Indian Journal of Agricultural Economics 77: 3 (2022):491-507
DOI:10.63040/25827510.2022.03.013

Determinants of Climate-Smart Agriculture: Micro-level evidence from India

Dibakar Sahoo*

The paper attempts to examine the factors that influence climate-smart adaptation (CSA) strategies. The study used binary logit and multivariate probit models to understand the dynamics and factors of agricultural households' behavioural decisions on CSA strategies. Based on the results of the binary logit model, the study indicated that factors such as access to extension services and training, educational level, occupation, and crop damage level positively and significantly influenced farmers' decisions to use CSA strategies. Similarly, the results of the multivariate probit model reveal that factors such as perception of climatic risks, educational level, gender, access to irrigation infrastructure, and access to extension services and training all had a significant impact on the adoption of the majority of CSA strategies. To improve the intensity of CSA strategies, the study recommends expanding training and extension services to farming masses, the expansion of irrigation facilities, and weather information at the farm level.

Assessment of Market Competitiveness and Performance of Spice Crops in India

Manish Sharma and Ram Singh†

The study tries to assess the comparative advantages of the important spices sector both at the domestic and international level and the impediments in its growth by analysing twenty year (2001-2020) secondary data on exports and imports of spices crops, share of Indian spices in world trade as well as Indian GDP collected from Spices Statistics at a Glance 2021, Directorate of Arecanut and Spices Development and other published sources. The findings of the study indicate that the percentage contribution of spices of total agricultural foreign earning had increased from 6.52 per cent to nearly ten per cent during the last twenty years. The country has received a boost in terms of total foreign earnings through exports, whereas, share of spices import had not increased much. On the other hand, imports had also increased from 4.17 per cent to nearly eight per cent. Overall, among whole spice crops, the chilli had contributed maximum percentage share of total agricultural foreign

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earnings. Besides, all major spices had achieved positive growth thereby the value of foreign earnings on the whole increased from 16.23 thousand crores to 27.19 thousand crores during preceding six years. In terms of export earnings, the coriander, chilli, turmeric, cumin and celery indicated positive growth, while other spices still decreased. In the context of international trade, turmeric, cardamom, nutmeg, ginger, coriander and cloves recorded highest comparative advantages in export, whereas, black pepper, chilli, cardamom, nutmeg, cumin, garlic and clove recorded high comparative advantage in terms of import. The study concludes that the production and export earning of spices had great comparative advantages in India and need to be encouraged. There is also need to capitalise the advantageous position by securing a stable position in the global market.

Economic Feasibility on Cultivation and Marketing Strategy of Arunachal Orange - A New Paradigm for Competitiveness

L. D. Hatai, L. Geetarani Devi, B. N. Hazarika and A. K. Tripathy*

An attempt has been made in the paper to examine the economics of production, disposal trends, post-harvest losses and marketing channels, price spread, marketing efficiency in Arunachal orange as well as identify the marketing constraints and suggest some policy implications for improvement. For the purpose a sample of 60 Arunachal orange growers comprising 30 small (<1ha), 20 medium (1 - 2ha.) and 10 large (> 2 ha.) farmers growing Arunachal orange from two villages, viz., Dambuk and Roing of Lower Dibang Valley, Arunachal Pradesh were selected through stratified random sampling method. Besides, a sample of 10 wholesalers, 10 traders, 15 retailers and 15 village beoparies in the major marketing centres namely, Pasighat of East Siang and Roing of Lower Dibang Valley were randomly chosen. The study revealed that the total cost of cultivation was the highest on small farms followed by medium and large farms. It may be due to usage of more inputs and higher expenses on labour, planting materials by these growers. The highest BCR of 4.86 was achieved by the large farms because of judicious expenditure in Arunachal Orange cultivation and obtaining a sizeable amount of returns. The price received by the farmers was the highest when Arunachal Orange was directly sold to consumer in all categories of farms and the lowest from the sale through wholesaler. The net price received by the all categories of Arunachal Orange growers was highest of Rs. 2432/- per quintal when directly sold to the consumer. The extent of total post-harvest losses is 1.04, 1.11 and 0.89 quintal per hectare at the farm level for small, medium and the large farms respectively. It was seen that in case of overall sample farmers the post-harvest losses at farm level and market level were 1.01 and 0.31 q/ha respectively. It

