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## Impact of Groundnut Seed Production on Farm Profitability: A Case Study in Karnataka

**Govind Pal, C. Radhika, K. Udaya Bhaskar and S. Rajendra Prasad***

The study aims to analyse the impact of groundseed production on farm profitability in Karnataka. For the purpose, primary data was collected from 100 farmers of Chitradurga district in Karnataka during the agricultural year 2013-14 and data were analysed using tabular analysis and discriminant function analysis. The analysis of data showed that the average land holding of groundnut seed farmers was more in comparison to grain farmers and average land holding of the district. Maize crop was dominant in the study area followed by groundnut, ragi, bengal gram, jowar and others. The analysis of data revealed that human labour occupied the major share of the total cost in seed production of groundnut and bullock and machine labour occupied the major share of total cost in grain production of groundnut. The higher human labour requirement in seed production was mainly due to activities like roughing, gap filling, etc. The variable cost was comparatively higher in seed production over grain production. The total cost of cultivation in groundnut seed production was around 18 per cent higher than grain production. The gross return was about 27 per cent higher in seed production than grain production and net return from seed production of groundnut was 40 per cent higher than grain production. The discriminant analysis indicated that human labour with 45.56 per cent followed by gross return, seed, manures and fertilisers, bullock and machine labour contributed to discriminate between the seed and grain production of groundnut. Higher yield and profitability in seed production may be popularised among the farming community to increase the certified seed production. The increased productivity and net profit would attract the farmers for adoption of certified seed production technology and farmers may be encouraged to grow quality seed of groundnut.

## An Empirical Assessment of Productivity and Farm Income for Onion Crop in Maharashtra

**Deepak Shah†**

The study attempts to evaluate the productivity variations and farm income for various varieties of onion grown in the state of Maharashtra, apart from addressing the perceptions of farmers regarding problems faced by them in onion cultivation and

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reasons for cultivating this high value crop. The study showed highly profitable nature of onion crop cultivation since per hectare return over variable cost hovered from Rs.45,459 for Panchganga variety of onion grown during *kharif* season to Rs.81,018 for Nasik Lal variety of onion cultivated during *rabi* season. Further, cultivation of onion generated 9 per cent per quintal net returns over per quintal variable cost for *kharif* Nasik Lal variety, 68 per cent for *kharif* Panchganga variety, 60 per cent for *rabi* Fursungi variety and 80 per cent for *rabi* Nasik Lal variety. In general, onion farmers allocated 126 per cent higher area under *rabi* onion as against *kharif* onion with all the varieties put together. Longer shelf life, better quality of produce, higher productivity and reasonably higher prices on offer were the major reasons for higher allocation of area under *rabi* as against *kharif* onion. Variations in profit were seen on account of productivity differences, cost structure and prices received by the farmers for various varieties. Although onion crop cultivation was found to be lucrative proposition, the farmers faced a number of problems, which encompassed high price fluctuations, lack of remunerative price, lack of minimum support price (MSP) and government procurement, etc. The farmers also showed concern for lower yield and yield instability, labour shortage, erratic and irregular electricity supply, lack of facilities of driers, market infrastructure related problems, poor quality of underground water, and collusion among traders and trade malpractices, etc. There is, therefore, need to address these problems through appropriate institutional and policy framework. It is felt and also reported by the farmers that there should be MSP for *rabi* onion, which has shelf life of 4-5 months depending upon the quality of the produce. The government intervention and support for *rabi* onion would certainly solve onion crises, which has become more frequent in recent years. The government support for *rabi* onion will not only protect the farmers but also the consumers.

**Replicating Small Farms, Prosperous Farmers in India: Lessons for Policy and Practice**

**Sukhpal Singh***

Small farm and small farmer viability have been a constant policy concern in India given smallholder dominated agriculture. Though there are different definitions of small farm in literature depending on local context, the term ‘smallholder’ is a relative one in that it refers to limited resource endowments of such farmers relative to those of other farmers in the sector in each local context. The Indian small farmers are in a state of agrarian distress and search for making them earn enough from a small farm continues. It is in this context of academic and policy discourse that this paper draws evidence based policy and practical recommendations for replicating the

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Small Farm, Prosperous Farmer (SFPF) models of agricultural development in India based on empirical case studies of 35 small (who were just two hectares or smaller farm operators) and prosperous farmers (earning at least one lakh rupees per acre per year) across three states of India – Punjab, Gujarat and Maharashtra. The major objectives of the study carried out in 2012 were to: document profiles of SFPFs in terms of their resources, costs and profits; provide evidence of success (in terms of net income and prosperity) given small holdings, identify the major factors in prosperity/success-personal, institutional and social; and understand the role of policy and business environment, if any and, infer on possibilities of replicability of SFPF success given other contextual factors in other regions. The study identifies sources of success and policy relevance of such factors for making inclusive agricultural development possible.

