

# 12. Agricultural Economics, Marketing and Statistics

## AGRICULTURAL ECONOMICS

### Impact of vegetable production on income and employment of small farms

The impact of diversification of agriculture towards vegetables was assessed on farm income and employment using household level information from the western Uttar Pradesh. The results clearly revealed that vegetable production is more profitable and labour-intensive as compared to cereals and it fits well in the small farm production systems. The small farms are relatively more efficient in production and own more family labour in contrast to large farms. Women are also benefited as the vegetable production engages relatively higher women labour in various operations.

### Labour use in vegetable production (man days/ha)

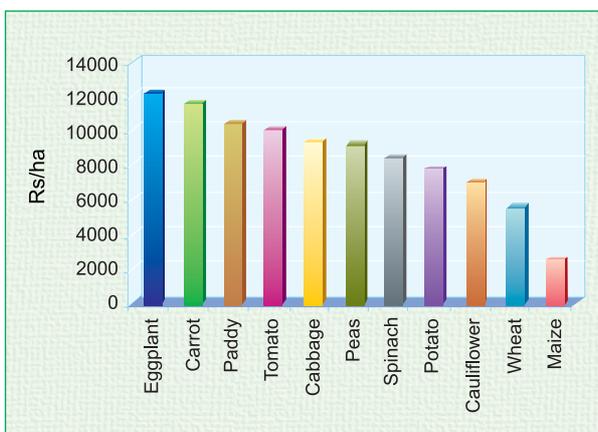
Vegetable production is an important source of income for small farms. It accounts for 66% share in the value of crops output. Among vegetables, potato, cauliflower and tomato

contribute 57% to the total farm income. Large farmers also gain much from vegetable cultivation. With nearly 28% of the area under vegetable cultivation, they realize about 46% in terms of value. Potato, cabbage and tomato account for about 66% of the total value of vegetable production in the production portfolio of large farmers.

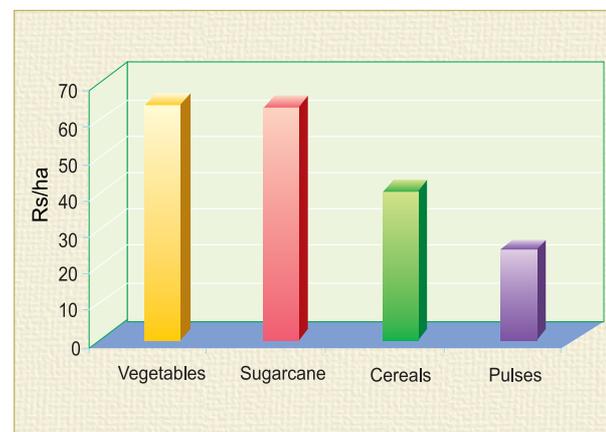
### Linking smallholders to markets for high-value crops: Role of farmers' organizations

Institutions such as farmers' cooperatives, producers' associations and contract farming are considered efficient means of linking smallholders to markets. Integration of vegetable producers with village level associations of fruit and vegetable growers has been examined along with costs and profits of the producers.

The impact of association on farmer members was studied through a survey conducted in Haryana. Study revealed that transaction costs are higher in wet markets and the institution-linked sales



Net return from vegetables and cereals production



Labour use in vegetable production (man days)



**Production costs, transaction costs and net returns from spinach (base 2002)**

Particulars	(Rs/tonne)		
	Producer members	Independent producers	Per cent difference
Crop yield (tonne/ha)	8.6	8.3	4.0
Cost of production	1,485	1,171	-12.9
Transaction cost	35	437	-92.0
Total cost (production + transaction)	1,520	2,067	-26.5
Output price	3,311	3,074	7.7
Net revenue	1,791	1,007	77.9

reduce these costs by 92%. The smallholders benefited most from this arrangement despite having low marketed surplus and higher transaction costs. Price realization was also higher in institution-linked sales; this shows producers' collective bargaining power and no extraction of monopsonic rent in the output market. Post-stratification of sample vegetable producers consist 50% members of small holding size indicating large involvement of smallholders in growers' associations.