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was apparent that all categories or Arunachal Orange farmers were facing the production constraints viz. high infestation by pest and disease, high-cost inputs and scarcity of labours. Lack of cold storage in that area of study compelled the farmers to sell their produce soon after harvest. Overall, it was observed that low price in wholesale market, seasonal fluctuation in prices due to irregular supply were the major marketing problems faced by these farm growers. It was observed that the total marketing cost increased from 23.96 per cent in channel-I to 27.35 per cent in channel-II and to 29.49 per cent in channel-III. Improved market infrastructure, direct and group marketing, establishment of modern marketing and processing units, market integration, formation of FPOs and the improvement of the overall efficiency of the marketing system are some of the measures suggested. Besides new strategies are needed to resolve the problem recurrent price fluctuations, high marketing, storage and transportation cost, non-availability of adequate storage facilities, post-harvest losses and lack of competitive marketing system. Arunachal Orange cultivation is one of the potential alternatives for the diversification of agriculture and development of agro-processing industries and this sector needs to be encouraged by promoting producer's co-operative and providing adequate short term credit facilities particularly in the rural areas. In order to hedge risk of Arunachal orange production and marketing, it is imperative to develop market intelligence services, introduction of support price and insurance scheme in Arunachal Pradesh. Adoption of new technology and sustainable utilisation of resources can help Arunachal Orange growers in minimising the cost of production.

Can the Innovation in Paddy Cultivation Increase the Economic Benefits? - A Study of Groundwater Irrigated Area

G. Karthiga Devi, A. Narayanamoorthy, P. Jothi and K.S. Sujitha[†]

Paddy is the largest foodgrain crop cultivated in India. But, because of the looming water scarcity, paddy cultivation under the conventional inundation method is going to be unsustainable in the future. An innovative method of paddy cultivation popularly known as the System of Rice Intensification (SRI) helps reduce water consumption while increasing land productivity and that too with lesser inputs. Although SRI has been in practice over the last few years in India, the impacts of SRI on water saving, land productivity as well as on profitability has not been analysed in detail using data collected from groundwater irrigated area. In this study, therefore, an attempt has been made to fill this gap utilising data collected from a total of 100 sample farmers from Pudukkottai in Tamil Nadu state. The results reveal that the SRI method helps save about 46 per cent of irrigation water, increase land productivity by

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about 51 per cent while reducing about 20 per cent in the cost of cultivation over the conventional inundation method. SRI method also helps the farmers to harvest an additional profit of Rs. 17,639/acre over the same realised by non-SRI farmers. As paddy is the largest water-consuming crop in India, the study suggests that the ever-increasing water scarcity can be reduced considerably by expanding the area of this innovative method of paddy cultivation and that too with increased production.

Socio-Economic Impact of Improved Variety and Production Technologies of Chinese Potato in Tamil Nadu

P. Prakash,[*] D. Jaganathan, ** Sheela Immanuel,* P. S. Sivakumar, *** R. Muthuraj,*** T. Krishnakumar* and Prabhat Kishore#**

