Annual Report
2011-12

National Centre for Agricultural Economics and Policy Research
(Indian Council of Agricultural Research)
New Delhi-110 012

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NCAP Annual Report 2011-12

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PREFACE

Changes taking place in the operating environment for agriculture and macro-economic variables necessitate thorough understanding of their implications and designing of appropriate policy responses. The National Centre for Agricultural Economics and Policy Research (NCAP) has been carrying out this responsibility continuously ever since its establishment in 1991. The Centre was created with a view to strengthening agricultural economics research and enhancing competence in agricultural policy analysis within the National Agricultural Research System of the country. The Centre has promptly responded to various challenges and opportunities that emerged from time to time in Indian agriculture, and carved out a space for itself in the policy discourses on agricultural issues. This could be made possible only due to the exemplary performance by committed and hardworking staff of the Centre.

The Annual Report 2011-12 presents a concise account of activities and achievements of the Centre for the previous financial year. Despite a limited number of scientists, the Centre undertook 15 regular research projects. Some noteworthy research contributions were development of commodity market outlook models for grains and oilseeds; the association between farm size, input use and productivity in agriculture; historical and spatial growth performance in Indian agriculture; seed policy; sustainability issues in agriculture; climate change and agriculture; conservation agriculture; poverty and agriculture; gender dimensions; agricultural insurance products and their promotion; organised retailing; market integration; value chain in meat; economic impact of livestock diseases; impact of Self Help Groups; visioning for dairying, hill and rainfed agriculture; impact of National Horticulure Mission; and, impact of Bt technology in cotton. The Centre has also undertaken many capacity building programmes, networking and policy interactions with stakeholders.

Dr Ramesh Chand, Director of the Centre, has been conferred with the Rafi Ahmed Kidwai Award of ICAR for his outstanding contributions in agricultural research. Many works of the scientists of the Centre were published in journals of national and international repute. The significant achievement at the infrastructural front included the creation of a record-cum-exhibition room.

We are grateful to Dr S Ayyappan, Director-General, Indian Council of Agricultural Research, and Secretary, Department of Agricultural Research and Education, Government of India, for his guidance and keen interest in the activities of the Centre. I thank Dr Arvind Kumar, DDG (Education), ICAR, and other staff of Education Division for their help and co-operation in smooth running of the Centre.

My colleagues, Dr Suresh A Kurup and Sh Sajesh V K have ably compiled and edited this report. Mr Deepak Tanwar has patiently processed the manuscript. I thank them and all others who have contributed in various ways in bringing out this report. I acknowledge the outstanding contributions and team work of NCAP staff for taking the Centre to newer heights.

(Ramesh Chand)
Director

LIST OF ACRONYMS

AICL	Agriculture Insurance Company of India Limited
AKMU	Agricultural Knowledge Management Unit
ARIS	Agricultural Research Information System
BCR	Benefit-Cost Ratio
Bt	*Bacillus thuringiensis*
CeRA	Consortium for e-Resources in Agriculture
CGPRT	Centre for Research and Development of Coarse Grains, Pulses, Roots and Tubers
CGIAR	Consultative Group on International Agricultural Research
CMIE	Centre for Monitoring Indian Economy
CP	Control Programme
CRIDA	Central Research Institute for Dryland Agriculture
CSO	Central Statistical Organisation
DARE	Department of Agricultural Research and Education
DPSIR	Driving Force - Pressure - State - Impact - Response
DWR	Directorate of Wheat Research
EPW	Economic and Political Weekly
ERNET	Education and Research Network
ESI	Environmental Sustainability Index
ETL	Extraction, Transformation, Loading
FAO	Food and Agriculture Organisation
FMD	Foot and Mouth Disease
GDP	Gross Domestic Product
GoI	Government of India
GUI	Graphic Use Interface
IARI	Indian Agricultural Research Institute
IASRI	Indian Agricultural Statistics Research Institute
ICAR	Indian Council of Agricultural Research

ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
ICT	Information and Communication Technology
IMC	Institute Management Committee
IP	Intellectual Property
IPM	Integrated Pest Management
IRC	Institute Research Council
ISEC	Institute for Social and Economic Change
JSC	Joint Staff Council
KCC	Kisan Credit Card
MAFSU	Maharashtra Animal and Fishery Sciences University
MC	Management Committee
MGNREGS	Mahatma Gandhi National Rural Employment Guarantee Scheme
MSP	Minimum Support Price
NARS	National Agricultural Research System
NAIP	National Agricultural Innovation Project
NICRA	National Initiative for Climate Resilient Agriculture
NISCAIR	National Institute of Science, Communication and Information Resources
NISTADS	National Institute of Science, Technology and Development Studies
NPL	National Physical Laboratory
NPV	Net Present Value
NSSO	National Sample Survey Organisation
NSA	Net Sown Area
NSDP	Net State Domestic Product
PAU	Punjab Agricultural University
QRT	Quinquennial Review Team
RAC	Research Advisory Committee
SACs	South Asian Countries
SAARC	South Asian Association for Regional Co-operation
SAUs	State Agricultural Universities
SCI	Science Citation Index
SHGs	Self Help Groups
SRI	System of Rice Intensification
SRR	Seed Replacement Ratio

TE	Triennium Ending
TFP	Total Factor Productivity
TNAU	Tamil Nadu Agricultural University
VDSA	Village Dynamics in South Asia
V-PAGe	Visioning, Policy Analysis and Gender
WEF	World Economic Forum
WSTs	Water-Saving Technologies
WBSTFP	Web Based Software for Computation of Total Factor Productivity
WDPs	Watershed Development Programmes

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EXECUTIVE SUMMARY

The National Centre for Agricultural Economics and Policy Research (NCAP) is making persistent efforts to sustain excellence in agricultural economics and policy research in the country. The Centre serves as a policy think tank and helps the ICAR through credible research to actively participate in policy debates and decisions and in monitoring and interpreting the research impacts at various levels. The Centre sensitises policy planners in the country and ICAR about the emerging changes and concerns related to agriculture and farmers. Besides helping ICAR, the Centre also provides policy inputs to several other public sector organisations, Departments, Ministries and various state governments.

The Centre had 18 scientists and 16 other staff in the year 2011-12. The total expenditure of the Centre, including externally funded projects, during the year was Rs 734 lakh.

A Research Advisory Committee chaired by Prof. V S Vyas, a distinguished economist and member, Prime Minister's Economic Advisory Council, guides the Centre in its research programmes, and a Management Committee guides its overall functioning. Besides, a number of committees (mandated by ICAR and internal) facilitate decentralised management of the Centre.

Research is conducted at the Centre under five broad themes, viz. technology policy, sustainable agricultural systems, markets and trade, institutional change and agricultural growth and modelling. During the year 2011-12, the Centre undertook 15 research projects and completed four consultancy research studies. It has not only maintained but also increased the linkages and collaborations with many institutions in India and abroad. Besides, it organised a number of workshops, trainings, brainstorming sessions and policy discussions. A brief account of research and other activities undertaken by the Centre during 2011-12 is given below.

- A study on proposed Seeds Bill 2011 has shown that in quality seed production, participation of the public sector has increased faster than of the private sector in recent years. Increased supply of quality seed has been an important factor for acceleration in agricultural growth after 2004-05. Still, there is a large mismatch between availability and requirement of good quality seeds, not only of hybrids, but of self-pollinated crops also. Prolonged indecisiveness in enacting this important piece of legislation is impinging on the technology spread in agriculture.
- Research on compliance with food safety standards in milk production in the states of Bihar, Punjab and Uttar Pradesh has shown significant variations in the adoption intensity of food safety practices. The cost of compliance with food safety measures is found to be Re 0.50/litre, but it contributes to better price realisation.

- A study conducted to assess the economic impact of foot-and-mouth disease in Andhra Pradesh has revealed an average per farm benefit of about Rs 22,300 on account the Control Programme (CP).
- The visioning exercise in dairy sector has estimated the total economic demand for milk by 2021 under normal, high and low growth scenarios as 132 million tonnes, 140 million tonnes and 123 million tonnes, respectively.
- The visioning exercise for hill agriculture, based on experience of Himachal Pradesh, has pointed to a less cereal-oriented future farming scenario. The yield gaps in different fruits have been estimated to be in the range of 4-117 q/ha and their addressal would help in attaining higher farm profitability. In the context of impending climate change and climate variability, protected and conservation agriculture would gain currency in the future.
- Quantification of the impact of Bt cotton adoption in India has revealed a benefit of approximately Rs 220 billion. Eighty-five per cent of it accrues to producers and the rest to the private sector seed companies and marketing firms. Statewise, the highest benefits were recorded in Maharashtra, followed by Gujarat.
- With the introduction of Bt hybrids, more than 90 per cent of cotton area in India has gone under hybrids in all the states. In India, the private seed companies have promoted Bt cotton following the route of hybrid so that they can extract surpluses through sale of hybrid seeds every year. The total hybridisation inadvertently renders the farmers' rights infructuous, as the seeds cannot be used for further cultivation. As a consequence, the varietal composition, fibre composition and cost of cultivation have undergone a sea change. In this context, the public sector institutions can capitalise the comparative advantage in producing open-pollinated Bt cotton varieties.
- Watershed Development Programmes (WDPs) have attained, at least partly, the immediate goals of rain water harvesting and increasing crop productivity; the larger goals are yet to be achieved.
- A new project has been initiated to assess the impacts of climate change on agriculture as well as to identify adaptation strategies and options for its mainstreaming with larger developmental pathways, with the funding support of National Initiatives on Climate Resilient Agriculture (NICRA).
- The study on awareness of conservation agriculture among the farmers of Mewat district of Haryana has revealed the existence of a wide gap between the technologies available at the research level and knowledge about them at the farmers' level.
- A comprehensive sustainability indicator has been constructed based on the Driving Force - Pressure - States - Impact - Response (DPSIR) framework by taking into consideration the ecological, economic and social dimensions of agricultural sustainability. The sustainability indicator has revealed that the states of Jammu & Kashmir and Himachal Pradesh remained at first and second places, respectively during the period 1990-91 to 2007-08. The association between economic and ecological sustainability indicators has tended towards a negative direction, and the magnitude has become stronger over the years.
- At national level, the overall growth in application of NPK has been 4.15 per cent per year during the period 1991-92 to 2010-

11. Over the years, fertiliser-use in the country has moved in favour of P and K.

- NCAP has developed two outlook models-one for grains and the other for oilseeds-under a dynamic as well as spatial partial equilibrium modelling framework, incorporating a system of simultaneous equations for effectively depicting the linkages between various economic variables corresponding to the food balance sheet of major foodgrains in India. The Outlook Model for Grains focuses on three major staple foodgrains of India, viz. rice, wheat and maize, along with their interrelations with other complementary and substitute crops. The Outlook Model for Oilseeds developed with a similar scope and applications, focuses on major oilseeds, viz. rapeseed & mustard, groundnut and soybean, as the primary commodities.
- A study on market integration and price transmission in rice and wheat in India has shown that the transmission from international prices to farm gate prices is asymmetric and the short-run shocks in international prices do not have a significant influence on the domestic prices at any level of wheat supply chain. Effective intervention by the Government in rice and wheat markets, and insulation of domestic fertilizer prices from increase in international prices of crude oil and fertilizer are the major reasons for this.
- The study on export performance of meat from India has shown an increase in domestic production (from 2.6 million tonnes in 1980 to 6.3 million tonnes in 2010) and export of meat. Buffalo meat is the most competitive meat produced in India. The major factors that may drive the Indian meat export are identified as adjusting our export strategy in tune with the international prices, increasing competitiveness of Indian meat industry, increasing the domestic meat production and greater compliance with the sanitary and phyto-sanitory measures. The export demand for small ruminant meat was ruling high and leading to faster growth in export as compared to growth in production.
- The agricultural productivity of marginal and small holdings has been found to be much higher than the average productivity for all-size categories, but they are weak in terms of generating adequate income and sustaining livelihood. Despite high productivity, tiny holdings (below 0.8 hectare) do not generate enough income to keep farm family out of poverty. The fertilizer-use per unit of area, irrigation intensity, cropping intensity and area coverage under high-yielding varieties decline with increase in farm size. The inverse relationship between farm size and productivity has become stronger with time.
- On an average, MGNREG Scheme has provided employment to the tune of 18 per cent of the total employment of the beneficiary households. The share of the Scheme in total employment was more in agriculturally backward area (25%) than in the developed area (14%).
- The role of banks has been and will continue to be critical for scaling-up of crop insurance, since their outreach and penetration in the rural hinterlands cannot be matched by any alternative channel for delivery of subsidy-driven crop insurance.
- A design of insurance product for potato has been developed in collaboration with Agriculture Insurance Company of India Limited (AICL) and Punjab Agricultural University (PAU), taking into consideration the perceptions of farmers of Punjab.

- Once the distributional distortions are negated, the coverage of Kisan Credit Cards (KCCs), a major vehicle for delivering institutional credit to the agriculture sector, is reduced by one-third to reach 48 per cent at national level.
- The study conducted to examine the effectiveness of SHGs in agriculture in Andhra Pradesh and Kerala has revealed that SHGs are most effective in resource mobilisation, followed by capacity building, providing access to extension services and technology adoption. Group effectiveness is least in marketing aspects of agricultural commodities.
- Female participation in agriculture has been found declining at the national level over a period of 15 years ending 2009-10; however, the rate of decline is higher in the Eastern India (Bihar, Jharkhand and Odisha) than at national level.
- The agricultural sector in the country has witnessed wide variations in growth performance during different phases of technology and policy. Technology-led growth tempo of early green revolution phase was sustained during the period of wider dissemination of technology (1975-76 to 1988-89), but the subsequent period witnessed the growth becoming broad-based with diversification of production towards horticultural and cash crops. The post-reforms period experienced a visible deceleration of growth in most of the major crops due to a significant diversion of resources away from agriculture which continued up to the year, 2004-05. A sharp recovery has been realised since then, due to a conscious hike in public and private investments and a substantial improvement in terms of trade in favour of agricultural sector.
- A study undertaken to analyse the impact of agricultural productivity, rural literacy, and real rural wages on rural poverty has revealed a significant depressing effect of all the three variables on rural poverty; the highest effect being exerted by agricultural NSDP per rural population.
- The Centre conducted a Summer School on "Decision Support System in Agriculture using Economic Tools" and two trainings on "Quantitative Techniques for Agriculture Policy Analysis" and "Developing Agricultural Commodity Outlook Models for Policy Analysis". NCAP also provided training on "Core Issues in Agriculture" to the probationers of Indian Economic Service (IES). Besides, the Centre conducted several theme/project-wise trainings, interaction meetings, workshops, etc. which helped in capacity building of the project partners.
- As part of the dissemination of research output, the Centre published two Policy Briefs and one Policy Paper during the year under report. The staff of the Centre published more than 35 research papers in leading journals of national and international repute and contributed 13 book chapters/ popular articles. The scientists of the Centre were involved in a number of professional and policy interactions and projects. The website of NCAP (www.ncap.res.in) was regularly updated and all the publications of the Centre were uploaded on the website.

During the period under report, reviewing of the Centre for the period 2006-2010 was also carried out by the Quinquennial Review Team (QRT) with Dr S S Acharya as Chair. The Team assessed the overall performance of the Centre in terms of achieving the mandates as well as on institutional management. Out of the three

mandates, the performance of the Centre in respect of two mandates, viz. policy oriented research and enhancing ICAR's participation in policy discussions was rated 'Outstanding' by the QRT. The performance in capacity building was less than expectations, but was assessed as 'Above average and Good'. Considering all the three mandates together, the score of NCAP was 9.13 out of 10. Based on the recommendations made by the QRT, the General Body of ICAR has approved to raise the Centre to the level of an Institute. The major infrastructural development during the period was construction of a record-cum-exhibition room.

I. PROFILE OF NCAP

The National Centre for Agricultural Economics and Policy Research (NCAP) was established to strengthen agricultural economics and policy research in the National Agricultural Research System (NARS) of the country. The Centre acts as eyes and ears of the Council and helps the ICAR through credible research to actively participate in policy dialogues and decision making. It serves as the nodal agency of the ICAR in monitoring and interpreting the research implications of changes in ground realities, and macroeconomic environments at national and international levels.

Location

The Centre is located in the Pusa campus in New Delhi. It has in its close vicinity several institutes of ICAR and of other orgainsations; these include Indian Agricultural Research Institute (IARI), Indian Agricultural Statistics Research Institute (IASRI), National Physical Laboratory (NPL), National Institute of Science, Technology and Development Studies (NISTADS), National Institute of Science, Communication and Information Resources (NISCAIR), Institute of Hotel Management, Catering and Nutrition, etc. The Centre is very close to the National Agricultural Science Centre (NASC) Complex which houses National Academy of Agricultural Sciences (NAAS), regional offices of nine Consultative Groups of International Agricultural Research (CGIAR) Centres and offices of many professional societies. The Centre, thus has the locational advantage in terms of multidisciplinary studies, inter-institutional interactions and research linkages, library facilities, etc.

Vision

Leveraging innovations for attaining efficient, inclusive and eco-friendly agricultural growth through agricultural economics and policy research.

Mission

To strengthen agricultural economics and policy research for providing economically-viable, socially-acceptable and environmentally-feasible policy options for science-led agricultural growth.

Mandate

The mandate of the Centre is:

1. To conduct policy-oriented research in network mode on:
   (a) Technology generation, diffusion and impact assessment,
   (b) Sustainable agricultural production systems,
   (c) Interaction between technology and other policy instruments like incentives, investments, institutions and trade, and
   (d) Agricultural growth and modelling with focus on role of technology;
2. To strengthen agricultural economics and policy research in the NARS; and
3. To enhance participation of ICAR in agricultural policy debates and decisions

through policy-oriented research and professional interactions.

Research Activities

Research activities of NCAP are broadly covered under the following five major themes:

- Technology policy
- Sustainable agricultural systems
- Markets and trade
- Institutional change
- Agricultural growth and modelling

As a part of policy advocacy, the Centre organises workshops where issues of major policy interests are discussed by the policymakers, academicians, etc. The Centre also organises lectures of distinguished scholars and policymakers for a deeper understanding of the global developments and policy changes. Trainings and capacity building in frontier areas of agricultural economics are accorded high priorities by the Centre.

The Centre maintains close linkages with several national and international organisations involved in agricultural research, development and policy issues. Collaborative research projects, seminars, workshops, publications and participations in policymaking bodies are the usual modes of policy interface which help improve the outreach of the Centre. The Centre regularly brings out publications like Policy Papers, Policy Briefs, Conference Proceedings, and PME Notes, besides publishing in journals. These serve as the main agents for dissemination of its research findings.

Management

A Research Advisory Committee (RAC) comprising eminent professionals, mostly from outside the ICAR system, guides the Centre on its research activities. Prof. V S Vyas, Member, Prime Minister's Economic Advisory Council, is the Chair of present RAC. The functioning of the Centre is supervised by a Management Committee (MC), which is constituted and mandated by the ICAR. Besides, a number of internal committees and cells, including those mandated by ICAR, are operating for an efficient and decentralised management of the Centre. The Joint Staff Council (JSC) promotes healthy interaction and congenial work environment at the Centre. Director conducts regular meetings with staff, mostly every month, to discuss problems and difficulties, if any, faced by the staff and to elicit their suggestions for the cordial functioning of the Centre. The organogram of the Centre is illustrated in Figure 1.

