Dhamas and Deolikhan villages in Hawalbagh block of district Almora were selected for the study where some afforestation work has been done on their community waste land by a voluntary agency. The economics of selected tree species were worked out using investment evaluation criteria viz., gross benefit—cost ratio (B-C ratio), Net present value (NPV) and internal rate of return (IRR). To determine the optimum plan for afforestation, Linear Programming technique was used. The four tree species ranging in the economic life of 12 to 15 years proved to be the most profitable group of tree species with B-C ratio ranging from 1.97 to 4.44, NPV between Rs. 58,675 707 to Rs. 1,42,9440 and IRR between 33 to 46 percent. The tree species having economic life in medium range (35 years) appeared to be next profitable group of tree species having B-C ratio in the range of 1.68 to 1.90, NPV in the range of Rs. 26,786 to Rs. 34,677 and IRR in the range of 24 to 25 percent. The long duration (100 years) tree species proved to be the least profitable group of tree species with B-C ratio ranging between 1.12 to 1.20, NPV between Rs. 2631 to Rs 4161 and IRR between 14.2 to 14.3. The optimum plan for afforestation showed the plantation of dual purpose (fuel and fodder) tree species of economic life in the range of 12 to 35 years to meet the fuel and fodder deficits of the selected villages in all the plan years i.e., 2000 AD through 2050 AD. The profit maximisation plans showed to plant all the community lands available for plantation which yields excess fuel and fodder over and above the deficits to be met, while in cost minimisation plans, all the land is not required to be planted to meet the fuel and fodder deficits in the village particulary those having sufficient land for plantation.

Veerkar, P.D. 1988. Economics of Preservation of Mango into Different Products in Ratnagiri District (M.S.). Konkan Krishi Vidyapith, Dapoli. *Major Adviser* : S.G. Borude.

Ratnagiri district having maximum number of processing units was purposively selected for this study. Information from 27 processing factories was collected by personal interview for the production season 1987.

Out of 27 factories, 15 were engaged in pulp making, four were engaged in pickle making, two were engaged in chutney making and six were engaged in making raw slices in brine. The average established period of the factories was 14.7 years.

Of these factories 21 were managed by individual entrepreneurs and six were run in partnership.

Per factory total capital investment was the highest in pulp making and the lowest in chutney making. In the total capital investment, proportion of working capital was higher than fixed capital in all the categories of products.

Considering the ex-factory gross values received and the per factory total cost of preservation for different products, the ex-factory net profit was Rs. 2,63,345.31 in pulp making, Rs. 1,42,329.77 in pickle making, Rs. 63,923.78 in chutney making and Rs. 50,887.14 in making raw slices in brine. The cost of preservation of processed product net of by-product worked out to Rs. 19.27 per tin (860 g.) for pulp, Rs. 887.06 per quintal for pickle, Rs. 1,308.51 per quintal for chutney and Rs 257.07 per quintal for raw slices in brine.

The total employment generated by all the factories together was 25,984 man days, out of which the maximum (45.65 per cent) was in pulp making. Of the total employment around 65 per cent employment was created for female and about 35 per cent for male labourers.

The cost of preservation of one quintal Alphonso mango into pulp worked out to Rs. 971.26. Processing increased the sale value of mango. The gross and net values added from pulp processing were Rs. 777.01 and Rs. 343.03 respectively. The cost of preservation of one quintal local types of mango fruits into pickle, chutney and raw slices in brine worked out to Rs. 557.48, Rs. 861.00 and Rs. 151.28, respectively. As regards the gross values added, they were Rs. 813.30 from pickle making, Rs. 1272.39 from chutney making and Rs. 72.47 from making of raw slices in brine. The net values added were Rs. 355.82 from pickle making, Rs. 511.39 from chutney making and Rs. 21.39 from making raw slices in brine.

The returns on capital investment were the highest in pickle making (58.53 per cent), followed by chutney making (48.35 per cent), pulp making (35.48 per cent) and making raw slices in brine (18.33 per cent). The respective input-output ratios were 1:1.64, 1:1.59, 1:1.35 and 1:1.14. This indicated that, preservation of pickle was most profitable followed by chutney, pulp and raw slices in brine.

The per worker per day gross returns were the highest (Rs. 1,275.90) in pulp making and the lowest (Rs. 255.11) in making raw slices in brine. Same trend was observed in case of net returns per day. This is because operations like pulping and seaming were found to be done with the help of machines.

The break-even production analysis showed that the actual production handled in all the factories was more than break-even point production.

Non-availability of tin cans and their high prices was the main problem faced

by pulp making factories. High rate of sales tax and high cost of transport were the problems faced by remaining three product making factories.

The percentages of spoilages and loses was between 0.4 per cent and 1.5 per cent in different products. The sanitary and hygienic conditions in the premises of the factories were not observed as per specifications laid down in Fruit Product Order (1955), except to some extent in pulp making factories.

Srivastava, A. 1988. Economic Analysis of Experimental Data on Tomato Crop in Tarai Region. G.B. Pant University of Agriculture and Technology, Pantnagar, Nainital. *Major Adviser* : L.R. Singh

The study was carried out to identify the best level of spacing, and mulching for tomato crop and to estimate the response function with respect to irrigation and with respect to nitrogen and phosphorus separately to ascertain the optimum input requirement tomato crop. Quadratic and square root type of production functions were tried in both the cases to derive economic conclusions. The study also aimed at working out the best mode of fertilizer application, the best measure of chemical control with respect to late blight and early blight of tomato and the best tomato based rotation out of the five rotations analysed.

The study is based on the data generated from spacing cum fertilizer trial, mulching cum irrigation trial, foliar fertilization trial, disease control trial, and rotational trial conducted during the year 1981-82 to 1984-85.

The study revealed that 60×80 cm^2 spacing level and mulching by sugarcane leaves were the best treatments for raising tomato crop. It was found that the optimum levels of nitrogen, phosphorous and irrigation were changing under varying cost price situation. The study indicated that the best mode of application of nitrogenous fertilizer was 40 kg. N as basal and 20 kg. N as foliar fertilization. For effective control of late blight and early blight in tomato, the crop should be sprayed with Dithane M-45, Cuman and Cuman L respectively.

The most efficient rotation from the view point of benefit-cost-ratio was worked out to be brinjal-tomato-onion. It is suggested that cultivation of tomato crop in tarai region should be adequately backed up with recommended agronomic and plant-protection measures.

Singh, A. 1988. Trend Analysis of Electric Generation, Consumption, Availability and Rural Electrification and its Relation to Agricultural and Industrial Production in U.P. G.B. Pant University of Agriculture and Technology, Pantnagar, Nainital. *Major Adviser* : V.K. Sharma

Power is one of the basic infrastructures of any economy. Since, in developing

countries like India, electricity is the most important form of power, a study of trend analysis of electric power generation (source wise), consumption (sector wise), availability and rural electrification and its relation to agricultural and industrial production becomes very important in order to attain the targeted growth in future and maintaining a balance in the growth of agriculture and industrial sectors since both the sectors compete for this scarce resource, a rational allocation of available electric power has to be made between these sectors.

The present study was, therefore, undertaken with the following objectives, to examine the growth trend in electric power generation, consumption, availability and rural electrification and optimum allocation of electric power in agricultural and industrial sectors. The study is exclusively based on secondary data. To estimate the growth trends in the above mentioned aspects linear, quadratic and exponential equations were fitted into the time series data on above variables, and then best fitted equations were selected on the basis of nature of scatter diagrams, R^2 values and significance of regression coefficients.