The study tries to assess the socio-economic impact of improved variety and technologies of Chinese potato and to determine the factors influencing the adoption by the farmers in two districts of Tamil Nadu.The impact assessment was based on farm households survey conducted in Tenkasi and Tirunelveli districts of Tamil Nadu among 200 Chinese potato producers during 2021-2022. The Logistic regression model was used to identify the factors determining the adoption of improved variety and Inverse Probability Weighted Regression Adjustment (IPWRA) method was used to estimate the impact of adoption of Sree Dhara (Chinese potato var.) on yield and income. The findings indicated that the cost of cultivation, gross income and net income for Sree Dhara adopters were 7 per cent, 37 per cent and 87 per cent higher than the non-adopters respectively. Factors such as years of schooling, farm income, access to extension services and block dummies had significant positive effect on adoption of improved variety. The IPWRA results showed that the impact of adoption of Sree Dhara on yield and income was higher by 23.65 per cent and 24.99 per cent respectively than the non-adopters. Lack of awareness about improved varieties and inaccessibility to credit and crop insurance were the major constraints to technology adoption in Chinese potato. Therefore, recognising its higher nutritional value and potential farm income, institutional support in the form of better extension linkages, credit facilities and crop insurance to the Chinese potato growers need to be strengthened.

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Dynamics of Market Integration between Domestic and Export Prices of Tomato in India

Sonali Katoch and Rakesh Singh[†]

The paper attempts to study the integration of tomato markets between five domestic Indian market prices, and an export price series calculated through export quantity and value over the selected period. Among five domestic markets, three primary markets viz., Nashik, Chittor, and Solan, and two secondary markets viz., Delhi, and Kolkata are selected for period of 12 years (2009-2020). The seasonality index identifies that tomatoes fetched more prices during the initial months of all the years. The instability obtained from Cuddy-Della Valle Index reveals high instability in tomato prices. Johnson's co-integration test is conducted after establishing that the prices are stationary and free from the consequences of a unit root. The number of co-integrating vectors implies the strength and stability of price linkages in the markets. Chittor market turned out to be a price leader from Granger Causality test. The highest speed of adjustment is also found in the Chittor market, and when a standard deviation shock is given to the leader market, an immediate and high response is noticed in all the other markets.

Water Budgeting for Effective Agricultural Water Management: A Study Across Agro-Climatic Zones of Uttar Pradesh

Prabhat Kishore[*] , Dharam Raj Singh and Shivendra K. Srivastava**[*]

The study tries to estimate irrigation water demand and supply across agro-climatic zones of Uttar Pradesh emulating pre-defined path of water balance approach. On the side of total irrigation water demand, crops require 64.50 BCM of water during complete growth period. On the other side, taking into account the existing irrigation sources and efficiencies of the irrigation systems, irrigation water availability is estimated to be about 65.76 BCM. The results indicate a slight surplus of water (1.96 per cent) at the state level, however, there exist wide variations at agro-climatic zones. The Bundelkhand zone, synonymous to drought, has the highest water deficit condition and the north-eastern plain zone endowed with adequate rainfall, is found to have highest water surplus condition. These findings advocate for rational crop selection according to the available water resources for long term sustainability. Therefore, the study suggests to supplement the existing policy instrument of optimal

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water use- region specific crop plan and efficient irrigation system (primarily micro-irrigation), with research on crop water productivity instead of crop yield.

Implication of WTO Agricultural Domestic Support Negotiations

Abhijit Das, Sachin Kumar Sharma[†], Teesta Lahiri, Paavni Mathur and Lakshmi Swathi Ganti

Attempts to reform agricultural domestic support pillar at WTO have been ongoing for nearly 22 years dating back to its inception in 2000, and members have failed to reach consensus, even at the recently concluded 12 th Ministerial Conference held in Geneva. Instead of addressing the historical asymmetries and imbalances in the Agreement on Agriculture (AoA), as demanded by developing members. The proposals by the Cairns group have built a narrative that the major trade distorting domestic support (TDDS) is as a result of developing members increasing support. The Cairns group have submitted proposals to cap and reduce the global agricultural TDDS by half using a proportionate reduction method. In this context, this paper has examined the implication of the proportionate reduction method on selected members of the WTO. Further, the paper has delved into the possible outcomes using compound annual growth rate to project 2030 TDDS entitlements of the selected members. The proposed proportionate reduction in TDDS appears skewed in favour of the interests of the developed members and the Cairns Group, while ignoring the interests of many developing members.