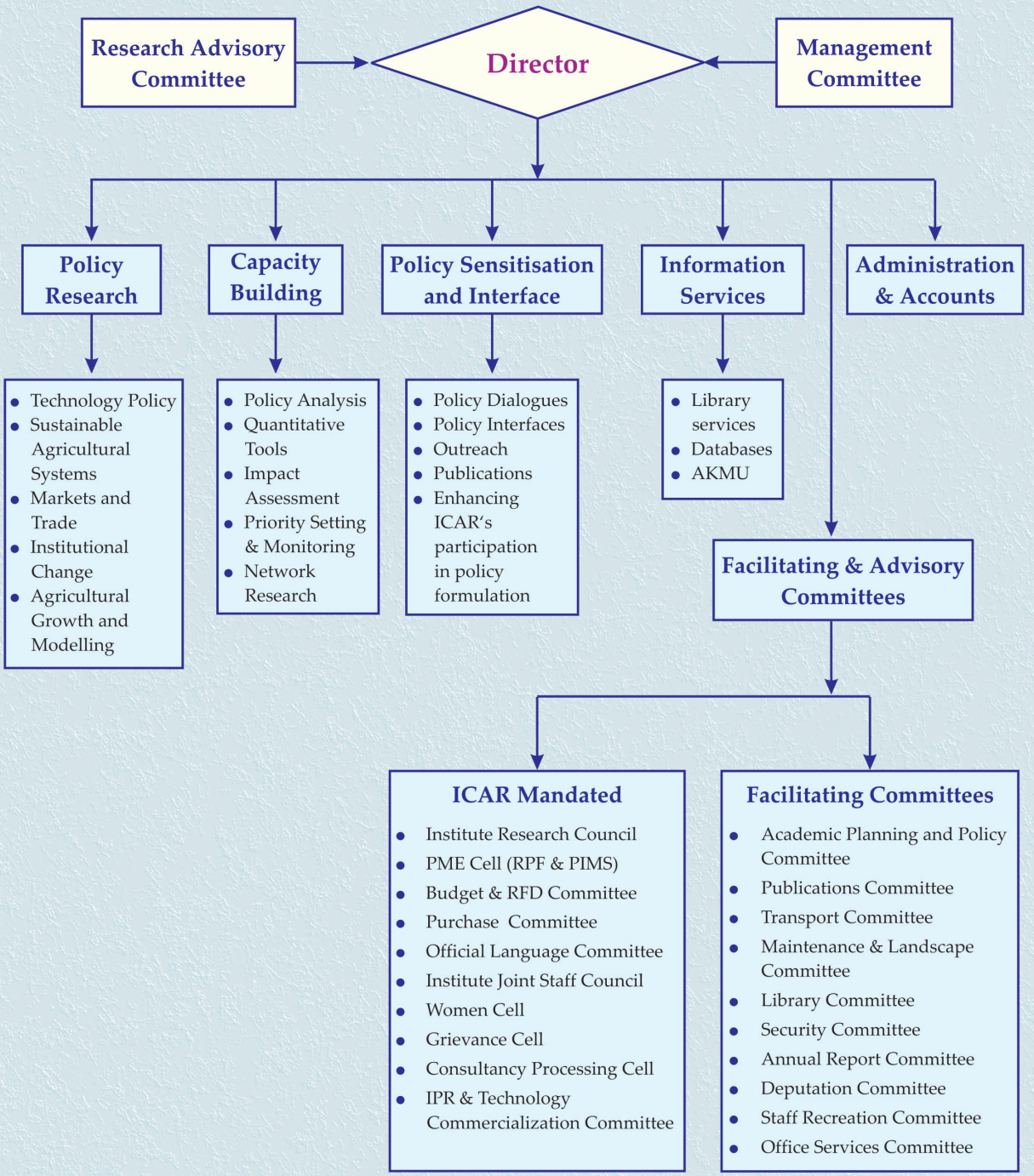
The achievements and functioning of the Centre are evaluated by the Quinquennial Review Team (QRT), constituted by ICAR. The current QRT for the evaluation of Centre for the period 2006-2010 was chaired by Dr S S Acharya, Hon. Professor, Institute of Development Studies, Jaipur. The Team has submitted its report to the Council in January 2012.

Infrastructural Facilities

NCAP Website

NCAP publishes all important information about activities of the Centre, particulars of staff, infrastructure, research projects, publications and linkages on its Website (http://www.ncap.res.in). The Centre's website is hosted through ERNET, New Delhi and is being updated at regular intervals. During the year 2011-12, more than 120 updations were made in the website. All NCAP publications have been uploaded on the website and are available in the form of PDF files. Data on access to NCAP publications have revealed increasing popularity of these

Figure 1: Organogram of NCAP



publications. During the reporting year, traffic to NCAP website increased significantly. The total number of (unique)visitors to the website was more than one lakh. Visitors from USA and India together accounted for more than three-fourths of the total visitors who accessed NCAP website (Figure 2). Measures of some important performance parameters of the NCAP website are presented in Table 1.

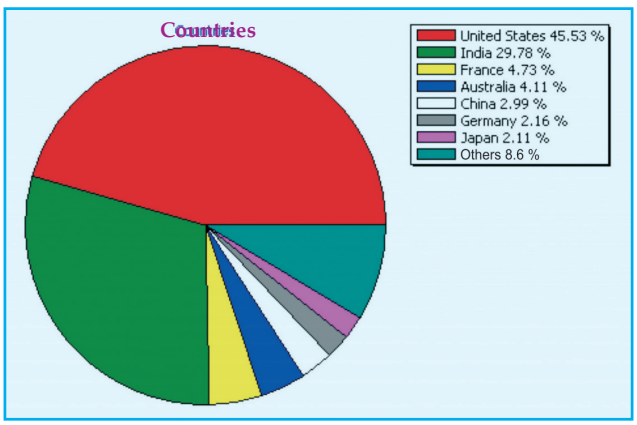


Figure 2: Distribution of visitors to NCAP website by countries, 2011-12

Table 1: Some performance parameters of NCAP website

Parameter	Mean value
Sessions per day (No.)	546
Hits per day (No.)	5143
Pages viewed per session (No.)	1.59
Sessions per IP address (No.)	2.18
Visitors at any time (No.)	1.80
Time spent per session (seconds)	285

Agricultural Knowledge Management Unit

Quick access to information at global level through electronic media has opened new options to tackle future challenges of Indian Agriculture in an effective and efficient way. The newly constituted Agricultural Knowledge Management Unit (AKMU), based on erstwhile Agricultural Research Information System (ARIS), serves this useful purpose. The goal of the AKMU is to strengthen information management using modern technologies within the NARS. The major objectives are:

- To put information close to managers and scientists
- To build capacity to organise, store, retrieve and use the relevant information into the agricultural research infrastructure.
- To share the information over NARS using NCAP website
- To improve the capacity to plan, execute, monitor and evaluate research programmes

To attain these objectives, the AKMU at NCAP is well equipped with latest computers, servers, firewall (Fortigate 80c), centralised antivirus server and analytical software like SPSS 20, STATA 12, LIMDEP 9.0, GIS, GAMS, Stella and SAS 9.3. For data management and in-house software development, SQL server 2008 and Visual Studio facilities have been installed. Online data bases (of CMIE data and other reputed data banks) are accessible through LAN. Each individual staff member has been provided with the latest computer and software, LAN, email account, internet facilities and required computational facilities. AKMU has been instrumental in providing access to NCAP researchers to various publications throughout globe via email system.

Library

NCAP library has the specialised collection of print and electronic databases like Statistical Abstracts, Economic Surveys, Agricultural Census, Input Surveys, Livestock Census, NSSO CD ROMs, CSO and other Government of India

publications and some state government publications. The library facility of the Centre is being developed as an efficient information service unit. At present, the library houses a total of 6098 publications which include 2941 reference books, 116 CD ROMs, 2261 databases, 692 reports, 88 SAARC publications and other reference materials. The library services are computerised using library software package with quick search facility. The library makes subscription to 15 national journals and 18 international journals and online subscription to CMIE database services and Economic & Political Weekly (EPW) archives. Many publications of FAO, CGPRT and CGIAR are available with the library. It has a separate section of books in Hindi. The researchers at the Centre have access to many journals through CeRA (Consortium for e-Resources in Agriculture), the platform provided by IARI under the NAIP project. The library is playing an active role in the timely dissemination of scientific and technical information to researchers in NCAP via Current Awareness Service and Newspaper Clipping Service also.

Record Room

Based on the recommendations of the QRT, record room facility has been developed at the Centre during the year 2011-12 as a safe repository of the research documents and achievements. The record room also displays all NCAP publications, annual reports, publications of individual scientists, recognitions and awards received by the Centre and by individual scientists. A photo gallery has been created to record and display memories of all important events organised by the Centre.

Budget

The expenditure of NCAP for the year 2011-2012 is presented in Table 2 and its staff position is depicted in Table 3.

Table 2: Expenditure during 2011-12

(in lakh Rs)

Head of Account	Plan	Non-Plan	Total
Pay and allowances	-	298.01	298.01
Over time allowance (OTA)	-	0.19	0.19
Travelling expenses	4.31	0.93	5.24
Works	5.48	-	5.48
Other charges including equipments	139.53	8.70	148.23
Human resource development (HRD)	0.68	-	0.68
Library	-	-	-
Pension/Retirement benefits	-	7.21	7.21
Sub-Total	150.00	315.04	465.04
National Agricultural Innovation Projects	97.94	-	97.94
National Fellow Project	-	1.54	1.54
Other projects	18.36	151.23	169.59
Grand Total	266.30	467.81	734.11

Table 3: Staff position during 2011-12

Sl. No.	Name of the Post	Sanctioned	Filled	Vacant
1.	Director	1	1	-
2.	Principal Scientist	6	3	3
3.	Senior Scientist	6	3	3
4.	Scientist	13	10	3
5.	Technical (T-3)	4	4	-
6.	Technical (T-1)	1	1	-
7.	Administrative Officer	1	1	-
8.	Assistant Administrative Officer	1	1	-
9.	Assistant Finance & Accounts Officer	1	1	-
10.	Private Secretary	1	1	-
11.	Assistant	4	2	2
12.	Stenographer	1	1	-
13.	Upper Division Clerk	1	-	1
14.	Lower Division Clerk	2	2	-
15.	Skilled Supporting Staff	2	2	-

II. RESEARCH ACHIEVEMENTS

Technology Policy

Agricultural Growth, Quality Seed and the Seeds Bill 2011 – Some Reflections

Harbir Singh and Ramesh Chand

Low use of good quality seed is a major factor for low productivity of various crops and for large gaps between actual and potential yields of available technology in India. The reason for low use of quality seed has been its non-availability and inadequate access. During the past few years, private sector has taken a lead in harnessing the benefits of technological innovations in some segments of the seed sector, as is evident from the examples of Bt-cotton, maize and pearl millet hybrids. However, the private sector has been concentrating on some selected types of seed and there have been instances of charging exorbitant prices by the private sector. To keep a check on such tendencies and to produce adequate amount of quality seeds of various crops, there is a strong need to promote competition in seed sector, strengthen role of public sector and encourage investments in seed production. The study was undertaken to deepen the understanding of the seed sector in India in the context of the proposed Seeds Bill 2011.

Demand for Quality Seed

To comprehend the size of domestic market for quality seed, the total quantity of seed requirement for various crops was estimated under three scenarios corresponding to 25 per cent, 33 per cent, and 100 per cent seed replacement rates (SRRs). The estimates show that even for achieving the minimum SRR of 25 per cent at the national level, there is a deficit of quality seeds to the tune of 36.4 lakh quintals for cereals, 7.8 lakh quintals for pulses and 12.6 lakh quintals for fibre crops. However, a closer look on seed demand for individual crops shows that we have adequate quantity of quality seed to achieve more than 25 per cent SRR for maize, pearl millet, rapeseed/mustard, sunflower, soybean and cotton (Table 4).

When fresh seed is used every third year (SRR = 33%), the gap between seed requirement and present availability increases to 112.3 lakh quintals for foodgrains and 17.7 lakh quintals for fibre crops. Additional seed requirement under the third scenario, that is when fresh seed is used every time, rises to 587.9 lakh quintals for cereals, 69.8 lakh quintals for pulses, 102.6 lakh quintals for oilseeds, 56.9 lakh quintals for jute and 1.4 lakh quintals for cotton. Under this scenario, the seed requirement for paddy and wheat is estimated to be 265.6 and 292.9 lakh quintals, respectively.

The estimates given in Table 4 show that there is huge mismatch between availability and requirement for good quality seeds, not only of hybrids, but also of self-pollinated crops. Except for the crops like maize, pearl millet, sunflower and cotton, hardly one-third of the demand for quality seeds is met at present. The proposed

Table 4: Seed requirement and gaps in demand for quality seed in India, 2008-09

Crop	Seed requirement (lakh q)	Quality seed distributed (lakh q)	Ratio of seed distributed/ requirement (col.2/col.1)	Gaps in demand for quality seed (lakh q)		
				Scenario I (SRR=25%)	Scenario II (SRR=33%)	Scenario III (SRR=100%)
Paddy	323.79	58.18	0.18	22.77	49.75	265.61
Wheat	367.71	74.83	0.20	17.10	47.74	292.88
Maize	18.77	7.94	0.42	-3.25	-1.68	10.83
Sorghum	10.20	2.41	0.24	0.14	0.99	7.79
Pearl millet	4.93	2.20	0.45	-0.97	-0.56	2.73
Barley	8.02	1.62	0.20	0.38	1.05	6.40
Ragi	1.90	0.25	0.13	0.22	0.38	1.65
Cereals	735.32	147.43	0.20	36.40	97.68	587.89
Gram	56.39	8.60	0.15	5.50	10.20	47.79
Pigeon pea	5.43	1.09	0.20	0.27	0.72	4.34
Green gram	6.37	1.23	0.19	0.36	0.89	5.14
Black gram	7.22	1.37	0.19	0.43	1.04	5.85
Lentil	7.25	0.59	0.08	1.22	1.83	6.66
Pulses	82.67	12.88	0.16	7.79	14.68	69.79
Rapeseed/Mustard	3.81	1.63	0.43	-0.68	-0.36	2.18
Groundnut	64.02	15.90	0.25	0.10	5.44	48.12
Sunflower	1.12	0.80	0.71	-0.52	-0.43	0.32
Soybean	71.29	20.89	0.29	-3.07	2.87	50.40
Safflower	0.41	0.09	0.22	0.01	0.05	0.32
Sesame	1.06	0.18	0.17	0.09	0.17	0.88
Nigerseed	0.37	n.a.	n.a.	n.a.	n.a.	n.a.
Oilseeds	142.07	39.49	0.28	-3.97	7.87	102.58
Cotton	3.65	2.27	0.62	-1.36	-1.05	1.38
Jute	57.17	0.28	0.005	14.01	18.78	56.89
Fibres	60.83	2.55	0.04	12.66	17.73	58.28

SRR = Seed Replacement Rate

Seeds Bill 2011 aims at enhancing production and supply of quality seed to meet the future requirement for sustainable agricultural production through promotion of competition in the seed sector. Prolonged indecisiveness in enacting this important piece of legislation may imping on the technology spread in agriculture.

Adoption of Food Safety Practices in Milk Production: Implications on Dairy Farmers in India

Anjani Kumar

In the backdrop of increased concern on the safety of food production, a study was undertaken with the objective to assess the status and the cost implications of safe milk production and to identify the determinants of compliance with food safety measures in milk production. The study is based on primary data collected from three states, viz. Bihar, Punjab and Uttar Pradesh. Food safety indices were developed for each milk-producing household to measure the extent of adoption of food safety practices. The adoption intensity of food safety practices varies from 0.42 in Bihar to 0.57 in Punjab. The compliance with hygiene and other sanitary measures for ensuring quality and safety of milk requires some additional expenditure. On an average, the cost of milk production would increase by Re 0.50/litre with adoption of desired level of compliance with food safety measures (Table 5).

Determinants of Compliance of Food Safety Measures in Milk Production

The relationship between intensity of adoption of food safety practices and characteristics/ activities of dairy farmers was assessed by using an ordered logistic regression model. It turned out that the higher level of education of farm household-head, larger herd-size and marketing with formal milk buyers (like, dairy-cooperatives, private dairy, etc.) affect the compliance with food safety measures positively (Table 6). The study has also revealed that adoption of safe milk production practices contributes towards increased price realisation.

Table 5: Cost of compliance of adoption of food safety practices

(Rs/litre)

Cost of compliance	Bihar	Punjab	Uttar Pradesh	Overall
Actual cost of compliance	5.22	6.25	5.45	5.64
Potential cost of compliance	5.88	6.68	5.84	6.14
Additional cost of compliance	0.66	0.44	0.39	0.50

Table 6: Determinants of compliance of milk safety measures - Ordered logistic regression estimates

(Dependent variable = Index of adoption of food safety measures)

Explanatory variable	Coefficient	Standard error
Education of household-head (years)	0.087*	0.025
Herd-size (No.)	0.180*	0.035
Category of milk buyer (formal=1, otherwise=0)	0.953*	0.236
Experience of household-head (years)	-0.008	0.009
Cut-off point 1	-1.414	0.326
Cut-off point 2	3.124	0.362
Number of observations	422	
log likelihood ratio	-278.438	
Likelihood ratio chi^2	70.100	
Pseudo R^2	0.100	

* Significant at 1 per cent level.

Software for Computation of Total Factor Productivity of Agriculture

Rajni Jain and AKM Samimul Alam

A Web-based Software for Computation of Total Factor Productivity (WBSTFP) has been developed to compute total factor productivity (TFP) of agriculture. The software is window based and provides a Graphical User Interface (GUI) to ease the process of computation of TFP using EXCEL data format without learning the software. Figures 3 to 5 present the GUI for computation of TFP. The software can be used on any computer which has access to internet.

Figure 3: Graphical User Interface for WBSTFP

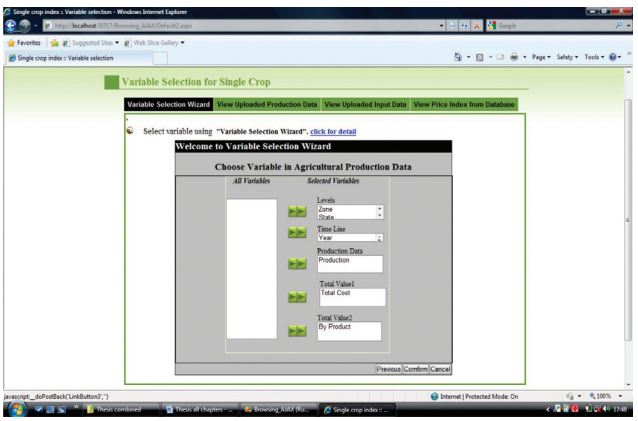


Figure 4: Interactive selection of variables for WBSTFP

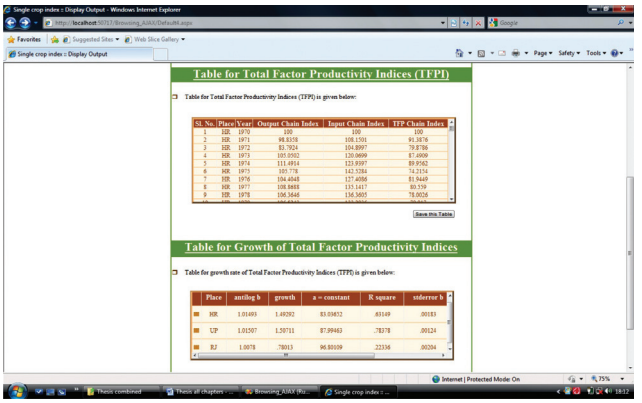


Figure 5: Computed TFP indices and growth rates

Economic Impact of Foot-and-Mouth Disease in India: Evidence from Andhra Pradesh

B Ganesh Kumar

Effective control of animal diseases is crucial to enhance contribution of livestock to the economy. One of the most contagious and devastating diseases of farm animals is foot-and-mouth disease (FMD). It is controlled mainly through prophylactic immunisation of susceptible animal population. The study conducted to assess the economic impact of FMD in Andhra Pradesh has revealed that FMD outbreaks persisted for more number of days in the areas where vaccination programme against it was not implemented. The economic loss due to this disease was of Rs 63,768 per farm in those districts where control programme (CP) was not executed, whereas it was of Rs 41,482 in those districts where CP was implemented, revealing an average per farm benefit of about Rs 22,286 on account of implementation of CP. Among the components of economic losses considered in this study, the loss due to reduced milk yield was the foremost, followed by the value of draught power lost, loss due to treatment and the loss due to mortality. Factors such as education of the farmers, their experience in dairy farming and

their total income positively influenced their urge to go for vaccination of their animals against FMD. Expansion of FMD-CP to the entire state / region, ring vaccination, incentive system for farmers to comply with vaccination of their animals, complete coverage of the susceptible animal population, quick response of the veterinary healthcare system in the event of outbreaks, regulation on movement of the animals across regions, etc. have been suggested for effective control and ultimate stamping out of the disease from the country.

