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Uses and Users of Agricultural Statistics

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Introduction

Agricultural statistics have many uses. Governments need statistics to monitor the performance of the agricultural sector, make policy decisions and plan development programmes. International organizations need information to monitor agricultural conditions and assess needs for assistance. Research institutes need data for research and analysis. Private businesses need information to help in their commercial operations. And last, but not least, farmers need information to help make decisions about farm operations.

The most important user of agricultural statistics is the government. To understand the government's agricultural statistics needs, we need to understand how the agricultural sector works; in particular:

- What is the role of the government in managing the agricultural sector and in what ways can it intervene in the activities of the sector?
- What are the main goals of the government for the agricultural sector?
- What are the main policy issues and problems in the agricultural sector?
- What are the government's decision making processes in agricultural policy and planning?
- How are statistics used in decision making?

The answers to these questions are largely determined by the type of economic system in place.

Statistical needs in centrally planned and market economies

By the 1950s, about one third of the world's population lived under socialist economic systems. Various central planning models were used for organizing the agricultural production sector. Most of these were characterized by government involvement in determining the demand for agricultural output, setting output targets, overseeing farm operations, providing agricultural inputs, procuring and distributing agricultural products, and price setting. In some countries, agriculture was collectivized, with state farms or co-operatives operating under the direct control of the government. Elsewhere, ownership of land and livestock remained in private hands, but was subject to certain government controls.

In a market economy, the government has a different role. The individual farmers themselves make all farm decisions, such as what to plant, when to plant, etc. The government will usually not be

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directly involved in the production or distribution of goods, its role being more one of creating favourable circumstances for the agricultural sector to function most efficiently.

The decisions required to be made by governments in centrally planned and market systems are quite different. In a centrally planned economy, the government needs to make decisions such as: 'this year, 1,000 ha of wheat will be planted on State Farm A'; 'Cooperative B will supply the state butter factory with 10,000 litres of milk each year'; or 'a tractor will be supplied to State Farm C to help with land preparation'. Under a market system, the decisions are more likely to be such things as: 'extension workers will visit the field to encourage farmers to plant more wheat'; 'markets will be established to help increase milk supply'; or 'import controls will be lifted to help encourage the use of tractors'.

The statistics needed to support such decisions are quite different under the two economic systems. To illustrate, let us consider the above 'tractor' decisions. In a centrally planned economy, the Ministry of Agriculture may own all farm machinery, which it makes available to agricultural enterprises as required. To do this effectively, it needs detailed operational information on each agricultural enterprise. Weekly (or even daily) crop reports, detailing the status of different farm activities (land preparation, planting, harvesting, etc.), expected dates of such activities, weather conditions, crop conditions, etc., are needed. Fuel price and fuel availability should also be monitored.

In a market economy, the job of the Ministry of Agriculture will usually not be to provide tractors to farmers, but to encourage farmers to take advantage of the benefits of greater farm mechanization. Weekly crop reports are not required for this. What is needed is information to monitor the use of farm machinery (how many farmers use different machinery, what is the stock of such machinery, etc.) and to assess usage amongst different groups (small and large farms, farms in each province, etc.). Data comparing the efficiency of farms with and without farm machinery are also needed.

Since the late 1980s, many socialist countries have introduced market reforms, which have changed the way the agricultural sector is organized and managed. Governments often found that existing statistical systems, which had been established to meet the requirements of the central planners, no longer provided the information needed to manage a more open economy. Data on farm operations were needed in less detail and less frequently than before. Data on farm finances were still of interest, but it was no longer necessary to do a detailed annual audit of each agricultural enterprise. With the market reforms, there was more emphasis on market-related data such as prices. Monitoring of international trends including prices, crop conditions and consumer preferences also became more important. In many countries, the economic changes also led to social problems and a greater need for statistics to measure such things as poverty and income distribution.

Usually, the economic reforms also led to a deterioration in the overall quality of statistics. Existing sources of data often disappeared. With the expansion of the unofficial economy and high inflation, it became very difficult to accurately measure output. In Russia, it has been estimated that the decline in national accounts between 1990 and 1994 was overstated by 12 percentage points. The statistical problems accompanying transition are discussed further in other chapters.

Case study - Mongolia

Agriculture is one of the most important sectors of the Mongolian economy, with livestock herding being the dominant activity. After the establishment of the Mongolian People's Republic, the government introduced a collectivized system of agriculture, based on the Soviet model. By 1988, there were 255 livestock co-operatives, 70 state farms and 34 other agricultural enterprises. The agricultural sector, along with other sectors of the economy, were managed on a planned basis. The Ministry of Food and Agriculture in Ulaan Baatar set prices and production targets for state procurement, based on the national economic plans provided by the National Development Board. Members of co-operatives were permitted to privately own a small number of livestock for subsistence needs.

An extensive agricultural statistics reporting system was established. Each agricultural enterprise supplied an enormous amount of detailed operational data. Information on livestock births, losses and production were provided monthly, and crop data were reported fortnightly during the growing season. Detailed annual financial statements were also provided by each agricultural enterprise. A 'fast information system' was also established to provide information on a day-to-day basis; crop plantings, for example, were reported every three days.

Message from the Director

The meetings of the Technical Advisory Committee (TAC) and the Governing Board (GB) of the CGPRT Centre for the year of 1997 were held in late November - early December. I would like to thank all of the participants of the meetings for their active participation and the Centre's staff for their earnest cooperation.

The TAC meeting was attended by seven out of the eight members and the GB meeting was attended by nine representatives out of eleven member countries. The Ambassador of Sri Lanka to Indonesia took the chair of the GB and the statement of the Executive Secretary of the ESCAP secretariat was read by the Director of the Programme Management Division of the secretariat in the opening session.

A trial was made this year to substantially shorten the length of both meetings from three to two days. The draft session report was prepared during an intermission in the afternoon of the second day and adopted accordingly. As a whole, the trial was most successful and accepted by the participants.

Progress reports of both the Research and Development (R&D) and the Human Resources Development and Information Service (HRD/IS) programmes were presented at the meetings.

Under the R&D programme, the following projects were discussed:

Completed projects:

(i) Agricultural diversification of food crop trade: their implications for agricultural policies in Southeast Asia.
(ii) Market prospect of upland crop products and policy analysis in selected countries in Asia.
(iii) Pulses trade study.

On-going projects:

(i) Economic assessment of selected resource management techniques in marginal upland agriculture.
(ii) Effects of trade liberalization on agriculture in selected Asian countries with special focus on CGPRT Centre crops.