**Increasing Farm Incomes through Farming System Approach in Himachal Pradesh**

**Divya Sharma and Ashok Kumar†**

An attempt has been made to study the existing production in the study area and suggest the optimum production systems for increasing farm income in Himachal Pradesh. The entire state is divided into four agro-climatic zones and a total of 160 respondent farmers were selected from two districts and three farm size of land holdings. The results indicated that crop enterprises like vegetable crops yielded much higher returns as compared to cereals, oilseeds and pulses. It was further revealed that cereal and vegetable crops accounted for 56.12 per cent and 14.39 per cent, respectively of the total cropped area on medium farms. Oilseeds covered 8.63 per cent area and pulses ranked lowest with 5.75 per cent area on medium farms. The cropping intensity was observed to be 197 per cent. Among the vegetable crops lady's finger, cauliflower and french bean were most profitable. Tomato and brinjal gave the lowest returns due to attack of bacterial wilt. A significant gap between average and potential yield of vegetable crops was observed which was not the case in cereals indicating thereby a wider scope of development and evolution of resistant and hybrid varieties of vegetable crops. Inadequate and non-availability of quality seeds were the problems faced by majority of the farmers. Crop-cum-dairy farming emerged to be the most remunerative farming system which is capital intensive and provision of capital at low rates of interest is essential. To adopt the suggested type of farming, pastures and grasslands in the area should be improved with introduction of suitable legumes and improved grass species.

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## Inter-State Comparison of Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) Implementation Strategy: Impact on Rural Poverty and Agricultural Labour Wages

**Syed Rizwan Ahmed*, Sanjay Kumar**, Jasdev Singh** and Murtuza Khan*****

MGNREGS is the most comprehensive, demand based legal framework promised on open ended budget for implementation unlike all other allocation-driven social sector schemes. The study makes broad assessment of the performance of MGNREGS during 2012 to 2015 and identifies the major concerns which cover entire states across India in terms of districts, person days of employment generated, expenditure and the extent of inclusion of socially disadvantage groups in its implementation. There has been rapid progress in the previous four years from 2012-13 to 2015-16 because of the increase in the number of districts covered. The average person-days of employment per household increased from 45 in 2012-13 but later decreased to 42 in 2015-16.The share of women increased from 52 per cent to 56 per cent in the later years. The share of households of Scheduled Caste (SC) has increased to 18 per cent to 23 per cent and Scheduled Tribe (ST) has increased to 16 per cent to 18 per cent in the given period. Impact on poverty shows Tamil Nadu as a richer state with less poverty ratio of 15.83 the average earning from the scheme increased to 594 per cent whereas poorer state like Chhattisgarh having more poverty ratio of 45 per cent showing decreased MGNREGS earnings to 75 per cent. This design flaws can be easily fixed by allocating resources to the states proportionate to number of rural poor in that state. An attempt has been made here to assess wage gaps in terms of wages across the states for different years. MGNREGS national average wage rates per person-day have depicted a rising trend over the years and agricultural wages have also increased across the country over the same period. MGNREGS has been an important driving force behind this rising wage rate but the scheme has performed better in expenditure on agriculture and allied sectors with increased allocation from 56 per cent to 59 per cent in reference period.

## Are All Indian States Equally Profitable in Terms of Rice Production?

**Chandralekha Ghosh and Debadatta Mazumder†**

The paper analyses the input use scenario and profitability growth in the case of rice production for 16 states and mainly five inputs viz., seed, fertiliser, manure, labour and animal labour from 1996-97 to 2012-13. The exponential growth rate of

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profit as well as the exponential growth rate of input use and input use cost share have been computed. It is observed that the states namely Karnataka, Kerala, Haryana and Madhya Pradesh where the use of bullock labour declined and the use of fertiliser increased have shown higher profitability. In case of Assam the growth rate of profit is negative, this may be due to higher cost of mechanisation since the cost share of fertiliser and machines have significantly grown in Assam compared to other states. In West Bengal the growth rate of profit is positive but not significant. It is observed in states where human labour is costly has negative impact on profitability namely, Gujarat and Punjab. While on the other hand, in states like Bihar and Uttar Pradesh where mechanisation is far behind the increased use of bullock labour has positive impact on profitability. The study thus provides an earshot of how the states use the different factors for increasing their productivity and how the input use pattern affects profitability. The comparison between states for different input use is very important to know their position in agricultural growth and profitability in agriculture.