Visioning, Policy Analysis and Gender

Visioning and Strategic Planning for Dairy Sector in India

B S Chandel and P Ramasundaram

The study has analysed the entire dynamics of dairy development - from production to consumption - in order to come out with strategies to meet the future requirements, in both short- and long-terms. The study has also carried out scenario development and characterisation of milk production systems using district level secondary data.

During the past eighteen years ending 2009-10, the milk production in India has increased at the rate of 3.8 per cent per annum. About 54 per cent of this growth came from productivity growth and the remaining from the growth of population of in-milk animals. The contribution of productivity to the growth of total milk production in the case of indigenous cattle was about 71 per cent, which was higher than that in buffaloes and cross-bred cattle. Among the milk production systems, "buffalo production system" was the most important accounting for 31 per cent (29 million tonnes) of the total milk production, followed by "mixed production system". The "indigenous milk production system" was spread over a wider area sustaining the largest human population (34 %). Projections have been made under the given assumptions for both nutritional demand and economic demand under three alternative scenarios at two time-intervals, viz. 2021 and 2035. The total economic demand in 2021, under normal, high and low growth scenarios is estimated to be 132 million tonnes, 140 million tonnes and 123 million tonnes, respectively. The five production systems have been categorised into extensive and intensive systems and strategies for increasing milk production have been reported under different demand scenarios and supply situations. These strategies pertain to breeding, feeding, infrastructure, institutions and economic realms.

Visioning Hill Agriculture

Y S Negi and P Ramasundaram

The study has analysed the process of and trends in agricultural development in the hill states, taking Himachal Pradesh as a case, and has visualised through scenario planning the shape of agriculture in the state in the times to come. The state has witnessed diversification from traditional crops to commercial crops like fruits, vegetables, flowers and medicinal and aromatic plants. Based on these trends, there is a strong likelihood that in future the farming scenario in the state would be still less cereal-oriented and yields of major cereals and pulses do not point to their improvement. However, looking at the potential yields of different cereal crops and enterprises, the same can be increased by 6-30 per cent in different crops in times to come even under the present input availability scenario. Addressing the yield gap (to the tune of 4-117 q/ ha) would be the major strategy for fruit crops as

well, which occupies more than two lakh hectares at present.

In the context of climate change and variability, protected agriculture (particularly of commercial vegetables and flower crops) would gain currency in the future. Lowering of the size of operational holdings and out-migration from agriculture would pave the way for emergence of contract/ cooperative farming, or for drastic changes in cropping patterns in favour of low maintenance-requiring perennial crops. To make agriculture a lucrative vocation, the study has suggested market-led and sustainability focused strategies. These include conservation of the health of agro-ecosystems, establishment of facilities for small-scale agro-processing and infrastructural development, among many others.

Impact of Technology and Policy on Cotton Production in India

P Ramasundaram, Suresh A Kurup and Josily Samuel

(a) Welfare effects and its distribution across regions and farm categories

Quantification of the impact of Bt cotton in India over a technology life-period of 14 years has revealed a welfare generation of Rs 220 billion, 85 per cent of it accruing to the producers and the rest to the private sector seed companies and marketing firms (Figure 6). The distribution of production surpluses across the states varied widely depending upon the penetration of Bt technology, its agronomic performance and variations in pre-Bt cotton performance. The highest total surplus was recorded in Maharashtra, followed by Gujarat. Andhra Pradesh and Punjab have depicted a contrasting performance in benefits accrual because of the difference in agronomic performance and the exogenous technology growth. While the lower reduction in insecticide-usage combined with positive exogenous technology growth reduced the producers' benefit (in absolute terms and in comparison with the acreage) in Andhra Pradesh, the significant reduction in insecticide-usage and lower exogenous production growth resulted in higher and more than proportionate benefit in the case of Punjab.

(b) Implications of adoption of transgenic hybrids as plant varieties in cotton

Since its introduction in 2002-03, the adoption of Bt cotton was invasive and unparalleled. More

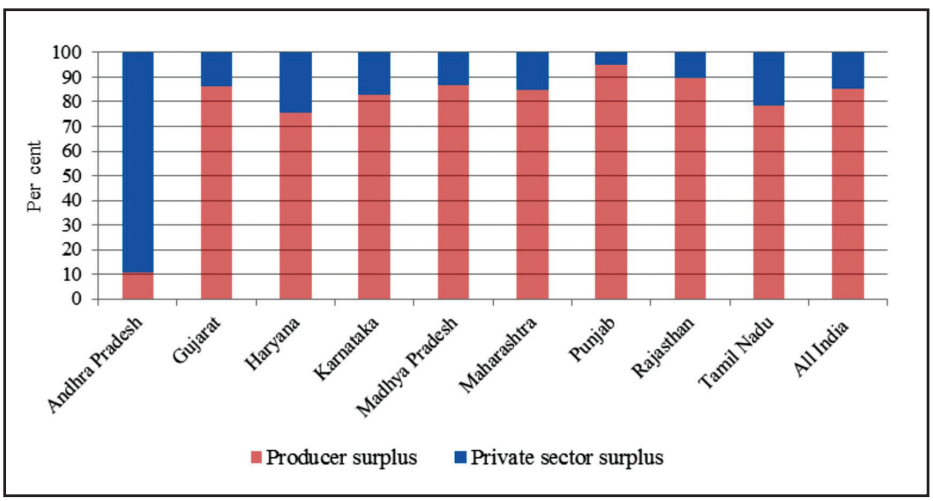


Figure 6: Distribution of total surplus generated by Bt cotton across states

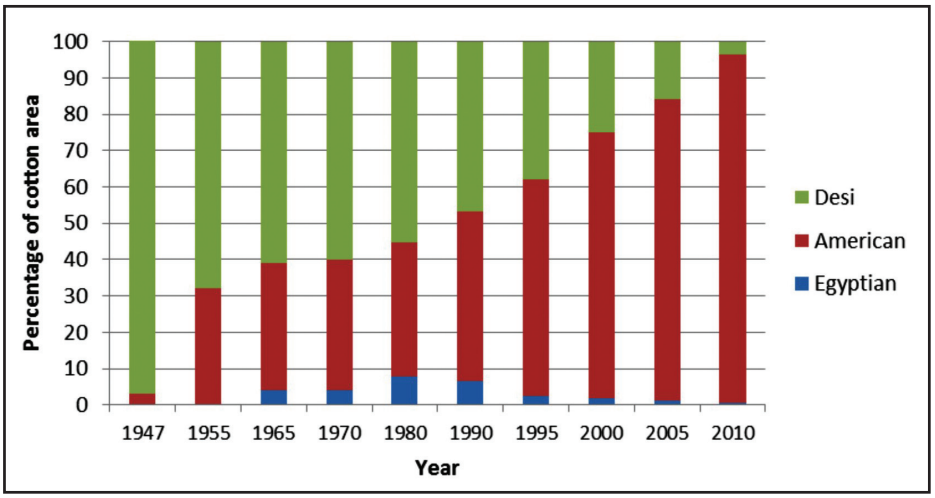


Figure 7: Distribution of area under cotton across different species

than 90 per cent of cotton area went under hybrid cotton in the cotton-growing states, including the north zone, where its adoption was less than 10 per cent before Bt introduction. This indicates that demand of Indian farmers was more for Bt gene than hybrids *per se*. The varietal composition (Figure 7), fibre composition and cost of cultivation have undergone a sea change, post-Bt introduction. Besides, complete hybridization will render the genetic base narrow and will pose production and utilisation problems, as Bt cotton is developed in hybrids with traits for medium and long staples. This resulted in over-production of medium and long staples, with reduced production of the short-staple cotton, which has a wide utility in medical and upholstery industries. Further, it has implications for cost of production on account of higher prices of hybrid seeds. The cultivators may be *inter-alia* over-investing in Bt-cotton hybrids in a recurring manner. India is the only major cotton-producing country in the world where Bt technology has been commercialised through hybrids. This indicates that the companies in India have promoted Bt technology through hybrids to extract surpluses. In this context, development of Bt-cotton varieties with desired traits like drought tolerance, shorter crop cycle, increased nutrient-use efficiency, etc. can be a better option. It can be achieved by public sector institutions, as they are well-equipped to undertake these exercises and can develop open-pollinated Bt varieties as public goods.

(c) Impact of technology and policy on input-use and cost of cultivation in cotton

The cotton cultivation has witnessed major changes in the realm of technology in the form of introduction of commercial hybrids in late-1960s, its diffusion in 1970s and 1980s, emergence of private seed industry in 1990s and introduction of genetically modified cotton during the early years of the previous decade. The study has examined these changes comprehensively by analysing the dynamics of input-use in cotton since 1970s till 2008.

Between TE 1978-79 and 1991-92, the real cost of cultivation of cotton (at 1999-2000 prices), increased from Rs 13,542 to Rs 17,320 per hectare. However, it declined to Rs 15,230 per hectare in

the next decade (by 2001-02), but registered a sharp increase to Rs 16,263 per hectare by 2007-08. The 1990s generally indicated a period of reduced input usage. Bt phase, on the otherhand, has witnessed increased usage of inputs like fertilizer, manure and human labour (in physical quantities), machine labour and irrigation (in real prices) and a reduction of insecticide. Correspondingly, the yield of cotton increased from 5.27 q/ ha in 1978-79 to 8.35 q/ ha in 1991-92, 7.85 q/ha in 2001-02 and further to 14.46 q/ha in 2007-08. The changes in the cost of cultivation and yield are reflected in cost of production. The real cost of production declined from Rs 2498/ q in TE 1978-79 to 1957/ q in 1991-92; by 2001-02 it rose to Rs 1968/ q. However, it reduced by 44 per cent during Bt phase. This is reflected in the output-input ratio as well (Table 7); it exhibited a definite pattern of general increase during the early hybrid phase, across the board decline during the late hybrid phase and an increase during the Bt phase. What is interesting is that the results related to performance and efficiency of cotton production in various periods turn out to be different in different states.

Agrarian Change and Farm Sector Distress: An Exploratory Study

Elumalai Kannan, R S Deshpande and P Ramasundaram

India's agrarian structure is being dominated increasingly by the marginal and small land-holdings, and the trend is likely to continue. This marginalisation of holding puts such farm households in a disadvantageous position with respect to accessing factor and product markets. Among others, marginalisation of holdings and increased market dependence have put the famers in distress conditions. A review of the existing studies revealed that factors like failure of public institutional mechanism, particularly credit delivery system, marginalisation of holdings, changes in land-use pattern, tenancy problems, lack of technological breakthrough in crop yield, rise in input costs, frequent crop failures due to pests and diseases, natural disasters, supply of spurious seeds, reduction in import tariffs with consequent dip in domestic prices (e.g., plantation crops), etc. have led to a fall in crop income, thereby putting farmers under distress. An analysis of the farm business income using cost of cultivation data has also revealed a fall in farm business income (in real

Table 7: Trends in ratio of value of output to cost C_2 in cotton in different states of India

State	1978-79	1991-92	2001-02	2007-08
Andhra Pradesh	1.19	1.26	1.10	1.16
Gujarat	1.08	1.23	0.92	1.38
Haryana	1.33	1.68	1.34	1.05
Karnataka	1.43	1.32	0.88	1.30
Madhya Pradesh	1.35	1.15	0.93	1.15
Maharashtra	1.67	1.49	0.92	0.98
Punjab	1.00	1.41	0.82	1.20
Rajasthan	—	1.90	1.43	1.53
Tamil Nadu	1.35	1.18	0.83	0.98
All India	1.27	1.37	0.99	1.18

terms) in many crops in Karnataka, Maharashtra, Punjab and West Bengal in recent years. The weighted farm business income from all the crops has declined in Karnataka, Maharashtra and Punjab.

Watershed Based Development and Agricultural Growth in India

Amita Shah and P Ramasundaram

The study aimed at bridging some of the information gaps, and discussing future challenges in the light of the existing evidences and impact analyses of watershed projects in India. The study is based mainly on the secondary data and draws from the studies on impact assessment in the recent past. The studies include (a) various exercises undertaken by three organisations under ForWaRD (www.forward.org.in); (b) comprehensive assessment undertaken by ICRISAT; and (c) study on repair and maintenance of assets in the post-project scenario by the Development Support Centre.

Together the evidences suggest that whereas Watershed Development Programmes (WDPs) have attained, at least partly, the immediate goals of harvesting of rain water and increasing of crop productivity, the larger goals are yet to be addressed. The approach, therefore, should not be to find alternative mechanisms for increasing access to irrigation (mainly by reducing the run-off), and enhance crop productivity (often by using more of groundwater). Rather the approach should be to identify alternative institutional mechanisms that may simultaneously help address the larger issues of equity, resource sustainability and post-project management. This is essential because the basic idea of watershed-based development is to combine the entire multiple and also complex objectives, and not merely to enhance farm productivity. The importance accorded to the decentralised planning process and multiple objectives like development of pastures, increase in water-use efficiency, and adoption of sustainable farming practices are yet to take a centre-stage. It is imperative that the unique role and the approach of watershed-based development is retained, upheld and nurtured in the true sense in which the programme is visualised as the key intervention for developing agriculture and rural livelihood in some of the low potential and hitherto neglected regions of the country. The next phase of watershed development will have to bring a balance between ecology (or resource regeneration) and productivity enhancement in order to move towards a sustainable and equitable development across different agro-ecological regions of the country.

Assessing the Status, Performance and Impact of National Horticulture Mission across Different States/Regions

Sudha Mysore and P Ramasundaram

The National Horticulture Mission was launched in 2005 aiming at 'doubling of' horticultural crop production, establishing convergence and synergy among various development programmes, and promoting development and dissemination of technologies by blending traditional wisdom and frontier knowledge. The Mission had an outlay of Rs 6500 crore for a period of 7 years. It covers 371 districts distributed across 18 states and three Union Territories of the country. The Mission has been focusing on research, development, post-harvest management at various levels and marketing aspects of horticultural crops.

The preliminary results are suggestive of a direct benefit in the form of savings in cost and improvement in quality, resulting in additional benefits at individual farm-level. It is observed

that the horticultural sector grew at much faster rate than its counterparts during the period 1991-92 to 2007-08. Within the sector, production of spice crops, followed by vegetables has shown a higher rate of growth during the period. Amongst individual fruits, mango has gained the most, registering a 50 per cent increase in area, followed by citrus (26%) and banana (13%), whereas pineapple has gained the least. Overall, the area under fruits and vegetables has increased over the past two decades. While the traditional fruit basket comprising mango, banana and citrus still holds promise, other minor fruits like sapota and guava have shown promise under area expansion led production growth. The specific programmes initiated under the Mission appear to benefit producers at individual farm-level. However, the governance issues need a careful attention.

Sustainable Agricultural Systems

Enhancing Resilience of Agriculture to Climate Change through Technologies, Institutions and Policies

P S Birthal, Suresh A Kurup, Shiv Kumar, G P Reddy and Ranjit Paul

Climate is changing, and in all probability, further change in it is inevitable. Agriculture is highly sensitive to changes in rainfall and temperature, and therefore any significant or erratic change in climate will threaten agricultural production. The emerging trends in agrarian structure, climatic parameters like rainfall and temperature, and demand for agricultural commodities imply a need for greater efforts towards building a climate-resilient agriculture through a combination of mitigation and adaptation strategies at various levels, including farms, farming community, local governments, institutional structures and agricultural research and development policy. The overarching goal of this project is to enhance the adaptive capacity of agriculture through mainstreaming technologies, institutions and policies to cope with the potential food-insecurity challenges of climate change.

Knowledge and Awareness on Conservation Agriculture among the Farmers of Mewat District of Haryana

Usha Rani Ahuja

There exists a wide gap between the technologies on conservation agriculture available at the research level and knowledge about them at farmers' level. Keeping this in view, an attempt was made to elicit information on the awareness and knowledge level of farmers about conservation agricultural technologies. The study, conducted in 17 villages of Mewat district of Haryana with a sample size of 170 farm families, has revealed that only 13 per cent of the farmers are aware about the zero tillage practice and it is being adopted in only one village. Retention of crops in the field is also not encouraging, as they have alternative uses as fuel and fodder.

Assessing Sustainability of Indian Agriculture: A State Level Analysis

Suresh A Kurup

The concept of 'sustainable development' has emerged as an important developmental paradigm in the context of challenges emerging at the natural resource fronts as well as impending climate change. As a welfare concept, the 'sustainable development' has evolved over the years as mutually dependent, but often conflicting concerns of ecology, economics and ethics. A wide ranging indicators and methodologies have been developed by various researchers to assess the sustainability. A recent one gaining wide popularity is the approach adopted to evolve the environmental sustainability index (ESI) by the World Economic Forum (WEF), Yale University and Colombia

University, based on the Driving Force – Pressure – State – Impact – Response (DPSIR) framework, using a large number of variables.

In this background, an attempt has been made to estimate the sustainability of Indian agriculture during the past 30 years, by developing a comprehensive indicator, taking into account the ecological, economic and social dimensions of development, using DPSIR framework. A number of variables have been selected under each dimension to reflect different components. Using this framework, the sustainability of agriculture at the state level has been estimated for the years 1990-91, 2000-01 and 2007-08. The indicators are comparable across the states and over the years. Among the major 20 states considered, Jammu & Kashmir and Himachal Pradesh are consistent in their positions at first and second places, respectively, during all the time periods; while other states followed a trend, but with some variations in between. The Spearman rank correlation coefficient has indicated that the association between the economic and ecological sustainability indicators tends towards a negative direction, and the magnitude has become stronger over the years. It is a matter of deep concern for the agricultural growth trajectory of the country.

Fertilizer Consumption Scenario in India

Diana S

The NPK application in the country has increased at the rate of 4.15 per cent per year during the period 1991-92 to 2010-11. The growth rate was 4.5 per cent during 1990s and 6.62 per cent during the 2000s. Among the nutrient components, though N is being applied at a higher level, its growth rates have been lower than that of both P and K, during the overall period as well as during both the sub-periods; the trend being more pronounced during the later decade. Significant variations have been noticed in the growth of fertilizer consumption across states (Table 8).

Table 8: Growth rates of nutrients consumption at national level, 1991-92 to 2010-11

(Per cent)

Period	N	P	K	Total
1991-92 to 2000-01	4.16	5.43	4.96	4.50
2001-02 to 2010-11	5.37	7.83	10.51	6.62
1991-92 to 2010-11	3.34	5.19	7.08	4.15

Data Source: Fertilizer Statistics (various issues), Fertilizer Association of India.

Impact of Climate on Yield and Yield Variability of Rice and Wheat in Punjab, India

Diana S and S S Raju

A study was carried out to examine the potential impacts of climate change on the agriculture of Punjab, India, using the Just and Pope production function. It has estimated the impact of climate variables, viz. temperature and precipitation on yield and yield variability of rice and wheat using the data for the period 1979-80 to 2009-10.

The time trend, a proxy of technology, has shown a positive and significant effect on the mean yield of both rice and wheat. Rainfall has depicted a positive and significant effect on the mean yield of wheat. The effect of rainfall on yield variability was negative in both the crops and was significant in wheat. The climate change leading to increased rainfall will favour wheat yield and reduced variability in the yield of rice and wheat and vice versa. An increase in temperature, however, will increase variability, especially for the wheat crop. Over the past couple of years, the variability in yield has declined in rice and increased in wheat.

Markets and Trade

The Rise of Supermarket Chains in Andhra Pradesh: Effects on Farmers, Traditional Retailers and Local Vendors

M B Dastagiri

The debate on the impact of supermarkets on agriculture and the opening up of the economy to multi-brand retail marketing firms is inconclusive and highly polarised. The study has analysed the impacts of supermarkets on various aspects of agricultural marketing. It was conducted in Hyderabad, Andhra Pradesh, with data collection from officers of supermarket supply chains (namely, Reliance, More and Heritage) and farmers. It has been revealed that adoption of direct marketing models with backward linkages provides a saving to the farmers in terms of marketing cost and other charges due to elimination of middlemen. Farmers supplying to supermarkets have many advantages like access to technical guidance, market information on prices, perfect weights, spot payments, etc.