Economic Assessment of Maize Marketing through Farmer Producer Organisation in Karnataka

S. Likhitha [*], Anbukkani Perumal[**] Pramod Kumar,[**] M. L. Nithyashree [**] and G.K. Jha[**]

The study has mainly focused on studying the trends of maize in India and the value chain through different market channels and the role of various intermediaries in maize marketing in Davanagere district of Karnataka and a comparision of different channels in revenue generation to the farmers. Maize crop has showed growth rate of 2.0, 4.6, 2.6 in area, production, productivity from year 1990-2020. The prices also indicate a rising trend. Davanagere district is major maize growing belt in Karnataka which is also having advantage of feed processing and starch industries nearby locality. It was observed that compared to four market channels involving the village

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trader, wholesaler, FPO and processing companies are in direct contact with the producer. Channel involving FPO has highest B:C ratio of 2.22 due to low input cost coupled with high prices for produce whereas market efficiency was found to be highest in fourth channel involving processing companies with 1.92. The reason is that costs incurred was low for farmers connected to FPO is because they can obtain inputs at lower cost and offer prices higher than prevailing market prices. The reduction in market intermediaries is the reason for higher price realization in FPO as compared to channel I and II which involved the village traders and wholesalers. The reason for higher share of producer in consumer rupee and higher market efficiency is complete removal of intermediaries. However these innovative channels are not widely used due to lack of awareness among farmers, quality issues in produce leading to rejection by processing companies at FPO and zero billing channel.

An Estimation of Factors Determining Adoption of AgriTech by Farmers in Nelmangala, Karnataka

Shwetha Kumari and M. Vineeth[†]

India's agriculture sector continues to remain the main source of livelihood for over 40 per cent of the population and contributes 19.9 per cent as of 2021 to the national gross domestic product. But, the agricultural sector is affected by several challenges. As a result of this, various interventions are being introduced by several stakeholders in the form of agricultural technology start-ups, in the recent years in India. Of 700 AgriTech start-ups in India there are about 226 AgriTech startups in Bangalore, Karnataka as of mid-2021. The study aimed to analyse the factors (age, educational level, economic status, farmer category) that determine the adoption of AgriTech provided by AgriTech start-ups in rural Bangalore. The study also intends to understand the emergence of AgriTech industry in Karnataka. For the purpose Byrasandra and Srinivaspura in Namangala taluks of Rural Bangalore district, Karnataka among farmers who had adopted AgriTech and who had not adopted AgriTech were selected. A descriptive analysis such as chi square, cross tab and bivariate pearson correlation was used to examine the objectives using a random sample of 100 farmers. From the result it was evident that farmer's age, educational level, economic status and farmer category played an important role in the adoption of AgriTech.

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Energy Use Efficiency and Greenhouse Gas Emissions in Punjab Agriculture

Sangeet Ranguwal, Baljinder Kaur Sidana[*] and Sunny Kumar

Efficient use of energy resources in crop production is an important goal in sustainable agriculture. The growing global population exerts pressure on agricultural production systems that aim to secure food production while minimising GHG emissions. In this study, the energy use efficiency(EUE) and GHG emissions associated with the production of major crops in the Indian Punjab has been studied during 2018-19. It was found that the share of Direct Energy(DE) and non-renewable energy in total energy use are higher than the indirect energy(IDE) and renewable input energy on Punjab farms except in sugarcane. Electricity as DE and fertilisers in the form of IDE are the primary energy sinks for cultivating different crops. The specific energy based on economic yield is significantly high in cotton (10.76 MJ/Kg), followed by paddy (6.77 MJ/Kg), while it lies below 5 MJ/Kg for the rest of the crops. High energy intensity indicates an opportunity for improving the energy productivity of crop cultivation in the state. In terms of total input-output energy, net energy gains and EUE, sugarcane production occupies the top rank, followed by paddy among seasonal crops. It was also observed that paddy cultivation emits the highest CO2 eq. emission (6691 kg CO2 eq./Ha) among crops, around 60 per cent is contributed by methane (CH4) only due to submerged paddy cultivation in the state. Thus, efficient use of fertilisers, optimised pumping facilities for irrigation, adoption of RCT's, i.e., DSR, laser levelling, and minimising crop residue burning in the field and using them for energy supply are the measures suggested to improve EUE and mitigating GHG emissions.