**Impact of Alternate Income Sources on Consumption Expenditure of Rural Households in Karnataka: A Quantile Regression Analysis Across Different Agro-Climatic Zones**

**Gayathri Mohan, B.V. Chinnappa Reddy and K.B. Umesh***

The study was undertaken to assess the influence of farm household income on consumption expenditure in rural Karnataka across different agro-climatic zones. The farm household income comprised income from agriculture, allied activities (AA) and non-farm activities (NFA). The influence of these factors on food consumption expenditure (FCE), non-food consumption expenditure (NFCE) and total consumption expenditure (CE) across farm households was assessed using the quantile regression analysis. The sample households were selected using a multi-stage random sampling procedure from Kolar, Mandya, Hassan and Chitradurga districts of Karnataka representing different agro-climatic zones. The mean consumption expenditure was highest in Kolar and the least was for Hassan district. The highest magnitude of NFCE per annum was observed in Kolar and the least in Hassan. For FCE, the highest mean value was in dryland region of Chitradurga and least in irrigated area of Hassan. In the water resource endowed districts of Mandya and Hassan, high agriculture income and family size influenced positively CE/NFCE/FCE. In the dry district of Chitradurga, however, NFA income played a crucial role for livelihood among lower expenditure groups. The study concluded that to ensure livelihood and food security of poor, policies need to be framed to promote NFA and AA activities.

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## Cost-Benefit Analysis of Floriculture: A Case Study from Vedaranyam, Tamil Nadu

**R. Gopinath, R. Vimal and N. Amaravathi†**

The paper examines the costs and benefits involved in floriculture, in two villages of the Vedaranyam block of Tamil Nadu, during 2014-2015. The analysis pertains to 43 women who took up floriculture activity to supplement their main employment activity as salt pan workers or collectors of non timber forest produce (NTFP). Nerium and jasmine are the two flower crops that are considered for the purpose of this study. Primary data were collected on a daily basis from each of the 43 women involved in floriculture activity in the study villages of Kovilankollai and Adivasi Colony. The primary data set pertains to various components of fixed and variable costs, production details and revenue received from sale of flowers for the period 2014 to 2015. The person-wise, month-wise production and income variation for the nerium and jasmine, across two villages has been carried out. In order to measure the costs of cultivation, $A_1$ method (capturing paid-out costs) was used and the economic viability of the intervention was measured by Break-Even Point (BEP) analysis. Inter-personal variations in all the two villages were discussed and factors responsible for the variations were analysed using linear regression model and Garrot ranking method. Finally, SWOT analysis was used to map forces acting on floriculture cultivation at a given point of time. The analysis indicate that total profits earned per acre per annum for the year 2014-15 from the cultivation of nerium and jasmine in Aadivasi colony and Kovilankollai villages are Rs. 126048 and Rs. 100578 respectively. Accordingly, the breakeven points vary across the two villages. Significant inter-personal variations are observed with respect to production and profit from floriculture. Most importantly, floriculture intervention, promoted as a supplementary income generation activity for women groups would be fruitful only if area assigned per woman member is increased.

## Impact of Crop Production Technology of Sunflower on Farm Income and Productivity in Western Maharashtra

**K.G. Sonawane, V.G. Pokharkar, S.A. Kadam and D.B. Yadav***

The objectives of the paper are to study the employment and income pattern and the effects of improved sunflower production technology on resource use, structure, cost and returns, to work out the input use and yield gap of sunflower and to identify the constraints in adoption of improved sunflower production

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technologies. For the purpose 30 sunflower growers were selected randomly on the basis of operational holding and the study was undertaken for three years, 2011-12, 2012-13and 2013-14. The total annual employment of family worker was 359.63 days, 435.76 days and 431.94 days for low, medium and high adoption groups, respectively. There exists an excessive gap from 8 to 83 per cent in the use of manures. The per cent gap in seed use was 14.60 at the overall level. The use of chemical fertilisers shows that 'P' component in sunflower were used at higher levels. The per hectare yield has increased from 5.8 to 11.88 quintal per hectare over the different level of adoption. Thus, per hectare costs were also increased from Rs. 5,347.20 to Rs. 7,140.84.

The sample cultivators reported the problems like non awareness of improved technology, costly plant protection, non-availability of human/bullock labour for interculturing and quality manure, high cost of ploughing, seed and plant protection measures. There was excess use of phosphoric fertiliser for sunflower crop. The productivity of sunflower ranged between 5.80 to 11.88 qtl/ha for technology adoption groups. Thus there is potential for technology adoption which may help productivity expansion by 1.84 qtl/ha for sunflower by technology adoption groups.

**Wallop of Minimum Support Price on Food Crops in India**

**S. Varadha Raj and M. Anjugam†**

The paper aims to analyse the effect of minimum support price (MSP) on area, production and farm harvest prices of food crops in India. The study is based on time-series data during 1992- 2012 for paddy, wheat, maize, coarse cereals, gram and tur. The positive trend was observed in area, production and productivity of all food crops, except in the productivity of tur, but the increase in the paddy area was negligible. The relative changes in MSP of paddy, wheat, tur and gram showed that the MSP as a policy tool favoured wheat crop over paddy. The cultivation of wheat, tur and gram proved to be profitable as the value of output was higher than the cost of cultivation. In case of paddy, it was not a profitable enterprise due to high input cost and labour crisis. The negative deviation of MSP over cost C2 was observed in paddy, maize and arhar. The previous year MSP did not significantly influence the area of paddy and arhar, but, it had an effect on area of wheat, coarse cereals, maize and gram. Hence, the existing MSP for food crops must be beyond cost C3 including 5-10 per cent price incentive based on the changes of input and output prices. The state specific MSP for important food crops may also be given to safeguard the farmers.