Proposed projects:

(i) Economic and policy analysis in the ecoregional initiative for Southeast Asia.
(ii) Human resources development to enhance sustainability of upland agriculture in selected Southeast Asian countries.
(iii) Avenues for agri-industrial development.

Under the HRD/IS programme, the following activities were reported, together with impressive achievements in publication and information services.

Completed:

(i) Regional working seminar on "Database management for agricultural planning and research".
(ii) In-country training course on "Database management and application relating to CGPRT crop development in South Asia" in India and Pakistan.

Planned:

(i) Regional working seminar on "Measuring agricultural performance in development policy perspective".
(ii) In country training course on "Database management and application relating to CGPRT crop development in South and Southeast Asia" in Sri Lanka and the Philippines.
(iii) One- and two-week training courses for general and advanced levels on "Dissemination of tools for eco-regional analysis and planning of the development of CGPRT crops in Asian monsoon agriculture".

The Centre's next annual cycle started promptly after the meetings.

HARUO INAGAKI

In 1990, the government introduced market reforms throughout the economy. The state enterprises were converted to private ownership. Business units were established to manage the large-scale agricultural operations, and ownership of livestock transferred from cooperatives to individual herdsmen. The marketing and pricing of agricultural produce were gradually freed up.

The dismantling of the state enterprises led to a breakdown of the statistical reporting system and it

was necessary to rely on assessments of local officials. The volume of statistical reporting was reduced. Steps have been taken to improve the statistical system: the collection of livestock production data through sample surveys of herdsmen has been tested; and surveys for the collection of price and other market-related data are being developed.

One problem in redefining data needs was in reorienting the policy and planning role of the Ministry of Food and Agriculture. There was also disquiet felt by some about forsaking statistical information that had 'always' been available, even when it was no longer relevant to the new economic environment.

Government as a user of agricultural statistics

A useful starting point for planning an agricultural statistics system to meet the needs of the government is to examine what the main goals and priorities are for the development of the agricultural sector and what issues and problems are likely to influence development planning and policy making.

In most developed countries, agricultural productivity is high and food is cheap and plentiful. Over-production of agricultural commodities is common and this often leads to declining farm incomes and a shift of population from rural to urban areas. The main priorities for governments are usually problems related to low farm prices, restructuring of agricultural industries, and export promotion. On the nutrition front, the problem is more likely to be people eating too much, rather than too little.

The situation is different in developing countries. High population growth rates and low farm productivity often result in food shortages. Agricultural land is often in short supply, rural poverty is chronic, and transport and communication facilities are weak. The policy priorities and objectives for the agricultural sector are often stated in a country's national development plan. Some typical priorities in developing countries of the Asia and Pacific region are to:

- ensure food security for the country's population;
- increase farm incomes and reduce income inequalities;
- improve the nutritional status of the rural population;
- improve crop yields;
- increase the area of land under irrigation;
- improve the supply and distribution of fertilizers and seeds;
- diversify crops to supply domestic and export markets;
- achieve sustainability in the use of land and water resources by controlling deforestation and providing alternatives to shifting cultivation;
- ensure rural women are provided with the opportunity to participate in economic activities; and
- develop agribusiness potential.

What types of actions can a government, operating under market conditions, take to help achieve the policy objectives identified above? We have already noted that farm level decisions are made by farmers, not the government, and so the government cannot just decide, for example, that farmers will grow more fruit crops to supply export markets. Efforts to impose such decisions on farmers are usually not successful and can provoke much resentment. Farmers must be persuaded that the actions advocated are in their interests.

Instead of direct action to influence farm level decisions, governments seek to create the right conditions (legal, institutional, economic, etc.) for the desired outcome to be achieved and to provide technical support to help reach that goal. To help achieve the aim of 'diversifying crops to supply domestic and export markets', various measures could be considered:

- undertake research into the suitability of alternative crops, export market opportunities and domestic consumption patterns;
- implement macro-economic policies favourable to export industries, such as freeing up prices, removing barriers to exports, encouraging foreign investment, and adopting suitable exchange rate and interest rate policies;
- use taxation measures, such as relief from land tax for orchard plantations, to promote crop diversification;
- improve the country's infrastructure, including roads and bridges, to help the movement of goods to markets;
- provide marketing assistance and establish wholesale and retail market facilities to help farmers market their products; and
- provide extension services to help farmers introduce new crops.

Other types of government intervention include: construction of irrigation or other facilities to promote increased agricultural output; dissemination of market

information to farmers and traders to help them make informed market decisions; action to promote the purchase or distribution of farm inputs; and the provision of facilities for the distribution of emergency food in times of crop losses.

How are statistics used to help make the decisions that lead to these actions? Statistics help, in the first instance, in identifying whether there is a problem requiring action. If so, the statistics will quantify the problem and help to explain why it has arisen. Statistics will also suggest ways in which the problem can be resolved and help to evaluate the effects of different policy options. Finally, statistics help in the monitoring and evaluation of policy actions and programmes.

Statistics are also used for various types of agricultural research and statistical analysis undertaken to support government policy making. For example, a statistical model can be developed to determine what cropping systems are most suited to certain areas. Using statistics on prices, yield and production costs (seeds, labour, fertilizer, imputed land rent, imputed family labour), the gross margin (value of production less costs) can be calculated for each alternative crop. Using a linear programming model, the optimum crop mix - for a given amount of land, capital and labour - to maximize gross margins can be determined. Different price scenarios can also be examined.

Box 1 Solving the food supply problem with the aid of statistics.

Ensuring an adequate supply of food for its population is one of the most urgent problems faced by many governments. For most countries of South and South East Asia, the production of rice, the staple food crop, is of foremost importance. Let us consider how a government goes about assessing the rice production and food supply in the country. Is the production of rice sufficient? If not, what is the deficit, why has it occurred, and what can be done about it?

To examine this issue, one first needs a time series of the basic rice crop statistics, showing trends in rice area, production and yield. Is rice production declining? If so, is it because less land is being cropped or are yields declining? If yields are declining, the statistics will need to be further examined to understand why this is happening. Data on fertilizer usage might show that fewer farmers are using fertilizers. This might be because the supply of fertilizer is insufficient. The question is whether imports or local production of fertilizers has declined or prices have increased? Perhaps the statistics indicate that yields are low in certain provinces or amongst certain types of farms, such as small farms. If crop area is declining, the statistics will show whether it is happening in certain provinces or across the whole country, and whether it is because farm sizes are getting smaller or that there are fewer farmers.