Electric power generation from all the sources except diesel and gas power increased significantly during 1960-61 to 1984-85, the over all generation increasing at the rate of 15.26 per cent per annum and the gap between demand of electric power and the demand actually met increased at the rate of 35.63 per cent. Thus, there is an urgent need to boost up the generation of electric power. Electric power consumption increased significantly in all the sectors. But in case of industrial sector consumption increased at a decreasing rate whereas in agricultural sector it increased at increasing rate. The growth rate for total consumption was 11.62 per cent per annum. Rural electrification increased significantly in terms of number of electrified villages, Harigan Basties and tubewells. Availability of electricity in terms of per capita and per village also increased significantly, but per tubewell availability significantly decreased (at the rate of 20 71 per cent per annum) due to faster growth in the number of tubewells. The analysis of marginal value products of electricity suggested the use of electricity in industry sector on priority basis. But, since a balance has to be maintained in the growth of both sectors, a minimum requirement of agriculture should also be met even at the cost of economic interests.

Joshi, L. 1988. Parity Price Analysis of Major Crops of U. P. G. B. Pant University of Agriculture and Technology, Pantnagar, Nainital. *Major Adviser* : S.A. Ali

The study was carried out to estimate the various inter crop price parties using 1960-61, 1970-71 and 1980-81 as the base periods respectively. The study also calculated the parity prices for wheat, paddy, maize, bajra, barley, jowar, sugarcane, arhar, pea, gram, groundnut and rapeseed/mustard for the year 1987-88 taking 1970-

71 as a base year. These parity prices were estimated by various bases viz., fixed base method, average parity method and adjusted base method. The parity prices were also worked out in terms of farm inputs alone as well as in terms of farm inputs and family expenditure taken together. The study also confined itself in working out the income parity of the farmers of U.P. to measure their economic status.

The study is based on secondary data procured from various sources. The study revealed that inter crop parities remained unfavourable for wheat and paddy irrespective of increase in area and productivity of these crops. The average of parity prices worked out by various bases were quite higher than the previous year's procurement and farm harvest prices. It was also found that though the agricultural sector contributed 45-50 per cent of total income in the Uttar Pradesh, the income parity indicated a continuously declining trend all through the period of study.

Srivastava, R.S. 1988. A Study on Impact of IRDP on Income, Employment and Assets of Beneficiaries in Koesla Block of District Azamgarh. G.B. Pant University of Agriculture and Technology, Pantnagar, Nainital. *Major Adviser*: T.S. Bhogal.

IRDP is the single largest antipoverty programme launched during 1978-79 to improve the socio-economic conditions of the poor in rural area. The present study has been conducted in Koelsa block of Azamgarh district with 37 sample beneficiaries from four major schemes. The study was confined to study the impact of selected schemes on income, employment, cropping pattern and cropping intensity of the beneficiary households; to study the impact of IRDP scheme on assets, liabilities, and inequalities in inome and assets of beneficiaries and to study the constraints in accomplishment of objectives of IRDP, if any.

Lorenz curve, Gini ratio, Coefficient of variation, and Standard deviation were applied to see income and asset inequalities.

Findings of the study shows that income and employment of the beneficiary has increased in all the schemes except the chaffcutter scheme which had no impact on employment. Increase in off-farm income was more than on-farm income on the sample farms. Based on this it may be concluded that the development of agro-based industries in the area will help the farmers in increase their income through increased off farm opportunities. Inequalities in case of net family income and assets have declined while an increase has been observed in on-farm income. This shows growing inequalities among IRDP beneficiaries. Finally, overtime corruption at various levels and dominance of rich and politically influenced people have been found as the important hinderance in achieving the objectives of the IRDP in the area. Implementation of IRDP as a comprehensive block development plan is therefore, suggested to achieve fully the goals of the programme.

Kumar, S. 1988. Resource Use Efficiency Under Rainfed Agriculture in Hawalbagh Block of Almora District. G.B. Pant University of Agriculture and Technology, Pantnagar, Nainital. *Major Adviser* : L.R. Singh

Agriculture is the main occupation of the hill region and more than 90 per cent area in U,P. hills is rainfed. The productivity of resources is very low because of in efficient use of the resources. The present study has been conducted in Hawalbagh Block of Almora district with 62 sample farms from two different elevations. The objectives are; to study the existing cropping pattern, input use and profitability of various crops on the sample farms; to determine the input-output relationship for important crops and farm business as a whole and to estimate resource use productivity and determine resource use efficiency on the sample farms.

The results of the study shows that paddy, ragi are the main crops in kharif season and wheat in rabi season at both the elevations and major cropped acreage was devoted to food crops. The major share of farm input was contributed by household labour mostly by the female members. In terms of return over variable cost, chillies and potato were the profitable crops but the area under those crops was very low.

The result of regression analysis shows that the elasticity coefficients of variables human labour, bullock labour and manure are significant for some of the crops and there was scope to increase the level of use of these resources in some crops. The marginal value productivity of these resources particularly human labour in some cases is very low and negative, indicating an efficient use.

From the present study we conclude that under existing condition barring a few cases, farm resources are being used efficiently on small and large farms at lower and higher elevations. In a few cases, there is sub-optimal and excess use of this resources. Because of inadequate alternative opportunity of employment in the region, the human labour use in few cases are excessive generating negative productivity. It is therefore, suggested that new employment avenues in the region should be provided. The study also indicates potential for generating higher income through vegetable crops. This, however, calls for adequate support in the form of development of infrastructural facility and provision for credit and fertilizer.

Sharma, U. K. 1988. Dynamics of Land Use in Different States of India. G.B. Pant University of Agriculture and Technology, Pantnagar, Nainital. *Major Adviser* V.K. Pandey

The study was carried out to examine the changes in land use pattern, the trend and growth rates in different land use classes and the dynamics of land use shifts among different classes in different states of the country. Spearmann's rank correla-

tion coefficients were calculated to examine the overall changes in land use pattern. Linear and log-linear forms of time trend equations were estimated to calculate the growth rates and annual rate of change among different land use classes in different states. The dynamics of land shifts in different state was analysed based upon linear additive identities of annual rates of change. Time series data of the nine standard land use classes for the period from 1966-67 to 1983-84 was used in the study.

The study revealed that overall land use pattern more or less has remained the same in different states, except for a few periodical changes in some states. However, time trend growth rate analysis showed that there were significant changes in various land use classes in different states as well as country as a whole. Some favourable trends are observed such as a substantial increase (over 10th ha. per annum) in forest area in the states of Gujarat, Karnataka, Orissa and Rajasthan, a substantial decline (over 10th. ha. per annum) in barren and usar land in the states of Assam, Bihar, Gujarat, Himachal Pradesh, Mizoram, Orissa, Punjab, Rajasthan, Tamil Nadu and Uttar Pradesh, a substantial decline in fallows and or waste lands in the states of Andhra Pradesh, Karnataka, Madhya Pradesh, Maharashtra, Meghalaya, Orissa, Punjab, Tamil Nadu, and Uttar Pradesh, a substantial increase in net cultivated area in the states of Assam, Haryana, Karnataka, Madhya Pradesh, Punjab, and Rajasthan. Contrary to these, some unfavourable trends are also observed such as substantial decline in forest area in the states of Himachal Pradesh, and Nagaland, a substantial increase in barren and usar land in the states of Haryana, Maharashtra, and Tripura, a substantial increase in fallow and/or waste lands in Gujarat, Mizoram and Tamil Nadu and a substantial decline in net cultivated area in the state of Tamil Nadu and Uttar Pradesh.

The dynamics of land use shifts indicated a substantial amount of shifts in a large number of states as well as at the country level from both the desirable ecology sector comprising forest, permanent pastures and miscellaneous trees crops as well as the undesirable ecology sector comprising barren and usar land to agriculture as well as non-agriculture sectors. These shifts from desirable ecological sector have adverse implications, while the shift from undesirable ecological sector have favourable implications towards ecological balance. The net transfers of land from agricultural sector to non-agricultural sector and the land transfer from net sown area to fallows and waste lands within agricultural sector as observed in some state and at the country level, have serious adverse implication towards agricultural growth and ecological balance.