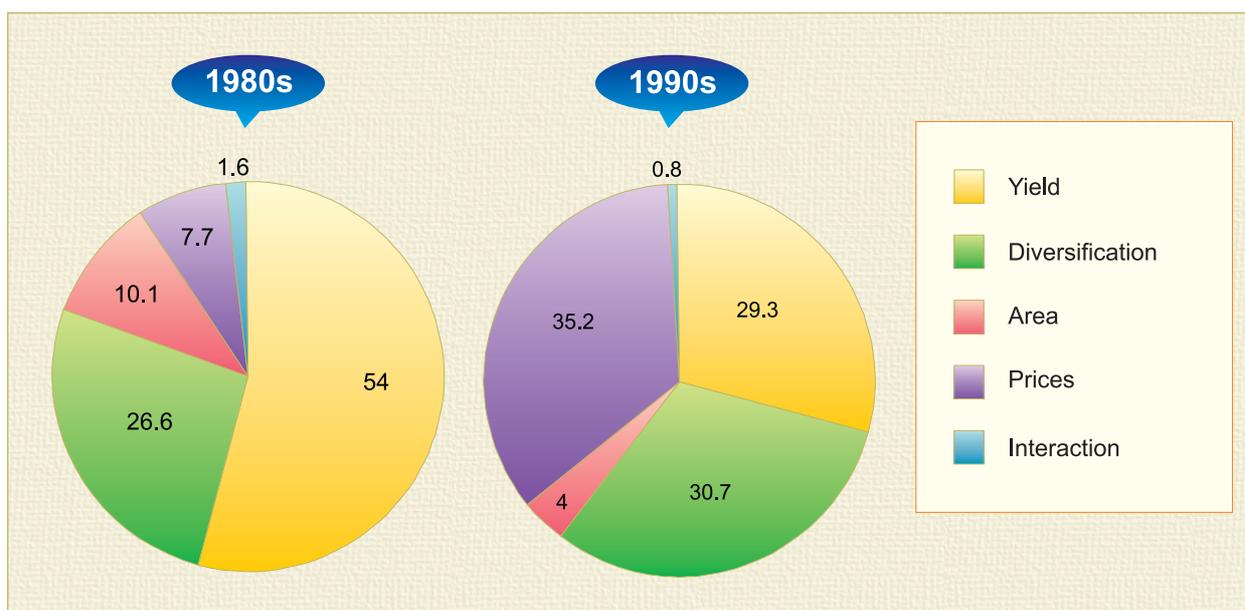
**Sources of agricultural growth in India**

The sources of agricultural growth in India have been decomposed during pre-reform (decade of 1980s) and reform (decade of 1990s) periods. A clear trend has emerged at the national level that

during the pre-reform period technology (crop yields as proxy) dominated the different sources of growth, and output prices became the important sources of growth in agriculture during the reform period. Share of agricultural diversification towards fruits and vegetables has consistently increased in agricultural growth during the past two decades, with much faster rate during the reform period. Some important policy implications have emerged from this study.

First, the contribution of technology to future agricultural growth should be viewed seriously. The present agricultural scenario and current stagnated or decelerated growth of major commodities are due to various ailments. It may be recognized that contribution of technology must be stepped-up for sustaining agricultural growth and meeting the global challenges. This would require (i) higher efficiency of investment on agricultural R&D, (ii) matching R&D agenda, keeping in view the ever changing and emerging challenges in different regions, and (iii) strengthening of public-private partnership in research, extension and input-delivery system. Higher allocation of research resources would be necessary for developing technologies to enhance yield potential of all commodities. Additional research resources would also be required to promote agricultural diversification in the non-traditional areas. New high-value crops in non-traditional areas would require greater research on production, marketing and processing to sustain their technical feasibility and economic viability.

Second, the contribution of agricultural diversification to agricultural growth must be viewed as an opportunity in the rainfed areas, which were by-passed during the 'green revolution'



Sources of agricultural growth



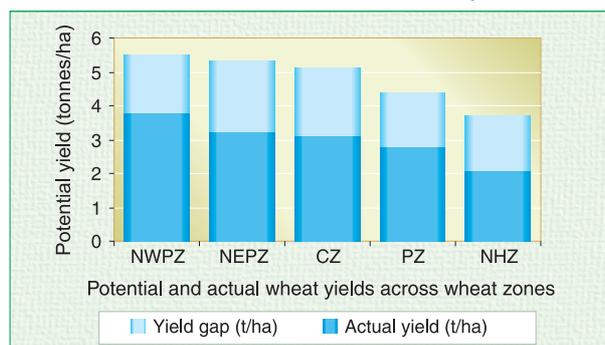
period. Promoting agricultural diversification towards high-value commodities and creating their appropriate markets and processing technologies can be used as effective tools to alleviate poverty and conserve natural resources in the niche areas. It may require investment on development of infrastructure and institutional arrangements, which suit the needs of high-value commodities. The study has suggested that better market integration, effective vertical coordination and value addition would be the pre-requisites for promoting agricultural diversification towards high-value commodities.