To explore whether there is a rice surplus or deficit, one needs to examine food supply and food needs. To estimate how much rice is available for food, the rice production data need to be adjusted using data on post-harvest losses, milling losses, and the use of grain for seed and other purposes. Rice exports and imports and food stocks also need to be considered. To estimate the amount of rice required to feed the population, data on population, population growth rates and food consumption patterns are needed.

From this diagnosis, the government will obtain a description of the problem to be addressed. For example, the analysis might show that rice production is 5% less than what is needed for food self-sufficiency and will need to increase by 2.3% a year to keep up with population growth. It might further reveal that rice production has declined because of, say, three factors: the deteriorating crop yields in certain provinces; the decline in fertilizer usage; and the low productivity of small farms.

The results of this analysis will lead to a consideration of different policy approaches to bring about changes in the factors identified as causing the problem. Reducing the price of fertilizers, for example, by lowering taxes could be one option considered. The consequences of this action can be assessed by analysing farm income, farm management and crop yield data. What will be the farmer's response to the price reduction? What improvement will there be in rice yields with increased use of fertilizers? Statistics also help in costing alternative policy actions; the cost of the fertilizer proposal can be determined using data on the quantity of fertilizer used.

The private sector as users of agricultural statistics

Farmers make day-to-day decisions on all aspects of farm operations, including: what crops to plant, when to plant them, what varieties to use, how much seed to use, whether to use fertilizers, how much fertilizer to apply, when to harvest, where to sell produce, and at what price to sell produce.

Farmers in developed countries produce for export or domestic markets and their decision making will be driven by normal economic considerations. They are supplied with much statistical information through the media and farmer associations and this becomes an essential element in efficient farm management and operations. A wheat farmer in Australia is aware of general economic conditions, crop conditions, weather, prices, the results of agricultural research studies, and factors affecting export markets such as crop conditions in other wheat producing countries, exchange rates, wheat stocks, etc. They may even trade in wheat prices or exchange rates on the futures market as protection against future uncertainty.

Farmers in developing countries are usually less concerned with concepts of maximizing profitability than with providing subsistence for the family and surpluses to meet any emergencies. Their main source of information is the government network,

namely extension workers, village officials, and sometimes radio and television. The information provided is usually in the form of advice on planting of different crops or crop varieties, use of inputs, etc.

One of the most important information needs of farmers in developing countries, and one that can directly influence their decision making, is data on prices and other market factors. With such data, farmers can make informed decisions on what to plant; when to schedule their harvest; and when, how, and at what price to sell their produce. If Cambodian farmers learn that prices in Phnom Penh have increased today, they can bring their produce to the Phnom Penh markets tomorrow. In newly emerging market economies, farmers are often not familiar with the operations of markets or not aware of current prices, and as a result, can be disadvantaged in their dealings with traders. After 1990, many Mongolian herdsmen, with their newly privatized herds, experienced problems in adapting to free market conditions after a lifetime of socialist controls. A market information system, providing regular price and other market data issued through the media and other means, can help farmers to overcome this problem. Many countries have given high priority to establishing such market information systems.

Businesses also need statistics. Food wholesalers, retailers and traders need information on prices and market conditions in the same way as farmers do. A Cambodian rice trader, aware that rice prices are higher in Battambang than in Phnom Penh, can transport rice to Battambang to meet the additional demand there. Agricultural suppliers also need information to identify market opportunities and develop marketing strategies.

Large private companies are often quite sophisticated users of statistics. A company planning a major investment in an orchad plantation will need to assess the economic viability of the project through analysis of production, prices, domestic consumption trends, export potential, and international factors.

The perception that official statistics are collected for governments, not for private businesses and individuals, is still widespread. This view is mistaken. Statistics help farmers, traders and others make better decisions; this certainly benefits the individuals themselves, but it also benefits the community as a whole. With access to regular price data, both farmers and traders can make informed market decisions which help in stabilizing prices and offsetting shortages.

Box 2 Data dissemination.

To ensure that statistics are widely used, an effective method of data dissemination is needed. Often, statistics are not formally released and it is difficult for users to access the data. Instead of being presented in a statistical report, the statistics are on a piece of paper (often with hand amendments) in the statistician's drawer (somewhere), available for sighting on request (if the statistician hasn't gone on leave and the statistics can be found). There may be more than one set of figures (the statistics may have originally been calculated incorrectly but the earlier data have not been discarded). The technical department may have another set, or sets, of figures (data may have been subject to further amendments based on political or technical considerations). In these circumstances, the statistics that users get depends on who they see and when they see them. Statistics must be released formally and systematically. The responsibility for releasing statistics must be assigned to a single agency.

The most common means of release of statistics is through printed publications. Other forms of data dissemination are becoming popular, especially microfiche, diskettes, CD-ROMS, and on-line services such as the Internet. These are not only cheaper but often provide data in a more convenient form for the user. On-line statistical services provide users with immediate access to the statistics rather than having to wait for the physical delivery of a statistical report.

Statistical publications should be directed at both the casual and serious user. The presentation of commentary and graphical presentations, highlighting the main results, can help bring the statistics to the attention of the casual user. However, detailed statistical tabulations are needed by those interested in serious policy analysis and research

Agricultural statistics and national accounts

Agricultural statistics, along with statistics from all other sectors, are used in the compilation of what are the most important economic statistics for national policy and planning, namely the national accounts. National accounts statistics present a statement of the overall economic position of the country. One of the most important national accounting measures is the Gross Domestic Product (GDP), which measures the total value of all goods and services produced within the country. GDP is usually measured in 'current price' and 'constant price' terms. The constant price data are based on price levels in a certain base year and are used to measure real changes over time, taking out the effects of price change. The year-to-year change in constant price GDP provides a measure of the overall

rate of growth of the economy, the most important indicator of how a national economy is faring. The growth rates of each sector, such as agriculture, manufacturing, etc., are also important measures.

There are three ways of calculating GDP: the production approach, which aggregates the production or 'value added' of all goods and services produced in all sectors of the economy; the income approach, which aggregates the incomes generated in the process of producing the goods and services. and the expenditure approach, which aggregates the expenditure of the users of all goods and services. Under the production approach, the value added for agriculture is the value of all agricultural production less the value of inputs used (fertilizer, pesticides, etc.). The current price value of production can be calculated by taking the production of each agricultural commodity and applying a suitable price, such as the 'farm-gate' price. (Inputs need to be deducted because these are part of the production of the manufacturing sector.)