Gogoi, J. K. 1988. A study of Resource Allocation in Farms of Flood-prone and Flood-free areas in Sibsagar sub-division of Assam. Assam Agricultural University, Jorhat. *Major Adviser* : B.C. Bhowmik

This study was conducted in Sibsagar Sub-Division of Sibsagar District during 1987-88 with the objective to develop optimal farm plans which maximise the farm net returns. The study was carried out in three distinct situations, based on incidence and extent of floods, viz., flood-free, moderately flood affected and flood-prone situations.

The analysis was done with the help of deterministic linear programming model using primary data collected from sampled farms, which were classified into three categories, viz., small, medium and large, by square root frequency distribution method of stratification.

Optimal plans were obtained by optimising with existing resources and with capital borrowing, labour hiring, FYM and fodder purchasing activities in successive runs. The plans revealed that remunerative enterprises began to appear with larger quantities and less remunerative enterprises with lesser quantities or they were eleminated from the plans altogether. Area under HYV paddy crops increased in most of the optimal plans of all the size-groups of farms under all the situations. Area under local paddy crops decreased in all the optimal plans. In most of the cases, it was restricted to the minimum area kept for local varieties. Most of the vegetables were eleminated from the optimal plans. The vegetables commonly appearing under different situations were potato, tomato, cabbage and cucurbits. Dairy and poultry appeared to be remunerative livestock activities in some of the optimal plans. But in the successive runs number of dairy cows increased and poultry decreased.

Due to optimisation with different objectives the farm net returns increased in the successive runs in most of the size groups of farms under all the situations. The small farms showed greater potentiality of increasing farm net return as compared to the other two size-groups of farms.

Labour employment increased considerably in all the size-groups of farms. It was found to be higher in the small farms and especially the flood-free areas showed higher increase in labour employment.

Das, A.K. 1988. Human Resource Utilization Patterns in Assam Agriculture—A Case study in the Srijangram Development Block, Goalpara District, Assam. Assam Agricultural University, Jorhat. *Major Adviser* : D.R. Kalita

The investigation was carried out in the Srijangram Development Block of

Goalpara District in Assam during 1986-87. The specific objectives of the study were (i) to examine the demographic structure and potential labour force, (ii) to study the existing patterns of utilization of labour force in agriculture, (ii) to investigate the impact of technological changes on human resource utilization and, (iv) to explore the scope for increasing opportunities for employment.

Two stage random sampling design was followed for the selection of sample holdings. Villages formed the first stage and the operational holdings were the second and ultimate stage of sampling. The farms were classified into marginal, small, medium and large farm groups based on the square root method of optimal classification. Fifteen per cent of the farms under each selected village were randomly selected from each of these categories of farms. Simple statistical tools like simple averages, percentages etc. were used to fulfill the different objectives of the study.

The analysis revealed that majority of the total work force in each of the farm categories was found to be engaged in agriculture. Permanently hired labour was also utilized by the medium and large farms for agricultural purposes. Small amount of casual labour was utilized in all the farms during the peak periods. However, farm family labour was the dominating source of labour supply and utilization in the study area. The availability and utilisation of human labour per farm were directly related to the size of farm while, per hectare utilization was inversely related to the farm size.

Different rice crops were dominating the cropping patterns in the study area. The cropping intensities indicated inverse relationship with the size of farms. Amongst different activities, crop production consumed the highest amount of labour in each of the farm groups except in the marginal holdings, in which household cooking and management consumed the highest amount of labour. Amongst crop enterprizes, local *ahu* rice utilized the highest amount of labour per farm in each of the categories of holdings. However, labour utilization per hectare was the highest in the production of potato followed by wheat and jute in all the farms. Among different operations, primary tillage consumed the largest amount of labour followed by harvesting and post-harvest operations. The distribution of labour utilization over the months showed that it was maximum in July and minimum in the month of October.

Among all categories of holdings, changes in technology, specifically adopting selective technology, had substantial impact on human labour employment in agriculture. Ample scope of employment was found in the study area through adoption of labour intensive improved technology, developing enterprizes like dairy, poultry, piggery, fishery, along with crops and encouraging the agro-based industries and cottage industries.

Singh, K. R. 1988. A Study of Marketing of Pineapple in Central Districts of Manipur. Assam Agricultural University; Jorhat. *Major Adviser* : K.C. Talukdar.

An attempt was made in the present study to examine the pattern of production and marketed surplus of pineapple, relative efficiency in marketing of pineapple among the growers, interrelationship between marketing institutions and agrarian structure, and constraints in the marketing of pineapple.

The study was conducted in the Central district of Manipur during 1986-87. Thoubal and Churachandpur Development Blocks were selected purposively from Central and South districts of Manipur. Five villages were selected randomly from each block. Farmers were selected by applying multistage stratified random sampling taking the household as the ultimate unit. The growers were classified into four major groups; viz., marginal, small, medium and large farmers. The growers who planted pineapple for home consumption were not considered in the sample. A total of 100 marginal, 36 small, 36 medium and 16 large farmers were selected based on proportion of area under pineapple.

The productivity per hectare of pineapple for marginal, small, medium and large farmers in Thoubal Development Block were 15.0, 19.42, 14.77 and 16.81 tonnes, while in Churachandpur Development Block these were 20.81, 21.42, 19.01 and 16.54 tonnes, respectively. The productivity for pooled farmers in Thoubal and Churachandpur Development Blocks were 16.17 and 17.47 tonnes per hectare and these were higher than the average yield of 15 tonnes per hectare in the state.

The marketed surplus for marginal, small, medium, large and pooled farmers in Thoubal and Churachandpur Development Blocks were 93.77, 96.21, 97.38, 96.86 and 6.82, and 98.96, 97.73, 99.42, 98.86 and 98.76 per cent, respectively. The marketed surplus was lower in Thoubal Development Block due to higher domestic consumption. The significant factors that directly affected the marketed surplus of 'Queen' variety were total production and area under pineapple while the 'Kew' variety was directly affected by total production, area under pineapple and level of farm income but was adversely affected by non-marketed transaction of pineapple. The elasticities of marketed surplus with respect to total production and area under pineapple for 'Queen' variety were 0.95 and 0.96, respectively. The elasticities with respect to total production, area under pineapple, non-marketed transaction and level of income for 'Kew' variety were 0.70680, 0.18301, – 0.07406, respectively.

The most popular and efficient channel in marketing of 'Queen' and 'Kew' varieties for medium and large farmers was producer-market wholesaler-distant retailer-consumer while producer-local trader-distant retailer-consumer was the most popular and efficient channel for marginal and small farmers in marketing of 'Kew'

variety. The highest cost (Rs. 331.77) was incurred by market wholesaler while the highest margin of 59.54 per cent of purchased price was earned by pre-harvest contractor. The net share of producer in the consumer's rupee varied from 36.07 to 58 82 per cent for 'Queen' variety and from 26.05 to 66.61 per cent for 'Kew' variety. The price spread was directly related to the levels of margins, costs and wastages, number of middlemen involved in the channel and the type of market used by growers. The highest price spread (73.94 per cent) was observed when produce was sold to processors. The lowest (33.38 per cent) was observed when produce was sold to local traders for 'Kew' variety.

Lack of organisation among the growers, absence of storage facility, inadequate credit, transport and communication bottlenecks and malpractices in the market by intermediaries were not only responsible for lower producer share (26 to 66 per cent) of the consumer rupee but also made marketing system of pineapple inefficient, inequitable and exploitative in the state.

Rahman, S. 1988. An Analysis of Parity Prices for Major Crops in Assam State. Assam Agricultural University, Jorhat. *Major Adviser* : K.C. Talukdar.

The present study seeks to examine the parity prices for major crops, inter-crop price and income parity and income parity of the farmers. Five major crops, *viz.*, rice, wheat, jute, mustard and sugarcane were selected for the study. Data required for the study were collected from both primary and secondary sources. Time series data from 1970-71 to 1985-86 were analysed by simple tabular analysis to study the price structure. The prices for major crops were projected for the year 1986-87 and 1987-88. Two stage stratified random sampling was used as sample design taking village at first stratum and household at ultimate stratum. ten per cent each of marginal, small and medium and all the large farmers of the villages were selected for primary data collection.