Third, output prices have emerged as an important source of agricultural growth in all the regions during the reform period. Price-led agricultural growth may not be sustained unless supported by the government, as has been practised for rice and wheat. During the reform period, prices of rice and wheat were raised to protect the interests of farmers. On the other hand, rising demand for fruits and vegetables led to a rise in their prices. These high prices may not continue in the event of globalization when demand-induced cheaper import would suppress their prices. The other problem with the price-led growth is that it would benefit only those farmers, who have sufficient marketable surpluses. The smallholders, who have tiny marketable surplus, will be deprived of the benefits of rising prices. Such a phenomenon may lead to growth with wider inequality.

Fourth, area expansion may not continue as a future source of growth in the land-scarce regions. The growth in such regions will come from agricultural diversification towards more remunerative commodities and technological breakthroughs. It is, therefore, important that these growth sources are targeted for sustainable and equitable growth in agriculture.

### Wheat production in India: Opportunities and challenges

Wheat is the staple food crop accounting for about 40 % of total cereals production in India. Its production is constrained by a number of problems, and a huge yield loss of 30 % is estimated at all India level. The loss in yield occurs



due to a number of abiotic, biotic and socio-economic constraints. If these could be minimized, the actual production and yield levels can be increased considerably.

A study conducted across major wheat zones during 2004, has revealed nearly 2 tonnes/ha of yield gap between the actual yields on farmers' field and frontline demonstration yield. It varies across different wheat zones. The yield difference is high (2 tonnes/ha) in the north-eastern plains zone (covering wheat areas of eastern parts of Uttar Pradesh, Bihar, Orissa, and West Bengal), and central zone (covering areas of Madhya Pradesh and Gujarat). There is also a considerable scope to increase wheat yield and bridge the yield gap of 1.7 tonnes/ha in north western plain zone covering states of Punjab, Haryana, Rajasthan and western parts of Uttar Pradesh, despite high yield levels.

## AGRICULTURAL STATISTICS AND COMPUTER APPLICATION

### National information system on agricultural education network in India (NISAGENET)

NISAGENET has been developed and implemented on the recommendations of National Statistics Commission (NSC) for providing information for policy and planning of agricultural education in the country. The project is being executed by the Indian Agricultural Statistics Research Institute (IASRI), New Delhi, as the Lead Center having collaboration with 42 participating organizations that includes SAUs - 34, ICAR Deemed Universities - 4, AAIDU - 1, Central Universities - 2 (AMU and BHU) and the Central Agricultural University, Imphal.

The Central Server Application Software website has been implemented on internet at the web address <http://www.iasri.res.in/NISAGENET> having the facilities like:

- Agrikhoj – a Search Engine for agricultural education
- Directory – Classified information from NISAGENET
- Discussion Forum – for sharing information
- Reports/Queries – Dynamic Reports for user's
- Reports/Queries on other public funded and/or private aided and unaided colleges affiliated to central and other universities are also available on the web site.

The network architecture of the system ensures that NISAGENET acts as an independent information system at the organization level and would be useful for the agricultural education data management of the university and its affiliated/constituent colleges as well as from the Central Server at the IASRI. It will act as a decision



support system and would be quite useful to academicians, planners, policy makers, scientists and technologists, and the students pursuing higher education in agriculture.

### Expert system on wheat crop management

Expert system on wheat crop management is a Web-based system developed at the IASRI in collaboration with the DWR, Karnal, and IARI, New Delhi.