Constant price estimates for the agricultural sector can be calculated in one of several ways: calculate values using prices in the base year rather than the current year; revalue the current price estimates using a price index; or use quantity indicators to estimate the constant price change.

Various agricultural statistics are needed to compile national accounts, including: value and quantity of all crop and livestock commodities produced; prices of agricultural commodities; value of farm inputs; household expenditure; capital expenditure; farm income; wages; exports; and imports.

Pulses in India: An Explorative Assessment

Mruthyunjaya[*]

In early 1997 a regional study on the international and domestic market of pulses was completed. This study includes India, Pakistan, Sri Lanka and Myanmar. This contribution is based on the section on India which was researched by Dr. Mruthyunjaya, Assistant Deputy Director, of the Indian Council for Agricultural Research. This compilation focuses on the domestic pulse market of India. New findings of positive income elasticities of pulses shed a new light on policy options.

Policy and opportunities

The policy on pulses in India seems to be ambivalent. Policy-makers and planners recognize quite explicitly the importance of pulses in the diet of less-affluent people and have consistently drawn up plans to secure an adequate domestic supply. The practice is the setting of production targets, based on consumption estimates. The consumption targets are tagged to population, and have consistently outstripped domestic supply, by as much as around 3 million tons annually.

Current findings, however, show that the income elasticity for pulses is positive, and that demand seems to be well entrenched in lower as well as middle income groups. This would indicate that a redefinition of the need and the demand for pulses is necessary. If the demand for pulses is indeed well entrenched, the government of India would be able to use import controls as a mechanism to steer domestic supply, and so influence prices. There are indeed signs that this is happening. While there are many observations that prices in international markets are too high for the domestic consumers, imports, and minor exports are taking place, albeit at a very small scale in comparison to the domestic market. The Indian pulse market is thus not entirely segregated from the international supply, but there are quite clearly price differentials. The government has until recently controlled imports by establishing a ceiling on imported pulses wholesale and retail traders may hold. The import of pulses is open under the Open General License, with a 5% duty. It seems that the policy has to some extent contributed to a controlled import regime; however, this needs further study.

The position of India in the world market of pulses is rather peculiar. In terms of quantity produced and consumed, its position is dominant. Its production is 23.11% of the world production, but its import is only 6.64% of world import; its exports (since the early 1990s fluctuating around 40,000 tons per annum) are 0.35% of world export. The country is in short supply of pulses by an estimated 3 million tons (recommended diet estimate)

[*] Indian Council of Agricultural Research, New Delhi, India. This paper was extracted from Market Prospects for Pulses in South Asia: International and Domestic Trade, Working Paper No. 27, Bogor: CGPRT Centre.

annually. The gap is bridged partially through imports at around 600,000 tons: black gram from Myanmar and China, lentil from Turkey, and kabuligram from Australia and Turkey.

The high international prices give India the option to induce high domestic prices through control imports. These would obviously benefit producers and neglect consumer interest. Yet, this policy option does not seem to enjoy attention. Government policy seems to be based on the importance of pulses to poorer income groups. It needs to be researched in more depth whether the current findings, which show that the demand for pulses actually increases with income, are indeed correct. In doing this, attention is also necessary for the consumption and the production side. There are signs that the consumption of dal, the major processed consumer product is tagged to the consumption of rice and maybe bread. If this could be confirmed, and a relationship with quality classes established, it may be possible to refine the stance on the social importance of pulses somewhat. On the production side one often hears and reads the explanation for the downward trends in production of pulses. The government targets of production were initially based on assumptions of land use (irrigated land), which were not born out in actual practice. It was originally assumed that pulses would be grown in newly irrigated areas. Farmers, however, shifted to more remunerative crops, and growth of pulses was less than expected because they continued to be grown on marginal lands.

If the above account is indeed correct, then it is clear that the Government of India has missed the early opportunity of influencing farm- gate prices through supply control. Posing this question is easy, but one can not know whether such a policy could actually have been brought to bear. In addition, research to improve productivity of pulses in irrigated conditions might have led to greater production under high input conditions.

On the consumption side one can make the following observations. Aside from the earlier mentioned link between consumption of dal, rice and bread, there is a steep increase in the consumption of milk, which is the major supplier of protein in partly vegetarian India. Since the production of pulses is also likely linked to the raising of livestock, pulse producers may not be in desperate need of their own supply of protein. The same argument holds in general for consumers, who consume increasing volumes of milk.

Marketing and trade of pulses

The key characteristic of any agricultural market is that production is virtually always seasonal, and that consumption takes place on a continuous basis. The market smoothes out the temporal differences through moving, storage and processing and distribution of goods. Marketing and trade starts with farmers who sell to collection traders, who sell in turn to wholesale traders, who provide processors or distributors with pulses. Through these traders the pulses enter the domestic distribution channels, and are ultimately made available to consumers.

One issue needs mention in advance of the discussion of the marketing systems. This concerns the still widespread myth that pulse growers are always located on marginal lands, and are therefore subsistence farmers. Pulse growers can be located on marginal soils, but this is not automatically so. The idea that pulse farmers are subsistence farmers in the sense that they eat their own product is wrong. Pulses can not serve as a staple, as farm people know quite well. Farm produce is usually sold, and only seed requirements are commonly withheld from entry in the product market.

Table 1 shows that the marketable surplus in pulse farming is estimated at around 60% of production. One has to take into account that farm production is small and that even minor household consumption and seed use will quickly lead to low marketable surpluses.

Table 1 The percentage of marketable surplus in different pulses.

Commodity	Percentage of Marketable Supply
Gram	40.30
Arhar	50.00
Urad	61.30
Masoor	53.50
Moong	59.01

Source: Report of the working group on Agricultural marketing for the Eight Five Year Plan 1990/1995. Department of Rural Development, DMI, Government of India.

The Indian domestic market for pulses dominates completely. In recent years India exported between 30,000 and 60,000 tons, while imports fluctuated between 400,000 and 1.2 million tons, possibly absorbing annual production fluctuation (Table 2). The short term shifts in international trade could be interpreted as indicative of a successful turn-around of the trade balance in

the pulse market. It is, however, not possible to distinguish whether import control or production shifts have played a role in this course of events. This issue may deserve some attention.

Table 2 Pulse production, import and export, 1990/91 to 1994/95 in India ('000 tons).