The prices were estimated for the years 1986-87 and 1987-88 by different methods, *viz.*, Fixed base method, Average parity method, Adjusted base method, parity between prices received for farm products and prices paid for farm inputs and parity between prices received and prices paid. Averages of different approaches were estimated and were adjusted with cost-gross return ratio. It was found that the adjusted parity prices for rice, wheat, jute, mustard and sugarcane during 1986-87 should be Rs. 167.59, Rs. 223.31, Rs. 316.06, Rs. 487.33 and Rs. 483.12, respectively and for 1987-88 should be Rs. 172.86, Rs 226.22, Rs. 321.94, Rs. 520.15 and Rs. 534.43, respectively. It was found that procurement prices fixed for the selected crops were much lower than the adjusted parity prices in both the years. However, the projected farm harvest prices for only rice and mustard in both the years were higher than the adjusted prices. Thus, farmers were getting favourable prices for rice and mustard in the state.

Inter-crop price parity analysis for rice and jute revealed that rice is a more renumerative crop than jute in the state. Further, the procurement prices fixed by the Government were not found to be remunerate for the farmers of Assam. Difference between procurement price and cost of production revealed that mustard was the most profitable crop while jute showed the lowest profit in the state. The study further revealed that the price policy has been in favour of the large farmers as the difference between procurement price and the cost of production was highest in case of large farmers.

Income parity analysis revealed that the farm sector followed a declining trend in its contribution towards the total income of the state to the extent of 29.38 per cent. This indicated that the farm sector is not a predominating sector over the non-farm sector. The parity ratio between farm and non-farm worker indicated a low and declining trend a throughout the study period which indicated the deteriorating economic lot of the farm sector in comparision to the non-farm sector.

Sarma, R. 1988. Power Utilization Patterns in the Farms of Bajali Development Block of Assam. Assam Agricultural University, Jorhat. *Major Adviser*: D.R. Kalita.

The study was undertaken in Bajali Development Block of Barpeta District in Assam. The objectives of the study were to examine the nature, availability, utilisation and roles of power along with the problems of availability of power in agriculture under various categories of farms in the study area.

Two stage random sampling technique was followed for selecting the sample for this study. Villages were the first unit and operational holdings were the second and ultimate unit of sampling. The farms were classified into small, medium and large farm groups, based on the size of holdings, and 20 per cent of the farms were randomly selected from each group. Simple averages, percentages and 't' test along with the Cobb-Douglas function were used to highlight various objectives of this investigation.

The analysis revealed that different rice crops dominated the cropping patterns of the study area. The cropping intensities indicated inverse relationship with the size of farms. Human, bullock and machinery were the main sources of power in agriculture. The human and bullock sources were dominating the supply and consumption of power. Machine power availability and its utilisation in agriculture was very limited. The availability and utilisation of power per farm were directly related to farm size while per hectare utilisation was inversly related to the size of farms.

Among different activities, crop production consumed the highest amount of power on all categories of farms followed by household cooking and management. Amongst crop enterprises, local *sali* rice utilised the highest quantity of power per farm in each category of holding. However, power utilisation per hectare was highest in potato production followed by wheat and HYV *sali* rice on all the farms. Among the different operations, seedbed preparation/ploughing/levelling consumed the largest portion of total power followed by harvesting/threshing/winnowing operations on all the holdings.

The regression coefficients indicated that bullock and machine powers on medium farms, and human and machine powers on large farms are significant in increasing production. Bullock power could be usefully substituted with machine power on large farms. Though non-significant, each of the power sources exhibited positive role on small holdings.

Scarcity of human and bullock labour during peak period, unfavourable climatic conditions, higher price of quality bullock, high purchasing cost of machinery, lack of skill of the farmers in operating and maintaining the machinery were some of the major problems affecting agricultural production, directly or indirectly.

Shedage, M.N. 1989. Economics of Production of Selected Flowers in Thane District (M.S.). Konkan Krishi Vidyapith, Dapoli. *Major Adviser* : S.G. Borude

Thane district ranks first in area under flowers in the Konkan region of Maharashtra. Out of various flower crops *kagda*, *mogra* and spider lily are the prominent ones. Farmers of Vasai tahsil have specialized in the cultivation of *kagda* and *mogra*, while farmers in Dahanu tahsil have specialised in the cultivation of spider lily. Hence, an integrated study of economics of production of selected flowers in Thane district was undertaken. Fifteen sample cultivators were selected from six villages which were selected purposively. Where the required number of cultivators were not available, all cultivators growing the flower crop were selected. In Vasai tahsil there was a common sample for *kagda* and *mogra*. Thus, the final sample consisted of 68 cultivators, but the flower-wise total was 105.

The study revealed that flower cultivation was highly labour intensive. The average per hectare yield of *kagda*, *mogra* and spider lily was 8,098 kg. 8,006 kg and 4,753 thousand flowers, respectively. The cost of production was estimated at Rs. 2,13,569 For *kagda*, Rs. 2,16,649 for *mogra* and Rs. 1,18,896 for spider lily. The net returns were Rs. 32,967, Rs. 28, 438 and Rs. 32,555, respectively. The benefit-cost ratio was maximum in spider lily (1.38) and equal in *kagda* and *mogra* flowers (1.15).

Cobb-Douglas functional analysis revealed constant returns to scale in *kagda* and *mogra* production as indicated by the sum of elasticities of 0.949 and 1.068, respectively. In spider lily increasing returns to scale were observed as indicated by the sum of elasticities (1.119) In the production of *kagda*, *mogra* and spider lily flowers, production elasticities of land only were statistically significant, while, the elasticities of all other independent variables were non-significant. Some of the inputs like family labour, F.Y.M. and fertilizers were used in excess quantities, resulting in negative returns.

The majority of cultivators of Vasai tahsil marketed flowers through village merchants and in Dahanu tahsil all spider lily cultivators sold flowers directly to commission agent-cum-wholesalers in Bombay market.

Limited irrigation facilities, small scale of production, adoption of traditional technology of production and borrowing from non-institutional agencies are some of thefeatures of flower cultivation.

Dalvi, V.D. 1989. Economics of Production. Marketing and Processing of Cashewnut in Sindhudurg District (Maharashtra State). Konkan Krishi Vidyapith, Dapoli. *Major Adviser* : G.G. Thakare

Ratnagiri and Sindhudurg districts of Maharashtra together account for 95 per cent of the state's area and production of Cashew. Considering the importance of cashew in Sindhudurg district an attempt is made to study the economics of production, marketing and processing of cashewnut in the district. Data were collected from cashewnut growers including some who had planted high yielding varieties, traders/merchants and cashew processing factories.

Of the total sample growers, 93 per cent had planted local varieties of cashewnut. About 21 per cent growers had planted seedlings of improved varieties and 20 per cent had planted H.Y.V. grafts. The per hectare yield of nuts of local varieties and grafts was 390.92 kg and 785.09 kg, respectively. There is no difference in per tree yield of local and graft varieties as grafts had not yet attained full maturity. Per hectare value received, labour requirements and total maintenance cost were computed for both local varieties and graft orchards. The analysis revealed that for local varieties net returns of Rs 2647 per hectare were obtained. The per quintal cost of raw nuts was Rs 683 and the input-output ratio was 1.60. The corresponding figures for graft orchard were Rs 7268, Rs 509 and 2.03, respectively.

Raw nuts fetched a higher price when sold after drying. The per quintal net gain due to storage varied from Rs 16.72 to Rs 287.02. Prices were fixed by open negotiation in all the cases. Around 53 per cent of the growers sold their produce through village merchants/itinerant traders and 25 per cent through whole salers. In term of quantity, about 30 per cent and 44 per cent was sold through village/ itinerant traders and wholesalers, respectively.