Market Integration and Price Transmission: The Case of Rice and Wheat in India

PS Birthal, Ramesh Chand and Shiv Kumar

The spurt in prices of staple grains in 2008 created several problems in many countries across the globe, obviously due to adverse impact on food and nutritional security. However, most of the analyses and writings focused on the impact of world food crisis of 2007-08 on consumers and transmission of world food prices to the retail level. An equally important aspect related to how and to what extent very high global prices of rice and wheat were transmitted to the farmers or producers of these crops did not receive adequate attention. It is equally important to understand the price transmission also to the farmers or farm gate level, because only through this transmission, a possible supply response to increase the supply of these cereals can be expected. Johansen cointegration approach was applied on monthly data for the period 1995 to 2011. The long-run elasticity of price transmission from international to wholesale and retail prices of wheat is higher than that to the farm gate prices. The transmission from international prices to farm gate prices is asymmetric, indicating that farm gate prices respond differently during rising and falling phases of international prices. Interestingly, the short-run shocks in international prices do not have any significant influence on domestic prices at any level of wheat supply chain. There is lack of congruence between international and domestic prices of rice and wheat. Domestic prices during the crisis period did increase but the increase was considerably lower than the increase in global prices.

During 2007-2009, the movements in global prices and domestic prices of rice and wheat were almost in contrast to each other. During the five-year period ending 2008-09 or 2009-10, the coefficient of variation in international price was two-to-three times the domestic prices of rice and wheat. On the contrary, the coefficient of correlation between monthly international and domestic prices of rice and wheat have been found, generally, quite low and insignificant, both during pre-crisis (1996-2007) and crisis (2007-2011) periods. The main factors that impeded the transmission of abnormal increase in global prices to Indian markets were timely and effective government intervention in rice and wheat markets, and almost complete insulation of domestic fertilizer prices from increase in international crude oils and fertilizer prices. The paddy and wheat growers in India received

considerably higher prices during 2006-08 and it continued during 2008-09, owing to the mix of domestic policies, including hike in MSPs. The farm harvest prices of wheat registered an annual increase of 14 to 22 per cent and that of rice increased by 7 to 20 per cent continuously during 2006-07 to 2008-09. There has been a considerable hike in MSPs during 2007 and 2008 as part of food security package of the Government. The crux of findings is that high global prices have impacted farm gate prices in India, not directly but through their influence on the decision of the government related to the levels of fixation of guaranteed support prices.

Enhancing Meat Export from India: Status and Future Trends

Suresh A Kurup

The domestic meat production increased from 2.6 million tonnes in 1980 to 6.3 million tonnes in 2010. Accordingly, export of meat from India has also increased since 1980s, both in quantity and value terms. From 0.53 lakh tonnes in 1980-81, meat export increased to the level of 5.5 lakh tonnes by 2009-10, accounting for about 12 per cent of meat production in India. During 2009-10, the meat export fetched an amount of Rs 6,325 crore. While buffalo meat accounts for about 23 per cent of the total production, its contribution to meat export accounts for more than 85 per cent. Mutton/ chevon constituted about 12 per cent of total meat export. One major reason for lower export of Indian small ruminant meat/ meat products is its high domestic demand and high prices. The case of poultry meat is quite interesting - despite contributing more than one-third of total meat production, its share in meat export is meagre. The major factor that might have contributed to the low export is the poor competitiveness of Indian poultry sector.

The buffalo meat is the most competitive meat in India, because the domestic producer price is lower than of all other major producers in the world. A similar trend is observed in the case of pig meat. The trend in the case of mutton and chevon depicts a mixed picture, wherein India is not competitive compared to some countries, particularly Australia. In case of poultry meat, the prices in India are not competitive to most of the major producers, particularly USA, China and Thailand. The major factors that may drive the Indian meat export include export strategy intune with international prices, increasing competitiveness of Indian meat industry, increasing domestic meat production and greater compliance with the sanitary and phyto-sanitory measures as per international regulations.

Production and Export of Small Ruminant Meat in India

Suresh A Kurup

Growth in the production of small ruminant meat is not keeping pace with the surging domestic and external demand. Recent data show that strong pressure of external demand is resulting in a higher share of production going towards export. In the year 1990-91, about 1.6 per cent of the domestic small ruminant meat production was exported (Table 9). It remained below 1.7 per cent till 2000-01, but thereafter it has risen rapidly, reaching a level of 11 per cent by 2009-10. In fact, the export growth has reduced domestic availability of small ruminant meat over time. The strategy to expand the small ruminant population has to focus on addressal of many constraints, mainly falling in the structural realms, the major one being scarcity of grazing lands. Small ruminants depend heavily on the availability of pastures for grazing.

Table 9: Trends in production, export and domestic availability of small ruminant meat in India

Particulars	1990-91	2000-01	2009-10
Total production (tonnes)	611000	689000	718000
Total export (tonnes)	9464	11903	79337
Export as a percentage to production (%)	1.55	1.73	11.05
Domestic availability (tonnes)	601536	677097	638663

Developing Commodity Outlook Models for Major Grains and Oilseeds

Anjani Kumar, Shinoj Parappurathu, Shiv Kumar and Rajni Jain

In an era when the Indian economy is undergoing a rapid transformation as a result of greater integration with the global economy, a balanced and comprehensive agricultural policy has an important role to play. In this regard, there is an increasing realisation of the need for timely and reliable information on the likely demand, production, trade and prices of important agricultural commodities in the country. Commodity Outlook Models are widely used across the globe to generate advance information on medium- and long-term projections on the above-mentioned economic variables. Apart from generating outlook, these models are capable of undertaking sensitivity analysis and simulations under alternative policy and technological scenarios.

Grain Outlook Model

A 'Grain Outlook Model' has been developed under a dynamic as well as spatial partial equilibrium modelling framework. It incorporates a system of simultaneous equations for effectively depicting the linkages between various economic variables corresponding to the food balance sheet of major foodgrains in India. This model specifically focuses on three major staple foodgrains of India, viz., rice, wheat and maize, along with their interrelations with other complementary and substitute crops. Technically, the model utilises the time series information for undertaking projections, but simultaneously derives equilibrium values of the variables based on the linkages established through a set of equations that cut across commodity as well as spatial dimensions. The projections with base year 2010-11 on major variables for the three primary crops are presented in Table 10.

Oilseeds Outlook Model

'Oilseeds outlook model' has been developed for major oilseeds, viz., rapeseed/mustard, groundnut and soybean, as the primary commodities. This model has been developed considering the multiple uses of oilseeds like direct consumption as food, use as cooking and multi-purpose oil, oilcakes, etc. As the production of each oilseed is limited to a few states in the country, the model depicts the country as one region. Presently, the oilseeds outlook model has the year 2010 as the base-year for projections and can generate outlooks till the year 2025. As in the case of 'grains outlook model', provisions have been made to regularly update base-year and also to extend the period of forecasting. In future, it is targeted to integrate both grains and oilseeds models dynamically so that each model takes inputs from the other model and gets converged simultaneously.

Table 10: Baseline equilibrium projections for wheat, rice and maize at all-India level

Variable	Wheat			Rice			Maize		
	2015-16	2020-21	2025-26	2015-16	2020-21	2025-26	2015-16	2020-21	2025-26
Area ('000 ha)	29365	29755	30187	42774	42945	43156	9103	9078	9010
Yield (tonnes/ha)	3.07	3.23	3.40	2.33	2.46	2.60	2.50	2.65	2.79
Production ('000 tonnes)	90136	96042	102586	99820	105762	112267	22758	24025	25093
Food and other use ('000 tonnes)	87483	93476	100085	95911	102007	108350	10389	11122	11662
Feed use ('000 tonnes)	2579	2495	2425	0	0	0	9530	10283	10688
Total use ('000 tonnes)	90063	95971	102510	95911	102007	108350	19918	21405	22350
Ending stocks ('000 tonnes)	18911	18911	18911	18452	18037	17990	640	631	634
Net trade ('000 tonnes)	73	71	76	3917	3905	3917	2823	2620	2745

Institutional Change

Farm size, Input Use and Productivity: Understanding Strength and Improving Livelihood of Smallholders

Ramesh Chand and P A Lakshmi Prasanna

The study revisits the debate on farm size and agricultural productivity to suggest policy measures for addressing the twin problems of raising productivity and growth of agriculture and improving income and livelihood of smallholders who constitute more than 80 per cent of the total farming households, 50 per cent of the rural households and 36 per cent of the total households in India. The study has contested the hypothesis that many advantages of smallholders disappear as a country develops and becomes more efficient to have progressively large and more mechanised farms. This type of change has been experienced in the Western economies where economic transformation has been associated with increase in size of holdings with a near wipe out of smaller farms. However, experience of Asia has been totally different than of Western economies, as the concentration of smallholders has remained very high in Asia, with average farm-size remaining below 1.2 hectares in Japan, Korea and China. The experience of China is particularly interesting for India. China's experience shows that there are ways to eliminate poverty even with high concentration of workforce in agriculture and predominance of marginal holdings. The study has argued to look for ways and means to improve productivity and livelihood of smallholders without too much worrying about the size of holdings *per se*.

Farm size and input use

The study has found that use of fertilizer per unit of area, irrigation intensity, cropping intensity and area coverage of high-yielding varieties (HYVs) decline with increase in farm size (Table 11). Lower the size of holding, higher was the use of inputs, crop intensity and coverage under high-yielding varieties, reflecting the role of technology. Obviously, higher use of these factors would result in higher productivity, and, the farm categories with higher value of these factors are also expected to realise a higher productivity.

Farm size and productivity

The value of crop output per hectare was Rs 25,173 for holdings below 0.4 hectare and Rs 18,921 for holdings of 0.4 to 1.0 hectare (Figure 8).

Table 11: Input use at various farm-size categories during 2001-02

Particulars	Farm-size category					
	Marginal	Small	Semi-medium	Medium	Large	All categories
Irrigation intensity (%)	51	39	37	36	31	39
Fertilizer use (kg/ha)	175	129	112	95	68	119
Area under HYVs (%)	72	68	65	61	47	64
Cropping intensity (%)	139	128	126	125	121	128

As the farm size increased towards two hectares, productivity declined to less than Rs 17,000 per hectare. For large farms (4-10 ha), the value of aggregate crop production declined to Rs 13,500 per ha. Farmers operating on landholdings above 10 hectares (very large size category) were found to have very low productivity (Rs 7722/ ha); it was about half of the productivity of large holdings and less than one-third of the productivity of the bottom farm-size category. Agricultural productivity of marginal and small holdings was found to be much higher than the average productivity for all size categories.

Advancement of technology or modernisation of agriculture has not diluted the pattern of negative association between farm size and productivity. It seems that emerging changes in labour market and rising demand for labour will further increase the advantage of smallholders over large-size holdings. Much vaunted scale advantage has not provided any edge to larger size holdings, nor has it constrained production at marginal and small holdings. On the contrary, the available evidence suggests that productivity of Indian agriculture will rise significantly if land inequality is reduced in favour of lower size holdings.

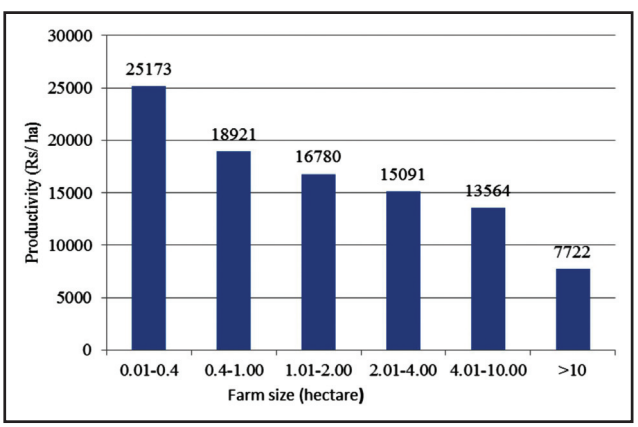


Figure 8: Farm size and productivity during 2002-03

Strength of smallholders and their livelihood

Despite strong advantage in land productivity and much better production performance, smallholders earn awfully low income from agriculture on per capita basis, primarily due to highly adverse land-man ratio (Table 12). Per capita availability of land at marginal holdings is merely 1200 square metres and at small holdings, it is 2400 square metres. Gross value of agricultural (crop + livestock) output in the years 2007-08 and 2008-09 was Rs 52,191 (2004-05 prices[1]) while gross value of inputs was Rs 14,663. After deducting cost of inputs and hired labour, per hectare income of a farm family from agriculture comes to Rs 33,227 at 2004-05 prices. Taking into account the size

[1] Income was estimated at 2004-05 prices because poverty line income was available for this year.

of family, per capita income from agriculture per hectare of land comes to Rs 6,655. This income was compared against the Planning Commission norm of poverty line for rural areas which shows that a farmer operating less than 0.64 hectare area will be under poverty. Based on the Tendulkar Committee norm, a minimum 0.8 hectare land area is needed to keep a farm family above poverty line, if this family lives only on agriculture income. This implies that 62 per cent of the farmers in India, who own less than 0.8 hectare of farm, would be under poverty if they do not have opportunity to earn income outside agriculture. This figure is going to rise further with the ongoing division of landholdings. It is thus clear that with the present level of productivity, three-fourths population of smallholders can't meet its livelihood from farm income alone.

The study has found that although small farms in India are better in terms of production performance, they are weak in terms of generating adequate income and sustaining livelihood. Tiny holdings below 0.8 hectare do not generate enough income to keep the farm family out of poverty despite high productivity. Raising income of such farmers by relocating a sizable chunk to outside agriculture and thus raising size of holding, has not worked in India and other major Asian countries. Another strong factor against this option is that increase in size of landholdings involves lower productivity. Serious steps should be taken to generate employment avenues for smallholders outside agriculture, but within the countryside, so that the workforce at small farms gets work and income from rural non-farm activities without leaving the farms. This seems to be the only way to achieve higher productivity and to sustain agricultural growth together with augmenting the income of smallholders for a better livelihood.

Table 12 : Estimation of farm income derived from CSO data at 2004-05 prices

Sl. No.	Particulars	Amount (Rs)*
1.	Gross value of agricultural output/hectare of net sown area	52191
2.	Gross value of inputs other than labour /ha NSA	14663
3.	Cost of hired labour @	4251
4.	Farm family income /ha (1-2-3)	33277
5.	Farm family income/capita assuming 5 persons per farm household	6655
6.	Poverty line income for rural population: Planning Commission Tendulkar Committee	 4276 5360
7.	Breakeven farm size (ha) to be above poverty line based on: Planning Commission Tendulkar Committee	 0.642 0.805

Source: National Accounts Statistics 2010, CSO, GOI.
* Average of 2007-8 and 2008-09
@ Based on NSSO (2005) ratio of cost of hired labour to costs of inputs is 0.29:1.

Impact of Mahatma Gandhi Rural Employment Guarantee Scheme on Rural Employment and Migration

Usha Rani Ahuja, Sonia Chauhan and Khyali Ram Chaudhary

To see the differential impact of Mahatma Gandhi Rural Employment Guarantee Scheme (MGNREGS) on rural employment and migration in agriculturally-backward and agriculturally-advanced areas, a study has been conducted in the two contrasting districts of Haryana in terms of agricultural development, viz. Karnal (advanced) and Mewat (backward). The study has used primary data collected from 120 farm families with equal number of MGNAREGS participating and non-participating households. The impact has been studied in terms of income and employment generation, migration, debt repayment and wage earnings. It is observed that on an average, MGNREGS has provided employment to the tune of 18 per cent of the total employment of the beneficiary households. In the agriculturally-backward area, the share of MGNREGS jobs in total employment is 25 per cent, while it is 14 per cent in the agriculturally developed area.

Farm Women's Access to Resources and Participation in Decision-making

Usha Rani Ahuja, Anjani Kumar and Rajni Jain

Access to resources and participation in decision-making are the major upholders of women empowerment. The extent of accessibility of rural women to productive resources and their role in decision-making on various farm, non-farm and domestic activities, has been examined in three eastern states, viz. Bihar, Jharkhand and Odisha. Data were collected from 480 farm women through interviews using a pre-designed schedule from twelve villages of these states. The study has revealed that access of farm women to assets like land, credit, investment, machinery and livestock and production inputs, viz., fertilizers, pesticides and seed is limited; less than five per cent women have access to these resources in spite of their significant contribution in farm activities. In terms of asset ownership, the situation is relatively better, but in case of participation in decision-making, role of women is very low in general. However, in Jharkhand villages, women's role in decision making is better, which is mainly due to the social structure of tribal villages in the state. Since, the majority of women employment is rooted in agricultural activities, women's access to agricultural resources would be crucial for their empowerment.

Pricing for Crop Insurance and Identifying Institutional Mechanisms to Improve Access and Outreach of Crop Insurance Products

S S Raju, Diana S and K N Rao

Pricing insurance is one of the most important components in developing an insurance product (Figure 9). An analysis of insurance premium has been carried out by examining its various components like pure premium, reserve load, administrative and operating component and return on equity. Methods of estimating pure premium and factors affecting premium rate like space factors, contract factors, etc. have also been looked into.

For scaling-up of crop insurance, the role of banks has been and will continue to be of critical importance. The lack of conviction of banks in the ongoing crop insurance schemes is as much a problem as the unreasonable expectations of their personal dealings with crop insurance. Nevertheless, the outreach and penetration of banking in the rural hinterlands are growing

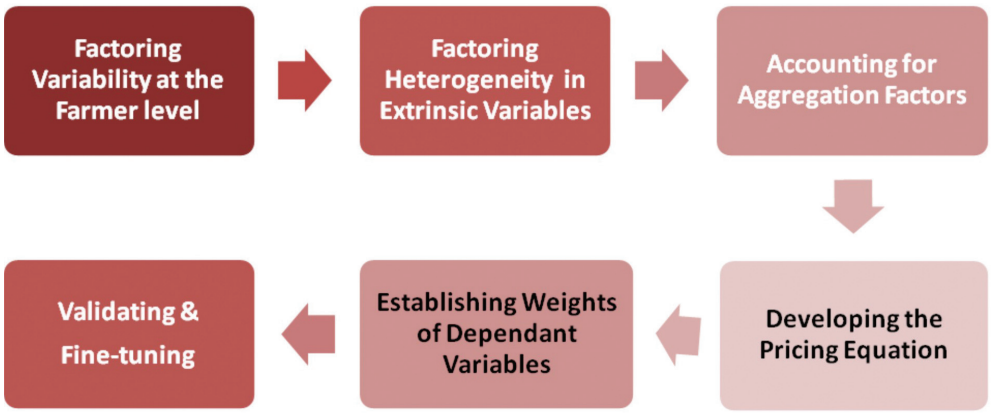


Figure 9: Pricing framework for an agricultural insurance product

rapidly and cannot be matched by any alternative channel relevant for delivery of subsidy-driven crop insurance.

Insurance product for potato

A design of insurance product for potato crop has been developed by the Centre in association with Agriculture Insurance Company of India Limited (AICL) and Punjab Agricultural University (PAU), based on the perceptions of farmers of Punjab. During the term, it envisages to provide insurance coverage for the eventualities out of rise in temperature resulting in reduced plant growth at early maturity stage, coverage against reduced plant growth and tuber yield/quality out of pests/diseases infestations and un-seasonal/excess rainfall. The maximum sum insured under the policy is Rs 30,000 per acre and the total premium is Rs 2,000.

Progress of Kisan Credit Card Scheme

Anjani Kumar

In the context of concerns regarding the authenticity of information on the coverage of Kisan Credit Card (KCC) Scheme due to various reported anomalies in its distribution, an analysis was undertaken to present a clear picture on the progress of KCC Scheme. It is noted that once the distributional distortions are negated, the coverage of operational holdings at national level gets reduced to 48 per cent as against the reported coverage of more than 72 per cent, with wide variations across states (Table 13). On contrasting this poor coverage with the deadline to attain the full coverage by 2007-08, the need for concerted efforts is clearly reflected.