The system provides the users with recommendations and advice concerning wheat production. This system is subdivided into four modules: Variety selection, Plant protection, Cultural practices and Harvesting technology and one module for knowledge management. Variety selection module specifies the variety from the farmer's point of view. Plant protection module is subdivided into pathological aspects, entomological aspects and weed management. In pathology, the system identifies micro diseases such as leaf rusts, blights and bunts etc. In entomology, the system identifies pest/insects affecting plants and recommends control measures. The cultural practices module specifies the process of cultivation of the crop. The harvesting technology module helps in advising the right method, right machinery and right time for the harvest.

A user can interact directly with any module as per his requirements. These modules extend information to the user through his queries or through a click of the button. The developed system can be utilized in making similar systems on other crops. It may be used as an effective tool for agricultural research and planning.

### Design resources server

A design resource server ([www.iasri.res.in/design/](http://www.iasri.res.in/design/)) was created to popularize the research in design of experiments and analysis of data among the stakeholders, experimenters and research statisticians. This server is strengthened and uploaded regularly.

- Square lattice designs are resolvable block designs and are quite useful for agricultural field experiments. For the benefit of the experimenters an online software for generation of square lattice design with 3 replications has been prepared and uploaded on Design Resources Server.
- Supersaturated designs are fractional factorial designs. Definition of supersaturated designs, experimental situations in which supersaturated designs are useful, efficiency criteria for evaluation of supersaturated designs, catalogue of supersaturated designs for asymmetrical factorial experiments and

bibliography on supersaturated designs has been uploaded on Design Resources Server. The complete details of the design can be obtained by clicking on the design parameters in the catalogue.

- Designs for biological assays help in the estimation of the *relative potency* of the *test preparation* with respect to *standard* one. Material on contrasts of interest in parallel line assays and slope ratio assays has been uploaded on Design Resources Server.
- Hadamard matrices have a tremendous potential for application in many fields particularly in generating fractional factorial designs. An online software has been developed. The software also describes the method by which a Hadamard matrix is generated.
- A B-version of the software for generation of efficient nested block designs is prepared.

### Web page developed

**Lattice designs:** This web page contains list of Lattice designs along with the layout for easy accessibility of the experimenters.

**Circular designs:** This web page generates layout plan of circular designs that form an important class of incomplete block designs and is available for all number of treatments with smaller number of replications. The randomized layout of these designs can also be generated. These designs offer more flexibility in terms of their availability for any block size.

### The Agricultural Research Data Book 2007

This is eleventh in the series, and is an attempt to put together main components/indicators of such

#### Outlier in designed experiments

A dissemination Workshop was held on 26 July 2007. Some salient achievements of the project are:

- A test statistics for detecting the multiple outliers in the presence of masking was developed.
- Some M-estimation procedures are appropriately modified for application in designed experiments. A new objective function is also developed.
- Least Median of Squares (LMS) has been modified for application into the designed experiments.
- A robustness criterion for identifying robust design that is robust against the presence of two outliers is developed. It was found that binary variance balanced designs are robust against the presence of two outliers.
- Software for analyzing experimental data in the presence of outliers is developed.



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information. The Data Book comprising 261 tables, is organized into 11 sections.

### **Developing remote sensing based methodology for collection of agricultural statistics in Meghalaya**

The project entitled “Developing Remote Sensing Based Methodology for Collecting Agricultural Statistics in Meghalaya” was initiated in 2003 in collaboration with Space Application Centre (SAC), Ahmedabad and North East Space Application Centre (NE-SAC), Shillong. Its main objective was to develop a suitable methodology for generation of crop statistics through integration of remote sensing digital data and field survey. The study was initially carried out in Ri-Bhoi district for estimation of area under paddy crop. To validate this methodology, it was repeated in the next year in two districts of Ri-Bhoi and Jantia Hills. Methodology was also found to be flexible

to take care of the problems of North Eastern region i.e. non-availability of land record system, non-accessibility of vast area, undulating topography, hilly terrain, etc. Accordingly, SAC has decided to implement this methodology for estimation of area under paddy crop in the entire state. Meanwhile, attempt was also made to develop suitable methodology for estimation of area under potato, ginger, pineapple, banana and maize in East Khasi Hills and West Garo Hills. Suitable integrated sampling designs were adopted to collect the data for above crops through field survey. The data related to production statistics, consumption pattern, disposal and seed rate from the selected farmers from the Ri-Bhoi, East Garo Hills were collected through scientifically designed survey schedules. This methodology needs to be further validated for extending it to other crops and in the entire state, which is the future course of action under this project.

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