The average Working season of processing factories was 257.7 days. The overall capital investment was Rs 40,44,899 which comprised 11 per cent fixed capital and 89 per cent working capital. The overall male and female labour employed per factory per day was 5.57 and 65.88, respectively.

Factories purchased around 48 per cent of their requiremats of raw cashewnut from wholesalers and 39 per cent from growers. Per quintal cost of processing was Rs 331 of which the major share was of interest on capital (51 per cent). The per quintal total cost of marketing incurred by factories was Rs. 98 of which the major share was of commission agents (60 per cent). Per factory net returns were Rs 7,93,864.

Overall rate of capital turnover was 122.53 per cent and the returns to investment were 28.30 per cent. The overall gross and net returns per worker per day were Rs 269 and Rs 48, respectively, while per day per worker quantity of nuts processed was 0.11 quintals.

The maximum quantity of cashwnut was marketed through private agencies and hence the share of producer in the price received by processing factory was low (52.0 to 53.0 per cent). The share of producer was comparatively high when they sold directly to the factory (58 per cent) and through co-operative societies (56 per cent) but the quantity of nuts marketed through these channels was low.

Joshi, V.G. 1989. Economics of Poultry Production in Ratnagiri District of Maharashtra State. Konkan Krishi Vidyapith. Dapoli. *Major Adviser* : R.P. Thakare

The present study was undertaken to examine the various economic aspects of egg and broiler production in Ratnagiri district of Maharashtra State. Specificaly the capital structure, costs and returns, cost of egg and broiler production, productivity and profitability of layer and broiler birds and methods of disposing off of poultry products were examined.

For the study, 22 Layer, 32 broiler and 6 RIR farms were selected randomly. Besides ratios, percentages and averages, regression analysis was used to examine input-ouput relationships in egg and broiler production.

The per bird capital investment on egg production farms was Rs 103.27 in which investment towards poultry houses, cages, land and poultry equipment were 73.35, 18.42, 4.70 and 3.46 per cent, respectively. As against this per bird capital investment on small and large broiler farms were Rs 10.70 and Rs 7.82, respectively with about 82 per cent investment being on broiler housing only. The per bird investment on broiler farms decreased with the size of farm.

The total cost (Cost C) per 100 layers was Rs 18,319.60 in which variable and fixed costs were 75 and 25 per cent, respectively, with feed accounting for a major portion (58 per cent) of cost. The gross returns per 100 layers indicated a per layer profit of Rs 11.93 over cost C. Average egg production per leyer in production cycle of one year was 243.35 eggs with a cost of production per egg of 0.63. The input-output ratio in egg production was 1.07.

The cost and return structure per 100 broiler birds for a production cycle of about 8 weeks indicated that net returns over cost C were Rs 60.92 on small farms and Rs 126.49 on large farms. The input-output ratio varied from 1.02 to 1.05 on both groups of farms. Feed alone accounted for 41 per cent of the total cost.

On per annum basis, RIR farms were found to the most profitable followed by layer and broiler farms.

The cost of production per kg live weight on small and large broiler farms was Rs 20.11 and Rs 18.37, respectively, with an overall average of Rs 19.22.

Labour use per 100 birds per production cycle was estimated at 48.83 mandays on layer farms and 8.62 mandays an broiler farms. Total employment of 23669 days was estimated to be generated in poultry industry of Ratnagiri district of which about 80 per cent is in broiler production 15 per cent in egg production and 3 per cent in rearing of RIR birds.

The break-even analysis of sample poultry farms indicated the break even size of 196 layer birds, 287 broilers on small farms, 1404 broilers on large farms, and 137 birds on RIR farms. As against this the actual sizes of farms were varying in the range of 100 to 126 per cent on different categories of poultry farms.

Functional analysis revealed that in egg production, the production elasticity of feed variable was highest (1.0558) and also statistically significant. The production elasticities of medicines and other miscellaneous cost items were negative. In egg production diminishing returns to scale were oberved.

In case of broiler production, higher and statistically significant contribution of the independent variables number of birds and medicine cost was observed. Feed was non-significant and showed a high degree of multicollinerity with flock size. Production elasticities indicated constant and diminishing returns to scale on small and large broiler farms, respectively.

About 95 per cent producers sold the eggs directly to the consumers. On small broiler farms 60 per cent owners sold broilers to retailers, 30 per cent to wholesalers and only 10 per cent directly to consumers. Large broiler farms sold 80 per cent broilers to wholesalers and 20 per cent to retailers. The transport and loading unloading charges incurred by producers was Rs 2.80 per 100 eggs. For broilers these

costs were Rs. 50 and Rs. 1.14 per broiler when sold to retailers and wholesalers, respectively.

Bhatia, J. 1989. Diversification of Agriculture in U.P.—An Empirical Analysis. G.B. Pant University of Agriculture and Technology, Pantnagar, Nainital. *Major Adviser* : S.K. Tewari.

The study was confined to the state of U.P. taking each district as one unit of observation with two main objectives, namely; to find out the pattern of diversification in economy of U.P. Particularly in agricultural economy, at different points of time; to examine the empirical relationship between crop diversification and selected agro-economic variables in U.P.

Thc fall in the share of primary sector reflected that the state's real income structure was heading towards gradual diversification. The share of agriculture subsector was on decline and shares of animal husbandry and fishing subsectors were picking up. Agriculture and animal husbandry subsectors showed significant positive growth. Forestry and logging subsector registered significant negative growth and showed the, lowest variability. Therefore, state government should enforce adequate protection to the forests and speed up afforestation project as this subsector lends stability to U.P. economy. To promote diversification, irrigation should be assured and number of milch animals should be increased in districts.

Rownier, M. P. 1989. Changes in cropping Pattern and Adoption of New Technology in Agriculture—A Case Study in Nazira Development Block in Sibsagar District, Assam. Assam Agricultural University, Jorhat. *Major Adviser* : A. Saikia.

The study was conducted in Nazira Development Block in the Sibsagar district of Assam to examine changes in cropping patterns, farm returns of the farmers, extent of adoption of new technology and constraints faced by the farmers in adoption of new technology. Six villages were selected randomly and 128 households (proportionate sample) were selected randomly in four groups, viz., marginal (22), small, (42), medium (19) and large (8) farms.

The cropping pattern in the area has not undergone significant changes. Rice continues to be the dominant crop covering more than 90 per cent of the gross cropped area in both the time periods. Increase in area under HYV rice was 405 per cent, a result of Government efforts under SRFP. Interest of the marginal and small farmers towards mustard and winter vegetables was found to be increasing. The returns of the farmers were almost double in HYV rice than local rice. The returns from vegetables were much higher than from mustard and hence area under evgetables was higher than mustard. The extent of adoption of new agricultural

technology was high. with 69 per cent of households covering 18.40 per cent of gross cropped area adopting new technology. Consumption of NPK per hectare of gross cropped was 20.71 kg. Around 26 per cent of the households used plant protection measures in 9.87 per cent of gross cropped area. Adoption of improved tools and implements was, however, low Scarcity of labour on time (mainly in winter rice), lack of irrigation facilities, problems of insect pests and lack of funds were the major constraints faced by the farmers in adoption of new technology.

Gogoi, P. C. 1989. A study on Organization of Rural Deposits and the Effect of Farmer's Involvement with Different Deposit Schemes in Jorhat sub-division of Assam. Assam Agricultural University, Jorhat. *Major Adviser* : B.K. Barooah.

Savings and deposit mobilisation plays a vital role in the capital formation of Indian economy. Though many studies have been undertaken by various authors in this context, specific studies pertaining to the involvement of farming community are, however, lacking. The present study was an attempt in this direction which aimed to evaluate the impact of deposit schemes instituted by different institutions on farmers and the factors influencing farmers savings and deposits along with their investment pattern in Jorhat sub-division under Jorhat district in Assam. The study was based on information obtained from 98 sample households belonging to 8 villages scattered in the operational area of Central Jorhat and Titabor Development Blocks.