ETL Model for Integration of Heterogeneous Agricultural Socio-economic Data Sources

Rajni Jain, Anjani Kumar, Shinoj Parappurathu and Shiv Kumar

The NARS requires comprehensive information on various components like land, water, climate, market, trade, crops and cropping system along with many socio-economic parameters. This requirement can be met by integrating data from various sources on the required aspects. ETL (Extract, Transform and Load) process is used to extract data from heterogeneous sources after applying quality checks and loading it on the target database (Figure 10). The study has implemented ETL process for agricultural socio-economic data. The data from various sources have been organised into eight different modules.

Compilation of data has been done at various levels starting from district level to country level as per applicability. Implementation of ETL for each of the modules involves data extraction, transformation, updation, loading of data on target data repository, documentation of technical metadata and metadata management.

Table 13: Revised estimates of progress in KCC Scheme across states, 2009

State	No. of KCCs (in millions)	Estimated actual cards (in millions)	Percentage of household covered by KCCs
Andhra Pradesh	14.7	7.6	63
Assam	0.5	0.4	14
Bihar	3.3	2.9	20
Chhattisgarh	1.6	1.3	39
Gujarat	2.9	2.1	46
Haryana	2.4	1.2	72
Himachal Pradesh	0.4	0.3	35
Jammu & Kashmir	0.1	0.1	6
Jharkhand	1.1	1.0	-
Karnataka	5.3	4.7	63
Kerala	3.3	3.1	45
Madhya Pradesh	5.4	4.5	57
Maharashtra	8.2	7.4	54
Odisha	5.3	2.7	61
Punjab	2.3	0.8	79
Rajasthan	4.9	3.9	63
Tamil Nadu	5.9	5.3	64
Uttar Pradesh	15.9	7.9	35
Uttarakhand	0.6	0.3	32
West Bengal	3.2	2.8	40
India	93.7	61.7	48

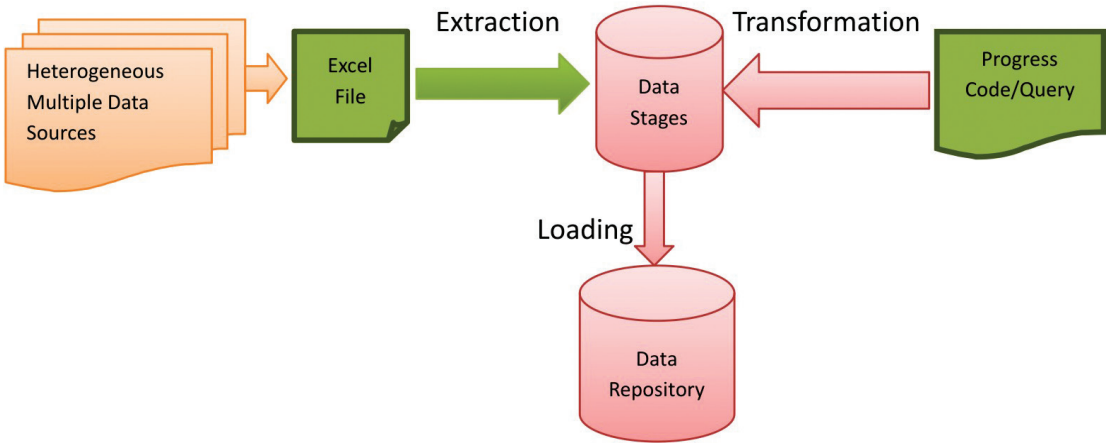


Figure 10: ETL process for agricultural and socio-economic datasets- A schematic representation

Effectiveness of Self Help Groups in Agriculture

Sajesh V K and P Ramasundaram

In recent years, Self Help Groups (SHGs) have transgressed beyond the role of financial inclusion and other developmental objectives, and are increasingly being involved in various income-generating activities, including farming and other agriculture-related activities. The study conducted to examine the effectiveness of SHGs in agriculture in Andhra Pradesh and Kerala has revealed that SHGs are highly effective in resource mobilisation; especially in terms of credit availability, access to productive resources and reduced transaction cost. These are followed by capacity building, access to extension services and technology adoption. Group effectiveness is the least in the marketing aspects. The higher score for marketing in the case of Dairy SHGs in the Chittoor district of Andhra Pradesh, where SHGs are integrated into the milk supply chain, points to the need for developing market linkages to sustain the group mobilisation in agriculture. It has been observed that SHGs with higher effectiveness have a good functional relationship with relevant institutions and organisations. Factors which are found to constrain the effectiveness of SHGs in agriculture include difficulty in access to land on continuous basis, non-availability of quality planting materials, difficulties in marketing, etc. SHG members have perceived improvement in various components of empowerment like personal, economic, socio-cultural, familial and political due to group participation.

Female Participation in Agriculture in East India: 1983-84 to 2009-10

Usha Rani Ahuja, Anjani Kumar and Rajni Jain

The major objective of the study was to examine the pattern of female participation in agriculture and allied sectors in different agro-ecological zones of India and its temporal variation in Eastern India. The information was compiled from the employment schedule of NSSO data from 1983-84 to 2009-10. It has been observed that female participation in agriculture is declining at the national level with time; however, the rate of decline in the study area, viz., Bihar, Jharkhand and Odisha, was higher than that noticed at the national level (Table 14). The same trend has been observed in the case of livestock and other allied activities as well.

Table 14: Trends in female participation in agriculture in Eastern India and at national level, 1983-84 to 2009-10

State	Female work participation (%)				Percentage points reduction during		
	1983-84	1994-95	2004-05	2009-10	1983-84 to 1994-95	1994-95 to 2004-05	2004-05 to 2009-10
Bihar	26.43	22.38	22.20	12.44	-4.05	-0.18	-9.76
Jharkhand	47.18	34.94	43.78	28.97	-12.25	8.84	-14.81
Odisha	34.84	36.41	38.29	32.07	1.57	1.88	-6.22
India	37.72	37.53	38.85	33.76	-0.19	1.33	-5.09

Growth and Modelling

Historical and Spatial Trends in Indian Agriculture: Growth Analysis at National and State Levels

Ramesh Chand and Shinoj Parappurathu

Indian agriculture has witnessed wide variations in growth performance during a span of six decades after Independence. In order to find the effects of major changes in technologies and policies on the sector and to understand the broad trends in growth, a comprehensive growth analysis was undertaken by dividing the overall period into six phases, viz., pre-green revolution period (1960-61 to 1968-69); early green revolution period (1968-69 to 1975-76); period of wider technology dissemination (1975-76 to 1988-89); period of diversification (1988-89 to 1995-96); post-reform period (1995-96 to 2004-05) and period of recovery (2004-05 to 2010-11). The Bai and Perron (2003) methodology of multiple structural break determination was used for identifying the various phases.

The overall assessment of the growth in agricultural sector suggests that green revolution period has been the golden period for Indian agriculture that witnessed tremendous growth in both agricultural output and input use (Table 15). The period of wider dissemination of technology can be considered as the phase during which the spread of green revolution technologies across regions aided in maintaining the growth tempo realised during the previous period. The subsequent period witnessed the growth becoming broad-based with faster diversification of production towards horticultural and cash crops. However, the post-reforms period experienced a visible deceleration of growth in most of the major crops and this can be attributed to a significant diversion of resources away from agriculture. Both public and private investments suffered a setback during this period and the effect was manifested in sluggish performance of the sector as a whole. Moreover, the use of primary inputs in the sector also slowed down due to which the yield levels of most of the crops suffered a deceleration. The retardation of growth continued up to the year 2004-05 after which a sharp recovery was realized, the reason for which can be attributed to a conscious hike in public and private investments and substantial improvement in terms of trade in favour of agricultural sector.

The study has concluded that, more than a matter of chance or as a brief spell of improvement, the recovery can be considered as the result of a significant alteration in strategy that put considerable focus on the agriculture sector, be it a rapid expansion of agricultural credit, reinvigorated growth in the distribution of quality seeds or

Table 15: Growth rates of GDP (2004-05 prices) of various sub-sectors in India during different phases of growth (Per cent/year)

Sector	1960-61 to 1968-69	1968-69 to 1975-76	1975-76 to 1988-89	1988-89 to 1995-96	1995-96 to 2004-05	2004-05 to 2010-11
Agriculture & allied	1.03	1.98	2.42	3.24	2.35	3.31
Agriculture*	0.70	1.93	2.71	3.21	2.30	3.37
Forestry & logging	3.70	2.01	-1.77	0.74	2.05	2.25
Fishery	3.91	4.19	3.45	7.37	3.28	4.42
Non-agriculture	4.90	3.67	5.23	5.91	7.05	9.68
All sectors	3.19	2.99	4.25	5.14	5.95	8.57

*GDP Agriculture includes crops and livestock

substantial outlay of public and private investments in the sector. However, the future growth in the sector relies a lot on the manner in which the resources are put into productive use and the degree to which farmers are incentivised to continue with the farming profession.

Agricultural Growth and Reduction in Poverty

Anjani Kumar

In the context of the inconclusive debate on the dynamics of rural poverty, a study was undertaken to analyse the impact of agricultural productivity, rural literacy, and real rural wages on poverty reduction in the rural households. It was estimated by using state level data at three time periods, viz. 1983, 1993 and 2004. The study has revealed a significant depressing effect of all the three variables on rural poverty, the highest effect being exerted by per capita agricultural NSDP (Table 16). This indicates that the benefits of growth in agriculture have trickled down to the rural poor and the growth has been inclusive. However, agricultural growth alone will not be sufficient to substantially reduce the incidence of rural poverty. Wages being a major source of income of rural households, their improvement would significantly reduce rural poverty. Therefore, rural development programmes that have direct or indirect influence on the living conditions of farming and landless labour households need to be accorded considerable importance to ensure inclusive growth. A significant negative relationship between poverty and literacy suggests that education plays an instrumental role in rural poverty reduction, calling for higher investments on human resource development in the rural areas for inclusive growth.

Table 16: Regression estimates of rural poverty in India

Dependent variable: Rural poverty (%)

Exploratory variable	Coefficient	Standard error
Agricultural NSDP per rural person (Rs)	-0.976*	0.148
Rural literacy (%)	-0.315**	0.158
Rural wages (Rs)	-0.198*	0.069
Constant	12.90	1.29
R^2	0.72	

* Significant at 1 per cent level, ** significant at 5 per cent level.

III. BRIEF ACCOUNT OF THE XI PLAN ACHIEVEMENTS

Technology Policy

- The Centre has highlighted the contributions of public and private sectors in the total research spending and its role in TFP growth in agriculture.
- A comparative assessment of the agricultural R&D and institutional reforms in India with other developing countries was carried out. The comparison with China has revealed that Chinese system is more decentralised in terms of structure and funding. Public expenditure measured in 1999 PPP dollars indicates that China spent 2,578 million Yuan annually on agricultural research during 1995-2000, which further rose to 4,329 million Yuan in 2002. This investment is more than double of that made by India. The expenditure per hectare of arable land is also higher in China (PPP 37.32/ ha) in comparison to India (PPP 10.66/ha).
- Impact analysis of research in NARS has revealed an increasing trend in the total number of research publications during 1990s as compared to that in 1980s. However, a majority of these publications (about 80%) have appeared in non-SCI (Science Citation Index) journals with zero impact factor.
- A high pay-off to investment in agricultural research has been observed and it is a 'win-win' option to improve total factor productivity (TFP) and alleviate rural poverty. Moreover, deceleration in agricultural growth since the mid-1990s, has underscored the need for acceleration of technology flow to farmers and higher investment in R&D.
- An investigation into the major sources of growth in agriculture during the three decades from 1975 to 2005, has revealed that among cereals, wheat experienced the highest TFP growth at about 1.9 per cent, compared to 1.4 per cent each for maize and barley, 1.0 per cent for bajra, 0.7 per cent for rice, and 0.6 per cent for jowar. The TFP growth in oilseeds sector varied in the range 0.7 - 0.8 per cent per annum. Among pulses, the TFP growth is estimated to be 0.5 per cent for moong, followed by gram (0.2%).
- Applications of improved technologies have increased the productivity manifold in various crops and species. Adoption of improved technologies could contribute 19.8 per cent gains in wheat yield during 1999-2000 to 2004-05. Technology-led growth in the livestock sector has contributed to the annual growth rate of 2.3 per cent during the period 1970-71 to 2003-04.
- Adoption of available technologies that minimise the gap between attainable yield as demonstrated in various experimental farms and farmers' fields would lead to yield gains of 40-100 per cent.
- Government of India has invested huge resources to harness the potential of

biotechnology. The emphasis is on tissue culture, tolerance to biotic and abiotic stresses and improving quality and shelf-life of agri-food products. The presence of private biotech research is limited.

- The effect of dairy-cooperatives on the compliance with food safety measures is found to be positive.
- A study on the impact of foot-and-mouth disease control programme has indicated that the economic loss would have been to the tune of about Rs 1,100 crore, had there been no control programme.
- New Seed Policy and economic reforms have provided enormous opportunities to the private seed sector. At present, this sector shares a large proportion of seeds of cotton, rice, maize, and vegetables.
- The fisheries sector has witnessed a spectacular growth of over 800 per cent during the past five and a half decades of planning and development. The outlay for fisheries research in total agricultural research has grown from 2.7 per cent in the IV Five-Year Plan to 6 per cent in the IX Plan.

Sustainable Agricultural Systems

- A study on desertification in South Asia has concluded that cereal-based farming system is the most important livelihood strategy, followed by livestock-based systems in sample districts. Also due to fragmentation of landholdings, the livelihood strategy is undergoing a change towards cash crops and non-farm employment opportunities.
- An examination of the land-use dynamics and planning in India over the years has revealed that the share of area under non-agricultural use doubled in 2001-08 as compared to that in 1951-61 and the increasing share of current fallows needs immediate attention.
- Water being the most critical input in agriculture, a number of water-saving technologies (WSTs) are being developed. It has been found that WSTs are mainly used for horticultural crops. The empirical evidence on micro-irrigations is skewed towards drip system, because of its large application in horticultural crops. For deciding provisions of subsidies on WSTs, economic returns from investment and their use in crops should be estimated.
- The review of the status and effectiveness of demand management options such as water pricing, energy regulations, water markets, water saving technologies, and user/community organisations has suggested that their actual effects on water saving and use efficiency are too meagre and are also very thinly spread to have any major impact on the local and regional water demand.
- The study on impact of System of Rice Intensification (SRI) in Tamil Nadu has shown that SRI provides higher returns and conserves water to the tune of 22-39 per cent over the normal cropping practice. It provides higher production at lower cost along with fulfilling economic as well as environmental criteria.
- A study on the distribution of small ruminant population has revealed that the small ruminant population is undergoing regional shifts since long, in terms of geographical composition. The regional shift is becoming sharper in the case of sheep population, wherein southern region has registered a sharp increase from around 46 per cent to 60 per cent.
- The coping strategies for climate change based on limited sets of variables (especially,

temperature and moisture) have been found less effective in dynamic setting. There is a need to integrate socio-economic variables with bio-physical model for better results. Location-specific appropriate technologies might help adaption to the changing climatic conditions. To reduce risks related to climate change, it is necessary to formulate appropriate credit and insurance policies suiting to different ecosystems.

- The National Biofuel Policy has been designed to harness various benefits arising out of a large-scale development of biofuels. However, the success of the programme would largely depend on the readiness of the stakeholders and the government machinery to tackle the emerging challenges over time. It has become apparent that bioethanol production based on sugarcane molasses is neither economically viable nor sustainable in the long-run. Similarly, the jatropha-based biodiesel production is facing several obstacles like slow progress of planting, sub-optimal processing and marketing infrastructure, under-developed distribution channels, etc. Substantial research on second and third generation feed stocks is crucial to address the future bio-energy needs of the country.
- Over-investment on private irrigation assets (i.e., wells and pumpsets) by some farmers and non/under-investment by others due to various constraints has led to the emergence of rental markets for irrigation assets. Available data have shown that about 10 per cent of the total pumpsets in the country are involved in pumpset rentals.

Markets and Trade

- Evidence from studies undertaken at the Centre indicates that India is a major exporter of rice, but export of wheat is marred with significant fluctuations. Export surpluses of wheat were transitory in nature; and their exports were followed by huge imports to stabilise its domestic prices and demand. Further, international prices are volatile; and if these get transmitted to the farm level, it will destabilise the cropping pattern.
- Domestic demand for cereals has been projected to be 219 Mt by the year 2012 and 261 Mt by the year 2020. The demand for pulses by these years would be 16 Mt and 19 Mt, respectively. Thus, the overall foodgrains demand has been projected to be 235 Mt by the year 2012 and 280 Mt by 2020.
- A wide array of literature has pointed out that India's edible oil sector is not competitive globally. During the post-WTO period, India exported large quantities of vegetable oils and oilseeds (23% each), and oilcake and oil meal (54%). Competitiveness in the edible oil sector depends on the production of oilseeds and their processing efficiency.
- A study to identify the determinants of export performance of livestock products has revealed that India's livestock export will increase by 0.21 per cent as a result of 1 per cent increase in the GDP of the destination countries. The ratio of domestic production to consumption plays a significant role in increasing the export of bovine meat, poultry, livestock and mutton. It has been found that devaluation of currency during 1990s and its management during the post-liberalisation period as well as removal of quantitative restrictions played an important role in the export of livestock products.
- Analysis of marketing models of horticulture and fisheries in the WTO regime has concluded that new models in fish retailing and some private market models are better

than their traditional counterparts in terms of operating hours, price advantage to consumers, hygiene and consumer acceptance. Strategies to enhance marketing efficiency like up-scaling the volume of produce handled through technology and institutions, integration, regular inflow of information, provision of market intelligence support, etc. are needed to promote direct marketing models in horticulture.

- Market integration of milk is important to ensure fair returns to dairy farmers. The evidence has shown that wholesale prices at Chennai, Delhi, Kanpur, Kolkata and Mumbai milk markets are cointegrated with one long-run equilibrium relationship.
- Commodity outlook models for grains and oilseeds have been developed. The outlook model can provide medium- and long-term outlooks.

Institutional Change

- A study on diversification of Indian agriculture has shown that it is diversifying towards high-value crops in all the regions but its speed is more in western and southern regions. It has been found to be more in states having a larger share of smallholdings.
- Higher returns relative to other crop groups is the main underlying factor for the diversification towards horticulture.
- A study on the impact of vegetable production on income and employment of smallholders has revealed that vegetable cultivation is not only more profitable and labour-intensive than cereals, but also more suitable to the needs and resource endowments of smallholders.
- Studies on vertical integration aimed at assessing the costs and benefits of institutional linkages such as contract farming and producers' associations to the producers have found that the farmers associated with such institutions could save as much as 60-90 per cent on transaction costs, and earn 13-100 per cent more profit than their counterparts. Studies on contract farming in the dairy sector have shown that farmers benefit from such contracts through reduction in transaction cost (70-90%). Contract farming has enabled the farmers to produce organic rice in compliance with food safety and quality standards and has also improved their bargaining power through the association.
- A study on agricultural insurance has revealed that it has served very limited purpose in terms of area, number of farmers and value of agricultural output. Payment of indemnity based on the 'area approach' misses the affected farmers outside the compensated area, and most of the schemes are not viable. This requires renewed efforts by the government in terms of designing appropriate mechanisms and providing financial support for agricultural insurance, including private sector insurers.
- The analysis of linkages between infrastructure and agricultural development has indicated that transport, power, irrigation and research infrastructure affect the agricultural productivity in a significant manner. The majority of farmers (82%) account for only 50 per cent of the institutional credit; on the other hand, 18 per cent of the farmers having more than two hectares land account for 49 per cent of the institutional credit.
- A review on the status of smallholders in Indian agriculture has revealed increase in the number of smallholdings between1970-71 and 2005-06 and consequent reduction in

inequality in land distribution. Land-utilisation efficiency measured by cropping intensity is higher in the case of marginal (139%) and small farms (126%) compared to large-size class (119%). Increase in fertilizer consumption per hectare of net sown area is more for marginal farmers, followed by small and large farmers. Fertilizer imbalance index is also lower on smallholder farms. At all-India level, it is observed that land productivity of smallholdings is higher compared to that of large farms.