Year	Production	Import	Export
1990/91	14,260	1,273	-
1991/92	12,002	313	-
1992/93	12,815	383	34
1993/94	13,300	628	44
1994/95	14,120	555	60

The geographical span of India suggests that inter-regional and inter-state movement of pulses is very important to satisfy the requirement of regular supply at more or less stable quality to processors. The processors purchase from wholesale suppliers, and distribute to the wholesale distribution agents, making the produce available to consumers. Because supply is seasonal, and consumption takes place on a daily basis, one has to take into account seasonality of production, storage and transport at all stages of the market.

Transport is the major determinant of efficient and cost effective marketing (Table 3). In India, it would seem that the collection market externalizes the cost of transport from the field to the buying point to producers. This means that farmers' marketing costs are a function of their locality and access to roads. Various surveys show that farmers transport their produce mainly by animal-drawn carts (58%); the other means of transport are tractor-trolleys (28%) and trucks (5%). Small farmers may bring their produce by head-load, carrying the load mostly in gunny bags. Large farmers usually receive higher prices than small farmers. Farmers located near the markets receive higher prices than those located further away. Farmers who have road links with markets receive higher prices than those who have no road links. This is logical, and a universal observation in the marketing of agricultural goods.

Table 3 shows that in India the marketing costs constitute a large proportion of value added in the pulse market. This is to be expected.

Case studies on the marketing of pulses show that farmers have options in choosing partners. Agency-wise, farmers sell 7.6% of their marketable surplus to village traders, 88% to wholesaler traders, 35% to processors, and only a very small proportion of 0.8% to consumers directly. This last number shows that there is little direct consumption of pulses. An in-depth study reveals that a very large number (28) of marketing channels exist for gram. The percentage quantities moving in these channels show the mobility of pulses. Around 24% of gram reaches the consumer in the state of production; the quantity going outside the state in trading channels is nearly 74%. Gram traded through government channels is around 2%. Approximately half of the pulses channeled to consumers outside the state goes as grain flour.

The easiest way to classify pulse markets is by scale, i.e. the turnover. There is a clear relationship between the number of participating traders and the actual size of a market. The number of participating traders increases with the turnover. Some authors conclude that pulse markets show the tendency to be oligopsonistic, i.e. a situation where a small number of suppliers serves a large number of buyers. This may be true on occasion. It is important to recognize that any agricultural market has oligipolistic tendencies; traders tend to operate in a geographical area, which is defined by their transportation span and, most importantly, their acquaintance with producers. In foodcrops such as pulses, many producers always supply several collectors, who in turn supply a number of wholesalers and processors, who supply in turn a large number of consumers. It depends therefore entirely at which market stage one looks how one classifies the market.

In India one can also distinguish between local collection wholesale markets in terms of transaction structure. The majority of markets are producer area based direct transaction markets, without a coordinating mechanism. Price setting is the result of negotiation between trader and producer. This is the most common type of agricultural collection wholesale market. Another type is encountered in areas where state governments have set up auctions in producer centres, often linked to cooperatives.

The government has tried to set up auctions in pulses in order to create competition in the collection/wholesale trade. These efforts seem to have resulted in higher producer prices, and also in higher costs. The expectations of an auction system may have been somewhat high. A description of auction markets in Rajasthan, reported by Acharya (1985), illustrates the course of events and

Table 3 Marketing and processing costs of major pulses 1991/1992 in Rs/quintal, India.

Particulars	Pigeonpea	Lathyrus	Horse Gram	Green Gram	Black Gram	Lentil	Total Pulses
A. Cost of Raw Material	883.44	336.28	621.52	736.38	699.63	685.99	540.31
B. Marketing Cost							
(i) Transportation	32.27	9.80	16.96	21.26	29.76	20.55	16.67
	(31.86)	(25.80)	(22.35)	(25.34)	(37.45)	(31.83)	(26.33)
(ii) Mandi Tax	8.83	3.36	6.22	7.36	7.00	6.86	5.40
	(8.72)	(8.67)	(8.20)	(8.78)	(8.81)	(10.62)	(8.53)
(iii) Sales Tax	7.84	5.98	11.57	13.62	12.87	12.59	10.74
	(7.74)	(15.42)	(15.25)	(16.24)	(16.20)	(19.50)	(16.96)
(iv) Labour Charges	2.18	2.18	2.18	2.18	2.18	2.18	2.18
	(2.15)	(5.62)	(2.87)	(2.60)	(2.74)	(3.38)	(3.44)
(v) Commission	3.06	1.98	1.91	3.14	3.48	2.00	2.20
	(3.02)	(5.11)	(2.52)	(3.76)	(4.38)	(3.10)	(3.47)
Sub-total	54.18	23.30	38.84	47.56	55.29	44.18	37.19
	(53.49)	(60.10)	(51.19)	(56.70)	(69.58)	(68.43)	(58.73)
C. Processing Cost							
(a) Variable Cost:							
(i) Salaries & Wages	6.84	2.38	3.47	3.42	5.36	4.17	3.55
	(6.75)	(6.14)	(4.57)	(4.08)	(6.75)	(6.46)	(5.60)
(ii) Power & Fuel	7.12	2.67	4.31	3.42	5.02	2.65	3.82
	(7.03)	(6.89)	(5.68)	(4.08)	(6.32)	(4.10)	(6.03)
(iii) Repairs & Main.	2.60	1.50	2.84	2.02	1.79	0.85	1.97
	(2.57)	(3.87)	(3.73)	(2.41)	(2.25)	(1.32)	(3.11)
(iv) Overhead Exp.	2.29	1.00	2.06	2.63	1.23	1.38	1.50
	(2.26)	(2.58)	(2.71)	(3.13)	(1.55)	(2.14)	(2.37)
(v) Tax, Insurance &	4.46	0.09	1.27	1.93	1.21	1.31	1.44
Licensing Fee	(4.40)	(2.40)	(1.67)	(2.30)	(1.52)	2.03	(2.27)
(vi) Interest on	13.04	4.21	13.18	16.07	4.52	4.88	7.78
Working Capital	(12.87)	(10.68)	(17.37)	(19.16)	(5.69)	(6.94)	(4.29)
(vii) Depreciation on	9.30	2.55	8.49	6.00	3.84	4.90	5.25
Building & Plants	(9.18)	(6.58)	(11.19)	(7.15)	(4.83)	(7.59)	(8.32)
(viii) Miscellaneous	1.47	0.23	1.42	0.83	1.20	0.64	0.81
	(1.45)	(0.28)	(1.87)	(0.10)	(1.51)	(0.99)	(1.28)
Sub-total	47.12	15.47	37.04	36.32	24.17	20.38	26.12
	(46.51)	(39.90)	(48.81)	(43.30)	(30.42)	(31.57)	(41.27)
Total Value Added	101.30	38.77	75.88	83.88	79.46	64.58	63.31
	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)
Total Cost	984.74	375.05	697.40	820.26	779.09	750.55	603.62

Note: Figures in parenthese indicate the percentage to the total value added in marketing and processing.

expectations:

> " [In Rajasthan] the number of wholesalers and commission agents has increased over time, but the number of brokers has decreased. Brokers operate in very few markets, mostly secondary ones. Though the number of wholesalers or commission agents in one [researched] market was 157, on average only 10 to 30 assembled for auction at a time. The number who actually participated in bidding for a specific lot was only 2 to 6".