Around 50 per cent of farm households derived benefits from the different deposit schemes. The involvement of farmers with these schemes was directly related to the size of operational holdings. It was observed that almost all the farmers were aware of the operation of saving deposit schemes, although none of them were found to have information on security schemes. Farmers' deposits were mostly concentrated (48-78 per cent) under saving deposit accounts followed by recurring deposits, private insurance policies, L.I.C. policies and fixed deposit accounts. Small, medium and large farmers were all found to maintain deposits under the different types of schemes.

A number of institutional and non-institutional agencies were involved in deposit mobilisation programmes. However, commercial banks played the dominant role and shared about 30 per cent of the total farmer's accounts during this period. Of the three factors, namely, size of operational holding, education and locational distance, operational holding was found to affect the number of accounts as well as the amount of deposit significantly.

Farmer's investment preference was more towards physical assets than towards financial assets. Annual investments tended to increase with the increase in the size

of operational holding. More than 50 per cent of total investment was contributed from farmers own funds in all the size groups with the exception of small farmers.

Waldia, K. 1989. An *Ex-ante* Financial Analysis and Optimum mix of Various Tree Species for Agro Forestry for Bhabhar Region of Nainital District, U.P. G.B. Pant University of Agriculture and Technology, Pantnagar, Nainital. *Major Adviser* : A.N. Sharma

Keeping in view the role of agro-forestry in mitigating the acute shortage of fuel-fodder in rural areas, the present study was undertaken in the Haldwani Block of Nainital district, U.P., to determine the financial viabllity of various tree species under agro-forestry conditions and to find out their optimum mix on the fields of small and marginal farmers. Ten tree species namely Subabool (*Leucaena leucocephala*), Poplar (*Poplar deltoides*), Eucalyptus (*Eucalyptus hybrid*), Bakain (*Melia azedarch*), Mulberry (*Morus alba*), Kachnar (*Bauhinia variegata*), Saru (*Casuarina equisetifolia*), Safee Siris (*Albizzia procera*), Kala Siris (*Albizzia laebbeck*), Bundeni (*Acrocarpus fraxinifolius*) having economic life of 8 to 30 years were considered for the study. To examine financial viability of various tree species B : C ratio and NPV were calculated separately for each species and to determine optimum mix single period linear programming technique was used. On the basis of financial analysis poplar, Eucalyptus and Subabool having economic life of 8 to 10 years emerged to be the most profitable group of tree species. As per the optimum mix of various tree species Suhabool and Kala Siris appeared to be the most suitable tree species for agro-foresty. The proposed plans can meet upto 57 90 and 45.92 per cent of the annual fuelwood requirements and 50.0 and 40.0 per cent of annual green fodder deficit on the fields of small and marginal farmers, respectively.

Prasad, B. 1989. Credit Requirement for Optimum Crop and Milk Production Plans in Tamkohi Raj Block of Deoria District. G.B. Pant University of Agriculture and Technology, Pantnagar, Nainital. *Major Adviser* : T.S. Bhogal

The present study was undertaken with the following objectives, to study the existing crop and milk production pattern, formulation of optimum plans under two sets of production technologies viz., with existing technology (Plan I), existing + improved technology (Plan (II), estimation of potential increase in income through adoption of optimum farm plans and short term and medium terms credit requirements for different categories of farms.

Under the optimum plan I, paddy and wheat appeared with maximum area in kharif and rabi seasons on each category of farms, paddy and wheat with existing technology were replaced by paddy and wheat with improved technology in Plan

II. The numbers of milch animals which could profitably be maintained on marginal, small, medium and large farms were 4, 4, and 5 and 7 in both Plan I and Plan II.

Farm income could be increased from 54.61 to 156.12 per cent on marginal farms, 60 75 to 120.83 per cent on small farms, 30.20 to 93.16 per cent medium farms and 24.24 to 95.44 per cent on large farms over existing levels by adopting the optimum farm plan I and II, respectively. In the light of more potential to increase farm income through the adoption of Plan II farmers must be motivated for their adoption. Also there is a need to strengthen banking institutions in the area in view of the credit requirement for the adoption of optimum plans.

Singh, D.V. 1990. Economics of Small Scale Agro-processing Units in Nainital District (U.P.) G.B. Pant University of Agriculture and Technology, Pantnagar, Nainital. *Major Adviser* : V.K. Sharma

Keeping in view the important role played by agro-processing units in efficient commercialisation of agriculture, the present study was undertaken in Rudrapur and Bajpur blocks of Nainital district, U.P. to determine the cost of processing per quintal, return to processors and employment generated by processing units (Paddy, sugarcane and oilseeds), as also to examine the impact of plant size and capacity utilization on the cost of processing. Twenty paddy processing units under three different sizes (viz., one tonne, two tonne and three tonne), five sugarcane processing units and three oilseed units (9 bolt and 6 bolt type) were studied.

A stream of data on fixed and variable costs were examined to realize the objectives. On the basis of the analysis it was found that the cost of processing decreased with the increase in plant size and capacity utilization. It was found that three tonne type of paddy processing unit and 6 bolt type of oilseed processing unit had lower cost of processing per quintal than other sizes.

Dimri, A. 1990. Operational Analysis of Irrigation System in Jamrani Command Area. G.B. Pant University of Agriculture and Technology, Pantnagar, Nainital. *Major Adviser* : B. Prasad

The present study was undertaken at Jamrani command area with objectives to study the characteristics of Jamrani command area and the beneficiaries, implemen-mentation of operational schedule of irrigation system, water allocation problems, faced by beneficiaries, their views and suggest measures to improve the efficiency of irrigation.

In Bhabhar as well as in Tarai, irrigation system beyond outlet was through kachchi guls. Roaster system was not followed beyond the area of outlets Farmers

did not have prior information about the canal closure for repairs, desilting and changes in canal schedule etc.

To improve the efficiency, irrigation by Pakki channels should be made, roaster system should be followed beyond outlets and adhered to strictly by the appropriate organisation of farmers. Farmers should be informed in advance about the time schedule. Training and education should be provided to the farmers about irrigation management.

Reddy, R. M. 1990. Pattern of Investments and Returns in Citrus Orchards : A Study of Sweet Orange in Prakasam District, Andhra Pradesh. University of Agricultural Sciences, Dharwad. *Major Adviser* : H.S. Vijayakumar

Fruits play an important role in providing additional nutrition, religious functions and for convalescing patients. These provide an opportunity for the producers to earn additional income. The demand for fruits in India is 24.76 M.T., where as the production is only 23.64 M.T. An indepth knowledge of economics of production of fruits helps in increasing production of fruits in the country. Sweet orange is one of the important fruit crops of India. The study was undertaken with the objectives of assessing investment patterns in sweet orange orchards, financial feasibilities of investments, costs and returns in sweet orange production and the marketing aspects of sweet orange. The study was confined to Andhra Pradesh.

Prakasam district being one of the major sweet orange growing districts in coastal Andhra Pradesh, was purposively selected. Based on the area under sweet orange two mandals were selected. Random sampling technique was used for the selection of villages, sweet orange growers and the pre harvest contractors A total of 50 sweet orange orchards and ten preharvest contractors were selected for the study and the orchards were post classified in to small orchards (less than 2.5 acres) and large orchards (more than 2.5 acres). For the purpose of analyses at different growth stages, they were also classified into three age groups viz., less than 10 years old, between 10 and 15 years old and more than 15 years old orchards. The pattern of investments, costs in production and returns were analysed by tabulations and working out simple averages and percentages. Discounted cash flow technique was used to evaluate the net present value, Benefit cost ratio, Internal Rate of Return and the pay Back period.