- Some successful models of Information and Communication Technology (ICT) have been studied for assessment of their costs and benefits from the farmers' perspective. With the availability of information on input-use, technology and market prices, the farmers could realise better yield and higher market price and could reduce costs on information search and acquisition.
- Female participation in agriculture and allied sector activities has been observed to be highest in livestock production (76.94%), followed by forestry (52.42%), agricultural production (38.75%), agricultural services (38.74%), plantation (35.46%) and fishing (16.12%). Average participation rate has been estimated as 39 per cent.

Agricultural Growth and Modelling

- The performance of agricultural sector is closely monitored by the government and various strategies are put in place to counter adverse effects of various factors on this sector from time to time. These measures have been effective in decoupling India's agricultural sector from rest of the world and in minimising the effect of shocks in global economy on this sector. It has been concluded that apprehensions about the impact of global recession on Indian agriculture are not well founded and are overstated.
- The analysis of growth in agriculture has revealed that agricultural growth performance was satisfactory before 1995-96, but slowed down afterwards. This has been due to slowdown in the growth of fertilizer-use, irrigation, cropping intensity, declining international prices of agricultural commodities, neglect of price intervention in the underdeveloped yet potential growth regions, stagnation in public investment and diversification towards high-value crops, and terms of trade after 1995-96.
- A study analysing feasibility and constraints in achieving four per cent growth rate in agriculture during XI Plan has concluded that growth in GDP agriculture can be accelerated if the momentum in growth of fertilizer use, seed, irrigation, power supply, and public investments is maintained as in the past four years.
- The pattern of agricultural growth and economic convergence in Indian agriculture has affirmed that the benefits of economic reforms initiated by the Government of India have shown no visible impact on the convergence process of per hectare NSDP agriculture among Indian states. The slowing down of agricultural growth is raising serious concerns in policy quarters on account of its effect on rural prosperity, industrial performance and overall growth prospects. It has been found that one per cent increase in land productivity reduces poverty by 0.65 per cent.
- The share of high-value food commodities has increased considerably over the past 15 years. Studies on agricultural diversification have suggested a need for improving producers' access to markets, improved

technology, quality inputs and information as well as credit and risk-coping mechanisms.

- A study on growth performance across states has pointed out the rising regional disparities in India after initiation of the economic reforms programme in 1991. The study has concluded that in a dynamic scenario, income growth accelerated in the middle--income states, decelerated in most rich states and neither accelerated nor decelerated in poor states during the period 1980-81 to 2004-05.
- A study on livestock has revealed that some states like West Bengal, Tamil Nadu, Kerala, Karnataka, Haryana, Punjab and Maharashtra have performed better in both livestock production and poverty reduction during the period 1983-84 to 1997-98 as compared to some other states like Assam, Madhya Pradesh, Rajasthan and Uttar Pradesh. It has been pointed out that growth of livestock sector can be accelerated by improving feed quality and composition of livestock, veterinary facilities, and output marketing and institutional interventions.
- A study conducted in the four eastern states, viz. Bihar, Jharkhand, Odisha and West Bengal has identified that the differences in the educational level of household-head, value of productive assets, landholding-size, access to market and value of livestock are the major determinants of income inequality.
- In a study on instability in Indian agriculture, it is concluded that Indian agriculture has developed resilience to absorb shocks due to agro-climatic and other factors.
- A study on North- Eastern Region has revealed that agricultural diversification towards high-value crops has high prospects in growing fruits, vegetables, oilseeds, floricultural crops, etc. in this region.
- A study on the impact of technology on growth of poultry in North-Eastern states has indicated that backyard poultry farmers are more vulnerable to diseases like Avian Influenza.

System of Monitoring and Control over the Performance of the Centre

The progress of all the plan projects is being reviewed regularly by the Institute Research Council (IRC) during its meetings held monthly. It is also reviewed and advised by Research Advisory Committee (RAC) of the Centre during its meetings held annually and also by Quinquennial Review Team (QRT) every five years. Apart from these, the externally funded projects are also reviewed regularly through their designated review committee meetings held either annually or biannually. In addition, the Centre organises policy advocacy activities, training programmes and seminars/ workshops.

IV. POLICY INTERACTIONS

Ramesh Chand

- Chairman, Working Group on Crop Husbandry, Agricultural Inputs, Demand and Supply Projections and Agricultural Statistics for the XII Five Year Plan, Planning Commission.
- Member, Steering Committee on Agriculture and Allied Sector for XII Plan, Planning Commission.
- Member, Steering Committee on PDS, Storage of Foodgrains, Warehousing Development/ Regulation, and Consumer Protection for the Formulation of XII Plan, Planning Commission.
- Member, Advisory Committee on Agricultural Outlook and Situation Analysis Reports with Focus on Food Security, National Council of Applied Economic Research, New Delhi.
- Member, Expert Group to work out the methodological details for the pilot survey on Estimation of Savings and Investment through Household Survey, NSSO.
- Member, Expert Group of MGNREGA on Watershed Platform under Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA).
- Member, Committee in the Department of Food & Public Distribution under the Chairmanship of Secretary (F&PD) to monitor creation of additional storage space for storing Central stock of foodgrains, and for prudent management of Central stock of foodgrains.
- Member, Core Working Group for the Development of Strategy and Strategic Plan 2010-15 of the DARE/ICAR.
- Member, Committee to Formulate Long-Term State Agriculture Policy, Constituted by Office of Chief Minister of Punjab.
- Member, Technical Committee on Quinquennial Livestock Census 2012, constituted to finalise subject coverage, methodology time frame and all other details for conducting the Livestock Census.
- Member, Working Group on the Requirement of Modern Silos in the country.
- Member, O&M Programme Committee of the National Agricultural Innovation Programme (NAIP).
- Member, Working Group on Foodgrains – Balancing the Demand and Supply during 12th Plan Period, Department of Agriculture and Cooperation, Ministry of Agriculture.
- Nodal Officer, DARE/ICAR for coordination between the two Departments for service on "Information on Marketing Infrastructure".
- Member, Board of Studies of Faculty of Economics (FE), constituted by The President, South Asian University.
- Member, Coordination Committee for Organisation of Studies (CCOS) in the field of Agricultural Economics, Department of

Agriculture and Co-operation, Ministry of Agriculture, Government of India.

- Member, India's Delegation for G 20 Meetings on Agriculture.

P S Birthal

- Member, Working Group on Animal Husbandry and Dairying for the XII Five Year Plan, Planning Commission, Government of India.

V. AWARDS/ RECOGNITIONS

Ramesh Chand

- Rafi Ahmad Kidwai Award for Outstanding Research in Social Sciences (2010)

Hon'able Union Minister for Agriculture, Sh Sharad Pawar presenting Rafi Ahmed Kidwai Award to Prof. Ramesh Chand, Director, NCAP on 16 July 2011 at NASC Complex, New Delhi

- Chairman, Group on Crop Husbandry, Agricultural Inputs, Demand and Supply Projections and Agricultural Statistics for the XII Five Year Plan.
- Member, Steering Committee on Agriculture and Allied Sector for XII Five Year Plan, Planning Commission.
- Member, Steering Committee on PDS, Storage of Foodgrains, Warehousing Development/ Regulation, and Consumer Protection for the Formulation of XII Five Year Plan, Planning Commission.
- Participated in G 20 Meetings as member of Indian Delegation.
- Invited by His Royal Highness, Prince of Wales, Prince Charles to High Level Meeting on Sustainability and Food Security, London, 28 February, 2012.
- Member, Governing Board, SAARC Agriculture Centre, Dhaka.
- Nodal Officer for SAARC agricultural activities and Technical Committee on Agriculture and Rural Development.
- Member, QRT, CRIDA, Hyderabad
- Member, RAC, DWR, Karnal

Prof. Ramesh Chand, Director, NCAP in conversation with Prince Charles, during the dinner hosted by the Prince at his residence at Clariton House, London

P S Birthal

- R T Doshi Foundation Award for the best research article published in Agricultural Economics Research Review in the year 2010.

- Member of the Working Group on 'Animal Husbandry and Dairying' for the XII Five Year Plan, Planning Commission.
- Managing Editor, Agricultural Economics Research Review, AERA, New Delhi.

S S Raju

- Best Annual Report Award for the year 2010-11 under small institute category to NCAP by ICAR (Edited by S S Raju, Rajni Jain and Ajay Tanwar).
- R T Doshi Foundation Award (Second Prize) for best paper published in Agricultural Economics Research Review in the year 2010.

Anjani Kumar

- Member, Quinquenniel Review Team (QRT), Project Directorate for Farming Systems Research, Modipuram, Meerut.
- R T Doshi Foundation Award (Second Prize) for the best paper published in Agricultural Economics Research Review in the year 2010.
- Joint Secretary, Agricultural Economics Research Association, New Delhi.

Rajni Jain

- Best Annual Report Award for the year 2010-11 under small institute category to NCAP by ICAR (Edited by S S Raju, Rajni Jain and Ajay Tanwar).

VI. PUBLICATIONS

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Shinoj, P., Raju, S. S., Chand, Ramesh, Kumar, Praduman and Msangi, Siwa (2011) *Biofuels in India: Future Challenges*. Policy Brief No 36, NCAP.

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Chand, Ramesh and Raju, S. S (2011) *Instability and Regional Variation in Indian Agriculture*, Policy Paper No 26, NCAP.

C. Research Papers

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F. TV Talks

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Jain, Rajni, Rai, Raj Kumar and Kumar, Anjani (2012) ETL model for integration of heterogeneous agricultural socio-economic data sources. In: *6th National Conference on Computing for Nation Development (Indiacom 2012)*, organised by Bhartiya Vidyapeeth, New Delhi. 23-24 February.

Jain, Rajni, Samimul Alam, A. K. M. and Alka, A. (2011) Software process model for total factor productivity of agriculture. In: *5th Indian International Cconference on Artificial Intelligence*, Siddaya Institute of Technology (SIT), Tumkur, Karnataka. 14-16 December.

Jain, Rajni, Satma, M. C., Arora, A., Marwaha, S. and Goyal, R.C. (2012) Software process model for online rule generation using decision tree classifier. In: *6th National Conference on Computing for Nation Development*, organised by Bhartiya Vidyapeeth, New Delhi. 23-24 February.

Kumar, Anjani (2011) Structural transformation of Indian dairy, In: *Seminar on Prospects of India's Agriculture Export in 2025: Opportunities, Challenges and Roadmap*, IIFT, New Delhi. 6-8 July.

Kumar, Anjani (2012) Milk production in India: Growth, economics and competitiveness. In: *XL-Dairy Industry Conference 2012 of Indian Dairy Association*, New Delhi, 2-5 February.

Kumar, Anjani (2012) Priorities for livestock sector in Bihar, In: *State consultation workshop on Priorities and Possibilities of Investment for Accelerating and Stabilizing Agricultural Growth in Bihar*, Patna. 17 March.

Kumar, Anjani and Jain, R. (2011) Agricultural productivity in India: Historical and spatial trends at district level. In: *Policy Options and Investment Priorities for Accelerating Agricultural Productivity and Development in India,* organised by Indira Gandhi Institute of Development Research, Mumbai. 10-11 November.

Kumar, Anjani and Jain, R. (2011) Spatial and temporal variations in agricultural productivity at district level: Some preliminary findings. In: *Workshop on Policy Options and Investment Priorities for*

Accelerating Agricultural Productivity and Development in India, organised by Indira Gandhi Institute of Development Research, Mumbai and Institute for Human Development, Mumbai at India International Centre, New Delhi. 10-11 November.

Kumar, Anjani, Kumar, Sant, Singh, D.K. and Shivjee (2011) Rural employment diversification in India: trends, determinants and implications on poverty. In: *18th Annual Conference of Agricultural Economics Research Association (AERA) on Dynamics of Supply and Demand for Labour in Indian Agriculture*, Assam Agricultural University, Jorhat (Assam). 28-30 November.

Kumar, Anjani, Sharma, A.N., Jain, R., Kumar, P. and Ahuja, Usha (2011) Dynamics of rural poverty in India: The role of agricultural growth. In: *7th Conference of Asian Society of Agricultural Economics*, Hanoi, Vietnam. 13-15 October.

Kumar, Sant and Shinoj, P. (2011) Public support in agricultural production and marketing system in india. In: *Consultation Workshop organised by SAARC Agriculture Centre* at Kathmandu, Nepal. 14-15 December.

Sajesh, V.K., Ramasundaram, P., Kalaivani, N.J. and Sulaiman V, Rasheed (2011) Role of ICTs in mainstreaming rural women: Analysis of content, reach and impact. In: *International Conference on Innovative Approaches for Agricultural Knowledge Management: Gobal Extension Experiences*, organised by International Society of Extension Education and ICAR at NASC complex, New Delhi. 9-12 November.

Singh, R.V., Ahuja, D.B. and Ahuja, U.R. (2011) Farmers' field schools: A participatory extension approach for sustainable pest management. In: *Proceedings of 6th National Extension Education Congress-2011*. p. 347.

H. Proceedings

Kumar, Sant, Sikka, A.K. and Suresh, A. (2011) *Methodological Issues in Assessing Impact of Watershed Programmes*. Proceedings No. 15. NCAP and National Rainfed Area Authority, New Delhi.

VII. ON-GOING RESEARCH PROJECTS

Sl. No.	Title of Research Project	PI / Co-PI
Institute Funded		
1	Smallholders in Indian Agriculture: Past, Present and Future	P A Lakshmi Prasanna Rajni Jain Shiv Kumar
2	The Rise of Supermarket Chains in India: Effects on Farmers, Traditional Retailers and Local Vendors	M B Dastagiri
3	Indian Poultry Sector in Transition: Role of Technology and Institutions	B Ganesh Kumar
4	Fertiliser Application, Uptake and Imbalance	Diana S
5	Research Priorities in Indian Agriculture	Sant Kumar
6	Sustainability and Efficiency in Agriculture: An Exploratory Analysis	Suresh A Kurup
NAIP Funded		
7	Achieving Improved Livelihood Security through Resource Conservation and Diversified Farming Systems in Mewat	Usha Rani Ahuja
8	Risk Assessment and Insurance Products for Agriculture	Ramesh Chand S S Raju Diana S Rajni Jain
9	Developing a Decision Support System for Commodity Market Outlook	Ramesh Chand Anjani Kumar Rajni Jain Shiv Kumar Shinoj Parappurathu
10	Visioning, Policy Analysis and Gender (V-PAGe)	Ramesh Chand P Ramasundaram Sant Kumar P A Lakshmi Prasanna Suresh A Kurup B Ganesh Kumar Josily Samuel Sajesh V K

Sl. No.	Title of Research Project	PI / Co-PI
Other Projects		
11	Enhancing Resilience of Agriculture to Climate Change through Technologies, Institutions and Policies (Funded by National Initiatives on Climate Resilient Agriculture)	P S Birthal Suresh A Kurup Shiv Kumar
12	Tracking Change in Rural Poverty in Household and Village Economies in South Asia (funded by ICRISAT)	Ramesh Chand Anjani Kumar Usha Rani Ahuja Rajni Jain
13	Economic Impact of FMD and its Control in the Dairy and Meat Value Chains of Selected High Potential Regions of India: A Pilot Study (funded by ICAR)	B Ganesh Kumar
14	Strengthening Value Chain for Economic Efficiency: The Case of Small Ruminant Meat Marketing In India (funded by ICAR)	Suresh A Kurup
15	Machine Learning Approach for Data Mining in Agricultural Datasets (with IASRI)	Rajni Jain

VIII. CONSULTANCY RESEARCH

Name of scientist	Institution to which consultancy was provided	Area of consultancy/ contract research
Anjani Kumar	IFPRI, Washington D C	Structural Transformation in Indian Dairy Sector
Anjani Kumar and Rajni Jain	Food and Agriculture Organisation (FAO), New Delhi Office	Historical and Spatial Trends: District Level Agricultural Productivity Analysis
Ramesh Chand, Shiv Kumar and PS Birthal	Protection of Plant Varieties & Farmers' Rights Authority, New Delhi	Evaluation of the Scheme for Protection of Plant Varieties & Farmers' Rights Authority
Ramesh Chand and Shinoj Parappurathu	Food and Agriculture Organisation (FAO), New Delhi Office	Historical and Spatial Trends in Indian Agriculture: Growth Analysis at National and State Level

IX. RESEARCH ADVISORY COMMITTEE

The Research Advisory Committee (RAC) of the National Centre for Agricultural Economics and Policy Research (NCAP) was constituted for a period of three years w.e.f. 30 September 2010. The composition of RAC is as follows:

Dr V S Vyas *(Chairman)*
Professor Emeritus and Chairman
Institute of Development Studies
396, Vasundhara Extension
Gopal Pura Bye Pass, Tonk Road
Jaipur - 302 018, Rajasthan

Dr Ramesh Chand
Director
National Centre for Economics and Policy Research (NCAP)
Pusa, New Delhi - 110 012

Dr Mruthyunjaya
Former National Director
NAIPA-701, Vasundhra Apartment
Sector-6, Plot No. 16, Dwarka
New Delhi - 110 045

Dr (Ms) Amita Shah
Director
Gujarat Institute of Development Research (GIDR) Gota
Ahmedabad - 380 060, Gujarat

Dr V P S Arora
Vice Chancellor
Kumaon University, Sleepy Hallow Mallital
Nainital - 263 001, Uttrakhand

Dr J V Meenakshi
Professor
Delhi School of Economics
University of Delhi
Delhi - 110 007

Dr R K Mittal
Assistant Director General (EQR)
Education Division, ICAR
Krishi Anusandhan Bhawan-II
New Delhi - 110 012

Dr P Ramasundaram *(Member Secretary)*
Principal Scientist
National Centre for Agricultural Economics and Policy Research
Pusa, New Delhi - 110 012

X. QUINQUENNIAL REVIEW TEAM

Dr S S Acharya ***(Chairman)***
Honorary Professor, IDS Jaipur 33
Shahi Complex, Sector 11
Udaipur - 313 002
Rajasthan

Dr R S Deshpande
Director
Institute for Social and Economic Change
Nagarbhavi, Bangalore - 560 072
Karnataka

Dr Mruthyunjaya
Former National Director, NAIP
ICARA-701, Vasundhra Apartment
Sector-6, Plot No. 16, Dwarka
New Delhi - 110 045

Dr P G Chengappa
ICAR National Professor
Institute for Social and Economic Change
Nagarbhavi, Bangalore - 560 072
Karnataka

Dr R S Siddhu
Dean
College of Basic Sciences and Humanities
Punjab Agricultural University
Ludhiana - 141 004
Punjab

Sh S Sivakumar
Chief Executive
Agri. Business, ITC Limited
Secunderabad - 500 003
Andhra Pradesh

Dr P Ramasundaram ***(Member Secretary)***
Principal Scientist
National Centre for Agricultural Economics and Policy Research
DPS Marg, Pusa, New Delhi - 110 012

XI. MANAGEMENT COMMITTEE

Dr Ramesh Chand
Director
National Centre for Agricultural Economics and Policy Research (NCAP)
New Delhi - 110 012

Director
Directorate of Economics & Statistics
Delhi State, Old Secretariat
Delhi - 110 054

Economic Advisor
Economic & Statistical
Organization Govt. of Punjab
Chandigarh - 160 017

Dr R K Khatkar
Head
Department of Agriculture Economics
Haryana Agricultural University
Hissar - 125 004
Haryana

Sh Viswasrao Anandrao Patil
P.O. Lohara, Taluq Pachora
Distt. Jalgaon, Maharashtra

Dr H K Srikanta
59/1, 8th Cross, 5th Main R.K. Layout
Padmanabhanagar, Bangalore
Karnataka

Dr S L Goswami
Director
National Academy of Agricultural Research Management
Rajendra Nagar, Hyderabad - 500 030
Andhra Pradesh

Dr N H Rao
Joint Director
National Academy of Agricultural Research Management, Hyderabad - 500 030
Andhra Pradesh

Dr (Ms.) Sudha Mysore
Principal Scientist
(Agril. Economics)
Indian Institute of Horticultural Research
Hessaraghatta Lake Post, Bangalore - 560 089
Karnataka

Dr A K Vashist
Assistant Director General
ICAR, Krishi Bhawan
New Delhi - 110 001

Dr R K Mittal
Assistant Director General (EQR)
Indian Council of Agricultural Research
Krishi Anusandhan Bhawan-II
Pusa, New Delhi - 110 012

Sr Finance and Accounts Officer
National Bureau of Plant Genetic Resources
Pusa, New Delhi - 110 012

Administrative Officer *(Member Secretary)*
National Centre for Agricultural Economics and Policy Research
DPS Marg, Pusa, New Delhi - 110 012

Meetings of the Institute Research Council (IRC)

Institute Research Council (IRC) of NCAP is comprised of Director, NCAP and scientific staff of the Centre. Director, NCAP is the Chairman of IRC. Eight meetings of the IRC were held during 2011-12 (April-March). A total of thirty-three presentations were made during the reporting year. In the IRC meetings, deliberations were made on the progress of on-going projects, new research proposals and deputations to foreign countries.