It is logical that when commission agents increase in number, the number of brokers decreases. A good sign is that the number of wholesale traders increases, this is usually a sign of expanded inter-regional trade and strengthened market integration. In regulated markets, the open auction method is prevalent. Auction type markets are not necessarily cheaper than direct marketing. A comparison of the situation in Rajasthan, where two-thirds of farmers sell their pulse produce in the auction market, and the situation in Gujarat, where two-third of the farmers sell their produce to cooperative societies, shows that the marketing cost in the regulated market is higher than the costs of direct, party-to-party, transactions. The main cost factor is the transportation cost. The commission agent, through whom the farm produce is auctioned, plays an important role through participating in the bidding to ensure that his clients receive a reasonable price. Though the number of pulse traders shows a steady increase over time, there is a tendency for the number of traders to increase swiftly during scarcity years, presumably with the

aim of benefiting from high prices. In such situations, traders prefer to buy and sell in local markets, at the village or block level. In Uttar Pradesh, for example, a large quantity of grain is sold in this type of market.

Box 1 Dal marketing in India.

A good illustration of the mobility and the complexity of produce distribution is provided by the marketing of dal. In India, dal milling is the third largest agri-industry, after rice and wheat flour milling. We can distinguish two types of dal mills, small and medium scale. There are around 10,000 medium scale facilities in India, with a capacity of around 10 to 20 tons per day. Small capacity dal mills sell their produce in local markets. Medium to large capacity dal mills sell it to agents. Dal is marketed in other states where the sales tax is low or exempted for dal. The marketing of dal in the different regions of India is as follows:

- Southern India: mainly locally marketed, rest to outside state through agents.
- Eastern India: urad and 50% of moong is locally marketed.
- Central India: 40% is marketed within the zone. The balance (30% each) is marketed in Tamil Nadu and Andhra Pradesh.
- Western India: 35-45% is marketed within the zone. The balance is marketed in Kamataka, Tamil Nadu, Andhra Pradesh, and West Bengal (13.75%-16.25% each).
- Northern India: 45-50% is marketed in region. The balance (25-26.5% each) is marketed in Maharashtra and Karnataka.

Processed pulses show a very high mobility. Processors purchase 49% of the raw material (pulse grains) from the local *mandi* either through direct bidding during auction or from the local wholesalers. Processors also buy raw materials from neighboring states (on average 10%) and export the dal to outside the state (on average 75%). The processor's dal selling price was 38% higher than pulse grain purchase price in gram and earned 14% as net margin. In other pulses, with different recovery rates (70 - 87%), and different scale of production, the gross margin is higher, at 52% in moong and 71% in urad.

The importance of inter-regional or in India, inter-state, trade is borne out by differentials in the use of existing capacity for processing. Taxation and regulations differ among states, inducing flows of produce towards the lower cost regions. A study found that the capacity utilized by processing units is very low (about 40%) for all the pulses, except lathyrus. One of the reasons for low capacity utilization is that grain is sent out to other adjoining states, particularly to Maharashtra, where it is completely free from sales tax either on raw material or on final products.

One should, however, also take into account that inter-state movement and low utilization ratios of the processing industry are a sign of a complex temporal pattern of supply. The returns to storage are positive in the seven months from August to February, the probability of profits increases the closer the storage time comes to the beginning of the production period of March, June, when supplies are lowest.

Transportation and commission are two important items which vary according to the place where the raw material is purchased. The cost varied on these two items from 25% in horse gram to 42% in black gram depending on the distance. The total marketing cost was 58.7% on average with a maximum (89.6%) and minimum (51.2%) in black gram and horse gram respectively.

Consumption

Pulses are an integral part of the Indian diet. They are an important source of protein especially for the vegetarians and the economically poor and rural population of the country. Pulses are generally two to three times richer in protein than cereals and hence a cheap source or protein. They are also rich in lysine and threonine, the essential amino acids in which cereals are deficient and thus they complement the amino acid profile available from a cereal based diet.

There is pressure to stimulate the consumption of pulses. According to a suggestion put forward by the National Commission on Agriculture, the consumer demand for pulses in 1985 of 14.83 to 17.73 million tons and in 2000 of 20.70 to 24.70 million tons has to be raised to 17.45 to 20.86 million tons and 25.56 to 30.49 million tons respectively because of the post harvest losses and requirement of seed and feed (about 15% of gross production in 1985 and 19% of gross production in the year 2000). According to the NCA projection, the country has the potential to meet the anticipated demand of pulses through domestic production. NCA projected that pulse production in India can reach 22.0 mt in 1985 and 35.0 mt in 2000 AD. Whether India is indeed capable of meeting this production remains, however, in doubt.

It is clear that a closer look at the prevailing trends in consumption of pulses and its relation to income and prices is warranted. In 1987, the year of the latest fully analyzed consumption data, per capita consumption was 11 kg per capita in rural areas and 12 kg per capita in urban areas. Rural consumption of pulses increased faster than urban consumption of pulses over the years 1977-1987.

On a per capita basis, consumption of pulses is highest, at 11 to 17 kg per year, in the two highest income classes in rural and urban areas. However, inquiries indicate also that expenditure elasticities for pulses are higher than 1 in the two lowest income classes. This matter needs further confirmation in view of a recent study that found expenditure elasticities around 0.3 in rural areas and 0.2 in urban areas. In that study it is assumed that demand for pulses is highly price elastic for the lower income groups, yet as a whole in India the demand for pulses is price inelastic, at around -0.5.

In the situation just described, it is best to differentiate among the various species and qualities of pulses, in order to disentangle the seemingly contradictory signals emanating from research on the whole group. There are bound to be quality preferences. This is also of specific relevance to the rewards for storage and quality in the market. With more specific information it may also be possible to restructure and refine the target setting practices in India.