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## Impact of Irrigation on Farm Economy: A Case Study of Narmada Canal Command Area of Gujarat, India

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Looking into the importance of irrigation on farm economy, the present study attempts to find out the agronomic and economic benefits of irrigation on crop production at individual crop level and farm as a whole. The study also has tried to assess the impact of irrigation on farm employment generation. The study is based on primary data collected from two districts viz., Bharuch and Narmada of Gujarat State. The results suggest that after the introduction of irrigation facilities, farmers diversified their copping pattern towards water intensive crops like paddy and some new crops, viz., groundnut and summer bajra were introduced in the study area which was not grown earlier. After introduction of irrigation facilities in most of the crops, per hectare cost of cultivation and per hectare crop yield increased significantly more than the rain-fed condition. In Bharuch district, per hectare highest incremental net benefit for cotton crop was observed and lower for green gram. Farm level net incremental benefit was estimated to be Rs. 79556.62. The incremental farm employment was about 24 days for both gender in Bharuch district. In Narmada district, per hectare net incremental benefit was highest for *rabi* maize and lowest incremental benefit was observed for chickpea. Farm level net incremental benefit was estimated to be Rs .16463.59 per year. The incremental farm employment was 38 and 37 days for male and female respectively in Narmada district during the year. Thus, after introduction of irrigation facilities, on farm employment generation also enhanced significantly. This could lead to reduced outmigration from the village and improve the socio-economic conditions of the landless and agricultural labourers.

## Increasing the Productivity and Profitability: Soybean Sector of Maharashtra

**Jayanti Kajale and Sangeeta Shroff†**

Soybean occupies a major area in the cropping pattern of Maharashtra. The paper analyses trends and pattern of growth of this crop in the post-2000 period. Based on the data collected from the field, it calculates profitability of soybean and its competing crops and finally discusses the major problems/constraints faced by the soybean cultivators of Maharashtra. Though analysis of the field level data reveals higher profitability of the crop as compared to its competing crops, it also reveals average yield gap of around 14 quintals. The secondary data reveals slowdown in the overall growth rate of area, production and productivity in the post-2000 period as

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compared to the earlier period. It also reveals that though the average yield level in Maharashtra is higher than that in other major soybean producing states, it is higher only in 3 districts covering 4.5 per cent of the soybean area. In most of the districts, yields are very low. The average yields are lower than those prevailing in major soybean producing countries also and the experimental yield of the state i.e. 30 quintals per hectare. The major constraining factor seems to be inadequate irrigation facilities as only 0.4 per cent of the soybean area is under irrigation. Thus, production of the crop may get adversely affected in case of scanty rainfall ultimately affecting incomes of farmers. Sustaining growth of the crop is essential for protecting incomes of soybean cultivators and for increasing production of edible oils. Provision of adequate water, usage of resource conservation technologies, timely provision of quality seed and information regarding market prices and marketing channels are utmost important to increase yield levels of the crop.

**Impact of Microfinance on Farm Productivity: A Case of Dibrugarh District of Assam**

**Manashi Gogoi*, Rabi Sankar Saikia* and Danish Tamuly****

The study explores the socio-economic impact of microfinance through SHG-bank linkage programme on agricultural transformation in terms of productivity in Dibrugarh district of Assam. A sample of 100 respondents from 50 SHG units was selected using simple random sampling technique under three development blocks of Dibrugarh district. A survey was conducted to carry out the study in which a close ended structured questionnaire was developed to collect data from the farmers. After appropriate tabulation and interpretation of the collected data, inferences were drawn by using various analytical tools and techniques. The findings of the study reveals that SHG-bank linkage programme had increased productivity of the agricultural and allied sectors substantially and contributed to increase in income and living standards of the sample farmers in the study area.

**Production Efficiencies of Food and Non-Food Crops in Different Irrigation Systems in Tamil Nadu**

**M. Chinnadurai, K.R. Karunakaran, M. Chandrasekaran, and T. Thangadurai†**

The present study attempts to estimate the technical, allocative and economic efficiencies of food and non-food crops under the Data Envelopment analysis framework assuming the constant returns to scale in order to examine the variability

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in the farm production efficiency. The study is based on cost cultivation data for three block years, 2008-09, 2009-10 and 2010-11 and the cost accounting method was employed to collect data from all the 600 farmers in 60 selected talukas in the state of Tamil Nadu. The results revealed that sugarcane was highly profitable crop followed by *kharif* paddy, moong and groundnut. Pulses like urad, moongbean, horse gram fared better than paddy in terms of net returns valuation by three times. The study inferred that banana, turmeric, sugarcane are the highly profitable crops in Tamil Nadu. The highest profitability in turmeric and vegetable may be due to price variation. Relatively lower cost efficiency of sugarcane, turmeric and vegetable need to be improved by promoting yield increasing technologies and market price support interventions.