Mandates of Committees

A number of committees (as mandated by ICAR and internal) have been constituted for the decentralised management of the Centre. These committees and their terms of reference are as follows:

Academic Planning and Policy Committee

- discuss theme area membership
- strengthen internal planning and functioning and provide policy directions
- suggest steps for strengthening NCAP

Priority Setting, Monitoring and Evaluation Cell (PME Cell)

- plan, promote and monitor PME activities of the Centre
- report the progress of PME activities
- maintain and update RPF of all the scientists and projects
- prepare quarterly and half yearly progress reports of scientists and NCAP
- update Institute profile

Budget and Results Framework Document (RFD) Committee

- plan, review and monitor expenditure and resource generation including those for sponsored projects
- ensure compliance of proper procedures
- undertake activities related to RFD

Publication Committee

- plan, format and make recommendations regarding Centre's publications
- prepare guidelines for and arrange internal and external reviews and coordinate revisions
- help and advise younger faculty on publication-related matters

Purchase Committee

- purchase material and services according to the prescribed official procedure and in accordance with the Budget Committee guidelines/directions on utilisation of funds (Chairman of the Committee will also be the Store Advisor). The Committee will undertake stock verification as per ICAR requirement on priority basis.

Security Committee

- develop an effective security system for the Centre
- identify an efficient and effective security firm
- monitor the security staff regularly

Annual Report Committee

- collect material form scientists/office for inclusion in Annual Report
- edit the report and initiate process for its publication

Consultancy Processing Cell

- examine the proposals related to consultancy with reference to guidelines of the Council issued from time to time and recommend appropriate action

Maintenance and Landscape Committee

- monitor maintenance of the office building and the landscape; and take suitable action for improving/rectifying problems

- suggest innovative ideas for improving the office, utilities and landscape
- The committee will meet the Director on last working day of every month to review the status.

Women Cell

- recommend measures for the welfare of the women employees; and redress their grievances including those related to sexual harassment, if any.

Grievance Cell

- examine the grievances received and to suggest follow-up actions accordingly

Official Language Committee

- monitor the progress of work done in official language from time to time and suggest relevant programs for improvement
- organise *Raj Bhasha Week/Day*, as intimated by the Council from time to time
- report to the Council and other agencies on progress from time to time
- Propose ways of increasing use of *Raj Bhasha* in the Centre

Agricultural Knowledge Management Unit (AKMU)

- plan and monitor AKMU related activities
- prepare plan for computer and software upgradation for the Centre
- plan for effective virus control system
- propose effective maintenance plan for the Centre's computers
- monitor, improve and update Centre's website

Library Committee

- plan for procurement of books, journals and other publications
- improve library environment so as to make its effective use
- plan for library modernisation
- share Center's publications with partners and stakeholders

Deputation Committee

- to consider all proposals for foreign visits of the Scientists for approval

Transport Committee

- develop an effective system of meeting the vehicle requirement for official activities
- arrange vehicles for research and official activities
- guide/suggest maintenance of official vehicles

IPR and Technology Commercialisation Committee

- take up issues related to IPR of products developed for commercialisation
- develop conditions for commercialisation of products
- suggest ways for resource generation

Staff Recreation Committee

- plan indoor and outdoor recreational activities for the staff of the Centre
- organise recreational activities for the staff of NCAP

Seminar/IRC

- organise IRC/seminars
- ensure projection and other logistics at the venue of the seminars and IRCs

Office services committee

- look after office cleanliness and hygiene
- arrange communication and delivery of internal and external papers, mail
- ensure satisfactory office services

XII. PARTICIPATION IN SCIENTIFIC ACTIVITIES

Ramesh Chand

- Working Group on "Crop Husbandry, Agricultural Inputs, Demand and Supply Projections and Agricultural Statistics" for the XII Five Year Plan, New Delhi. 4 April 2011.
- Workshop on "Prospects of Indian Agriculture and Rural Poverty Reduction", India International Centre, New Delhi. 27 April 2011.
- ICSSR Research Surveys Workshop on "Economic Openness and Agriculture", ICSSR, JNU, New Delhi. 4-7 May 2011.
- Consultation meeting on "Dairy Production, Quality Control and Marketing System in SAARC Countries", National Dairy Research Institute (NDRI), Karnal. 26 May 2011.
- Interactive Meeting of XII Five Year Plan Working Groups' Chairmen and Member Secretaries with Industry Association, FICCI, Federation House, New Delhi. 6 June 2011.
- Consultation on "Food Security Dimensions and Production Concerns", Planning Commission, Yojana Bhawan, New Delhi. 16 June 2011.
- International Food Policy Research Institute (IFPRI) workshop on Fertilizer Market in "New Agri-Service Providers on the Scene: Introduction of Rural Business Hub Companies' Business Models", NASC Complex, New Delhi. 28 June 2011.
- Seminar on "Prospects of India's Agriculture Export in 2025: Opportunities, Challenges and Roadmap" –Session: "Challenges in Indian Agriculture towards 2025" (Key Speaker); Session: "Competitiveness in Indian Agriculture towards 2025" (Chairperson) and "Opportunities, Challenges and Roadmap" for the Session entitled "Future Strategy for Indian Agriculture" (Key Speaker), IIFT, New Delhi. 6-8 July 2011.
- Seminar on "NCAER's State of the Economy", NCAER, New Delhi. 27 July 2011.
- Steering Committee on "Agriculture and Allied Sector for the XII Five Year Plan (2012-17)", Chennai, 17-18 August 2011.
- Workshop on "Strengthening the Role of Agriculture for Nutrition-Secure India", IFPRI, New Delhi. 13 September 2011
- Workshop on Inflation at NIPFP, New Delhi. 16 September 2011.
- 5th Meeting of the Governing Board of the SAARC Agricultural Centre, Dhaka, Bangladesh, 23-25 September 2011.
- Consultative Workshop and presented country paper on India, in "National Agricultural Extension Systems in SAARC Countries – An Analysis of the Diversity", Thimphu, Bhutan. 23-25 November 2011.
- UN-ESCAP expert group meeting on "Regional Economic Issues", Bangkok, Thailand. 5-8 December 2011.
- Steering Committee on "Agriculture for XII Plan", Planning Commission, Hyderabad. 19-20 January 2012.

- Chaired Presentations on Significant Educational Achievements by the Teaching Professors (Discipline - Social Sciences), Golden Jubilee Convocation Programme of Post Graduate School of IARI, New Delhi. 12 February 2012.
- National Workshop on "Inclusive Agricultural Growth and Input Subsidies", ISEC, Bangalore. 16 March 2012.

P Ramasundaram

- NAIP- VPAGe Workshop on "Visioning and Strategic Planning of Dairy Sector", NDRI, Karnal. 2-3 September 2011.
- Round Table Discussion on "Food Prices: From Crisis to Stability" on the occasion of World Food Day, NCAP, New Delhi. 17 October 2011
- "World Cotton Research Conference-5" organised by International Cotton Advisory Committee, Washington, Indian Society for Crop Improvement, Mumbai & Indian Council of Agricultural Research, Mumbai. 7-11 November 2011.
- Workshop on "Water and Climate Change" organised by the Indian Institute of Technology, Delhi, the Norwegian Institute for Agricultural and Environmental Research, Norway and the International Water Management Institute, Hyderabad, IIT, Delhi. 1 February 2012.
- Workshop on "Cotton 2020 – Roadmap for Sustainable Production", FICCI, Federation House, New Delhi. 1 February 2012.

P S Birthal

- Consultation meeting of the working group on "Animal Husbandry and Dairying for the XII Five Year Plan", Kolkata. 17-18 June 2011.
- Workshop on "Agri-services for Inclusive Rural Growth" organised by the USAID and IFPRI, New Delhi. 28 June 2011.
- Seminar on "Prospects of India's Agriculture Export in 2025: Opportunities, Challenges and Roadmap", Session: "Competitiveness in Indian Agriculture towards 2025" (Key Speaker) IIFT, New Delhi. 8 July 2011.
- Working group on "Animal Husbandry and Dairying for the XII Five Year Plan", Srinagar. 23-24 July 2011.
- Workshop on "Policy Options and Investment Priorities for Accelerating Agricultural Productivity and Development in India" organised by the IGIDR, Mumbai and Institute for Human Development, New Delhi. 10-11 November 2011.
- Workshop on "Knowledge, Tools and Lessons for Informing the Design and Implementation of Food Security Strategies in Asia-A Technical Workshop and Conference", organised and facilitated by IFPRI, Washington, DC and The Institute for Integrated Development Studies (IIDS), Kathmandu, Nepal. 14-16 November 2011.
- Brainstorming session on "Prioritizing Development Initiatives for Higher, Inclusive and Sustainable Agricultural Growth" organised by the BMGF and IFPRI, IFPRI, New Delhi. 21 February 2012.
- Seminar on "Field Experiments in Market Segmentation Strategies for the Deployment of New Agricultural Technologies: The Case of Laser Land Levellers in Eastern Uttar Pradesh , organised by IFPRI and the Cereal Systems Initiative for South Asia (CSISA), IFPRI, New Delhi. 6 March 2012.

Usha Rani Ahuja

- A National Consultation on "Gender Perspective in Agriculture", NASC Complex, Pusa, New Delhi. 8-9 August 2011.
- 19th Annual Conference of Agricultural Economics Research Association, AAU, Jorhat. 28-30 November 2011.
- 6th National Extension Education Congress, ICAR Research Complex for Goa, Old Goa. 17-19 December 2011.
- Annual review and management meeting of the project "Tracking Change in Rural Poverty in Household and Village Economies in South Asia" Dhaka, Bangladesh. 10-11 March 2012.
- Global Conference on "Women in Agriculture", New Delhi. 13-15 March 2012.

S S Raju

- Round Table Discussion on "Food Prices: From Crisis to Stability", on the occasion of World Food Day, NCAP, New Delhi. 17 October 2011
- Policy Advocacy and Dissemination Workshops on "Risk Assessment and Insurance Products for Agriculture", held at AAU, Jorhat on 7 December 2011; TNAU, Coimbatore on 29 December 2011; MAFSU, Nagpur on 13 January 2012 and PAU, Ludhiana on 6 February 2012.
- Seminar on "Field Experiments in Market Segmentation Strategies for the Deployment of New Agricultural Technologies: The Case of Laser Land Levellers in Eastern Uttar Pradesh", organised by The International Food Policy Research Institute (IFPRI) and the Cereal Systems Initiative for South Asia (CSISA), IFPRI, New Delhi. 6 March 2012.

Anjani Kumar

- National Seminar on "Transfer of Technology of Strategic Pesticides Use to Enhance Agricultural Production and Food Security", ICAR and Dhanuka Agritech Limited, NASC Complex, New Delhi. 1 June 2011.
- Workshop on "Agri-Services for Inclusive Rural Growth", IFPRI, New Delhi. 28 June 2011.
- Round Table Discussion on "Food Prices: From Crisis to Stability", on the occasion of World Food Day, NCAP, New Delhi. 17 October 2011.
- "Prioritizing Development Initiatives for Higher, Inclusive and Sustainable Agricultural Growth", IFPRI, and New Delhi. 21 February 2012.

M B Dastagiri

- Round Table Discussion on "Food Prices: From Crisis to Stability", on the occasion of World Food Day, NCAP, New Delhi. 17 October 2011.
- Seminar on "Facilitating Trade and Global Competitiveness – Express Delivery Services in India", Hotel The Lalit Intercontinental, New Delhi. 8 February 2012.

Rajni Jain

- Round Table Discussion on "Food Prices: From Crisis to Stability", on the occasion of World Food Day, NCAP, New Delhi. 17 October 2011.
- Workshop on "Policy Options and Investment Priorities for Accelerating Agricultural Productivity and Development in India", India International Centre, New Delhi. 10-11 November 2011.

- 4th International Conference on "Data Management", IMT, Ghaziabad. 17-19 November 2011.
- 5th India International Conference on "Artificial Intelligence", SIT, Tumkur, Karnatka. 14-16 December 2011.
- 6th National Conference on "Computing for Nation Development", BVICAM, New Delhi. 23-24 February 2012.
- Annual review and management meeting of the project "Tracking Change in Rural Poverty in Household and Village Economies in South Asia", Dhaka, Bangladesh. 10-11 March 2012.

Sant Kumar

- "Stakeholders' Interface on GM Food Crops", APCoAB and TAAS, NASC Complex, New Delhi. 19 May 2011.
- National Seminar on "Transfer of Technology of Strategic Pesticides Use to Enhance Agricultural Production and Food Security", ICAR and Dhanuka Agritech LTD, NASC Complex, New Delhi. 1 June 2011.
- "Socioeconomic Considerations in Living Modified Organisms, Research and Information Systems for Developing Countries", New Delhi. 12 July 2011.
- Consultation Workshop on "Visioning and Strategic Planning for Dairy Sector in India", NDRI, Karnal. 2-3 September 2011.
- 19th Annual Conference of Agricultural Economics Research Association, AAU, Jorhat. 28-30 November 2011.

Shiv Kumar

- Seminar on "Field Experiments in Market Segmentation Strategies for the Deployment of New Agricultural Technologies: The Case of Laser Land Levellers in Eastern Uttar Pradesh", organised by IFPRI and CSISA, IFPRI, New Delhi. 6 March 2012.

Suresh A Kurup

- Round Table Discussion on "Food Prices: From Crisis to Stability", on the occasion of World Food Day, NCAP, New Delhi. 17 October 2011.
- "World Cotton Research Conference-5" organised by International Cotton Advisory Committee, Washington, Indian Society for Crop Improvement and Indian Council of Agricultural Research, Mumbai. 7-11 November 2011.
- National Seminar on "Prospect and Retrospect of Small Ruminant Production: Contribution to Socio-economic Security", organised by Indian Society of Sheep and Goat Production and Utilisation and Central Wool Development Board, Jaipur, Rajasthan. 7-9 December 2011.
- Seminar on "Field Experiments in Market Segmentation Strategies for the Deployment of New Agricultural Technologies: The Case of Laser Land Levellers in Eastern Uttar Pradesh", organised by The International Food Policy Research Institute (IFPRI) and the Cereal Systems Initiative for South Asia (CSISA), IFPRI, New Delhi. 6 March 2012.

Shinoj Parappurathu

- Round Table Discussion on "Food Prices: From Crisis to Stability", on the occasion of World Food Day, NCAP, New Delhi. 17 October 2011.
- Consultation Workshop on "Public Support in Production and Marketing System in Agriculture of SAARC Countries", Kathmandu, Nepal. 14-15 December 2011.

Diana S

- Policy Advocacy and Dissemination Workshops on "Risk Assessment and Insurance Products for Agriculture", organised at AAU, Jorhat on 7 December 2011; TNAU, Coimbatore on 29 December 2011; MAFSU, Nagpur on 13 January 2012 and PAU, Ludhiana on 6 February 2012.

Sajesh V K

- Regional Training Workshop on "Coherence in Information for Agricultural Research for Development (CIARD) and Strengthening Regional Agricultural Information System", jointly organised by SAARC Agricultural Centre, Asia Pacific Association of Agricultural Research Associations, Global Forum on Agricultural Research, FAO and Bangladesh Agricultural Research Council, BARC, Dhaka, Bangladesh. 10-12 May 2011.
- International Conference on "Innovative Approaches for Agricultural Knowledge Management: Global Extension Experiences", organised by International Society of Extension Education and ICAR, NASC, New Delhi. 9-12 November 2011.

XIII. VISITS ABROAD

Name of Scientist	Purpose	Place	Duration
Ramesh Chand	Participated in Third Meeting of the G20 Agricultural "Deputies", organised by Govt. of France	Paris	10 – 13 May 2011
	Participated in G20 Agricultural Ministers Meeting as Delegate from India	Paris, France	22-24 June 2011
	5th Meeting of the Governing Board of the SAARC Agricultural Centre	Dhaka Bangladesh	23-25 September 2011
	Consultation Workshop on "National Agricultural Extension Systems in SAARC Countries – An Analysis of the Diversity"	Thimphu, Bhutan	23-25 November 2011
	UN-ESCAP expert group meeting on "Macro-economic Outlook and Challenges in the ESCAP Region"	Thailand Bangkok	5-8 December 2011
	Meeting of High Level Government Representatives and Institutions to discuss "Sustainable Development Priorities" convened by His Royal Highness the Prince of Wales	Clarence House, London, SW 1A 1BA London, UK	28 February 2012
P S Birthal	Workshop on "Knowledge, Tools and Lessons for Informing the Design and Implementation of Food Security Strategies in Asia -A Technical Workshop and Conference", organised and facilitated by The International Food Policy Research Institute (IFPRI), Washington, DC, and The Institute for Integrated Development Studies (IIDS), Kathmandu, Nepal	Kathmandu Nepal	14-16 November 2011
Usha Rani Ahuja	Annual Review and management meeting of "Tracking Change in Rural Poverty in Household and Village Economies of South Asia"	Dhaka Bangladesh	10-11 March 2012
Anjani Kumar	Annual Review and management meeting of "Tracking Change in Rural Poverty in Household and Village Economies of South Asia"	Dhaka Bangladesh	10-11 March 2012
Sant Kumar	International Training on "Impact Assessment of Agricultural Research and Development"	Michigan State University, USA	4-24 August 2011

Name of Scientist	Purpose	Place	Duration
Rajni Jain	Annual Review and management meeting of "Tracking Change in Rural Poverty in Household and Village Economies of South Asia"	Dhaka Bangladesh	10-11 March 2012
Shinoj Parappurathu	Consultation workshop on "Public Support in Production and Marketing System in Agriculture of SAARC Countries"	Kathmandu Nepal	14-15 December 2011
Sajesh V K	Regional Training Workshop on "Coherence in Information for Agricultural Research for Development (CIARD) and Strengthening Regional Agricultural Information System" at BARC	Dhaka Bangladesh	10-12 May 2011

XIV. POLICY ADVOCACY AND CAPACITY BUILDING ACTIVITIES

Policy Advocacy and Dissemination Workshops

Considering the importance of risk assessment in agriculture and crop insurance thereof, Policy Advocacy and Dissemination Workshops were organised under the NAIP (Component -IV) sub-project "Risk Assessment and Insurance Products for Agriculture" with the aims of (i) dissemination of research findings of the project to researchers, administrators, policy makers, farmers and other stakeholders, (ii) sensitising the stakeholders on agricultural insurance, and (iii) interaction among various stakeholders on agricultural insurance. The deliberations provided valuable insights to the agricultural insurance companies, banks, agricultural and rural development specialists, economists and policy makers. The workshops were organised at Assam Agricultural University, Jorhat (North-East Region), Punjab Agricultural University, Ludhiana (Northern Region), Tamil Nadu Agricultural University, Coimbatore (Southern Region) and Maharashtra Animal and Fishery Sciences University, Nagpur (Western Region). The workshops were held during the period of December 2011- February 2012. A total of 250 participants registered for these workshops. The workshops created awareness about crop insurance, different types of risks in agriculture and policy options for upscaling and mainstreaming crop insurance in the states and elsewhere.