The special feature of the study was that to the changes in the yield rates of sweet orange plants and rates of changes in the prices of inputs and output were used to project the annual costs and returns. Cobb-Douglas type production function was used to evaluate the productivity of resources in sweet orange production. Marketing costs and market margins for the pre-harvest contractor were studied by

tabular analysis. Simulation analysis was carried out to suggest alternative marketing practices for the growers of sweet orange.

The investments per acre were higher in small orchards (Rs. 38851.67) than in large orchards (Rs. 24054.17). The investments were found to be financially feasible in both the size groups of orchards. The variable cost of cultivation of sweet orange was Rs. 1907.19 in small orchards and Rs. 1753.31 inlarge orchards. Further, the costs were higher in middle aged orchards (Rs. 1881.66 per acre) compared to others. The results of the production function analysis revealed that labour, manures and fertilizers and plant protection chemicals significantly contributed to the output. The pre harvest contractor incurred a total cost of Rs. 433.49 per tonne in marketing of oranges. Their market margin was Rs. 95.90 per tonne. Simulation analysis revealed that the growers could obtain an additional net reutrn of Rs. 56.76 per tonne of fruits by selling in the nearby whole sale market.

Jithendra, K.D.S. 1990. Performance of Dairy Co-operatives and their Impact on Milk Production, Income and Employment in Chittoor District, Andhra Pradesh—An Economic Analysis. University of Agricultural Sciences, Dharwad. *Major Adviser* : H.G. Shankara Murthy

In India, agriculture being only seasonal, the dairy industry provides off season work, steady income and keeps the rural population employed all the year round. Milk co-operatives are an integral part of the milk marketing and dairy development programme in India popularly known as 'Operation Flood'.

This study was undertaken with specific objectives of evaluating the working dairy co-operatives, to assess cost-return structure, resource use efficiency in milk production, dairy financing, milk marketing channels and impact of dairy co-operatives on milk production, income and employment in Chittor district of Andhra Pradesh.

The Chittoor milk union was selected for detailed study. Two chilling centres were selected one above the average (MPF, Chittor as Area-I) and one below the average (MCC, Pitchatur as Area-II). Four societies were selected each (one above the average and other below average) from the selected areas. Primary data was collected from the members of the societies and non-members. Secondary data was collected from societies and financial institutions. Various tools and techniques were employed to suit the specific purposes.

The members of societies were possessing more number of crossbred cows (72 41 per cent) than the local cows (27.57 per cent). The performance of the societies which were above average in both areas had shown better physical performance than below average societies.

The cost of milk production was high for crossbred cows than for local cows for both members and non-members of the study area. Whereas the cost of milk production per litre of milk production was high for local cows (Rs. 1.90) than crossbred cows (Rs. 1.65). Production function revealed that the milch cows were more responsive to concetrates and green fodder. The financial institutions were extending help with increased advances for dairy development under different schemes and with special emphasis on low income groups. The members of societies sold their milk through societies whereas the non-members sold through milk vendors, tea shop owners and directly to consumers. It was found that selling of milk through co-operative societies was more profitable (Rs. 3.43 per litre) than selling through other channels of marketing (Rs. 3.00 per litre).

It was found that the income earned by agricultural labourers and non-agricultural labourers from dairying was more than their income through other sources whereas small farmers earned more income from other sources like crop production than dairying. The employment created for members was significantly more (on an average 121.5 days form embers of Area-I and 111.2 days for members of Area-II) compared with non-members (on an average 76 days for non-members of Area-I and 53.3 days for non-members of Area-II).

Poddar, R. S. 1990. Performance of Bijapur Grameen Bank and Impact of Credit on Resource Utilization on Farms in Bijapur District—An Economic Analysis. University of Agricultural Sciences, Dharwad. *Major Adviser* : H S. Vijayakumar

Regional Rural Banks give thrust to rural lending. However, these banks face the threat of mounting overdues and declining profitability. Hence, an objective analysis of performance of these banks is called for. Further, an analysis of impact of credit on returns from farming assumes greater significance.

The present study was undertaken with the objective of evaluating the performance of a branch of Bijapur Grameen Bank in one of the dry farming regions of Karnataka. The other aspect of the study attempted to assess the impact of credit on cropping pattern, cropping intensity, net returns and labour employment.

Dhulakhed branch of Bijapur Grameen Bank in Indi taluk of Bijapur district, Karnataka was purposively selected. The performance of the branch was studied with respect to deposit mobilization, sectoral advances and loan recovery. For the analysis of the impact of credit, a sample of 120 farmers representing small and large holdings in unirrigated and irrigated villages was selected. The data pertained to the year 1987-88. Linear programming technique and tabular analysis were used for analyses of the data.

The results of the study revealed that while the deposits tended to decline there were imbalances in the sectoral advances and increasing percentages of overdues. The optimisation of resource use revealed that there was a shift in favour of a few but more remunerative crops and better land utilisation. With the increased borrowings, cropping intensities and net returns showed increasing trends. No significant enhancement in labour employment was noticed.

In the light of these findings, the branch may make serious efforts to improve its performance regarding the indicators studied. Further, farmers may be encouraged to adopt new package of practices by assuring liberal credit supply.

Barman, R. N. 1990. Effect of Subsidy on Farm Production—A Comparative Study of Tribal and Non-tribal Farms in Nalbari District, Assam. Assam Agricultural University, Jorhat. *Major Adviser* : B.C. Bhowmick

This study was conducted in Nalbari district using a multistage stratified random sampling technique. In total 66 tribal and 68 non-tribal farms were selected from two randomly selected blocks of the district. The study was designed to make a comparision between tribal and non-tribal farms regarding their farming systems, resource use and the effect of subsidy on farm production. A determinatistic linear programming model was used as the analytical tool for optimising resource use for various size groups of tribal and non-tribal farms. Tabular analysis was also used for substantiating other objectives of the study.

Mixed farming was found to be prevalent in the study area, with tribal farms having crop + dairy + poultry and non-tribal farms having crop + dairy + duckery as the dominating activities. The resource use per unit was comparatively more on non-tribal farms than on tribal farms. Subsidy was found to have played a positive role in increasing farm net returns of both tribal and non-tribal farms. The non-tribal beneficiary farms used comparatively more resources per unit and also obtained more net returns per unit as compared to the tribal beneficiary farms. Homestead farming was found to have provided about 6 per cent of the total labour employment and contributed a substantial share of over 30 per cent net returns from the whole farm business.

Several optimal plans were developed without and with imposition of minimum area restrictions and also with capital borrowing, labour hiring and FYM purchasing activities. The gross cropped area in optimal plans decreased in most size groups of farms, while the composition of the cropping patterns, net returns and labour employment showed a substantial increase in all the optimal plans of the tribal and non-tribal farms. Net returns in the non-tribal farms were comparatively higher than in the tribal farms.

Kharmawphlang, M. 1990. A Study on Agricultural Credit in Mylliem Development Block of East Khasi Hills District, Meghalaya. Assam Agricultural University, Jorhat. *Major Adviser* : A.K. Sarma

The present study on agricultural credit was conducted in Mylliem Development Block of East Khasi Hills District, Meghalaya. The study was designed specifically to examine the sources and terms and conditions of borrowings, purpose and nature of utilization, repayment pattern and extent of overdues of the sample farmers during 1988-89. Proportional allocation method of sampling has been used in the study for drawing a mixed sample of 100 borrowing households from three district size groups, viz., marginal, small and medium. Simple statistical tools like averages and percentages were used for analyzing the data.

Institutional sources were found to be the dominant sources of credit in the study area favouring smaller size group farms comparatively more than the large size group farms. Among the institutional sources, co-peratives were important for the marginal and medium farms while commercial banks were for important for small farm. Among non-institutional sources, money lenders were important for small farms while relatives were found important for medium farms.