Determinants of Technological Adoption in Subsistence Farming in West Bengal

Sourashree Mukherjee* and Gaurav Saraswat[†]

The study tries to analyse the decisions of the farmers regarding adoption of technology and the constraints that bind such decisions by using farmers' household level data for West Bengal collected by the National Sample Survey Office (NSSO). Using logit model the study tries to examine which factors impact the decisions of the famers in adopting technology. The operational holding of two groups of farmers brings out the heterogeneity in the production processes. The use of the technology is more or less same among the farmers of the two divisions, as per our classification that is big and small. Based on our findings, it is inferred that whether the farmer runs the farms independently or collectively has no impact on the technology

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adoption choice. In a technical sense, insurance minimizes risk. As a result, the smaller a farmer's uncertainty is when his crop is insured, the more likely he is to embrace a technique. An important limitation of the analyses made so far in the study is regarding the unavailability of data for more consecutive time periods, which makes the analysis less revealing about the changes that are incorporated in the decisions of the farmers over a longer time frame. Providing more robust inferences about the decision of the farmers requires a time series analysis with alternative data sources if available. Further research can be carried forward by trying to incorporate alternative measures for the limitations mentioned above, and better inferences could be made for farm policies that can incentivize the farmers towards adopting a more efficient production technique.

Traditional Value Chains for Green Pea in Punjab: Production, Marketing and the Potential for Value Chain Upgradation

Simranpreet Kaur, Kamal Vatta and Kashish Arora*

The study examined green pea value chains in Punjab using the primary data collected from 50 pea growers, 20 vegetable wholesalers, and 20 vegetable retailers. The potential to expand modern value chains is explored. Three traditional value chains for pea were identified, and the pea growers preferred that with no intermediaries to raise their profits. High input costs, frequent insect-pest attacks and diseases, adverse changes in weather, lack of cold storage facilities, longer marketing distance, high transportation costs, and delayed payments from the wholesalers are the primary production, post-harvest, and marketing issues afflicting the pea growers. Furthermore, the study examined the awareness of pea growers about modern value chains involving the processing and export of green pea and their willingness and preparedness to upgrade to modern value chains. Awareness generation on modern value chains, price or economic incentives, input subsidies, and better credit facilities to the pea growers can play a significant role in the value chain up-gradation of the pea growers in Punjab. In addition, capacity building for quality production and strengthening of pea processing facilities in the state will also encourage the expansion of modern and more remunerative value chains for green pea in Punjab and will ultimately contribute to crop diversification and higher farm incomes in Punjab.

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Economic Impact of GI Tagged Kodaikanal Malaipoondu on Farmer's Income - Empirical Evidences in Tamil Nadu

M.Anjugam and P.Bharathi[†]

An attempt has been made to assess the impact of geographical indication (GI) tagged Kodaikanal Malai Poondu on farm households. It was registered in Tamil Nadu for its unique characteristics such as medicinal properties, long storage life period, high pungency and was cultivated from 18 th century. Cost and returns, marketing channel, post-GI initiatives of Kodaikanal Malai Poondu farmers were assessed. Cost and return analysis revealed that the total cost of cultivation in Kodaikanal hill Garlic was Rs. 2.23 lakh ha with the net return of Rs.3.56 lakh. After GI registration, the awareness among the consumer on hill garlic has been increased due to its medicinal properties. Area under garlic farming to smaller extent and price increase are observed. The major constraints faced by the Kodaikanal hill garlic farmers are prevalence of pest and diseases due to climatic variation and damage by wild animals. It is suggested to make arrangements for direct marketing of garlic in the domestic market through the association, encourage them to participate in the marketing fairs, promote awareness on GI tagged products, provision of subsidised inputs, efforts to increase the area under garlic to enhance production and to establish storage facilities for hill garlic. Moreover, farmers may be trained on value added products from garlic for enhance their net income.