**Role of Genetically Modified Crops on Profitability of Cotton Cultivation**

**M.N. Waghmare and P.N.Shendge***

The role of genetically modified cotton on productivity and profitability have been assessed in cotton growing area of Western Maharashtra. The study is based mainly on primary data collected for the year 2011-12 and analysed using Cobb Douglas type of production function. On an average, per farm area under Bt cotton was 2.27 ha, accounting for 69 per cent of the total land holding. With a yield of 24.50 qtl/ha, Bt cotton has registered 32 per cent higher yield and 219 per cent higher net return over non Bt-cotton, net additional benefit being Rs. 20418 /ha. The non-Bt cotton farmers use chemical fertiliser, pesticides and bullock labour excessively which result in a lower net returns. Genetically modified technology has been found to be the major contributor to the total productivity and profitability. Non-availability of quality seeds and in required quantity was the major constraint in adoption of technology in cotton cultivation. Higher productivity and higher profitability and lower pest problem have been quoted as the important factors behind preference for Bt cotton. However, high cost of seeds and incidence of pests and diseases other than bollworm have been observed as the major bottlenecks in cultivation of Bt cotton. The study concluded that Bt cotton cultivation is technically more efficient than non-Bt cotton. Bt cotton has created large and sustainable benefits, which contribute to positive economic and social development in India. To foster adoption, availability of quality and quantity of Bt cotton seed to farmers needs greater attention of Government agencies.

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## Production and Consumption of Minor Millets in India – A Structural Break Analysis

**P. Anbukkani, and M.L. Nithyashree**†

Millets play an important role in rainfed region of the country which contributes 60 per cent of the total area. Minor millets especially has very rich nutrients and minerals and resistant to drought and stress in rainfed farming. In this context the consumption pattern of small millets and finger millet are examined by using NSSO unit level data. Specifically the paper attempts to (i) study the spatial and temporal analysis of small millets in terms of area, production and yield, (ii) study the consumption of small millets for the major states and (iii) study the structural break of minor millet and finger millet in last two decades. Assam (18.82kg/hsh/m) and Bihar (18.69kg/hsh/m) states were the highest consumption of small millets found in all India and rural areas. Madhya Pradesh occupied the highest area of small millets followed by Chhattisgarh, Uttarakhand, Maharashtra, Gujarat and Tamil Nadu. Uttarakhand has highest productivity of 1174 Kg/ha followed by Tamil Nadu and Gujarat. Structural breaks estimated based on bai-peron method of structural break analysis for both finger millet and minor millet. In case of minor millets area of structural break was observed in the year 1998 and between 2000 and 2002. In comparison to sorghum, pearl millet and finger millet limited varieties of small millet have been developed. Investment in minor millets should be increased to improve the varietal development.

## A Study of Loan Requirements and Cost of Acquisition from Non-Institutional Agencies in Maharashtra

**B.V. Pagire, Y.C. Sale and S.V. Bhujabal***

An attempt has been made to study the pattern of loan acquisition from institutional and non-institutional agencies and its magnitude to estimate the cost of loan acqusition as well as extent of loan overdues in the state of Maharashtra. A total of 160 sample cultivators were selected from four districts, 8 tehsils and 16 villages of the state pertaining to the years 2008-09 to 2010-11. The findings of the study indicated that (i) in case of non-institutional loan, maximum loan was acquired from the money lenders, (ii) In the case of non-institutional agencies, the per cent gap was highest for medium farmers (23.47 per cent). Money lenders were more liberal to sanction the non-institutional loan requirement of farmers, (iii) the cost on items like stamp duty, processing fee and other sundry expenses incurred were higher at the overall level

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and (iv) The overdues of non-institutional loans were higher in case of medium size group of farmers (74.89). Majority of the farmers availed loan from money lenders. Therefore, it is necessary that the farmers should make some investment on other subsidiary occupations like dairy, poultry, sericulture, mushroom production and the likes which will be helpful for generation of income and employment thereby increasing the farmers own equity/funds for the developmental activities.