Processing

Efficiency in processing usually relates to efficiency in marketing. Losses and costs, and ultimately consumer prices, can be reduced through the use of good technology. Seventy-five percent of pulses produced in India is processed, therefore post harvest technology plays an important role in per capita availability. Pulses are processed in different ways. Processing is also done at the consumer's level. Pulse processing units vary in size from cottage industries to multistory plants using pneumatic conveyers. The steps involved in dal or besan making at home or in the mills are the following:

- cleaning (removing foreign matter from pulse grain);
- dampening (soaking of the grain in water for desired time);
- tempering (keeping soaked grain for sundrying);
- splitting (grinding of grain to make dal);
- husking (removal of husk from dal); and
- grinding of dal (broken or otherwise) is done to convert it to besan (flour).

Processing of pulses or dal milling is the next largest food processing industry after rice and flour milling. There are about 10,000 pulse mills with 10 to 20 tons/day processing capacity and with an approximate annual turn over of Rs 45,000 crore. They are privately owned. They work on average 200-250 days per year. The majority of the dal mills use conventional technology with locally fabricated machinery which consumes high electricity and time and they are labor inefficient. The Central Food Technological Research Institute (CFTRI) has developed appropriate technology (mini dal mill) suitable for the common varieties. It is suitable for family use and creates jobs in the rural areas (during off season). As compared to traditional milling, CFTRI technology is far superior. In the large traditional milling, the pre-treatment is largely traditional. It is time consuming and fully dependent on climate conditions.

A study made by National Productivity Council of dal mills in India revealed the following features:

- 90% of dal mills in India are privately owned, 8% under cooperatives, and 2% under government.
- 90% of the units earn profits.
- Only 6% of the units use CFTRI technology.
- The majority of units are semi-mechanized; they use the touch method to determine moisture content.
- Most units (around 90%) sun dry the pulses.
- The packaging material used is gunny bags.
- Commission charges, sales tax, patent charges vary significantly across the states.

In the 1980s an earlier study found that 40% of mills operated at their rated capacity, 16% at 75% capacity, and 24% operated at 25% of rated capacity. The reasons for this were in the mid 1980s insufficient power input to the mill and lack of capital. One would also assume that the supply would have some significance.

Output of the dal mill depends on the availability of raw material, capital and energy, and also the capacity of the mill and the number of working days. The major portion of the pulses processed is milled by the dal mills with daily capacity ranging from 0.5 ton to 10 tons/day. Packing and storage of dal is related with loss of quantity as well as quality. The packing material is seldom of good quality.

The pulses contain 11-14% husk and 2-5% germ and the rest endosperm. The extraction rates of processing are between 70 and 88% of raw material. The main by-products of pulse milling are in the form of brokens (6-13%), mixture of germ and powder (7-12%) and husk (4-14%). Small brokens

and husk are used as cattle feed; brokens are either used for human consumption, as an ingredient in cattle feed or fed to swans and elephants. Husks of lentil are used in poultry feed; brokens of Bengal gram are fed to horses and used in *besan* preparation. Brokens of green gram and black gram are milled to produce flour and are used in *papad* making. Normally, brokens fetch more than half the price of dal; husks fetch about 30% of the dal price.

Among the post-harvest losses (9.5%), storage losses account for major losses (7.5%), processing accounts for a 1% loss, and threshing and transportation for 0.5% each. Around 80% of the storage losses are due to insects, rodents and micro-organisms. The grains in the village are stored in mud bins, paddy straw mud plastered bin, bamboo mud plastered bin, reed, mud bricks, baked mud plastered pitchers, etc. The traditional structures can be improved by sandwiching a 700 gauge polythene sheet in between. The Pusa bin developed by the Indian Agricultural Research Institute is yet another improved storage structure. The Indian Grain Storage Institute also has developed modern farm storage structures of 14.5 mt capacity to meet farmers' requirements. Fumigation controls the insect infestation.

The major issues and constraints in the processing industry in India are summarized below:

- faulty layout of machinery (design does not meet specific or exacting requirement of grain properties);
- lack of storage facility; insect and rodent infestation and mold growth during post-harvest handling, storage and distribution cause substantial losses both qualitatively and quantitatively. Birds and rodent account for considerable losses during drying and storage;
- sun drying practice resulting in lengthy processing line and complete dependence on climatic condition;
- limitation of drying yard facilities;
- fluctuations in the availability of raw materials and their milling characteristics;
- arbitrary use of oil and water;
- high labor requirements;
- low yield and poor quality dal of mills;
- very low equipment utilization and high cost of processing;
- dust pollution inside the mill;
- costly packaging material; and
- lack of awareness of modern dal milling technology available in India.

Production

India is the major pulse growing country in the Asia-Pacific region, with 60% of area and 50% of production. Pulses account for about 20% of the acreage under food grains but only about 8% of the food grain production in India.

Production of pulses in India has remained below the government targeted supply of pulses. The country could only produce 12.65 million tons of pulses against the target 17.45 mt for 1995. The gap can be explained due to the failure to realize the expansion of area under pulses and the adoption of yield increasing inputs in 6.3 million ha under gram, arhar and moong. The other factor is that not enough and timely attention was given to technological, institutional and pricing framework in which pulses are produced and marketed. Also, research and development aspects have received little attention in regard to pulse crops, either in marketing or in pricing.

Some pulses already give relatively high yields, eg. soybean, broad bean and peas. But the production of pulses as a whole is stagnant. Several conditions have caused this situation. Cereal crops as staple food receive most of the attention from farmers and agricultural scientists; cereals are grown on the better lands, with improved agronomic practices, and receive policy support and development efforts. On the other hand, pulses are cultivated on marginal conditions and receive only minimal support, therefore "survival" technology becomes more important than high yields.

Among the pulses, gram, arhar, moong and urad together account for 75% of the area as well as production. Pulses are grown under rainfed conditions. They are generally grown in kharif (June to September; about 45% of area) and rabi (October to December; about 55% of area) seasons.

The major pulse producing states in India are Madhya Pradesh, Uttar Pradesh, Rajasthan, Maharashtra, Orissa, and Bihar which account for 73% of the area and 78% of the total production of pulses.

During the last decade, the area under pulses in India covered around 22.0 to 22.5 million ha and production reached around 12.5 to 13.0 million tons. In the last four years, however, the production has increased from 12.0 million tons to 14.1 million tons with a productivity rise from 532 kg/ha to 609 kg/ha. But a comparison across different Five-Year Plans indicates stagnation of area and marginal increase in

Box 2 Species and trade names of pulses in India.