Water Sustainability Concerns in Sugarcane and the Role of Drip Irrigation in Maharashtra

T. Kingsly Immanuelraj[*] **and Sant Kumar**

The groundwater level in sugarcane growing districts of Maharashtra has reached at over-exploited stage and calls for an alternative irrigation method and cropping pattern which are more efficient and sustainable. The present study has established that continuing of traditional method of irrigation is non-productive and unsustainable, leading to declining profitability. The role of drip irrigation is found to be efficient, productive and profitable. The study is based on secondary data on area, production, yield and cost of cultivation details covering the period 1971 to 2020. Translog profit function has been employed to examine the relationship between the prices of output and inputs with output supply and inputs demand. The findings indicate that increase in sugarcane production was mainly brought from increase in area, and yield started declining after 1980s. Data show that groundwater level in

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sugarcane growing districts have declined between 2-40 mt in over 96 per cent of wells in past two decades. The elasticities of output and inputs derived from translog profit function have shown that among four inputs, the coefficients for irrigation and intermediate inputs were elastic, signifying that price of sugarcane is the serious cause for scarcity of water and land degradation. Thus the rise in sugarcane price increases the demand for irrigation water and fertiliser (intermediate) by 1.94 per cent and 1.06 per cent, respectively. Therefore, for the long-run sustainable development of sugar industry, cane productivity has to be optimised not only per unit of land, but also per unit of water. As sugarcane price is the main driver of area under sugarcane and input use, and carefully managed price policy likely to promote welfare and sustainability of farmers and sugar industry by efficient use of irrigation water, fertiliser and adoption of efficient irrigation methods.

Status of Farm Mechanisation and Productivity in Bihar

Tulika Kumari, K.M. Singh, Ritambhara Singh, Aniruddha Roy, Nasim Ahmad, Rashmi Sinha and R.K. Meena[†]

Farm mechanisation is one of the important technological advancement to improve the agricultural productivity. The various sources of farm power have shown an increasing trend over the years except drought animals in all the agro-climatic zones of the state. The percentage increase in adoption of tractors is the highest, which shows increasing level of mechanisation. The study presents positive increase in farm power availability as well as productivity. The study corroborates with earlier studies that there is positive relation between farm power and productivity and for increasing the productivity there is need to enhance the mechanization in the state. Several constraints hinder the mechanization in the state including non-availability of electricity. Therefore, cost effective power source like use of crop residue for power generation, use of conventional and non-conventional energy source could improve the adoption of farm mechanisation and ultimately enhance the productivity and income.

Adoption of Organic Soil Fertility Measures and Its Impact on Farms' Outcome: Evidence from Millet Farms in Telangana

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The study examines the causal impact of adoption of Organic Soil Fertility Measures (OSFM) on farm net-revenue using household survey data of around 1100

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farmers in Telangana, India. The study uses inverse-probability-weighted regression adjustment (IPWRA) method to assess the causal impact of SWC measures on agriculture output while controlling for plot level, socio-economic, institutional and village level characteristics. The model results suggest that there is a significant difference in farm net-revenue among OSFM adopting farmers and non-OSFM farmers. The findings show that the difference between OSFM and non-OSFM farmers in average aggregate net revenue attributable to OSFM practices is about INR 5744 higher compare to non-OSFM farmers and in terms of percentages, the ATT value of OSFM category is attributed to 10.08 per cent higher compared to non-OSFM category. The study results suggest that OSFM adoption significantly increases net-revenue indicates that Governments must make efforts to create awareness of benefits of OSFM practices among farming communities.