Current farm expenditure for crops and livestock was the dominant purpose of borrowing constituting more than 90 per cent of total borrowings during 1988-89 leaving only about 9 per cent for the purpose of capital expenditure on purchase of livestock. As regards per hectare availability of current farm expenditure and capital expenditure, farmers of lower size groups benefitted more than the larger size groups farms. On the other hand, on per farm abailability basis, larger size group farms benefitted more from current farm expenditure while lower size group farms benefitted more from the capital expenditure.

Borrowings were mostly used for the purposes for which they were made with little amount (about 20 per cent of total borrowings during 1988-89) being misutilized or diverted for purposes other than proposed purpose. Farmers of lower size groups diverted comparatively grrater proportion of borrowed funds to purposes other than proposed. The major item of diversion was found to be family maintenance.

Extent of repayment was quite satisfactory in the area and increased wiih the increase in farm size.

Overdues of the farmers in the area were found to be less than the outstanding debt in both the periods. Larger size group farms were having higher amount of overdues and outstanding debt per holding in the recent year than the smaller size groups. Besides, overdues of the farmers stood against the institutional sources

alone. Marginal farmers were indebted more to co-operatives while small and medium farmers were indebted to rural banks. The prevalence of chronic overdues (overdues for 3 years and above) was less in the area as it formed only one-third of the total overdues as on 30th June, 1989. Both chronic and non-chronic overdues per defaulter increased with the inerease in farm size.

Deka, N. 1990. Milk Production in the Farms of Jorhat District of Assam—An Economic Analysis. Assam Agricultural University, Jorhat. *Major Adviser* ; D.R. Kalita

The study was conducted in Jorhat District using multistage random sampling technique. The study was designed to investigate the existing resource utilization patterns in milk production, the factors affecting milk productivity, the seasonal variation in milk production and the relative share of dairy and crop enterprises in total farm income.

Appropriate statistical and functional analyses were used for analysing data collected from randomly selected farm households under tradional, organised and improved technologlcal situations.

The results of the analyses brought out that in the case of utilization of existing farm resources, traditional situation utilized negligible amount of each of the resources in dairy enterprise in comparision to crop enterprises. In organised and improved situations, however, dairy enterprises utilized a major share of each resource over the crop enterprises. Most of the resources were found to be surplus in the study area. The organised situation differed significantly from traditional and improved situations in respect of availability and utilization of existing resources for crop enterprises. However, the traditional situation was significantly different from others in respect of availability and utilization of resources for dairy enterpise.

Regarding the factors affecting milk productivity, number of cows in milk, green fooder, dry fodder and concentrates played positive and significant roles in contributing to the milk yield and milk production in all the three situations.

The highest variation in milk production was observed during winter and the lowest variation was in the rainy season for all the situations. The winter season was significantly different from summer and rainy seasons in seasonal variation in milk production.

The share of income from dairy enterprise was negligible in traditional situation and was dominant in organised situation in comparision to crop enterprises. Dairy enterprise under the improved situation generated substantial share as compared to the crop enterprises.

Rao, A.R. 1990. Regional Trends and Disparities in Fertilizer consumption in India. G.B. Part University of Agriculture and Technology, Pantnagar, Nainital. *Major Adviser* : V.K. Pandey

Fertiliser consumption in India increased at a much faster rate since mid sixties. But, this increase is reported to have been widely different in different states of the country leading to great regional disparities in fertiliser consumption. These disparities need to be narrowed down in order to enhance fertiliser consumption and meet the country's food and fibre needs. Keeping this in view, the present study was conducted to (i) estimate trends and growth rates in fertiliser consumption in different states and the country as a whole, (ii) study the regional disparities in fertilizer consumption, and (iii) identify the factors responsible for these disparities. For this purpose, seventeen states of the country were selected, for which consistent time series data is available for the period from 1966-67 to 1984-85.

Linear and exponential time trend equations were estimated to work out trends and growth rates in fertiliser consumption. The coefficient of variation and spearman's rank correlation coefficients were used to see the disparities in fertiliser consumption aeross different states. A composite analysis of factors affecting fertiliser consumption and growth in these factors was done to identify the possible causation of these disparties.

The consumption of individual nutrients as well as total nutrients on per hectare of both net cultivated and gross cropped areas was found to have significantly increased in most of the states during the period. The fertiliser consumption, in general, was found to have increased at a much faster rate above all India average, in the states of Punjab, Madhya Pradesh, Haryana, West Bengal, and Uttar Pradesh. It was found to have increased at a much slower rate, below all India average in the states of Assam, Kerala, Tamil Nadu and Rajasthan.

There were large variations in fertiliser consumption on per hectare of net cultivated area as well gross cropped area, during both the terminal years of the study period. These disparities, as measured by coeffieient of variation, were found to be quite high and did not show any rising or declining trend over the study period, except in case of potassic fertilisers where and declining trend was observed. The ranks of different states with respect to per hectare fertiliser consumption also remained unchanged during the study period. Total credit advances per ha, per cent gross cropped area irrigated and per cent area under HYVs were found to have significant impact on fertiliser eonsumption in all the states. The growth rates in per cent irrigated area and per cent area under HYVs across the states were significantly correlated with growth rates in per hectare fertiliser consumption. However, the

growth rates in credit advances were not correlated with that in fertiliser consumption across the states. Thus, differential growth rates in per cent irrigated area and per cent area under HYVs across different states can be said to have caused differential growth rates in per hectare fertiliser consumption.

Agrekar, K.S. 1989. Study of Village Multipurpose Co-operative Societies in Ratnagiri District (Maharashtra), Konkan Krishi Vidyapeeth, Dapoli. *Major Adviser* : S.G. Borude

The present study was an attempt to know the opinions and attitudes of members and non-members towards the working of the village co-operative societies and to examine the extent of borrowing, reasons for low borrowing, non-borrowing and non-membership among the cultivators and non-cultivators in Ratnagiri district.

Four village co-operative societies were selected from Chiplum Tehsil randemly. From each society 30 members (20 cultivators+10 non-cultivators) and 30 non-members (20 cultivators+10 non-cultivators) were selected randomly from the same villages where the societies were organised. The final sample of 240 households comprised 80 member cultivators (Group I), 40 member non-cultivators (Group II), 80 non-member cultivators (Group III) and 40 non-member cultivators (Group IV). The data were collected for the year 1987-88.

The study revealed that, of the total members in Group I and II, 12 per cent were females and 88 per cent were males with an average share amount of Rs. 84. Only 46 (38 per cent) members had borrowed from co-operative societies in 1987-88. Average borrowing for the sample was Rs. 111.75. An examination of the last five years of borrowing showed that a very small proportion of member cultivators were regular borrowers. However, majority of the borrowers expressed satisfaction regarding adequacy of loan, timely availability, rate of interest, cash component and repayment.

The average per farm total borrowing by members of Group I and II in the year 1987-88 was Rs. 917.66, of which 32.18 per cent was from co-operative society, 8.29 per cent from Land Development Bank, 53.12 per cent from commercial banks and the remaining from other private agencies. This showed that even the members relied more on the commercial banks.

The major reasons cited for non-borrowing by the members were non-requirement of credit and adequate own funds (50%), high interest (41%), chairman and manager partial in sanctioning loam (23%), corruption (16%), fear of losing land in the event of non-repayment (15%), inadequate security (13%) and possibility of default (12%).

The major reasons given by Groups III and IV for not becoming members were : uncovinced about the benefits of cooperative society (100%), society not doing useful work (36%), corruption (23%), indifferent management (12%), no interest in society's affiars (9%), having service or other business (22%). When the non-members were asked about the possibility of becoming members in future, about 70 per cent stated 'no'. Regarding borrowing by non-members, the average per annum borrowing was Rs. 556, of which 40.13 per cent was from commercial banks, 11.22 per cent from Land Development Bank, 37.14 per cent from friends and relatives and remaining 11.51 per cent from money lenders and traders.

Thus, vigorous motivational work needs to be undertaken to increase the confidence of the members and non-members and improve operational efficiency of the cooperatives.