No.	Species	Common name	Trade name (in India)
1	*Cicer arietinum*	Bengal gram	Chana
2	*Vigna mungo*	Black gram	Urad
3	*Cyamopis tetragonoloba*	Clusterbean	Guar
4	*Vigna unguiculata*	Cowpea	Lobia
5	*Vigna radiata*	Green gram	Mung
6	*Dolichos biflorus*	Horse gram	Kulthi
7	*Vigna aconitifolia*	Kidney bean	Moth
8	*Lense culinaris*	Lentil	Masur
9	*Pisum sativum*	Peas	Matar
10	*Cajanus cajan*	Red gram (Pigeonpea)	Tur (Arhar)
11	*Glycine max*	Soybean	Soybean

production and productivity.

India faces a number of problems affecting pulse production. These are as follows:

- The areas cultivated are dry/rainfed and marginal. But when irrigation comes HYV of cereal replace them pushing pulses to marginal lands. Pulses are less profitable and hence farmers divert better lands and resources for the cultivation of cereals.
- HYVs, as compared to cereals, are scarce. The existing varieties have little yield advantage.
- Lack of good quality seeds and very poor replacement ratio.
- Very poor extention efforts of even existing technologies to farmers.
- Low use or no use of modern inputs such as fertilizers, pesticides, micronutrients, etc. because of risk of low yield.

  Susceptible to number of diseases like yellow mosaic and powdering mildew on moong, urad, and cowpea, sterility mosaic and wilt in arhar and blight in gram. Also, pulses are vulnerable to termites and susceptible to pests.
- The production of pulses in the off season, that is summer/rabi, is affected by stray cattle and blue bull which damage pulse crops such as

  arhar, moong, and urad more than any other crop.
- They are mostly grown by people whose socio-economic conditions are poor.

CGPRT Centre News and Activities

TRADELIB

The national experts have begun to write the draft reports of their country papers. Dr. Michio Kanai, project leader, visited Vietnam during November and discussed the project with Dr. Nguyen Trung Que, national expert of Vietnam and related officers.

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The draft country reports of the case studies are being revised by the national experts based on comments made by the Centre's staff. The major concerns and areas of the case studies are: (a) Pingba county, China: terracing techniques; (b) Huangyuan county, China: improving efficiency in water use in terraced areas; (c) Mathura district, India: efficient use of saline-sodic water in arid areas; and (d) Mawlasnai village, India: various cultivation practices.

HRD/IS

In November in-country courses on Integrated Database Management were held in India, under auspices of the Indian Council for Agricultural Research (ICAR) and in Pakistan, with the Pakistan Agricultural Research Centre (PARC). The training focused on database management, spatial analysis and linear programming for agricultural analysis. In India, a total of 24 participants attended the course and in Pakistan there were 18 participants. The participants were exposed to the following software: Access, Excel, Mapinfo and GAMS. The evaluation sheets pointed out that the choice of subject matter was highly appreciated, but that the five day course was too short. Judging by the interest shown and results achieved in exercises during the course the impact was substantial.

Announcements

Postgraduate Diploma/MSc Courses at the Natural Resources Institute, University of Greenwich

Postharvest Horticulture
Begins 16 March 1998 - PGDip 15 week/ MSc 1 - 2 years

The course emphasises a practical, integrated approach to the post-harvest management of tropical, sub-tropical and temperate fresh produce. It focuses on the identification and implementation appropriate technologies and management systems for optimising produce quality. The course considers options ranging from the traditional techniques of the subsistence farmer to the latest technologies for supplies of the most sophisticated horticultural markets. Topics include post-harvest physiology of perishable commodities, preparation of perishable crops for marketing, assessment and management of post-harvest losses, quality management and marketing.

Grain Storage Management
Begins 16 March 1998 - PGDip 16 weeks/ MSc 1 - 2 years

The course focuses on the principles and practices of both small-scale and large-scale commodity systems for grains and other durable agricultural food products in the tropics and sub-tropics, at all levels in the post-harvest system. Topics include storage and handling, biodeterioration factors, processing and quality, managements and economic, information and communication.

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Land Quality Indicators

An International Program of the World Bank, FAO, UNDP, UNEP and CGIAR

The goal of the Land Quality Indicators (LQI) program is to harmonize the combined objectives of increased agricultural and forestry production with improved environmental management. LQIs are needed for monitoring performance and progress towards this goal, and to promote technologies, policies and programs related to better use of natural resources and sustainable land management. LQIs are required at global, national and district levels.

The program initially focuses on LQIs for developing countries, although some experimental work will be done in other regions. The objectives of the program are:

1. To develop a set of harmonized LQIs for managed ecosystems (agriculture and forestry) in the major agro-ecological zones of tropical, sub-tropical and temperate environments.
2. To identify sources of data and information and develop common methods for analyses, aggregation, and application of the results.
3. To validate and disseminate the findings among the major institutions responsible for collection of LQI data, and to reinforce the institutional capacity needed for setting and implementing land and natural resources priorities, policies and technologies at sub-national and national levels.

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LQI home page: http://www-esd.worldbank.org/lqi/home.htm

CGPRT Centre

The Regional Co-ordination Centre for Research and Development of Coarse Grains, Pulses, Roots and Tuber Crops in the Humid Tropics of Asia and the Pacific (CGPRT Centre) was established in 1981 as a subsidiary body of UN/ESCAP.

Objectives

In co-operation with ESCAP member countries, the Centre will initiate and promote research, training and dissemination of information on socio-economic and related aspects of CGPRT crops in Asia and the Pacific. In its activities, the Centre aims to serve the needs of institutions concerned with planning, research, extension and development in relation to CGPRT crop production, marketing and use.

Programmes

1. Research, which entails the preparation and implementation of studies covering production, utilization and trade of CGPRT crops in the countries of Asia and the South Pacific.
2. Training of national research and extension workers,
3. Information and documentation which encompasses the collection, processing and dissemination of relevant information for use by researchers, policy makers, and extension workers.

Palawija News

Contributors are invited to submit concise summaries of significant social research related to CGPRT crops for publication. Figures (graphs or tables) may accompany the article. All articles are subject to editing to meet space limitations.

Please send all queries relating to articles in *Palawija News* to Publications Section, CGPRT Centre, Jalan Merdeka 145, Bogor 16111, Indonesia.

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