## How Efficient are our Paddy Farmers? A Comparative Trend Analysis in Cost of Paddy Cultivation and Estimation of Technical Efficiency

**C. Sulakshana Rao and R. Balasubramanian†**

The paper attempts to estimate the plot level technical efficiency of paddy farmers across major paddy producing states in India using stochastic frontier production function. The plot level data on the cost of cultivation of paddy across different Indian states was used in the study. The technical efficiency was estimated for the all major rice-growing states for two different time periods, 2003-04 and 2012-13. The analysis provides a comparative picture of how the efficiency has changed over time and act as a guide to the policy makers on targeting the inefficient rice-growing states and identifying states for feasible and efficient paddy production. It was observed that the realised output could be increased by more than 10 per cent by enhancing the efficiency without any additional inputs. The efficiency of rice farmers in India has declined over the decade from 2003-04 to 2012-13 in most of the major rice-growing states except Haryana and Maharashtra. Rice production with more than 80 per cent technical efficiency was observed in Odisha, West Bengal and Tamil Nadu, implying that the farmers in these states are far more technically efficient than the other rice growing states. The paper also analyses the trend in area and yield of paddy across the major rice growing states. Agriculturally advanced states showed a declining trend in the yield implying an increasing pressure on rice production ecosystems due to continuous, intensive cultivation practices. The decadal change in real cost of cultivation (TE 2004-05 and TE 2012-13) was calculated across the states and it varied from a maximum increase of 27.51 per cent in West Bengal to a minimum of 10.30 per cent in Punjab.

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## Comparative Analysis of Resource Use Efficiency in Mentha Cultivation on Different Farm Size Groups

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A study was conducted in Rampur district of Uttar Pradesh to find out the resource use efficiency of farmers in mentha cultivation. Multi-stage sampling technique was used to select blocks, villages and the respondents from the four villages of two blocks of Rampur district. Cobb-Douglas production function was employed to estimate the resource use efficiency. The variables seed on small farms, fertilisers on medium and irrigation and human labour on large farms were found to be significantly influencing the mentha yield, while the variable distillation facility was found to be significantly influencing the mentha yield on all farms except the large ones. The study concluded that the input use level on large farms was relatively higher than their counterparts of small and medium farm categories. Higher input use on these farms may be attributed to better economic access to inputs due to better resource base of large farmers. Further, despite of higher input use level on large farms the cost of mentha cultivation was the lower on large farms; and the cost of mentha cultivation (cost of mentha production). The inverse relation between cost of mentha cultivation and size of farm was due to scale economies realised on large farms in input use and bulk purchases and sales on large farms. In this regard, farmer's field trials and awareness campaigns on improved practices and correct method of use of inputs need to be undertaken for the benefit of mentha producers.

## Resource Use Efficiency of Major Cereal Crops of Meghalaya

**Ram Singh, Koijam Johny Singh, S.M. Feroze, R.K. Josmee Singh, Lala I.P. Ray, B. Lahari and Damewan Muliar†**

A study was undertaken in two districts of Meghalaya to work out the cost and returns major cereals crops, *i.e.*, rice and maize. Benefit cost ratio of rice cultivation worked out to be 1.10 while that of maize worked out to be 1.28. For this purpose a total of 340 farmers comprising 220 farmers from two district for rice and 120 farmers from two districts for wheat were selected. The cost of cultivation analysis point out that both the crops are less profitable as the farmers adopted traditional practices of cultivation. Hence, there is a lot of potential to increase the benefits from rice and maize cultivation by high yielding varietal. Besides efforts should be made at

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the state level to realise the economic benefits to the farmers as well as policy makers to popularise the production in the state.

**Commercialised Jhum Cultivation: A Case Study of Kharam Village, Manipur**

**Sadam Hanjabam***

Jhum cultivation is the most important form of agriculture system practiced in the hill areas of Manipur. But with the ever increasing population and limited land area it has undergone a transition. The once consumption-oriented jhum cultivation has started becoming market oriented. The paper attempts to understand the transition through a case study taken up in Kharam Pallen village of Senapati district in Manipur. In this paper a brief account of Jhum cultivation is provided and the village details are then described and analysed to understand the village structure, issues with agriculture, land systems and ownership, issues with livelihood, basic amenities and infrastructure. The findings as per the responses given by the village headmen and others involved in the focused group discussions were analysed. The researcher has also put inputs from observing the scenario and experiences in the villages. The main aim of this paper is to study the link between agriculture and food security in the specific agricultural and social contexts in the village.

**State-Wise Comparative Analysis of Different Cost Components and Factor Productivity of Paddy in Indian during Last Decade**

**S. Chatterjee†**

The present study attempts to evaluate state-wise variation in various cost components of paddy in India as well as the technological change in rice cultivation and its key factor contributor during 2000-01 to 2009-10. State level secondary data of input use and output of paddy has been accessed for the given period of time. For assessment of different cost components over the years, the exponential growth rates and instability of different cost components have been calculated using simple logit estimate while the state-wise total factor productivity for paddy have been computed using Divisia Tornqvist-Theil index model. The study evaluates that although there has been a stagnancy in the overall productivity of crop sector in India due to excessive use of inorganic fertiliser, insecticides and pesticides resulting in desalination of soil, still a combination of organic and inorganic mix package of practice for paddy in different states of India has been highly visualised as a marked technological change in rice cultivation has been observed in the state of Madhya

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Pradesh, Kerala and Karnataka. With the rise in operational cost of paddy including the hiring rate of tractors and power tillers, farm mechanisation has still become the prime contributor in different states of India. Despite a sharp increase in the human labour wage rate, the contribution of human labour still dominates the overall farming situation in India. Irrigation factor as been a major contributor with a negative impact on productivity change as most of the region has cultivated rainfed rice. The contribution fixed factors has been gone up as the opportunity cost of land has been increased.