Policy advocacy and dissemination workshop of the NAIP sub-project "Risk Assessment and Insurance Products for Agriculture" at Assam Agriculture University, Guwahati on 7 December 2011

ICAR Summer School on "Decision Support System in Agriculture using Economic Tools" 2-22 August, 2011

A Summer School on "Decision Support System in Agriculture using Economic Tools" was organised at NCAP during 2-22 August, 2011. It was coordinated by Dr S S Raju and Dr Rajni Jain under the guidance of Dr Ramesh Chand, Director. Twenty-five trainees, hailing from eleven states of India, participated in the Summer School. Discipline-wise, maximum participants were from agricultural economics (60%), followed by Agronomy, Entomology and Agricultural Engineering (8% each). The syllabus of summer school consisted four modules-economic tools and techniques, applications, data management and software. All the trainees were provided with sufficient lecture notes in the form of a manual and a CD containing lectures delivered by the faculty members. The sessions were appreciated by the trainees.

Participants of the ICAR Summer School on "Decision Support System in Agriculture using Economic Tools" with chief guest Dr Ashok Gulati, Chairman, CACP; Prof. Ramesh Chand, Director, NCAP and other NCAP staff during inaugural function on 2 August 2011

Other Meetings/ Trainings Organised

Meetings/ Trainings	Place
Annual Review Meeting of the Project "Tracking Change in Rural Poverty in Household and Village Economies in South Asia" 30 April 2011	NCAP, New Delhi
4th Dayanatha Jha Memorial Lecture by Prof. Abhijit Sen, Member Planning Commission during Institute Day Celebrations 2 May 2011	NCAP, New Delhi
Training on "Field Survey and Electronic Compilation of Data" under the project "Tracking Change in Rural Poverty in Household and Village Economies in South Asia" 20-28 July 2011	NCAP, New Delhi
Academic interaction with the students of South Asian University, New Delhi 5 August 2011	NCAP, New Delhi
Workshop to review the ICAR-ILRI Pilot study "Economic Impact of Foot-and-Mouth Disease in Selected Regions of India", organised by NCAP & International Livestock Research Institute (ILRI) 9-10 August 2011	NASC, New Delhi
PMAC review meeting on "Developing a DSS for Agricultural Commodity Market Outlook" 17 August 2011	NCAP, New Delhi
Round-Table Discussion on "Food Prices: From Crisis to Stability" during world food day, organised by NCAP 17 October 2011	NCAP, New Delhi
Induction-Level Training of the IES Probationers on "Core Issues in the Agricultural Sector" 26-30 December 2011	NCAP, New Delhi
Training programme on "Developing Agricultural Commodity Outlook Models for Policy Analysis", under the project "Tracking Change in Rural Poverty in Household and Village Economies in South Asia" 15-24 March 2012	NCAP, New Delhi
National Training on "Quantitative Techniques for Agriculture Policy Analysis" under NAIP-VPAGe sub-project 19-30 March 2012	NCAP, New Delhi
Workshop on "Commodity Outlook Models for Indian Agriculture" 26 March 2012	NCAP, New Delhi

XV. LECTURES DELIVERED BY NCAP SCIENTISTS

Name of Scientist	Topic and Date	Venue
Ramesh Chand	Amandeep Shergil Memorial Lecture titled "Agriculture Growth, Food Inflation and Food Security : Insights and Perspective" 19 December 2011	Guru Nanak Dev University, Amritsar, Punjab
	Special Lecture on "Marketing of Farm Products" to PG students and faculty of Social Sciences 9 March 2012	CIFE, Mumbai
	Keynote Lecture in National Workshop on Inclusive Agricultural Growth and Input Subsidies 16 March 2012	ISEC, Bangalore
P Ramasundaram	"Futures Trade and Forward Markets", ICAR Summer School on "Decision Support System in Agriculture Using Economic Tools" 21 August 2011	NCAP, New Delhi
	"Conservation Agriculture – Laser Leveling" , ICAR "Summer School on Decision Support System in Agriculture Using Economic Tools" 21 August 2011	NCAP, New Delhi
	"Horizontal and Vertical Diversification of India's Rural Economy: Potentials and Constraints", in Winter School on "Quantitative Methods for Agriculture Policy Analysis" 5 December 2011	NCAP, New Delhi
	Lectures and hands-on session on "Computation of Economic Surplus", "Total Factor Productivity – Conventional & Data Envelopment Analysis Methods", "Measurement of Farm Technical Efficiency", "Price Transmission, Price Discovery and Volatility in Futures Market – Application of EViews" and "Construction of Vulnerability indices & analysis", in National Training on "Quantitative Techniques for Agriculture Policy Analysis" 19-30 March 2012	NCAP, New Delhi
P S Birthal	"Models of Contractual Relations" in the training programme on "Quantitative Methods for Agricultural Policy Research" 17-22 October 2011	IARI, New Delhi
	"Agriculture Diversification for Growth, Equity and Sustainability" and "Agribusiness and Innovations in Supply Chain Management", in the Induction-Level Training of the IES Probationers on "Core Issues in the Agricultural Sector" 26 December 2011	NCAP, New Delhi

Name of Scientist	Topic and Date	Venue
	"Livestock, Agricultural Growth and Rural Poverty", in the Induction-Level Training of The IES Probationers "Core Issues in The Agricultural Sector" 28 December 2011	NCAP, New Delhi
Usha Rani Ahuja	"Gender Sensitive Indicators" in the ICAR Summer School on "Decision Support System in Agriculture using Economic Tools". 9 August 2011	NCAP, New Delhi
S S Raju	"Agricultural Risk and Insurance in India", ICAR Summer School on "Decision Support System in Agriculture Using Economic Tools" 8 August 2011	NCAP, New Delhi
	"Estimation of Feed and Fodder Availability and Requirement", in ICAR Summer School on "Decision Support System in Agriculture Using Economic Tools" 16 August 2011	NCAP, New Delhi
	"Biofuels: Prospects and Challenges", in Training Programme on "Quantitative Methods for Agricultural Policy Research" 21 October 2011	NCAP, New Delhi
	"Risks and Risk Management in Agriculture", Induction-Level Training of the IES Probationers on "Core Issues in the Agricultural Sector" 27 December 2011	NCAP, New Delhi
	"Risks and Risk Management in Agriculture", in Training Programme on "Developing Agricultural Commodity Outlook Models for Policy Analysis" 22 March 2012	NCAP, New Delhi
Anjani Kumar	"Livestock Sector: Policies, Planning and Schemes" 26 April 2011	IIM, Lucknow
	"WTO and Livestock Sector Trade" 26 April 2011	IIM, Lucknow
	"Food Safety Issues in Indian Agriculture" 03 August 2011	NCAP, New Delhi
	"Application of Logit Model" 09 August 2011	NCAP, New Delhi
	"Food Safety Issues in Indian Agriculture : Some Empirical Analysis" 23 November 2011	IARI, New Delhi
	"Dynamics of Rural Poverty in India. The Role of Agricultural Growth" 23 November 2011	IARI, New Delhi
	"Livestock, Smallholders, Poverty and Livelihood" 19 December 2011	IIM, Lucknow

Name of Scientist	Topic and Date	Venue
	"Livestock Sector Planning, Policy and Schemes" 20 December 2011	IIM, Lucknow
	"Food Safety Issues in Indian Agriculture : Some Empirical Analysis" 28 December 2011	NCAP, New Delhi
	"Agricultural Credit in India: Issues and Concerns" 29 December 2011	NCAP, New Delhi
	"Commodity Outlook Modelling Efforts at Global Level: Introduction and Review" 15 March 2012	NCAP, New Delhi
	"Definition, Concept and Estimation of Poverty in the Indian Context" 24 March 2012	NCAP, New Delhi
M B Dastagiri	"Innovative Marketing Models in Horticultural Marketing in India", in ICAR Summer School on "Decision Support System in Agriculture Using Economic Tools" 17 August 2011	NCAP, New Delhi
Rajni Jain	"Data entry using CS-Pro", in Training on "Field Survey and Electronic Compilation of Data under VDSA" 21-22 July 2011	NCAP, New Delhi
	"Overview of Decision Support Systems", in ICAR Summer School on "Decision Support Systems in Agriculture using Economic Tools" 2 August 2011	NCAP, New Delhi
	"Computation of TFP using WBSTFP and Excel", in ICAR Summer School on "Decision Support Systems in Agriculture using Economic Tools" 8 August 2011	NCAP, New Delhi
	"SPSS for Data Extraction using NSSO", in ICAR Summer School on "Decision Support Systems in Agriculture using Economic Tools" 9-10 August 2011	NCAP, New Delhi
	"Classification using Decision Tree", in ICAR Winter School on "Data Mining Techniques and Tools for Knowledge Discovery in Agricultural Datasets" 15 November 2011	IASRI, New Delhi
	"Data Pre-processing using SAS", in Training on "Data Mining Using SAS" 7 February 2012	IASRI, New Delhi
	"Classification using E-Miner: Decision Tree", in Training on "Data Mining Using SAS" 9 February 2012	IASRI, New Delhi

Name of Scientist	Topic and Date	Venue
	"Online Data Repository for Data Management", in Training Programme on "Developing Agricultural Commodity Outlook Models for Policy Analysis" 19 March 2012	NCAP, New Delhi
	"Overview of Data Mining Methodologies", in Training Programme on "Quantitative Methods for Agricultural Policy Research" 21 March 2012	NCAP, New Delhi
Suresh A Kurup	"An Overview of Concepts and Methods for Valuing Ecosystem Services", in ICAR Summer School "Decision Support System in Agriculture using Economic Tools" 9 August 2011	NCAP, New Delhi
	"Computation of Economic Surplus" in Training Programme on "Quantitative Methods for Agricultural Policy Research" 29 March 2012	NCAP, New Delhi
	Lecture and hands on session on "Vulnerability Indices", in Training Programme on "Quantitative Methods for Agricultural Policy Research" 30 March 2012	NCAP, New Delhi
Shinoj Parappurathu	Seven sessions on the module "Globalisation and Indian Agriculture" for the MBA-Rural Management students of KIIT 28 March-1 April 2011.	School of Rural Management Bhubaneswar
	"Agricultural and Rural Development Programs in India", in Training Programme on "Field Survey and Electronic Compilation of Data" 21 July 2011	NCAP, New Delhi
	"Gravity Model of Trade", in Summer School on "Decision Support System in Agriculture using Economic Tools" 3 August 2011	NCAP, New Delhi
	"Partial Equilibrium models in Agriculture" in Summer School on "Decision Support System in Agriculture using Economic Tools" 9 August 2011	NCAP, New Delhi
	"Applications of Partial Equilibrium Models for Policy Simulations" in Training Programme on "Data Analysis in Social Sciences using SAS" 14 August 2011	NCAP, New Delhi
	Delivered two lectures on "Grain Outlook Model for India" for the participants of the 10-day training programme on "Developing Agricultural Commodity Outlook Models for Policy Analysis" 19 March 2012	NCAP, New Delhi

XVI. DISTINGUISHED VISITORS

- Dr S Ayyappan, Director General, ICAR, New Delhi.
- Dr Swapan Datta, Deputy Director General (Crop Science), ICAR, New Delhi.
- Dr Arvind Kumar, Deputy Director General (Education), ICAR, New Delhi.
- Dr Bengali Baboo, National Director, National Agricultural Innovation Programme (NAIP), New Delhi.
- Prof. S S Acharya, Honorary Professor, Institute of Development Studies, Jaipur, Rajasthan.
- Prof. Abhijit Sen, Member, Planning Commission, Government of India, New Delhi
- Dr Uma Lele, Senior Advisor, World Bank, Washington DC
- Kenyan delegation (Romano Klome, J Ntiba Micheni, Dorothy Angote, Keneth Lusaka, Seno Nyakenyanya, Programme Manager (Shomap) and the Liaison Officer, MoA), for Interactions and Discussions.
- Mr Justin Mundy, Director, International Sustainability Unit, London.
- Parliamentarians from Ghana on a study tour.

Dr S Ayyappan, DG, ICAR and Secretary, DARE, Government of India, addressing NCAP Staff and guests on the occasion of the Concluding Workshop of NAIP Sub- project, Developing Decision Support System for Agricultural Commodity Outlook, on 26 March 2012. Seated on the dais (from left to right) are Dr Bengali Baboo, National Director, NAIP, Prof. Ramesh Chand, Director, NCAP and Dr Swapan K Datta, DDG (Crop Science)

XVII. PERSONNEL

Name	Designation	Area(s) of research
Scientific		
Ramesh Chand	Director	Agricultural Growth and Modelling Markets and Trade
P Ramasundaram	Principal Scientist	Technology Policy
P S Birthal	Principal Scientist (Joined on 16 May 2012 on completion of deputation)	Institutional Change Technology Policy Sustainable Agricultural Systems Markets and Trade
Usha Rani Ahuja	Principal Scientist	Institutional Change Technology Policy
S S Raju	Principal Scientist	Sustainable Agricultural Systems Institutional Change
Anjani Kumar	Principal Scientist	Markets and Trade Agricultural Growth and Modelling Institutional Change
M B Dastagiri	Senior Scientist	Markets and Trade
Rajni Jain	Senior Scientist	Agricultural Growth and Modelling Technology Policy
Sant Kumar	Senior Scientist	Technology Policy Agricultural Growth and Modelling
B Ganesh Kumar	Senior Scientist	Technology Policy
Harbir Singh	Senior Scientist	Technology Policy
Shiv Kumar	Senior Scientist	Markets and Trade Institutional Change
P A Lakshmi Prasanna	Senior Scientist	Institutional Change
Suresh A Kurup	Senior Scientist	Sustainable Agricultural Systems
Shinoj Parappurathu	Scientist	Markets and Trade

Diana S	Scientist	Sustainable Agricultural Systems
Josily Samuel	Scientist	Technology Policy
Sajesh V K	Scientist	Institutional Change
Kingsly Immanuel Raj T	Scientist	
Jaya Jumrani	Scientist	

Name	Designation
Technical	
Prem Narayan	Technical Officer (T 7-8)
Khyali Ram Chaudhary	Technical Officer (T-6)
Mangal Singh Chauhan	Technical Officer (T-6)
Sonia Chauhan	Technical Officer (T-6)
Satinder Singh	Driver (T-4)
Administrative	
A K Aggarwal	Administrative Officer
Vinod Kumar	Assistant Administrative Officer
T A Vishwanath	Assistant Finance & Accounts Officer
Umeeta Ahuja	Personal Secretary
S K Yadav	Assistant
Inderjeet Sachdeva	Assistant
Deepak Tanwar	Junior Stenographer
Sanjay Kumar	Skilled Supporting Staff
Ajay Tanwar	Lower Division Clerk
Mahesh Kumar	S.S.Gr II
Mahesh Pal	S S Gr I

XVIII. TRAININGS ATTENDED

Name	Topic	Duration	Institution
Sant Kumar	International Training on "Impact Assessment of Agricultural Research and Development"	4-24 August 2011	Michigan State University, USA
Shinoj Parappurathu	ICAR Summer School on "Agricultural Growth, Diversification and Food Security"	15 November - 05 December 2011	IARI, New Delhi
Josily Samuel	ICAR Summer School on "Decision Support System in Agriculture Using Economic Tools"	2-22 August 2011	NCAP, New Delhi
Sajesh V K	National Training on "Quantitative Techniques in Agriculture Policy Analysis"	19-30 March 2012	NCAP, New Delhi
Kingsly Immanuel Raj T	Training on "Quantitative Methods for Agricultural Policy Research"	17- 22 October 2011	IARI, New Delhi
	National Training on "Quantitative Techniques in Agriculture Policy Analysis"	19-30 March 2012	NCAP, New Delhi

XIX. OTHER INFORMATION

NCAP Annual Day

The Centre celebrated its 20th Annual Day on 2 May, 2011. At this occasion, the 4th Dayanatha Jha Memorial Lecture was also delivered by Prof. Abhijit Sen, Member Planning Commission, Government of India.

Prof. Abhijit Sen, Member, Planning Commission, delivering the 4th Dayanatha Jha Memorial Lecture, at NCAP on 2 May 2011

Promotion of Official Language 2010-11

For the implementation and extensive use of Rajbhasha among the staff of the Centre, a committee on Hindi official language (Hindi) was constituted by Central Rajbhasha Department. The committee monitors the progress of various actions being taken and suggests measures for implementation of official language. It coordinates and helps in executing the orders from the Council and Central Rajbhasha Department from time to time and reports the progress.

The Centre's *Rajbhasha Samiti* implemented all the guidelines, circulars and instructions issued by the Council and the Central Rajbhasha Department, Government of India. The Centre organised the monthly staff and *Timahi* meetings in *Rajbhasha* regularly. More than 80 per cent administrative work of noting and drafting was done in Hindi on different administrative files. The Centre published four popular research articles and the summary of annual report in Hindi. In addition, the *Rajbhasha Samiti* organised four workshops for generating better awareness of computerisation, translation and Unicode typing during the year.

The Official Language Committee of NCAP organised a series of events to celebrate "Hindi Week" during 14-21 September, 2011 and to generate more awareness among the staff about the use of Hindi. The activities which were organised during the 'Hindi Week' included essay competition, debates, dictations, translations and various extempore activities.

The "Hindi Week" ended with poem recitation competition. Dr Ramesh Chand, Director, NCAP, chaired the session. Dr Malvika Dadlani, Joint Director (Research), Indian Agricultural Research Institute, Pusa, New Delhi, was the chief guest. There was enthusiastic participation and the chief guest appreciated different presentations. She encouraged to carry out more work in Hindi without hesitation. Dr Ranjana Agrawal, Head, Forecasting Division and Dr Sushila Kaul, Sr. Scientist, IASRI, Pusa,

Prof. Ramesh Chand, Director, NCAP and Dr Malavika Dadlani, Joint Director (Research), IARI and the Chief Guest, distributing prizes to the winners of various competitions during the Hindi Week

New Delhi, served as Judges. The Director, NCAP and the Chief Guest distributed prizes to the winners. During the function, Mr Prem Narayan, Sachiv, *Rajbhasha Samiti*, who was instrumental in organising the programme, provided a brief summary of progress of *Rajbhasha* at the Centre.

List of Publications in Hindi

डॉ. ऊषा अहूजा, एवं प्रेम नारायण, पशु पालन एवं दुग्ध उत्पादन में ग्रामीण महिलाओं के लिए रोजगार के सुनहरे अवसर कृषि विस्तार समीक्षा, जनवरी-मार्च 2011 पेज 3-6.

प्रेम नारायण, सघनीकरण पद्धति से (एस.आर.आई.) धान की उन्नत खेती, राजभाषा आलोक वार्षिकांक 2011 पेज 8-12.

प्रेम नारायण, उत्तर पूर्वी राज्यों में हरित क्रान्ति के बढ़ते चरण में राष्ट्रीय खाघ सुरक्षा मिशन की भूमिका, राजभाषा आलोक वार्षिकांक 2012.

Promotions

- Dr Shinoj Parappurathu, Scientist was promoted to the Next Higher Grade Scientist (Sr. Scale) w.e.f. 12-6-2011.
- Sh Satinder Singh, Driver T-3 was promoted to the Next Higher Grade T-4 w.e.f. 29-6-2011.

Transfers

- Dr Harbir Singh, Sr. Scientist, selected to the post of Principal Scientist at Project Directorate of Farming Systems Research, Modipuram, Meerut, U.P. w.e.f. 27-5-2011.
- Dr B Ganesh Kumar, Sr. Scientist, transferred to Project Directorate on Animal Disease Monitoring and Surveillance, Bangalore w.e.f. 4-2-2012.
- Dr P Adhiguru, Sr. Scientist, transferred to Extension Division of ICAR Headquarters w.e.f. 5-3-2012.
- Dr (Mrs) Josily Samuel, Scientist, transferred to CRIDA, Hyderabad w.e.f. 12-10-2011.

New Joinings

- Mr Kingsly Immanuelraj T. joined as Scientist w.e.f. 3-9-2011.
- Ms Jaya Jumrani, joined as Scientist w.e.f. 24-12-2011.
- Sh Deepak Tanwar joined as Stenographer w.e.f. 15-4-2011.