Production, Export and Competitiveness of Fish and Fishery Products in India: An Analysis Across Technology and Policy Phases

A. Suresh[†], V. Geethalakshmi[†], V.R. Renjini‡ and Neethu Mol Jacob[†]

The main objectives of the study are (1) to identify the structural breaks in the production of fish and shrimp in India, and its exports, and to trace its linkage with major shifts in technology, policy and institutions; (2) to establish the causal relationship between production and export in case of fish and shrimp; and, (3) to sketch the performance of export of marine products in terms of growth, instability and competitiveness The study uses secondary data on production, domestic supply, and exports from various published sources. Using the Bai and Perron method, five structural breaks were identified in fish production and exports: 1981-1983, 1988, 1994-1995, 2000-2002, and 2006-2009, coinciding with shifts in technologies, development efforts, and policies. At the national level, from 1980–81 to 2018–19, the production of inland and marine fish increased at an annual rate of 6.3 and 2.4 per cent, respectively. The production performance at the state level varied widely. The performance of exports is examined by using growth and instability, across product groups and structural break periods (since 1995). The performance varied by technology and policy shifts. The marine products' export is competitive as indicated by the Revealed Comparative Advantage (RCA), but the competitiveness tapers over years. Granger causality analysis between fish production and exports has shown bidirectional causation, pointing to the importance of comprehensive R&D interaction and policies throughout the value chain. The study concludes that steps to improve production and value addition with favourable R&D and policies are critical to enhance fish production and its subsequent value addition.

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Economic Gain from Public Investment on Livestock Research: Evidences from India

Babita Kathayat,[*] Anil K. Dixit, [†] B.S. Chandel [†] , R.Sendhil[‡] and A.K Sharma[†]

An attempt is made to investigate the economic returns of livestock research investment–which is less known in Indian settings–using a unique panel dataset of 15 states (covering North, East, West and South zones) from 1991-92 to 2017-18. The study has used a trapezoid lag structure to build a livestock research and education (LRE) stock variable, and 14 year-lag was found to be best fit. The estimates of the fixed effects panel regression suggest that, veterinary infrastructure, road density and artificial insemination have positive influence on Total Factor Productivity (TFP). However, annual mean rainfall and education negatively influence the livestock productivity. Interestingly, livestock research and education (LRE) stock variable has significant positive impact on TFP. Overall, 40.9 per cent marginal internal rate of return (MIRR) – signifies substantial economic gains from livestock research investment. Regionally, North zone exhibited the highest impact of research on productivity followed by South, East and West zone. Study reveals that investing in livestock research has high economic returns; hence more research allocation in the livestock sector need to be prioritised.

Wheat Futures as a Price Risk Management Instrument: Evidence from APMC Mandis

Rahul Kumar Singh[†]

The focus of this study is to compute the optimal amount of futures contracts to be sold and the subsequent reduction in price variation achieved. Indian agriculture, because of its diversity, makes generalization of any inference on the commodity prices very difficult. The existing literature has avoided this fact and has analysed prices of futures market and one representative spot market. This paper has broken the trend and has analysed six APMC markets from different states of India with the futures market prices. The results reveal that farmers trading in selecting Rajasthan mandi can reduce the price risk by 46 per cent if they sell futures contracts amounting to 50 per cent of their wheat produce. The government should support the farmers and the commodity exchanges in setting up more delivery centres. Frequent bans on the futures markets may hamper the development of free market risk management instruments.

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Moving Towards Value Chain Upgradation or Diversification? A Case of Small Tea Growers of Assam in Brahmaputra Valley

Titu Mahanta[*]

The diffusion of tea production from large estates to small holdings in Assam raises questions on not only the sustainability of tea production and productivity in the region but importantly also on implications for livelihood of small growers. 'upgrading' in the value chain literature is seen to benefit the region in terms of ensuring better appropriation of value within the chain. This study examines product or quality upgrading of organic tea cultivation in the case of Small Tea Growers (STGs) of Assam given the institutional intervention on promoting upgrading. The study finds that interventions are present in the node of production, however not in incentivising the price of organic product. Hence, STGs either remains in conventional tea cultivation or diversify to other farming and plantation, raises the issue of sustainability of tea plantation and livelihood.

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