**Tracing the Changes in the Groundwater Market: Case Study of Amarsinghi Village, 2005 to 2015**

**Tapas Singh Modak and Aparajita Bakshi***

The paper documents the changes that occurred in the water market in Amarsinghi village, Malda district, West Bengal, between 2005 and 2015. The village was irrigated by diesel powered tubewells in 2005 and there was an active market for groundwater. In the study period all tubewells were electrified and a tubewell was installed by the government which was managed by a co-operative. These changes reduced irrigation costs substantially for farmers buying groundwater compared to diesel powered tubewells, and replaced share payments in water markets with fixed-rate payments. Irrigation costs as a share of total costs decreased continually for the major irrigated crops like boro paddy and potato in the study period though, costs in the private water market were higher than the co-operative tubewell. Though farmers using co-operative tubewell earned higher profits in irrigated crops initially, by 2015 profitability of groundwater irrigated crops were similar for both groups of farmers.

**Assured Irrigation Effects on Income and Employment in Farming of Uttar Pradesh – A Study of Central Plain and Bundelkhand Region**

**Babu Singh, Birendra Kumar, Rakesh Kumar Singh and Anjani Kumar Singh†**

The main objectives of the study are (i) to study the farm structure and cropping pattern of different households, (ii) to monitor the implications of external forces on specific and temporal changes in agriculture and natural resources management, (iii) to study the comparative advantages of different enterprises adopted by the farmers. This study was undertaken in the year 2014-15. The results of the study indicated

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composition and economic performance of the regions depend on availability of NRM, infrastructure development, literacy, health, soil health, irrigation facility and other related factors effects the ecosystem of the regions. For strengthening ecosystem should potential for developing farmers by diversifying the agriculture with livestock production. It strengthens the life of quality and healthy livings.

Thus, assured irrigation in the regions considering the main objectives are: (i) the imperative to increase income and employment, (ii) the need for higher employment on the farms and household, (iii) stabilisation of farm income over the season, (iv) conservation and enhancement of natural resources.

With these practices eradicate the poverty, improved life quality and healthy environment for survivability of natural resources and ecosystem in the regions.

## Extent, Impact and Determinants of Post-Harvest Losses in Tomato Production in Nagaon District of Assam

**Tinku Moni Borah***

The paper attempts to examine the extent and impact of post-harvest losses for the horticultural crop tomato at different stages of the supply chain and examine the factors affecting post-harvest losses of tomatoes at farm level in Nagaon district of Assam. The crop tomato has been selected as it is often cited as a crop with large post-harvest losses along with a fluctuating price trend. The study is based on primary data collected from Nagaon district, which accounts for largest tomato production share in Assam. The responses have been collected from tomato growers, collectors, wholesaler and retailers. Tabular analysis has been used to estimate the extent and impact of post-harvest losses at different stages and a functional analysis has been carried out to identify the socio-economic determinants of such post-harvest losses at farm level. The total post-harvest losses have been estimated at 26 per cent of total production comprising 11 per cent at farm level, 2 per cent at assembly market, 6 per cent at wholesale market and 7 per cent in retail market. Improper handing is found to be the major constituent of post-harvest losses for the crop tomato at farm level followed by harvesting and transit injury. The factors that influence the post-harvest losses significantly at the farm level have been identified and some policy implications have been highlighted. The contradictory finding of the study is negative association between post-harvest losses and level of production.

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**Estimating Different Components of Farm Income in Eastern and Western Region of Uttar Pradesh: A Village Level Income Analysis**

**Poonam Singh**†

The income from cultivation partly depends upon the nature of crops grown and partly upon the intensity of cultivation. The technological break-through in agricultural production through HYV seeds-fertilisers revolution has accelerated the transformation of Indian farm economy from subsistence level to a profitable business since green revolution periods. The paper has computed farm income with input structure according to different income concepts and discussed the livelihood issues of farmers on the basis of a village level survey in eastern and western region of Uttar Pradesh. The average per capita income from farm business has been estimated to be Rs. 2640 and Rs. 10002 in the two regions of the State. There is considerable disparity in the cost and income pattern among the different size categories of sample households in both regions and the study concludes that the western region is more prosperous than the eastern region on the income level basis. Farm business income per farm rises sharply with the size of holdings and is five times higher on big farms in Faizabad and more than six times higher in Bijnor district. Gross income per farm shows an increasing trend on all the farms due to continuous rise in prices of agricultural commodities while gross income per hectare reveals decreasing trend mainly due to higher cropping intensity, close supervision of small farms and more intensive use of animal and human labour in both the districts. Mixed farming, i.e., crop husbandry with animal husbandry is widely practiced in both regions but in higher intensity in western region.

**Allocative and Technical Efficiency in Rice Farming: A Region-Wise Study**

**Pallab Debnath and D.K. Pandey***

Improving the efficiency of rice production is accentuated through high level of importation of rice needs in Tripura. Tripura is a land locked hilly state of North Eastern Hill Region where rice is cultivated in both hill region and valley region. The paper has examined and compared the allocative and technical efficiency in rice farming among the regions and the factors affecting technical efficiency in Tripura. For the present study multi-stage sampling technique has been adopted and 120 respondents were selected through probability proportional to size. Data has been analysed using descriptive statistics, equating marginal value product and marginal factor cost, stochastic frontier production function analysis and regression analysis.

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The results have revealed that the farmers are not fully efficient in allocating their resources optimally; hence, some resources have been under-utilised while some have been over-utilised. As a consequence, some of the inputs should be increased in hill ecology while the same should be decreased in valley and *vice-versa*. The technical efficiency score revealed that the efficiency score in hill and valley differs marginally without any significant deviation. It was therefore, concluded that rice farmers can still increase output or save cost without the need to change existing technology and inputs.

**Economic Feasibility of Okra Crop Grown on Different Coloured Poly-Mulches in Udaipur District of Rajasthan – A Case Study**

**P.S. Rao and S.S. Lakhawat†**

Plastic mulching is a way of soil moisture conservation and improvement of water use efficiency of the crop. Poly-mulch also helps in better nutrient management and weed management. Different colours of poly-mulch has its individual effects on soil and plant health and also on some micro-climatic factors of the growing plants. Okra seedlings were sown on raised beds in two rows after lying of poly- mulch on the beds. The water has been supplied through gravity fed drip irrigation with one lateral for two rows of the crop. Economics of the crop has been worked out with regard to all coloured poly-mulches.The investigation trial was conducted at Plastic-culture Farm of CTAE, Udaipur (Raj.) to fulfill three specific objectives, namely: to study the effect of different coloured poly-mulches on the microclimate of the growing plants, to study the impact of microclimate on the growth and yield characters of tomato and to identify the colour of poly-mulch and their economic feasibility with regard to okra crop.

The fixed costs for okra cultivation on all four coloured poly-mulches namely black, silver, yellow and milky-white poly-mulch was the same and found to be Rs. 39,835/- for the period of six months for okra crop. The total variable cost (B) was found to be different and for first two types of colour namely, black and silver poly-mulches it was Rs**.** 1,40,171.20/- and for another two colours viz. yellow and milky-white colored poly-mulch it was observed to be Rs. 1,32,371.20/- per hectare. Cost of cultivation (A+B) for black and silver mulch was found to be Rs. 1,80,006.20 while, it was Rs. 1,72,206.20/- for yellow and milky white poly- mulch for per ha of tomato crop. Average yield of okra per hectare from black, silver, yellow and milky-white poly mulch was found to be 79,200 kg., 60,000 kg., 41,000 kg. and 47,000 kg respectively. The input out-put ratio or per rupee returns from 1.0 ha area form black, silver, yellow and milky-white poly-mulch was obtained as 4.40, 3.33, 2.38 and 2.73 respectively. Thus, it can be concluded that black coloured poly mulch have more

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input-output ratio and hence, it provided more profit as compared to any other type of poly-mulch for growing okra in Udaipur district of Rajasthan.

## Comparative Economics of Sunflower and Safflower Cultivation of Western Maharashtra

**V.A. Shinde*, S.S. Bhosale* and S.D. Patole****

A study was undertaken during the year 2014-15 to work out the input utilisation for cultivation of sunflower and safflower, to study and compare the costs, returns and profitability and suggest remedial measures. Based on primary data collected from Solapur district and from Solapur district Akkalkot (Nagansur village), South Solapur (Sindkhed village) and Mangalwedha (Borale village) tahsils are very well known for cultivation of both safflower as well as sunflower was selected purposively. The results of the study indicated per hectare cost of cultivation of safflower and sunflower (i.e. Cost 'C') to be Rs. 21133.10 and Rs. 24149.98, respectively. The per hectare gross income received from cultivation of safflower and sunflower was Rs.27478.83 and Rs.29859.74, respectively. It is indicated that safflower has obtained more gross income than the sunflower while in case of marketing the average marketing cost of safflower in channel-I was Rs.262.58 and in channel-II Rs.34.21. The major items of cost in the case of channel-I were commission charges, transportation, packaging charges and weighing charges. While in case of marketing cost of sunflower in channel-I, it was Rs.251.95 and Rs.34.34 in channel-II.

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